THE WAY FORWARD FOR AIRCRAFT NOISE SHARING AT SYDNEY (Kingsford Smith) AIRPORT

-THE SACF Inc REVIEW OF LTOP 1997-2003

VOLUME 1 MAIN TEXT

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ANOTHER PAPER PRODUCED BY SACF Inc TO ASSIST WIDE-SPREAD COMMUNITY DEBATE ON THE PERFORMANCE OF THE GOVERNMENT'S "FAIR-SHARE" NOISE PLAN [LTOP] AND FLIGHT PATH AFFECTATION UNDER SYDNEY AIRPORT'S MASTER PLAN

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SYDNEY AIRPORT COMMUNITY FORUM INC (C) 2003

FOREWORD & EXECUTIVE SUMMARY

Foreword:

This is the second major position paper from Sydney Airport Community Forum Incorporated[#2] (SACF Inc) . SACF Inc is an open forum representing airport community groups across the whole of the greater Sydney region from Randwick to the Blue Mountains, and from Hornsby to Sydney's south-west extremities (see Appendix A). It is representative of both the 'old' and 'newly' affected communities, in terms of existing and proposed airport operating plans. SACF Inc was established in August 1998 as a result of an initiative by founding convenor, Paul Zammit, the former MP for the Federal Seat of Lowe.

Paul Zammit realised shortly after introduction of the Long Term Operating Plan for Sydney (Kingsford Smith) Airport [LTOP] that, far from realising the pre-election liberal 'dream' of an airport and airspace management plan based on "putting people first" , the newly conceived LTOP was in many respects as community unfriendly and ill-advised as the preceding Labor government's Nov. 1994 opening of the Third Runway with a totally flawed EIS.

He also quickly realised that the LTOP, instead of maximising movements over water as promised, was implementing exactly the opposite scenario. He protested, was ignored, and as history will record, resigned from the Liberal Party. In the closing stages of his tenure as MP for Lowe, Paul had the vision of inaugurating a non-party political community forum, comprised of representatives of aircraft noise and airport-concerned community groups across the whole of the Sydney Basin.

Paul's vision was for an open [non-gerrymandered] community forum chaired by a retired judge, which would attempt to achieve outcomes putting the human environment of Sydney first, refusing to be influenced by short term political party games involving environmental trade-offs among electorates. Although Paul, following his failure to gain re-election as an independent for the seat of Lowe in December 1998, retired from active participation in SACF Inc., its founding community group representatives have endeavoured to keep the inaugural spirit alive. The objectives of SACF Inc are stated in Appendix A.

After nearly five years of following the frustrating machinations of the Government appointed Sydney Airport Community Forum [SACF] , SACF Inc is still comprised of community group representatives and convenors whose main concern is to "depoliticise" [#3] the airport and aircraft noise debate and reintroduce consideration of the human environment both in respect to development of airport operating plans and the new and/or second airport debate.

Since its inception, SACF Inc has carefully followed the proceedings of the government forum (SACF), and has made a deep and lengthy study of the LTOP. This paper was inspired by repeated calls from early 1999 by the Government' s own forum [SACF] for an independent audit of the LTOP to ascertain why the plan was not meeting its "movement targets". The Government SACF LTOP audit has still not commenced. This present ***SACF Inc Review*** began in early 2001 and, though awhile in gestation, has in its final stages been coincidentally produced against the background of the production of the Sydney Airport Corporation Limited [SACL] airport master plan.

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2 The first was "The Way Forward from Sydney's Airports Quagmire" , which appeared in July 1999.

3 Whilst political parties are invited to have a representative on SACF Inc for the purpose of consultation and for putting that political party's position, these representatives cannot vote or have membership on the Executive Committee of SACF Inc.

1. INTRODUCTION

The objectives of the present paper are to examine the impacts and outcomes of the federal government's Long Term Operating Plan [LTOP] against its stated goals. Whilst supporting in principle the concept of "Maximising movements over water" and "sharing noise" and other detriments of airport activity from the various Sydney airports, SACF Inc says that, where detriment is absolutely essential, the guiding principal should be that the human environmental interest should be put first.

SACF Inc agrees with the *stated aims* of the Government "Noise Share Plan", ie. "putting people first", but as will become apparent, disagrees in several major ways with the methodology and detail of its implementation, and resultant outcomes. LTOP has for some years now been increasingly failing to achieve its stated goals of maximising aircraft movements over water, and reducing the movements to the north of the airport to a runway end target of 17% . There is uncritical acceptance by the Government Forum [SACF] that the maximum over water movements proportion that can ever be achieved is 55% (projected to reduce to 49% with Master Plan movement increases by 2024) .

These failures increase air traffic complexity over Greater Sydney, in turn increasing both air pollution, noise, and third party crash damage risk. Since 1999, the government forum (SACF) has been requesting the Transport Minister to approve an independent audit of LTOP to ascertain why the LTOP plan is not achieving its goals, ie. movements to the north still double the 17% target by 2002, with movements projected to roughly treble by 2023 under Sydney Airport's "Master Plan"!

The Minister for Transport , however, persists in insisting that LTOP has succeeded, that the noise problem has been solved, and that it would be a waste of taxpayer's money to fund an independent review. There appears to have been excessive concern by government to avoid interfering with the sale process for Sydney Airport, which was first predicated on the promise of "no sale before the 'noise' problem had been solved."

SACF Inc believes that the "noise" (and not so prominently considered air pollution) problems from aircraft movements over Sydney have not been solved by LTOP. In this position it is supported by numerous resolutions from the government's appointed forum of similar name [SACF] . SACF Inc further says that the reasons for the failure of LTOP to *"solve the noise problem"* are manifold but not inherently difficult to discover and fix.

It also believes that by failing to implement LTOP according to its Ministerial Directives , the Government-appointed SACF, the Implementation and Monitoring Committee [IMC], the Department of Transport and Airservices Australia have introduced elements into LTOP which constitute profound public danger.

This is due to the vastly increased third party damage risk from departing jets should they crash when taking off overland . This risk could be almost entirely avoided by full implementation of the primary LTOP principle of maximising movements (and principally takeoffs) over water. Moreover, as will be shown , there has been no independent review by CASA of the safety of the LTOP flight tracks, nor was the "Safety Review Committee" ever constituted, both promised in the LTOP Proponent's Statement of 1996. This state of affairs cannot be permitted to continue.

This Document offers many viable and practical solutions. However, it necessarily covers several topics from different standpoints, and at varying technical depths, from which the essential recommendations converge . There is therefore some unavoidable repetition of Recommendations in this summary, of which we trust the reader will be forbearing. The principal repeating recommendation is for movements over Botany Bay to be truly maximised as Ministerially promised through fullest possible use of the over-water LTOP Modes 2 & 3 , ie. Simultaneous Opposite Direction (Segregated) Parallel Runway Operations (SODPROPs).

Herewith are the major findings of this report. :

EXECUTIVE OVERVIEW AND SUMMARY:

2. EXECUTIVE OVERVIEW -

2.1 The so-called Long Term Operating Plan for Sydney (Kingsford Smith) Airport (hereafter KSA) has persistently failed to meet its compass-direction movement targets of 17% north, and 55% over water. More movements (including most departures) now take place over residential areas than ever before.

2.2 The LTOP has produced a system of aviation anarchy in the skies over Sydney.

2.3 Many interested parties have contributed to this fundamentally unsafe system where there are dangerously criss-crossing flight paths with artificial overland altitude ceilings for departing jets.

The parties involved include, Bureaucrats with the Department of Transport, the Civil Aviation Safety Authority, The Bureau of Air Safety Investigation, Airservices Australia, The Royal Australian Airforce, the Government's own Sydney Airport Community Forum, its IMC, and politicians of all political persuasion who have been complicit in the planning and introduction of LTOP.

2.4 The perverse effect of LTOP since its inception in 1997 has been to increase the proportion of heavily laden jet departures over heavily populated areas to the north, east and west from 29% to 50% whilst decreasing takeoffs over water from 65% to 50%.

2.5 The per person affectation for the northerly takeoff modes under LTOP is fifty times the affectation for comparable takeoffs using the over-water modes.

2.6 Military Airforce Exclusion Zones [PRD's] appear responsible in some measure for the extremely low ceiling heights on takeoff. Together with Airservices refusal to implement the originally promised offshore (wide) arrival routes , they cause both unwarranted noise and further create dangerous criss-crossing of arrival flights increasing likelihood of mid-air collision over heavily populated Sydney.

2.7 If no new and/or replacement international airport is to be built on the rim of the Sydney Basin it is recommended that all RAAF facilities impacting on the airspace around Sydney Airport (including Richmond and Williamtown if necessary) be removed so that Military airforce exclusion zones do not worsen the environmental impacts of operations at KSA. The original offshore arrival routes should be reinstated.

2.8 The current management puts KSA in breach of the LTOP commitment to implement International Civil Aviation Organisation [ICAO] "Noise Abatement Departure Procedures" "A" & "B" [now "2" and "1"].

2.9 Simultaneous Opposite Direction Parallel Runway Operations (SODPROPs) should be used in segregated mode when weather conditions permit on the two parallel runways in different directions. To permit maximum utilisation of over-the-water modes using SODPROPs , Precision Radar Monitoring [PRM] and "Secondary Surveillance Radar" [SSR] should be employed continuously over Botany Bay.

2.10 The evidence shows that the LTOP promise of "fair and equitable" sharing of aircraft noise has not been implemented. In particular there has been a decrease in noise over unpopulated areas and water and increased noise over extensive heavily populated residential regions of greater Sydney, together with overwhelming evidence of politically determined flight paths.

2.11 Evidence is presented that community representation to determine flight paths is not based on affectation.

2.12 Current LTOP management does not allow rapid height attainment of jet aircraft after takeoff and there appears to be a deliberate policy of maintaining noisy large jets at low altitudes for long distances. ICAO -A [now 2] Noise Abatement operations should be enforced as originally mandated (but ignored by Airservices Australia at KSA) for all overland takeoffs .

2.13 Politicians should show due care for their constituents and insist on effective proper noise protection for the millions now affected around Sydney Airport. They should employ every means at their disposal to persuade Parliament to develop regulations under the Airservices Act (1995) for controlling the maximum noise impact from flying aircraft on underlying residential suburbs. Such controls should be consistent with the currently recommended standards for architectural acoustic design of residential homes in Australian Standard AS 2021-2000, and preferably also comply with recently promulgated World Health Organisation [WHO] recommendations for residential areas and/or with the New South Wales Noise Policy for residential areas near industrial sites. .

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GLOSSARY OF ACRONYMS AND UNITS

ACRONYM	***Description***
O7	The cross runway at KSA operating in the easterly direction
16L	The short parallel runway at KSA operating in the southerly direction
16R	The long parallel runway at KSA operating in the southerly direction
25	The cross runway at KSA operating in the westerly direction
34L	The long parallel runway at KSA operating in the northerly direction
34R	The short parallel runway at KSA operating in the northerly direction
AATA	Australian Air Transport Assocation
AIP	Australian Instructions to Pilots, Airservices Australia
AIP-ENR	AIP -"En Route" Supplement
Airservices Australia	The Air Traffic Control Aurthority in Australia
Airspace	The area of the sky within which aircraft are permitted to fly
ALP	Ausralian Labor Party
AMSL	Above Mean Sea Level
ANEF	Australian Noise Exposure Forecast
ANEI	Australian Noise Exposure Index
AS2021	Australian Standard 2021 - 2000 Latest Edition 2000
ASA	Airservices Australia
ATC	Air Traffic Control
ATM	Air Traffic Managemen5
BASI	Bureau of Air Safety Investigation
BCA	Badgerys Creek Airport
BOM	Bureau of Meteorology
CAAG	Coalition of Airport Action Groups
CAC	Community Advisory Committee (Third Runway)
CASA	Civil Aviation Safety Authority
CDA	Continous Descent Approach
CFIT	Controlled Flight into Terrain
CNEL	Californian Noise Equivalent Level (a modified DNL)
DAP-East	Departure & Arrival Procedures -East , Airservices Australia
DNL	Day and Night " noise Level or Ldn
DOD	Department of Defence
DOT	Department of Transport
DOTARS	Department of Transport & Regional Services
DOT&RS	Department of Transport & Regional Services
DUAP	Department fo Urban Affairs & Planning, NSW
EIS	Environmental Impact Study or Statement
EPA	Environmental Protection Authority, NSW
EPNL	Effective Perceived Noise Level
EPNdB	Effective Perceived Noise Level in dB(A) used in calculating ANEFs & ANEIs
ERC-High	En Route Chart (Above 20,000 ft) published by Airservices Australia
ERC-Low	En Route Chart (Under 20,000 ft) published by Airservices Australia
FAA	Federal Aviation Administration (USA)
GAC	"Great Arrival Circle" in Catherine Wheel Departure Protocol [S. 6.5]
GDC	"Great Departure Circle" in Catherine Wheel Departure Protocol [S. 6.5]
Go-Around	A pre-determined Flight path resorted to by an aircraft which is aborting a landing
Govt SACF	Government Appointed SACF
IAF	Initial Approach Fix for arrivals
IC	"Inner Circle" in Catherine Wheel Departure Protocol [S. 6.5]
ICAO	International Civil Aviation Organisation
ICAO-A	A Noise Abatement Departure Protocol authorised by ICAO (involving initial climb to 1500 ft
ICAO-B	A Noise Abatement Departure Protocol authorised by ICAO (involving initial climb to 1000 ft
IGA	Intergovernmental Agreement
ILS	Instrument Landing System (Radio based)
ILS-PRM	A type of approach to parallel runways involving the simultaneous use of ILS & PRM
IMC	Implementation and Monitoring Committee

ACRONYM	*Description*
IVA	Independent Visual Approach
Knot	A Nautical Mile per Hour
KSA	Kingsford Smith Airport, Sydney
La, max	Maximum Average Noise Level in units of dB(A)
Ldn	Energy & Time averaged Noise Level with bias adjustments for noise at night
Leq (T)	Energy and Time averaged Noise level ovcer time interval "T"
Lochard	A company specialising in Aircraft Position Monitoring
LSALT	Lowest Safe Altitude for aircraft
LTOP	Long Term Operating Plan for Sydney (Kingsford Smith) Airport aka The "Fair Share" Noise Plan
LTOPFR	LTOP Full Report , Airservices Australia "The Long Term Operating Plan for Sydney (Kingsford Smith) Airport & Associated Airspace - Full Report
LTOPSR	LTOP Short Report , Airservices Australia "The Long Term Operating Plan for Sydney (Kingsford Smith) Airport & Associated Airspace - Report Summary
MODE	A runway operating combination used in LTOP
MTOW	Maximum Take off Weight for an aircraft
NADP	Noise Abatement Departure Protocol
NCA	Noise Critical Altitude for airspace over residential area
NEPM	National Environment Protection Measure under the NEPM (Implementation) Act
NEU	aka "Aircraft Noise Complaints Line"
NEU	Noise Enquiry Unit run by Airservices Australia at KSA
NIMBY	Not in My Back-Yard
NOI	Notice of Intention under the former Environment Protection (Impact of Proposals) Act 1979
NOTAM	Notices to Airmen - issued by Airservices Australia
NRDC	Natural Resource Defense Council (USA NGO)
NTZ	No Transgression Zone" in simultaneous parallel approaches
N(70)	Contour representing number of noise events greater than 70 dB(A)
n. mi	A Nautical Mile = about 1.83 km
PANS-OPS	ICAO "Procedures for Air Navigation Services" - Aircraft Operations
PNdB	Perceived Noise Level in Decibels
PNL	Perceived Noise Level
PRD	Prohibited, Restricted or Danger" zone usually near a military airport.
PRM	Precision Radar Monitor -used for approaches to parallel runways
PRM NOI	Notice of Intention to introduce Precision Runway Monitor, Airservices Australia
RAPAC	Regional Airspace User Advisory Committee (Bankstown)
REP	Regional Environment Plan" in NSW
SABRE	SABRE Decision Technologies
SACF	Sydney Airport Community Forum (Govt. Appointed)
SACF Inc	Sydney Airport Community Forum Incorporated
SACL	Sydney Airport Corporation Limited
SEL	Sound Equivalent Level
SFO	San Francisco Airport
SID	Standard Instrument Departure
SMEC	Snowy Mountains Engineering Corporation
SODJETs	"SODPROPs" with only jet aircraft using the main parallel runways; Props using the cross runway
SODPROPs	Simultaneous Opposite Direction Parallel Runways Operations
SSR	Secondary Surveillance Radar (ICAO) used on parallel runways
STAR	Standard Arrival Route
TAAATS	The Australian Advanced Air Traffic System
TAC	Terminal Area Chart , published by Airservices Australia
Trident	A system within LTOP for spreading Arrival approaches over the north shore.
WHO	World Health Organisation

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THE WAY FORWARD FOR AIRCRAFT NOISE SHARING AT SYDNEY (Kingsford Smith) AIRPORT

- THE SACF Inc REVIEW OF LTOP 1997-2003

SYDNEY AIRPORT COMMUNITY FORUM INC (C) 2003

1. INTRODUCTION - POLITICAL & COMMUNITY BACKGROUND TO LTOP:

The Long Term Operating Plan for Sydney (Kingsford Smith) Airport was inaugurated with overland takeoff modes in December 1997, and received by some people with a sense of hoped-for relief as the harbinger of the promised (and long-awaited) liberal government "fair-share noise plan". But for others newly affected by aircraft noise it provoked outrage, a sense of injustice and hopelessness akin to that instilled in the hapless victims of the Third Runway debacle of 1994. [# 1]

The above-mentioned relief was an understandable reaction to the injustices imposed on people north of KSA in November 1994 by the ALP when, after promising to relieve the noise-burden of people north of the airport [and proferring Badgerys Creek as a second airport panacea]. Then instead of decreasing the overall noise impact using the third runway, the East-West runway was closed to please certain federal labor electorates east and west of the airport; and instead of putting most of the jet noise out to sea, the Third Runway opening increased noise in suburbs north of KSA by 2-300%.

In contrast, in 1997, many were unpleasantly surprised in areas newly affected by LTOP, especially those who had recently shifted residences to avoid the Third Runway impact after 1994. Many of these had been advised by real estate agents, noise consultants and government that their newly chosen suburb "could never" be affected by aircraft noise and were now once more horrified to find that the airport and its noisy flight-paths can affect anyone, anywhere in the greater metropolitan Sydney region.

Residents newly affected by LTOP, but told that they would in no way be affected by LTOP [# 2] included many in Coogee, Maroubra, Paddington, Woollahra, the inner North West [Dulwich Hill, Hurlstone Park, Ashfield, Burwood], and all the way round in an overland clockwise circle to Kuringai through Parramatta and the Hills. Thus LTOP resulted in yet another cycle of property market churning [which will please the NSW Department of Finance - Stamp Duties Office and the Federal Commissioner of Taxation (for those affected by CGT)]; but moreover has increased the public feeling that *"there is nothing they can do"* to prevent the airport juggernaught reaching them, wherever they live in Sydney.

Although LTOP broadened the spread of aircraft noise across a wider range of the Sydney electorates [in some instances with fanning apparently like the spokes of a wheel], on closer examination this so-called "fair-share" noise plan is only a very weak approximation to being fair. In fact there are some aspects of it which are quite patently unfair, and environmentally destructive, but more about this later.

Whilst granting that some who conceived of LTOP, with its compass point "movement goals" [17% north; 13% east; 15% west and 55% south], were sincere in their belief that noise can be fairly spread, there were others who, NIMBY [#3] -like , hoped to gain some parochial benefit through reducing an existing airport impact on themselves. At the same time others, realistic to the point of boredom for the initiating politicians, stated time and again that *"there was no way"* that any *"noise share plan"* could ultimately alter the fact that what Sydney needs as soon as possible was a new primary and/or replacement airport, preferably outside the Sydney Basin airshed.

After the start of LTOP in 1997, by early 1999 [# 4] even the Government's Sydney Airport Community Forum [government SACF] had become sceptical of Airservices Australia (ASA) ability to implement the LTOP fully in terms adherent to the original "movement target" goals.

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1 For the background to this see SACF Inc Position Paper *"The Way Forward from Sydney's Airports Quagmire"*, July 1999 ; See also Fitzgerald, P. (1998) *"The Sydney Airport Fiasco"*, Hale and Iremonger, Sydney.

2 PM Hon . John Howard, MP: *"there would be no new flight paths over Ashfield, Burwood, Concord, Concord West, Homebush, Mortlake, Rhodes and Strathfield "; "those who have not been affected by disruptive and loud aircraft noise in the past in the seat of Lowe will not be affected in the future":*SMH 9/2/1996

3 NIMBY - "Not In My Back Yard"

This position was complicated when, in late 1999, the Department of Transport proposed to activate a radar guidance system [The Precision Radar Monitor - PRM] over the North Shore which some say has the capacity to increase aircraft movements at KSA.

On that score however, Airservices Australia again protested its good intentions , proclaiming that PRM would only be employed to facilitate landings from the north on Runways 16L & 16R in "bad weather" [strong southerlies with low cloud ceiling] . On Airservices figures, this would increase arrival movements over the north in "bad weather", only, by about 64%, which amounts to about 50% of "16-direction" movements or 9.5 % of movements for an average year. This is bad-weather traffic which would otherwise need to be diverted away from KSA.

The PRM proposal caused uproar on the government Forum [#5] which criticised the government for introducing yet more changes to flight path management when the LTOP implementation was incomplete. As a result, a Commission of Enquiry was ordered by the then Minister for the Environment, Senator Hill.

After the Commission of Enquiry [The McMichael Commission] in 2000 the Government introduced the PRM on a "trial" basis. A consultant was employed to investigate its effects on ground noise over the north. The consultant reported that the PRM would not result in any environmental benefits, but there would be adverse effects over some areas of the further north [Kuringai and Galston]. In June 2002 Airservices Australia announced its full implementation, for use in bad weather, with modifications to ameliorate the predicted adverse effects [#6] .

On 4 February 2000, the government SACF Chairman [Dr. Brendan Nelson], dissatisfied with progress , called for "an impartial review of the Long Term Operating Plan" [LTOP]. Motions were passed to this effect. A Departmental paper on *"Options for an Independent Audit"* was produced [#7] , but not until the government SACF meeting of 12 July 2002 (the first held for 11 months during the Sale Process for KSA), was a subcommittee appointed under a newly-appointed Chair [Sen. Marise Payne] to consider the means for implementing the LTOP Audit [#8].

Airservices Australia [ASA] has always claimed [Eg. government SACF Minutes 15 November 2000 [#9]] that it was doing its best to implement LTOP and that although the (strictly runway end) "movement targets" over the north had still not been achieved, it was steadily reducing the total to the north , while movements to the east and west were being increased. Mr. K. McLean (Manager Airservices Operations KSA) said at the above meeting that the remaining components of the LTOP, the "Trident" (method for spreading landings from the north) and what is termed "high and wide", would not be fully implemented for about two years.

Then at the government SACF Meeting on 12 July 2002 Airservices announced that the Trident *was not feasible* and that "High and Wide" would be abandoned. Given that the latter were two of the LTOP features which offered the greatest potential to benefit both newly affected and traditionally affected areas of Sydney, this defeatism was both regrettable, and potentially fatal to achieving the LTOP objectives. A subsequently -convened working party and task-force was implemented by the IMC to further review these conclusions. It has recently reported that the only substantive reason for failure to implement "high and wide" is the allegedly increased track miles involved for representative aircraft [# 10] . It is submitted this is hardly a good reason for failing to implement a goal of LTOP for which the primary objective is to minimise noise impacts over residents.

A further factor delaying the introduction of LTOP, according to ASA, was the claim by air-traffic controllers that they were being overworked by the frequent ***"Mode"*** [#11] changes during 1998, and this

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4 SACF 27/2/1999
5 Govt SACF Minutes 27/2/1999
6 Govt SACF Minutes 12/7/2002.
7 SACF Doc. 2000/035.
8 At the time of proofing this text the audit had just commenced.
9 SACF 15/11/2000.
10 See IMC Minutes Meeting 51 ; 11/2/2003
11 There are 14 nominal runway operating modes in the original LTOP devised by Airservices Australia, but a much smaller number is being used owing to largely political decisions in the government SACF, but in some cases commercial imperatives imposed on SACF by its "Implementation and Monitoring Committee" the IMC .

resulted in an appeal to the Bureau of Air Safety Investigation [BASI] which ordered a temporary halt to further implementation of LTOP while the controllers' claims were investigated [# 12].

A second factor which allegedly impeded the introduction of LTOP was the Sydney Olympics pending in the year 2000, the need for runway exit upgrades and the installation of an instrument landing system [ILS] for the east west runway. However, even Airservices own LTOP Document: ***"The Long Term Operating Plan for Sydney [Kingsford -Smith] Airport and Associated Airspace"***, admits that full implementation of some aspects of LTOP could never have been completed prior to the Olympics [#13] .

During the year 2000 Airservices Australia admitted to the Government Forum that in the peak periods of operation during the bulge of the Olympic arrival and departure periods, when aircraft movements were to be at most 15% greater than average for the preceding year. Some "noise sharing modes" became unavailable at peak times with maximum movement rates on 2 October 2000 reaching 90 /hour (domestic) and 40/ hour (international) with total movements of between 900 and 1250 movements per day (ie ave 74 / hour) . [# 14]

A third factor affecting the introduction of LTOP was the parallel introduction by Airservices of TAAATS {"The Australian Advanced Air Traffic System" }. TAAATS is an Australia-wide, highly computerised, integrated air-traffic navigation control system which had been introduced in every major capital city except Sydney by early 1999 [# 15]. Given the technical complexity of TAAATS, it would understandably have taken air-space planners away from duties which, in an ideal world, could have been devoted to designing the "Trident " spreading system for landings over the north shore and other LTOP details.

A fourth delay was caused by the need to construct extensions to the cross-runway [East -West] and to install relevant Instrument Landing Systems [ILS] to permit larger jets to land and take off over the east and west. This work was not fully completed until just prior to the Olympic Games in mid- 2000, and the implementation of the ILS was delayed by court actions over the necessary removal of trees in the Botany council area [# 16]. There were also a number of taxiway extensions and runway modifications required to cater for the additional LTOP modes.

A fifth delay was introduced due to the failure by Airservices to foresee that its projected movement plans to the North West might interfere with Bankstown Airport's airspace, only 15 km away. The proposed changes, enabling only modest 6% (3.5 degree) climb gradients for heavy aircraft from Runway 34L were opposed by Bankstown RAPAC [# 17] members representing General Aviation (a forum of Bankstown Airport interests) [# 18] . This organisation also opposed the increase from 1500 to 2000 foot for the Noise Abatement Climb Procedure from Runway 25 [# 19]. Yet to-date, Airservices Australia and CASA (who became involved) have still not satisfactorily resolved these important questions.

Explanations and exonerations could go on for ever, but this only goes to show a lack of realism in some of the claims made by politicians and LTOP promoters that the schedule is behind; not to mention a possible political reason for the inability of Airservices to achieve the government SACF -proclaimed movement target goals.

The aim of this Review is to take an objective look at LTOP and to assess:

(1) What were its Goals?
(2) Were these Goals achievable?
(3) Could anything better have been achieved?; and if so,
(4) How should the noise problem be attacked?

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12 Systemic Investigation Into Factors Underlying Air Safety Occurrences in Sydney Terminal Airspace, BASI Investigation Report B98/90, Aug. 1998 ISBN 0 642 27457 6 - See further comment in SS. 5.12 & 5.3.2

13 See LTOP Full Report (LTOPFR) p. 183

14 Govt. SACF Meeting 7/7/2000, Report of J. Alroe, SACL

15 See James, M.L. (1997) Airspace Safety: Air Traffic Control and Airline Operations in Australia, Background Paper 10 1997-98, Science, Technology , Environment and Resources Group, Department of Parliamentary Library Publications, Commonwealth of Australia

16 IMC Minutes, Meetings 31 (15/2/2000) & 37 (14/11/2000)

17 Regional Airspace Users Advisory Committee - See The Airservices Bulletin Dec 1999, Vol 3 No. 5, p. 28

18 IMC Minutes, Meeting 17 (22/9/1998)

19 IMC Minutes, Meeting 17 (22/9/1998)

In some respects this paper foreshadows the long-awaited LTOP Audit demanded by LTOP supporters on the government SACF, which was in the process of organisation at the end of 2003.

This review, by a working group of the apolitical Sydney Airport Community Forum Incorporated [SACF Inc], sets out to understand the controlling parameters, and natural restrictions on the achievement of LTOP. It analyses the noise spreading actually achieved by the government SACF and Airservices Australia and asks the question : *"Is this fair and equitable?"*, and consistent with the acknowledged goal of the Howard government in its "Putting People First" philosophy [#20] .

Then it asks whether by any means the principal objectives of LTOP could be achieved more equitably, at least in the short term, because even ardent proponents of the LTOP do not believe that "noise sharing", as formerly envisaged, will continue to be possible with the projected doubling of aircraft movements by 2010 (recently extended to 2023 in Sydney Airport's [SACL] so-called Draft Master Plan). SACF Inc has proposed that the only realistic long term solution is for a new primary and/or replacement airport outside the Sydney Basin airshed [# 21] .

So, just what are the capacities and limitations on traffic flow consistent with "noise sharing" at Kingsford Smith Airport, given a 5 - 10% air traffic movements increase per annum for the next 10 years? "Noise sharing" was in fact hard pressed with an only 15% average per diem movement increase during the Sydney Olympics in October 2000. There have been many estimates , but in answer to a parliamentary question on notice from John Murphy MP [ALP Lowe, NSW] the Minister for Transport said that the airport movement capacity would be reached (implying that "noise sharing" as envisaged would effectively cease) by 2006-2007 [#22].

One presumes this answer was provided from up-to-date advice from the Department of Transport and Regional Services [# 23]. If true, there can be little hope for LTOP (or even the airport) beyond the middle of this decade; but SACF Inc believes that, in the interim, certain improvements could be made to LTOP which would significantly improve the quality of life of Sydney's residents "unavoidably" exposed to aircraft noise. In fact some of these improvements could be implemented immediately.

In this Review, we first examine the Aims and Objectives of LTOP;

Second we compare what has been achieved by LTOP against its stated goals; and discover its most important deficiencies;

Third, we raise safety considerations arising from the present implementation of LTOP which [in the view of community representatives of SACF Inc] increases the risk of serious accident occurring over heavily populated residential areas. Such risk should not be tolerated;

Fourth, we suggest a number of improvements by which LTOP [or some more suitably titled successor] could simply be improved, by requiring noise sharing only when flight paths must unavoidably traverse residential areas, and making the resultant sharing truly and quantitatively "equitable"; whilst at the same time focussing on actually "minimising" noise transmission from aircraft to the ground, instead of merely altering the distribution of spokes in the flight path wheel, as presently carried out;

Fifth, we briefly review the permissible uses of PRM [having first defined quantifiable sharing and minimisation objectives] and suggest some improvements;

Sixth, we look at lack of Commonwealth Regulation governing aircraft noise and pollution impacts and propose an approach to dealing with this, bringing aircraft noise regulation under the same rules as State land-use requirements for industrial noise sources in the vicinity of residential areas in our cities; and

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20 LTOPSR p. 1

21 See "The Way Forward from Sydney's Airports Quagmire", SACF Inc, July 1999 -henceforth *"The Way Forward, No. 1"*..

22 Hansard, Question No. 2045; 11/10/2000

23 What the Minister said was : " aircraft movements at Sydney Airport will approximate the number of available slots through the morning peak in 2006 or 2007. Growth in passenger demand to and from Sydney could be accommodated beyond this time if airlines were to make changes to current aircraft types, schedules or route structures." Hansard : Reply to Question No. 2045 11/10/2000

Finally, we propose a number of changes to airspace management which would assist in the implementation of the previously established goals and briefly examine the vexed issue of Constitutional Compensation for those residents truly unavoidably impacted by the aircraft nuisance (eg. Kurnell).

Many of the improvements we suggest could be implemented immediately at zero or minimal cost to government or airlines.

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2. AIMS AND OBJECTIVES OF LTOP

2.1 The Ministerial Directives:

On 20 March 1996, Airservices Australia was directed by the then Transport Minister Hon. John Sharp MP to:

> "***2. report to me by 16 December 1996 on a proposed long term operating plan for the Airport and associated airspace based on the following principles:***
> - ***all three runways at the Airport, including the full length of the east-west runway, are to be available for use by jet and propeller aircraft;***
> - ***<u>maximum use is to be made of flightpaths over water and non-residential areas</u>;***
> - ***the capacity of the Airport is to be maintained to the maximum practicable extent but the programmed movement rate is not to exceed 80 movements per hour;***
> - ***the safety of aviation operations is not to be compromised.*** [# 24]
>
> *[Author's Emphasis]*

The resulting "Long Term Operating Plan for Sydney (Kingsford Smith) Airport" [# 25] [the LTOP or "Noise Sharing Plan] proposed by Airservices Australia which resulted in December 1996 was formulated as follows [# 26] :

Airport capacity should be *"maintained to the maximum practicable extent"* consistent with *"noise sharing objectives"* with *"Movements"* capped at 80 per hour according to the following guiding principles :

(paraphrasing)

(i) **No compromise on Safety ;**

(ii) **Use of all three runways ;**

(iii) **Maximum use of flight paths over water (Botany Bay) and non-residential areas;**

(iv) **Where impracticable to use over-the-water modes, residential overflight to be "minimised" and noise arising from such flight paths to be "fairly shared;"**

(v) **"Respite" periods (totally free of aircraft noise) ordained for areas close to airport;**

(vi) **No overflying of any area by both arriving aircraft and departing aircraft to a given runway (No Reciprocity) ; and**

(vii) **Arriving flight paths should ensure that descent profiles are commensurate with "low-power", "low noise" operations.**

A further principle was added by the Minister for Transport [John Sharp MP] in his May 24 1996 Directive to Airservices Australia [# 27] ie:

(viii) **That noise abatement procedures for runway selection be optimised to facilitate the *<u>equitable distribution</u>* of the noise generated by the Airport ....."**

To the above list, should be added :

(ix) **Avoidance of Concentrations in Flight Corridors [The Spreading Principle]** [# 28]

However, for some reason the above "spreading principle" was only stated explicitly in relation to the proposed implementation of "Trident", a proposal for fanning arrivals from the north.

Given that avoidance of traffic concentrations on any particular path is as desirable for departures as for arrivals, it is assumed that spreading was a general objective of the "designers of LTOP", although , as will be shown, this aspect has not been universally implemented.

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24 Ministerial Direction to Airservices, Hon. J. Sharp MP 20/3/1996, Para. 2.

25 Abbreviations used: LTOPSR = Long Term Operating Plan Summary Report; LTOPFR = Long Term Operating Plan Full Report

26 LTOPSR, p. 10

27 Media Release, John Sharp MP, TR 36/96

28 The latter is a stated subsidiary criterion in the design of LTOP which may be inferred from the statement that there was a need to avoid: *"concentration of traffic on any particular path as this would amount to reintroduction of <u>flight corridors</u> albeit over different people"* - LTOPSR p. 17.

2.2 A "fair" and equitable distribution of noise:

During "task force" discussions leading up to LTOP there was some consideration of what was meant by (iv & viii), above, ie what is ultimately a "fair" or "equitable" distribution of aircraft noise.

In considering possible *"inputs and parameters"* that might be used to monitor *"the equidistribution of noise"*, the LTOP "Task Force" [which some community group leaders say actually never met] concluded that *"the system had to be simple, easily understood and accessible by the community"* [#30] and it also agreed that :

> *"[there must be] sufficient information for there to be community confidence in the monitoring process:"* [#ibid]

It then went on to say that there must:

> *" ... be an agreed understanding of what is meant by fair and equitable"* [# ibid.]

Seemingly admitting defeat even before the LTOP was delivered, the Airservices document proceeded to state that the task force environment working group *"was not able to identify a single criterion to demonstrate equity"* although it had identified a number of *"considerations"* which *"in balance, could be considered to constitute the basis for a fair and equitable distribution of noise."* [# ibid]

The "considerations" to be included in assessing "fairness" were:

1. Average Noise Exposure [ANEF];
2. Noise Level and Duration of Exposure , based on "time above 70dB(A)" [the N(70)];
3. "Respite";
4. Number of Overflights;
5. Time of Day or Night;
6. Non-Reciprocal Flights.

The LTOP reports then went on to say :

> *"once the new airport operating and flight path arrangements are in place it will be necessary to apply the above discussed noise sharing indices to assess the extent to which the noise is being shared."* [# 31]

There is a major logical difficulty with this assumption. It is putting the cart before the horse to claim one can implement a plan which will be "fair and equitable" when there is no acknowledged means for "measuring" the fairness of the plan [#32] . In practice the appearance of fairness has been repeatedly judged by the government SACF against achievement of the "LTOP movement targets" [17% north; 13% east; 15% west and 55% south] - and in particular the "17% north" criterion of which more later [Section 4.3 - *"DEFICIENCIES OF THE FOUR-POINT COMPASS TARGET GOAL"*].

Thus Airservices, the Department of Transport, and the government's Community Forum [government SACF] set out to implement a "fair share plan" without knowing in advance that it would produce equitable sharing. Moreover, given that the ultimate plan was predicated on a "wind-direction-dictated" system of choosing flight path Modes at any point of time, there was inevitably little predictability of the "sharing outcomes", given the characteristics of weather. All Airservices Australia could realistically do was send aircraft out following the dictates of the prevailing wind direction (though some question that this is what they really did).

The proposed major "fairness" measure in the LTOP is the "Australian Noise Exposure Index [ANEI], complemented by the "Australian Noise Exposure Forecast" [ANEF], when calculated for KSA . There was a stated intention to prepare ANEI on a quarterly (and cumulative) basis following LTOP implementation. Unfortunately, a true ANEF (forecast) is only possible once the flight path distribution had been stabilised. For Sydney Airport it was deferred until after the Olympic Games [#33]. In fact it was only with Sydney Airport's "Master Plan" publication in July 2003 that an ANEF was produced for 2023! Needless to say, the movement targets for the Master Plan greatly

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30 LTOPSR, p. 102

31 LTOPSR, p. 103

32 "Fair Share -The Sydney Flight Plan" Joint Government SACF; Airservices Australia; Sydney Airport Corporation; DOTRS document released mid - 1997

33 Personal Communication: Leigh Kenna - Airservices Australia

exceed the 15% increase under which the Minister's statement of October 2000 [# 34] predicted that the available movement slots would be exceeded.

Without pre-empting the conclusion of this Review, the LTOP as now implemented is a plan which does not work. Its movement targets have never been reached. More of Sydney than ever before is now subjected to excruciating levels of totally unnecessary aircraft noise from low flying jets. The proportion of jet departures over land is greater than ever before, and the principle of maximising movements over water has been ignored! However, LTOP is a plan that could possibly work if proper attention had been paid to the detailed principles laid down at the time of its conception.

It is now possible to see that unfortunately, at an early stage in its development, control of LTOP had been hi-jacked, whether innocently and unwittingly by ignorant people, or by interests indisposed to seeing the plan come to its fullest possible fruition. Whether this failure of LTOP is through ignorance, self-interest or malice is not for this review to judge.

[34] Hansard, Question No. 2045; 11/10/2000

3. COMPARISON OF LTOP AS IMPLEMENTED WITH LTOP AS CONCEIVED

3.1 THE MODES

When originally proposed, the LTOP consisted of thirteen Airservices Australia - approved methods of utilising available runway capacity. These were the LTOP "Modes" 1 - 10 ; 12-13 and 14A. SABRE Decision Technologies (Sabre) was engaged to model the potential movement capacity of the different modes. The Civil Aviation Safety Authority (CASA) was supposed to finally certify the safety of the government SACF - approved and available modes, SIDs and STARs [#35] .

However, when the LTOP was publicly announced in March 1997, two key "over-the-water" modes [Modes 2 & 3] had been omitted, together with Mode 6 . As implemented, therefore, the range of "modes" available to Airservices within LTOP became even more restricted due to decisions of the LTOP "Task Force" and the government community forum [government SACF] . A diagrammatic depiction of the approved modes is shown in Appendix B.

Mode 8 (though a component of the government SACF - approved LTOP package) was not "environmentally approved" until mid-1999 and was finally implemented in December 1999 [#36] . Also some of the available modes [Modes 12, 13 and 4] are hardly ever used. Mode 6 was reinvented as Mode 6A during 1998 and, against much opposition from the Eastern suburbs representatives on government SACF, was finally rejected by Airservices Australia in February 2001 because of its environmental impact on the Coogee Track and inability to bring about a significant reduction in movements to the north [# 37].

Some believe that Kurnell Village , comprising some 700 residences , may have exerted a disproportionate influence over Mode selection under the LTOP. This is because its "community representative" sits on both the government SACF and the LTOP Implementation and Monitoring Committee [The IMC -See further below], when most of the newly affected areas under LTOP are not represented on either the IMC or Government SACF. Also many references in government SACF and IMC Minutes are devoted to modifying modes to lessen the impact of and monitoring noise on Kurnell and North Cronulla, whereas the impacts on newly affected areas, without similar community representation, go unheeded.

3.2 IMPLEMENTATION OF THE MODES:

The schematic flight paths for the modes in the original Airservices LTOP Mode diagrams are simply "lines" on a map. There is no suggestion in the plan of spreading or fanning which might indicate that some thought had been given to the concept of "equitably sharing the noise." This is because the LTOP "Task Force" failed to get to grips with the concept of "equity" - except in discussions of the still-to-be-introduced "Trident" [#38] . There is also little indication of minimum altitude-gain objectives in the "final plan" which might suggest any advanced technical consideration of noise abatement principles. Some areas under the flight paths were to become *"newly affected "* under the plan, whilst other areas were to experience decreased noise or would experience no affectation at all.

Perhaps the easiest way to visualise the operation of the Modes is through a Mode Availability Table [Table 3.2.1].

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35 LTOP Proponents Statement Para 3.6 , p. 3-32.
36 See SACF 7/7/2000.
37 IMC Minutes Meeting No. 45 12/2/2001
38 LTOPSR pp. 15-17

TABLE 3.2.1 MODE AVAILABILITY TABLE *[All data from ASA LTOP Summary and Full Reports]*:

MODE	**1**	**2**	**3**	**4**	5	**6**	**7**	8	9	10	14A
ALL MONTHS AVERAGE AVAILABILITY [BOM] [#1]	23:00-06:00 hrs	46%	46%	46%	61%	53%	50%	50%	70%	76%	55%
DOWNWIND OPERATIONAL AVAILABILITY [#2] (knots)	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]	< 5 [#a]
SUSTAINED CAPACITY Movements /hour	23	56	49	43	53	67	64	78-80[#3]	74	73	66
Peak Capacity Movements /hour	25	59	51	44	54	57	69-75[#4]	80[#5]	75	74(87) [#6]	75[#7]
Arrivals Capacity Movements /hour	13	27	21	15	25	27-38	38-39	37-39	39	40	26
Departures Capacity Movements /hour	14	30	29	28	28	20-31	31-36	31-36-	35	33	49
Cloud Base Limitation [feet]	3,000	3,000	3,000	3,000	Nil?	Nil	Nil	Nil	Nil	4000[#8]	nil
Visibility Limitation [km]	10	10	10	10	Nil?	Nil	Nil	Nil	Nil	20	nil
Number of People affected by 70dBA impacts B747-200 - Arrivals - From North	Nil	134,400	Nil	Nil	134,400	0	0	0	0	169,900	134,400
Number of People affected by 70dBA impacts B747-200 - Arrivals - From South	700	700	700	700	0	700	700	700	700	0	0
Number of People affected by 70dBA impacts B747-200 - Arrivals - From East	0	0	0	0	44,200	0	0	0	0	0	0
Number of People affected by 70dBA impacts B747-200 - Arrivals - From West	0	0	0	0	0	0	0	0	0	0	72,600
Number of People affected by 70dBA impacts B747-200 - Departures -To South	4,000	40,000	5,800	9,800	9,800	0	0	0	0	9,800	9,800
Number of People affected by 70dBA impacts B747-200 - Departures - To North	0	Nil	606,300	0	0	606,300	606,300	606,300	606,300	0	0
Number of People affected by 70dBA impacts B747-200 - Departures - To East	0	0	0	0	Nil	223,200	0	127,200	127,200	0	0
Number of People affected by 70dBA impacts B747-200 - Departures - To West	0	0	0	0	Nil		787,200	787,200	0	0	0
LTOP Availability	Curfew	??	??	off-peak	respite mode	Not included	Peak	??	Peak	Peak	off peak
In LTOP (Yes/No)	Yes	No	No	Yes	Yes	No	Yes	Yes [#9]	Yes	Yes	Yes
NOTES TO TABLE 3.2.1											

1 BOM = Bureau of Meteorology

2 #a Table Footnote Note : The downwind component limitation has reportedly been abolished :SACF 26/2/1999 per K. McLean ASA

3 Assuming new runway exits construction & reduced "buyout" of 2 n. mi

4 Assuming new runway exits construction

5 With increased workload on controllers

6 With new runway exits for 16L & 16R & reduced "buyout" of 2 n. mi

7 With non-longhauls departing south of EW intersection

8 Performance varies depending on cloud horizon & whether dependent or independent approaches used

9 Introduction delayed to [date]

Nb. E-W Modes 12 & 13 are not described here owing to their possessing only limited movement capacity [33 /hour].

The actual utilisation of KSA runways by Mode under LTOP for the year 2000 is shown in Table 3.2.2:

TABLE 3.2.2 CUMULATIVE MODE UTILISATION 2000

MODE	**4** [#1]	**5**	**7**	8	**9**	**10**	**12-13**	**14A**
Time	1.99%	9.18%	4.85%	6.02%	39.02%	26.43%	1.53%	9.33%
Movements	1.04%	7.07%	3.99%	4.67%	44.37%	29.88%	1.41%	7.27%

[1] Described as "SODPROPS" in current ASA Reports; but see discussion on "over-the-water" modes, elsewhere in this Review

The conclusion to be drawn from the above analysis is that only some of the more capacious Modes have been included in the LTOP as currently operational, those excluded being principally the over-the-water modes [Modes 2 & 3]. A further conclusion is that the majority of modes included and now used support residential overflying rather than over-the-water operations, which were supposed to be maximised under LTOP [S. 2.1 (iii)] .

Mode 4 is the only specifically "over-the-water" mode being used, and this for only 1.04% of movements, when it alone was allocated between 5 and 10% of all movements in the LTOP Reports [#39] .

The deletion of Modes 2 & 3 by the LTOP "Task Force" surprised many , given that these modes offered most opportunity to maximise relief from aircraft noise impacts for the greatest number of people across Sydney [See Table 3.2.1], and were optimally consistent with the ostensible goal of maximising movements over water [S. 2.1 (iii)] . In contrast Mode 4, the only adopted SODPROPs mode , is a mode of self-limiting capacity and inherently dangerous . This is due to its requirement for simultaneous opposite direction departures on the same Runway 34L/16R. It therefore contributes little to seaward movement capacity.

Some experts have opined that a combination of Modes 2, 3 in an expanded Botany Bay or "SODPROPs"[#40] configuration could cater for at least 70% and as much as 85% of the movements from KSA. Therefore, it is submitted that the dominant northerly traffic flow and absence of SODPROPs over-the-water Modes is astonishing in view of a major expressed objective of the LTOP [# 41] being to maximise movements over water [See S. 2.1 (iii)].

3.2.1 The LTOP "Movement Targets"

What the members of the government Sydney Airport Community Forum (government SACF) repeatedly complain about is that the "Fair Share Noise Plan" "movement targets" under LTOP have not been achieved. By this the government SACF mean the LTOP-set targets of 17% north; 13% East; 15% West; and 55% south.

The above targets have been criticised because in themselves they provide no assurance of equitably sharing aircraft noise. Also there appears to be an implied assumption that afflicting more people with noise is in some way desirable. Moreover, the fact that movements south were initially limited to (and accepted as) only 55% testifies to failure of commitment to residential noise reduction. This is because the 55% over-water target is far below the potential maximum achievable if the goal had really been to optimise movements over water [See S. 6.3, & Appendix G].

The failure to consider "equity" is highlighted by the fact that the resulting compass bearing targets are merely "runway-end" targets, and have no impact whatsoever on the direction over Sydney from which the aircraft which has just landed or departed has or will be flown .

LTOP has consistently failed to reach the maximum over-water target of 55%. Meanwhile the government SACF absurdly questions why the northerly movement targets cannot be met and demands an "independent audit" of the statistical basis for the discrepancy. At almost every meeting, the north shore and Kurnell representatives clamour for movements over the residential east and west (in government SACF parlance the so-called "noise sharing modes") to be increased to compensate the north and lessen movements to the south (which need not fly over residents anyway).

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[39] See LTOPSR Fig. 10 p. 105.

[40] SODPROPS = Simultaneous Opposite Direction Parallel Runways Operations

[41] LTOPSR p. 10

This highlights the "tunnel vision" of the current government SACF and IMC, when simply bringing movements over Botany Bay up to its original target level of 55% (by transferring overland departures from 34L and 34R) would bring the LTOP closer to agreement with its "northerly" target of around 17%.

Yet every year as "LTOP" develops, the movement achievement for Bay side operations repeatedly falls between 45 and 50%, and the Master Plan goal for the Airport Corporation in 2023 now only 49%!

Recommendation 3.2.1 : LTOP should be redesigned to include all the available modes having regard to their functional capacity, safety and per person affectation. Given that a principal objective of LTOP was *"to maximise movements over the water"* , the excluded SODPROPs Modes 2 & 3 and the little-used Mode 10 should be reinstated with operational priority in the order (1) SODPROPs , (2) Mode 10.

Recommendation 3.2.2 : SACF Inc does not agree with the "compass-point" movement targets as expressed in LTOP because there has been no serious attempt to maximise movements over the sea. However, a minimalist approach to reducing noise impacts over residential areas given the current LTOP would be to transfer all jet departures from 34L & R to 16 L & R, thus raising Bayside movements to their "LTOP" target level of at least 55%.

3.3 TURNING AROUND THE AIRPORT

It is well acknowledged [#42] that departing jets disturb more people over a wider footprint than landing aircraft. It also stands to reason that maximising movements over water, thus affecting the least number of people, is a desirable goal. Prior to the, now infamous , *"Third"* parallel runway opening in November 1994, 65% of *all departures* took off over Botany Bay.

TABLE 3.3.1 THE AIRPORT TURNED AROUND

YEAR	Take-offs over Sydney Residents as a fraction of all take-offs [Modes 7,8 &9]	Take-offs over Botany Bay as a fraction of all take-offs [Modes 5,10 & 14A]
1993	34.3%	65.7%
1995	29%	65%
1999	45%	52%
2000	53%	44%
2001	49%	48%
2002	52%	45%

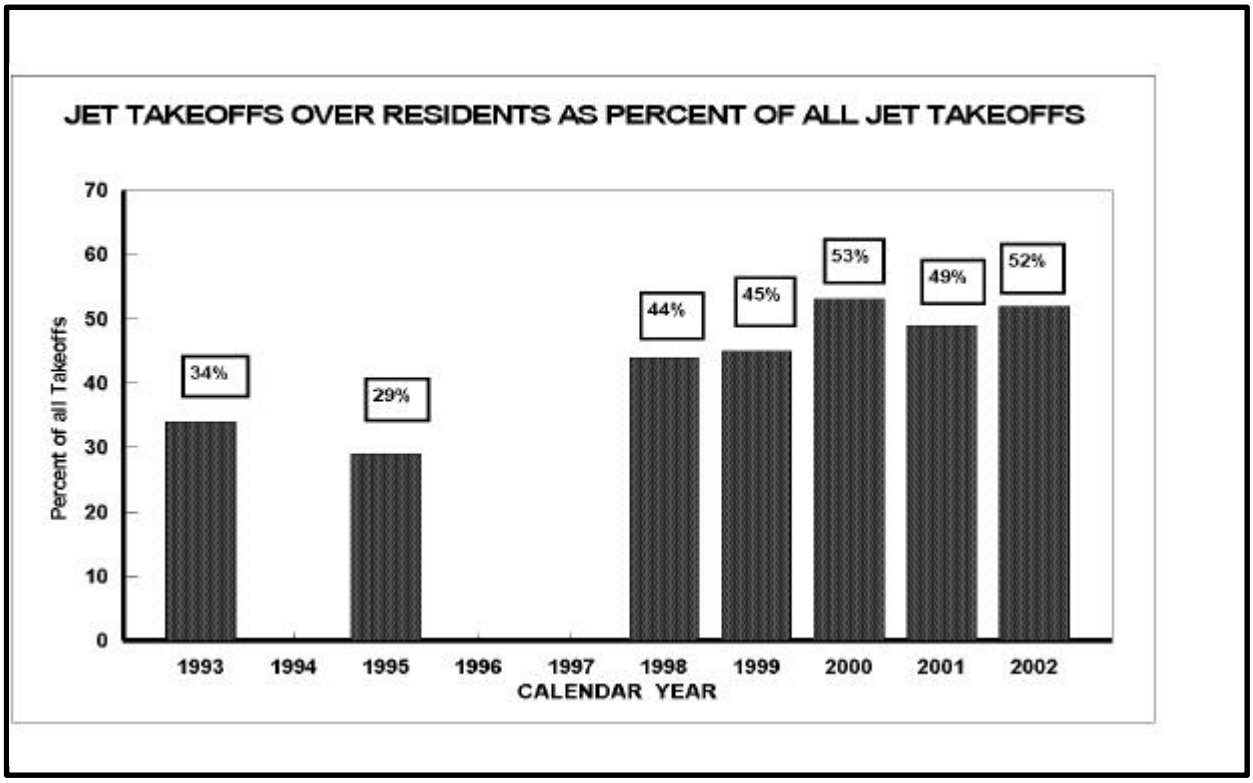
Even after this, in 1995, 65% of all takeoffs were sent out over Botany Bay. In contrast, with the government SACF's so-called *"equitable"* Noise Share Plan from 1997 the situation has been almost reversed. In the year 2000 53% of departures flew north, north west and north east over the most densely populated areas of Sydney , and this is with a "Plan" which was supposed to maximise movements over Botany Bay ! - *[See Table 3.3.1; Fig. 3.3.1]*

A glance at Table 3.3.1 shows that instead of "maximising" departures and/or movements over water, the LTOP has actually reversed the position prevailing in both 1993 & 1995. It is now maximising the noisiest movements (ie departures) at extremely low altitudes over people! The Wanda sandhills and Botany Bay heads have actually been relieved of noise under this regime.

These data are further summarised in the bar-graph in Figure 3.3.1:

[42] Australian Standard AS2021-2000 Tables 3.4-3.24.

FIGURE 3.3.1 BAR CHART OF PERCENT DEPARTURE FIGURES



For 2002 the position was better, ie. around 50:50. But this is still a far cry from maximising the most hazardous movements over water. How, one may well ask , can this situation have come about from a "noise share plan" which was supposed to maximise movements over water [S. 2.1 (iii)] and minimise movements over residential areas ? *[S. 2.1 (iv)]*

<u>Recommendation 3.3</u> : The practical outcome of the LTOP has been to maximise the use of residential overflights for the noisiest jet departures. This maximises noise over impacted residential areas and totally contradicts the stated goals of the Plan. Airservices Australia should be instructed forthwith to redesign the LTOP including all available Modes to fully implement the plan as originally described.

In particular all departing jets should be instructed to use Bay-side modes whenever possible.

3.4 "PER-PERSON AFFECTATION" - AN EVALUATION OF THE MODES:

An approach to evaluating the environmental impact of the Modes listed in Table 3.2.1 is to consider the ***"per person affectation"*** of the Modes by Movement Capacity [# 43] . This analysis is carried out below for the Departures/person , Arrivals/person and Movements per person breakdown impact of the Modes as shown in Table 3.4.1, which is taken from data in the LTOP Reports adopted in the Proponents Statement.

In Table 3.4.1 , the Airservices Mode movement capacities from Table 3.2.1 are converted to weighted averages relative to the total numbers of movements in each category per hour. The weighting is obtained by multiplying the differential number of sustainable movements in each direction by the number of people affected at the 70 dB(A) level in that direction and dividing this by the total number of movements.

The resulting data are sums of the above results for each direction. It is called a weighted average, because it allows for the different degrees to which flights [whether landings or departures] in each direction affect the different numbers of people.

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[43] Movement capacity is the number of feasible movements per hour given the ASA-SABRE analysis of the LTOP Modes in the LTOP Reports

TABLE 3.4.1 **HOURLY WEIGHTED AVERAGE NUMBERS OF PERSONS AFFECTED BY AIRCRAFT UNDER DIFFERENT MODES**

MODE	**2**	**3**	**4**	**5**	**6#a**	**7**	**8 #a**	**9**	**10**	**14A**
MOVEMENT CAPACITY	56	49	43	53	67	64	78-80[#1]	74	73	66
Persons Affected by Arrivals [Persons per hour of Arrivals] [#1]	15,556	667	700	55,024	26	497	19	700	169,900	15,531
Persons Affected by Departures [Persons per hour of Departures]	40,000	47,014	9,800	9,800	41,475	916,219	49,055	366,750	9,800	8,000
Persons Affected by Movements [Persons per hour of Movements]	28,929	40,498	6,626	31,132	12,391	444,089	19,018	183,725	89,850	59,348
Nb. #1 Data for numbers of people affected by each Mode in each direction are taken from the Long Term Operating Plan for Sydney (Kingsford Smith) Airport by Airservices Australia [Using both the Full and Summary Reports]. Nb. #a Note differential directional movement data are not provided by Airservices for these modes.										

In other words Table 3.4.1 takes the probability of flights arriving or departing and of movements in each direction, and then sums their multiples with the numbers of people to be affected at the 70 dB(A) level.

Mode 1 [The curfew Mode] is excluded in Table 3.4.1 because it is not a viable daytime SODPROPs mode.

Table 3.4.1 provides a means for selecting Modes based on the ultimate potential movement-affectation of people in each direction.

Considerations of Equity and Noise Minimisation [See Sections 4.3 to 4.4, below] suggest that Modes should be preferred which affect the minimum numbers of people. Given this assumption, the data of Table 3.4.1 shows that the Botany Bay modes [Modes 2, 3 and 4] , with their least per person affectation, are to be preferred.

This analysis does not allow for the possibility that time-sequenced flight path spreading could reduce any one individual's affectation very significantly, but that would be an hitherto undescribed improvement of LTOP, which is presented below [See S. 6.5 *Time Sequenced Catherine Wheel Departure Protocol*].

<u>Recommendation 3.4</u>: Noise Minimisation for the maximum number of people can be achieved using the now excluded LTOP over-the-water modes, Modes 2 & 3, together with appropriate use of Mode 10. Airservices Australia should be instructed forthwith to maximise the universal SODPROPs modes, ie. Modes 2 & 3 in order to achieve this LTOP objective. Only in this way can the original LTOP northerly movement targets be approximated.

3.5 THE BOTANY BAY MODES [MODES 2, 3 & 4]

"The Way Forward from Sydney's Airports Quagmire" [#44] *[henceforth, The Way Forward No. 1]* extensively discussed over-the-water mode availability [The SODPROPs Modes] and predicted that up to 75 movements per hour might be achievable using these modes [See Appendix D of that document , reproduced herein as Appendix G]. It also raised a number of questions for Airservices Australia which , despite several SACF Inc delegate meetings with Airservices Staff as well as written requests , have not been officially answered.

The Airservices Australia predictions of the numbers of people affected by Modes 2 & 3 assumes that aircraft departing over Botany Bay from Runway 16R will overfly Cronulla [# 45] . SACF Inc showed that this was neither necessary nor true. The "per-person" affectation will thus be less that shown in Table 3.4.1.

Methods were proposed in *"The Way Forward No. 1 "* to enable aircraft departing over Botany Bay to avoid each other in Modes 2 & 3, and also avoid overflying both Cronulla and (to a large extent) Kurnell. This conclusion requires an understanding of the separations available for independently departing and arriving aircraft, and is reached through consideration of the separation rules. Separations are the height and horizontal minimum distances required for safety reasons to be kept between aircraft on parallel or near parallel, flight paths. The vertical

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44 SACF Inc, 1999; ISBN 0-9751843-0-X (pbk); 0-97518453-1-8 (pdf)

45 See LTOPFR

separation requirement is 1000 ft and the horizontal deviation [for departures in parallel directions] under SODPROPs is 15 degrees .

Recent discussions with an expert in air-space management suggest that the SODPROPs could in fact handle up to 85 % of the traffic at KSA, provided the politicians and other interested "stakeholders" would allow this to happen. This 85% projection is supported by the independent more detailed analysis in S. 6.3 of this Review .

Comparing actual Mode Utilisation in Table 3.2.2 with the potential people affectation in Table 3.4.1 shows that much more could be done to achieve : (1) Equity and (2) Maximisation of over-the-water Modes in the LTOP, with resulting reduction of noise and pollution impacts, and decrease of crash risk, over residential Sydney.

<u>Recommendation 3.5</u>: Modes 2 & 3 presently excluded from the LTOP should be reinstated and used to the maximum possible extent to ensure maximisation of over-the-water operations at Sydney Kingsford Smith Airport.

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4. THE DEFICIENCIES OF LTOP WITH REFERENCE TO STATED OBJECTIVES

4.1 DEFICIENCIES OF THE FOUR-POINT COMPASS TARGET :

4.1.1 Limitations of the Four-Point Targets :

There are three major aspects of the four-point compass target goal:
As stated earlier, a major concern of the government SACF since the inception of LTOP was failure of the plan to reach its compass-bearing movement targets of 17% north; 13% east; 15% west and 55% south [#46] . In practice, achievement of the 17% movement target to the north would require all departures in that direction to be deleted, returning approximately to the pre-parallels situation of 1993 [#47]. For 2002 Table 4.1 also shows that the percentage arrivals from the north approximately equalled the original movement targets. Hence simply subtracting out the northerly departures from total movements would approximately "achieve" the crudely stated LTOP Goals.

TABLE 4.1

YEAR 2002[#1]	**NORTH**	**SOUTH**	**EAST**	**WEST**
MOVEMENTS	27.11	49.54	13.9	9.44
DEPARTURES	10.86	24.81	9.44	4.94
ARRIVALS	16.25	24.73	4.46	4.5

[1] Statistics from Minister's "Briefing Notes on Sydney Airport " , DOTARs

However, these targets are actually "runway end" movements, and did not predict the ultimate affectation of residential Sydney of the movement totals. In practice, even if the *"movement targets"* had been "equitable" and could have been complied with, the true geographic affectation would have been different, meaning that the resultant affectation may not be fair .

This is particularly true for departures because a departure "to the north", as monitored at the runway end, can go either east or west, or somewhere in between [See. Fig. 4.4.1]. Actually, all departures to the north deviate significantly after takeoff from the true north, those over the east turning as much as 115 degrees to finish up in two concentrated flight tracks across residents over the Coogee/ Maroubra area. To the north west, the ultimate turns are of up to 115 degrees , meaning that some aircraft logged as flying north really affect people in the west, south west or east; often more so than takeoffs from the East-West runway in those directions.

Figure 4.1.1 shows the effect of a complete day of operations in northerly winds shortly after LTOP commencement in March 1998 on the entire Greater Sydney Region within a radius of about 30 km of KSA centre. In the figure the site of the then proposed Badgerys Creek Airport is indicated by "BCA". The position of Bankstown Airport is indicated by "B/A" with its flight tracks coloured in burgundy. Departing Aircraft Tracks from KSA are shown with single arrow tracks; Arriving Aircraft Tracks to KSA are shown with double arrow tracks.

Figure 4.1.2 similarly shows the effect of a complete day of operations in southerly winds shortly after the introduction of LTOP in March 1998 on the entire Greater Sydney Region within a radius of about 30 km of KSA centre.

The desirable goal of achieving equity in the distribution of aircraft noise nuisance over Sydney Residences might be achievable had due diligence first been exercised to ***maximise movements over water as was foreshadowed in the plan*** [#48] , but it had not.

Moreover, the idea of ***"spreading a nuisance"*** simply to make the point that ***more people are sharing noise*** [See letter of Senator Payne to George Church in Appendix C] , when much better alternatives are available, has the odour of political conditioning , payback or airspace design incompetence, or perhaps something in between. Why on earth should departures be flying at the same altitude at Winston Hills as within 7 km of KSA?

If spreading has been achieved somewhat in the northwest, then the same cannot be said to apply to the East, where - once again- departing air-traffic is concentrated into three main corridors [Paddington, Coogee and Maroubra]. This

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[46] LTOPFR p. 3-6

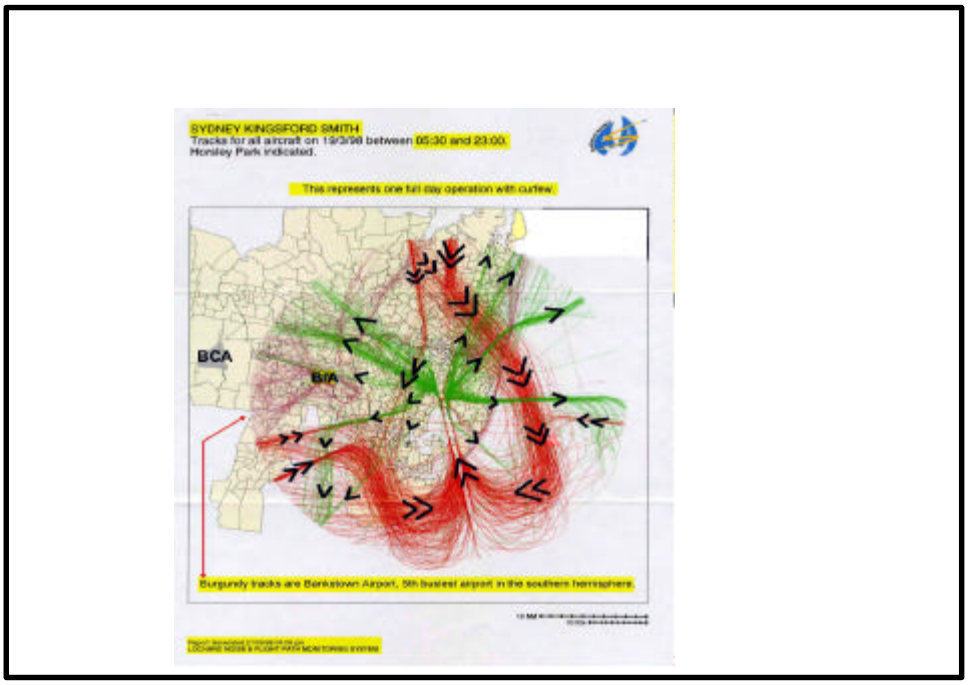
[47] See Fig. 2, "The Way Forward from Sydney's Airports Quagmire" SACF Inc July 1999; ISBN 0-9751843-0-X(pbk); 0-9751843-1-8(pdf).

[48] and of takeoffs in particular

FIGURE 4.1.1 A DAY'S OPERATIONS UNDER LTOP AT KSA IN MARCH 1998 -NORTHERLY WINDS

This Figure is reproduced and modified for the purposes of review and criticism pursuant to S. 41 of the Copyright Act (1968) from an Airservices Australia "Lochard" plot supplied on request to residents .

airn_nab.tif

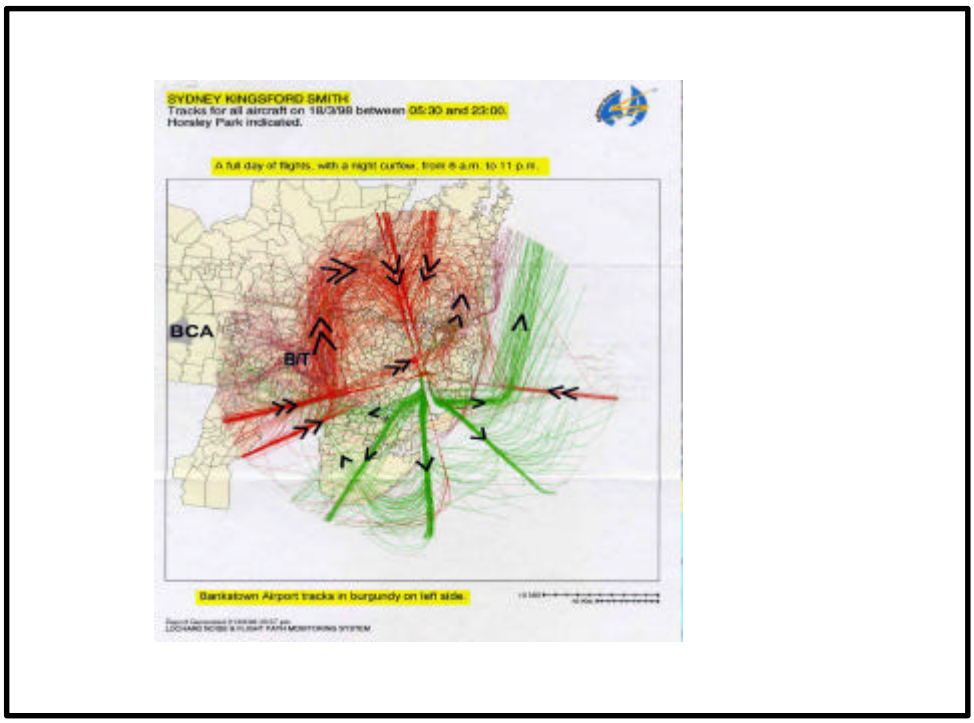


Key: BCA = Badgerys Creek Airport Site; B/A = Bankstown Airport; Arrows show direction of flight.

FIGURE 4.1.2 A DAY'S OPERATIONS UNDER LTOP AT KSA IN MARCH 1998 -SOUTHERLY WINDS

This Figure is reproduced and modified for the purposes of review and criticism pursuant to S. 41 of the Copyright Act (1968) from an Airservices Australia "Lochard" plot supplied on request to residents .

airs_nab.tif



Key: BCA = Badgerys Creek Airport Site; B/T = Bankstown Airport; Arrows show direction of flight.

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is despite a major LTOP principle being that, wherever possible, flight paths should be spread to avoid concentrations into corridors.

Thus from the outset the main LTOP tool for determining "equity" was the runway end targets . It will be submitted that a model for more equitably regulating affectation, for aircraft not trackable directly over water, is one based on a suitably devised "people-events metric". Such a metric is proposed in Section 6.4 (below).

Although the above Figures show data from 1998, the situation has not changed significantly since that time (See Appendix C). They illustrate the enormous extent to which greater western Sydney is now affected by (in particular) departing aircraft noise in northerly winds, and arriving aircraft noise in southerly winds.

4.1.2 Bankstown Airspace Interference:

Figure 4.1.1 also shows the influence of the 24 hour commercial airport at Bankstown *[ie the Bankstown Airspace]*. This forces west and north-westerly departing aircraft from KSA into concentrated low altitude flight corridors across Strathfield, Parramatta, and "The Hills" districts. This aspect was *not predicted* by Airservices in the LTOP design and is a major factor contributing to the failure to achieve greater flight path equity across the northwest hinterland. The IMC Minutes reveal there was some resistance to the modification of Bankstown Airspace to facilitate LTOP. Some changes, enabling only modest 6% (3.5 degree) climb gradients for heavy aircraft from Runway 34L were opposed by Bankstown RAPAC [#49] members representing General Aviation[#50] . This forum of Bankstown Airport interests also opposed the increase from 1500 to 2000 foot for the Noise Abatement Climb Procedure from Runway 25 [#51]. Yet to-date, Airservices Australia and CASA (who became involved) have not satisfactorily resolved these important questions.

This clearly illustrates why Bankstown airport *cannot* take up a major proportion of medium jet aircraft and function as a "reliever airport" for KSA, without significant adverse effects on LTOP as presently implemented. This aspect is further considered in Section 5.3.3 from the standpoint of the Safety and Human Environment impacts of running either Bankstown or the, perhaps erstwhile, proposed Badgerys Creek airport together with KSA.

To achieve equity for the effects of aircraft from KSA, given the present low flying, would result in Bankstown Airport being removed completely. Given that the residents of Bankstown and environs do not benefit from a curfew, and the predicted [#52] trebling of flights from KSA that is preferably what should happen.

4.1.3 The Departure / Arrival Overflying Ceiling:

What is not shown in the above Figures are the altitudes at which the aircraft are being flown. One might reasonably expect departing jets to achieve cruising altitude as quickly as possible, because in this way aerodynamic drag is minimised (and thus fuel costs) for the journey [#53] . However, the departing aircraft (shown with single arrows) in Figure 4.1.1 are actually flying underneath the arriving aircraft indicated by the double arrows. The original LTOP proposal was for arriving aircraft in southerly winds to travel 5 n. mi offshore to the east to enable takeoffs to gain altitude early [See S. 6.2, Fig. 6.2.3].

The altitudes (above sea level) being flown by the above takeoffs, for the entire 35 -60 km overland routes in these charts, are actually only between 2500 and 3500 feet. Similarly the arriving aircraft shown travelling north over the Nepean valley by double arrows in Figure 4.1.2 are at around only 3000 ft as they turn north east onto the arrival ILS above Dural/Kuringai.

In northerly winds this creates ***a departure ceiling of around 4000ft over greater Sydney*** . The aircraft thus fly low for distances of between 35 and 60 km to points beyond which air traffic control permits the jets to power climb to cruising altitude. These points depend on destination and are near the Blue Mountains (west and southwest) , Richmond (north west) or over Kuringai/West Head (north east) .

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49 Regional Airspace Users Advisory Committee - See The Airservices Bulletin Dec 1999, Vol 3 No. 5, p. 28

50 IMC Minutes, Meeting 17 (22/9/1998)

51 IMC Minutes, Meeting 17 (22/9/1998)

52 Sydney Airport Corporation Preliminary Draft Master Plan July 2003. SACF Inc Submission October 2003 ISBN 0-9751843-2-6 (pbk); 0-9751843-3-4 (pdf)

53 See 747 Flight Planning Tables, Boeing 747-100 Performance (JT9D-7A/7AH) , Zagoran, M. 2000

The arriving aircraft [shown in red and with double arrows] are flying at from 4000-6000 feet, above the tracks of aircraft taking off. This situation is taken up again in Section 5.3.1 in relation to airspace design and safety management at KSA.

In southerly winds (Fig. 4.1.2) the overflying problem does not occur, although the arriving aircraft in the north [over Dural, Kuringai and Hornsby Heights] reach quite low altitudes over residential areas due to the shallow inclination of the glide path for the arriving "Instrument Landing System" [ILS] used for the northern approach to KSA [See Section 7].

It can be shown that departing jets make much more noise over a wider footprint than landing aircraft when flown at the same distance from the ground (S. 8 & Appendices K & L] , provided the latter are actually "gliding down" and under minimum power [See SS. 7 & 8] .

The main points to be made at this juncture, however, are :

(i) ***the unevenness of spreading of the departing aircraft***; and

(ii) ***their close proximity to the ground which is environmentally suboptimal***.

These comments apply as much to departures over the east and northeast as to the northwest. It will be shown in Sections 6.2 & 6.5 that this situation could be avoided completely with proper airspace design.

It will also be demonstrated that effective maximisation of movements over water using SODPROPs is the best means of minimising noise and aircraft nuisance over residential Sydney [See. S. 4.3 and S. 6.3 where SODPROPs is considered in detail].

Furthermore, aircraft which *cannot avoid* traversing residential areas (such as long-haul arrivals from the north, and a few long haul takeoffs) should employ strict noise abatement arrival and departure procedures consistent with "World's Best Practice". It is shown that better practice for arrivals from the north could be introduced by slightly steepening the arrival glide path [See S. 8], and that better departure procedures are practiced overseas where ***"steepest practicable"*** takeoff gradients are enforced (eg. Osaka, Narita) , and high ***"noise critical altitudes"*** are mandated [such as at Oslo, Calgary, Auckland, Christchurch and even Canberra -See S. 8.2.3], and where ***"maximum permissible noise levels"*** (Washington DC & Boston Logan) are mandated for departing and arriving aircraft at certain points on the ground [S. 8.2.3].

Recommendation 4.1.1: The early abandoned goal in the LTOP Reports of defining what is meant by "equitable distribution" needs to be revisited. The instrument for determining "noise equity" should cease to be stated in terms of *"runway end"* percentage movement outcomes which do not reflect the true distribution of the resulting noise. A "people events metric", different from the ANEF must be devised which truly reflects whether equity is being achieved.

Recommendation 4.1.2: "True equity" in noise distribution is best approached at KSA by radical redesign of airspace [S. 6.2, S. 6.5.1], maximising movements over water through the use of SODPROPs Modes 2 & 3 [See S. 6.3] , and mandating maximum permissible aircraft noise levels for overflying residential areas [S. 8.2].

Recommendation 4.1.3: When Modes 7, 8 and 9 are being used, the arrival overflying ceilings over residential areas, presently preventing steepest possible takeoffs to cruising altitude, should be abolished forthwith and arrival tracks re-routed to comply with the LTOP routings which were originally proposed.

Recommendation 4.1.4: Changes to Bankstown Airspace needed to avoid flight path concentrations in the west and northwest must be mandated by Government, and the impossible environmental position of Bankstown as a 24 hour commercial airport recognised and reconsidered.

4.2 FAILURE TO MAXIMISE OVER-THE-WATER MODES:

Failure to maximise over-the-water modes is the primary reason for the failure of LTOP to meet its so-called "targets."

From the outset the LTOP promised to "maximise movements over the water". Yet early in its planning the very "LTOP Modes" which would have made it possible were eliminated. The failure of the government-appointed Sydney Airport Community Forum [SACF] to insist on the approval and maximum possible use of the over-the-water Modes 2 & 3 for non-curfew operations is the basic flaw of this air traffic plan. ***Consequently the so-called "fair share noise plan" has achieved a lower target for Botany Bay operations than existed at any previous time in the airport's history.***

The SACF Inc 1999 position paper "*The Way Forward from Sydney's Airports Quagmire"* argued that over-the-water modes could be exploited for at least 70% of the time for both arrivals and departures *[See S. 6.3; Appendix G]*. The paper established that there were no good practical reasons for not including the draft LTOP Modes 2 & 3 in the original formal LTOP. Questions raised therein were put to the then Chairman of the government SACF [Dr. Brendan Nelson], and offered to Mr. Ken McLean [Manager, KSA Operations, Airservices]. However, the IMC has deemed it inappropriate to consider them further; or if it has considered them, such consideration has led nowhere. Unofficially, however, SACF Inc has been told that up to, possibly, 85% of KSA [pre-September 11 2001] movements could be accommodated by a SODPROPs operation over Botany Bay. Figures of this order have also been confirmed by retired senior Qantas pilots to whom we have spoken.

This reveals the abject failure by Airservices Australia, the government SACF and the IMC to comprehend the claim of SACF Inc in *"The Way Forward #1"*, that over-the-water modes are capable of implementation without direct affectation of Cronulla or Kurnell; provided there is insistance on appropriate noise-abatement turns over Botany Bay and Wanda Beach, and departures left from Runway 16L out through Botany Heads.

However, the official Airservices Position remains the same. As recently as October 2001 a question was addressed by a member of the Govt SACF, Mr. Robert Hayes, to the IMC [#54] . This asked why greater use of SODPROPs was not feasible, including why the down-wind criteria could not be changed to maximise its use , and why the third runway could not be extended further into Botany Bay to facilitate SODPROPs .

The reply from the IMC came thus:

- *"The third runway was made as long as it could be without impacting on Port Botany. Increasing its length would essentially close the port"*
- *"A lengthened third runway would also impact on the Oil Refinery";*
- *"There would be <u>significant cost</u> associated with the proposal";*
- *"Increasing the tailwind criteria from 5 to 10 kts would present a significant safety issue;"*
- *<u>Action</u>: Airservices to write to Mr. Hayes to say that his proposal was not feasible on "safety technical and operational grounds."* [#55]

The above "excuses" can all be discounted as follows:

(i) The 5 knot downwind noise-abatement condition was mandatory at KSA until 1996. As to what is the "downwind" criterion, see S. 6.3.3;

(ii) A 10 knot downwind condition is in force at least at Brisbane Airport for noise abatement purposes unless otherwise requested by the pilot for safety reasons [# 56] ;

(iii) There is no reason why fuller SODPROPs operation cannot be achieved <u>without</u> increasing the length of the third runway as shown in S. 6.3 of this report;

(iv) The sitting Chairman of IMC [Mr. McLean] is on record as saying that a 10 knot downwind condition would be perfectly safe [# 57] . Thus he contradicts himself ; and

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54 IMC Minutes Meeting 43.
55 Minutes IMC Meeting 43 16/10/01, Agenda Item 5.
56 Airservices DAP-East BBN79NA1 (22 Feb. 2001 Noise Abatement Procedures Page 1)
57 Govt SACF Meeting 26/2/1999

(v) Boeing 747 Procedures specify a 10 knot downwind maximum [# 58] .

More significantly from the political perspective, perhaps, is the statement overheard by a SACF Inc observer at a meeting of the Government SACF on 4/2/2000 when Kevin Hill, the Kurnell community representative and IMC representative for the government SACF , was asked (off the record) why SODPROPs could not be more extensively used. The overheard reply was: *"because of the expected noise impact on Kurnell and Cronulla!"*

The totally specious nature of this argument was demonstrated in the *"The Way Forward #1"* [See below Appendix G]. Furthermore an extensive SODPROPs operation could in fact be conducted using existing Airspace Management principles ***without impinging on either Kurnell or Cronulla*** , or at least no worse for Kurnell (given its miniscule population) than the noise impacts now unnecessarily endured by millions of residents north, west and east of the Airport [See further S. 6.3]. The minimal noise impact on North Cronulla of the so-called "DEENA" SID (which twists out over Botany Bay across the Wanda sandhills) was revealed to the IMC by Dr. Colin Dahl [Airservices Noise Expert] at the IMC Meeting on 20 January 1998 [# 59] .

Subsequent consideration of the Airservices AIP [#60] has shown that far from SODPROPs being impractical on operational or safety grounds, it is expressly provided for in the AIP [# 61] [# 62].

According to the AIP, SODPROPs may be "conducted in meteorological conditions equal to or better than the minimum radar vectoring level, or the lowest minimum commencement level for instrument approaches to the arrival runway, whichever is lower." [# 63] It goes on to state that "Without prior approval the minimum shall be not less than cloud base 2500 ft and visibility 8 km in the arrival and departure sectors" [# ibid]. Also the departure runway course must diverge by at least 15 [o] from the approach course on the adjacent runway [# 64] . That this is possible without impacting on Cronulla was shown in *"The Way Forward #1"* , and more fully in S. 6.3, below.

Approaching Aircraft must be vectored to intercept final course at angles not greater than 30 [o], and be established on "final approach" no later than 10 n. mi [18 km] from touchdown [#65] . This condition is more conservative than that required for parallel instrument approaches, where the minimum distance for final approach is only 3n. mi.

Certain traffic information must be given by Air Traffic Control to pilots if their aircraft are expected to pass within 10 n. mi of touchdown. It is stated that the 10 n. mi criterion may be reduced if track divergence is more than 15[o#66] .

As to our submitted estimates for the true potential departure and arrival frequency and conditions available under a properly implemented and optimised SODPROPs operation, see Section 6.3 [***Utilisation & Potential For Over-The-Water Modes***] below.

Recommendation 4.2 : SODPROPs Modes 2 and 3 should be reinstated into LTOP and re-examined by Airservices Australia to enable maximum permissible over-the-water operations at KSA.

4.3 DEFECTS OF THE EXISTING APPROACH TO EQUITABLE SHARING [#67]

The LTOP has further suffered from failure to address the problem of what constitutes equity in noise affectation. This problem could be addressed through judicious choice of flight trajectories on a computer-directed time-spread basis. While some localised spreading is applied to "northerly" departures in the north west, there is almost total failure of the government's Sydney Airport Community Forum [government SACF] to properly implement departure spreading over both east or west. Many areas where flight paths could be constructed have remained almost totally unaffected.

There has also been no attempt by Airservices Australia to develop a noise-per-person metric which properly measures dosage per person per square kilometer. ***Such a metric would enable planning ahead of flight tracks for***

58 Boeing "747 - 100/SP/200B Limitations" . Zagoran, M.

59 IMC Minutes, Meeting 8 20/1/1998: *"Dr. Dahl stated that noise at Cronulla was difficult to measure as the noise was low and off to the side."*

60 Australian Instructions to Pilots, Airservices Australia.,

61 See AIP ENR 1.1 Part . 43.

62 See further detailed analysis in this Review S. 7.3.

63 AIP ENR 1.1 Part 43.1 (b)

64 AIP ENR 1.1 Part 43.1 (d)

65 AIP ENR 1.1 Part . 43. 2 (c),

66 See AIP ENR 1.1 Part 43.3 Note 1.

67 For definitions of acoustic parameters see S. 8 and Appendix K

different weather conditions so that the exposure of any individual person or residence on the selected tracks is minimised for the maximum period of time.

The proposal in the recent DOTARS Discussion Paper [# 68] for use of the "N70" (dB(A)) parameter merely provides a more pictorial approach to illustrating how people are being affected using 70 dB(A) minimum noise contours in an ex-post-facto manner. This may be a slight step forward in identifying noise affected residents, but it is of no use as a tool for noise minimisation planning .

Any attempts to forewarn residents contemplating *whether to become home owners* in an area, and greater certainty in aircraft noise predictability by region, are to be applauded. However, the 70 db(A) (minima) criterion is not an appropriate noise level to apply. In particular, it does not assist those newly affected, and the provision of N(70) contours, by themselves, provides insufficient information as to the magnitude of affectation [See S. 8.1.4] .

The submission below [S. 8.1.4] shows that a more environmentally appropriate measure [for the assessment of health related impacts from aircraft noise] is the WHO-based [# 69] level of 55 dB [LA max] for exterior living areas; and of 45 dB [LA max] for interior rooms [# 70] . This internationally promoted metric is similar to that recently endorsed in the NSW Govt Environmental Protection Authority Noise Policy Guidelines [71] [2000], which recommends LA_{eq} (15 min) levels of 40, 45 and 55 dB(A), respectively, for night, evening and day as maximum tolerable exposure to noise for residential properties from industrial sites in NSW.

Recommendation 4.3: That the Government adopts a more stringent noise exposure proscription for aircraft noise than the so-called "significant" ANEF[#72] levels employed. It is recommended that Airservices Australia be required to design its departure and arrival trajectories for aircraft using residential airspace so that the maximum equivalent energy level of the noise does not exceed the NSW Government Environmental Protection Authority requirement for residences in the neighbourhood of suburban industrial sites ie LAeq(15) = 40, 45, 55 (night, evening, day) . Alternatively, the requirement should be that the maximum noise in decibels permissible inside a living or sleeping area of a home should not exceed the architectural acoustic recommendation which is stated in Australian Standard As 2021, ie 50 dB(A) .

4.4 INADEQUATE USE OF SPREADING:

In Section 2.1 (viii) it was pointed out that one of the objectives of LTOP was to facilitate flight path spreading, especially where newly affected residents are involved [# 73] . Although the spreading discussion in the LTOP Reports occurs in the context of planning for Trident *[A pattern of northerly arrival spreading]*; there is no logical reason why "spreading", "fanning" or whatever one cares to call it, should not be a feature of LTOP throughout, for departures as well as arrivals.

Figure 4.4.1 shows the current regular distribution of jet aircraft tracks under LTOP in northerly winds, and southerlies up to 5 Knots [When departures could readily take place over the Bay].

Departures in the Figure are shown in Green , and Landings in Red [directions are also indicated by aircraft symbols]. Fanning is observed to a limited extent over the north west, but none over the East, where two distinct and concentrated flight paths are observed to occur; thus breaching the inferred taboo on flight path concentrations in the LTOP .

Whilst the fanning taking place over the north west is better than none, the principle is often forgotten by the LTOP Managers, and people on some tracks get much concentrated noise.

At the commencement of LTOP in December 1997, there was little or no fanning over the north west, flights were concentrated almost exclusively over the same tracks 17 hours a day for day after day, and these people were "newly affected." That was gross, an insult to residents, and an invitation to surmise that it was all a "softening -up process" imposed by government!

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68 "Expanding Ways to Describe and Assess Aircraft Noise" [March 2000 - ISBN 0642 42262 1]

69 WHO = World Health Organisation

70 "Community Noise" (1995) Berglund, B. & Lindvall T. Centre for Sensory Research Stockholm, WHO Contracted Report ISSN 1400-2817; ISBN 91-887-8402-9.

71 NSW Industrial Noise Policy, NSW EPA, January 2000.

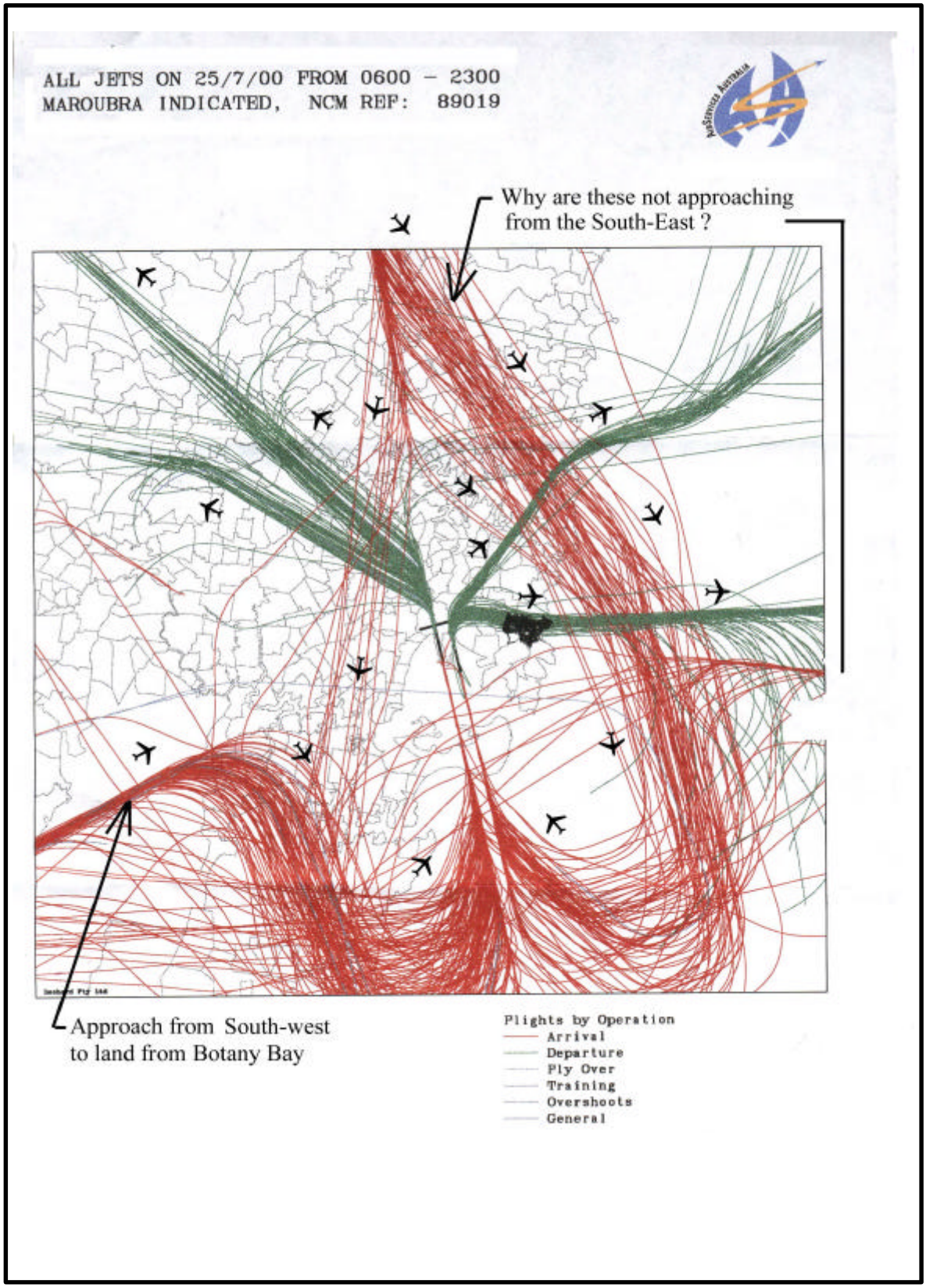
72 For definition of ANEF see S. 8.1

73 LTOPSR p. 17

FIGURE 4.4.1 ILLUSTRATION OF FANNING AND DEPARTURE CEILINGS UNDER LTOP 25/7/2000

This Figure is reproduced and modified for the purposes of review and criticism pursuant to S. 41 of the Copyright Act (1968) from an Airservices Australia "Lochard" plot supplied on request to residents .

Landing2.tif



What is not apparent form the daytime-averaged appearance of fanning in Figure 4.4.1 , is that it is almost completely random, successive planes turning every-which-way and without apparent order.

From 1997-98 there was considerable relaxation of the concentration over the north west, though recently (2002-3) there has been reversion to concentration over Summer Hill. However, in the east there has been no relaxation of flightpath concentration. In the northwest, low-level flight track concentration still resumes beyond Burwood and continues as far as "The Hills", Richmond and the Blue Mountains, and back across the northern edge of the city fringes for departures heading north and east.

A recent letter to a Winston Hills resident from the 2002-3 Chairman of the Government SACF [Sen. Marise Payne] admits that one particular area of Winston Hills gets 50% *of all departing jets* [See Appendix C]. This letter draws the fallacious inference that such a concentration "is fair." Independent enquiries have shown that these aircraft are also by this point in a sort of "delayed takeoff mode", now powering up, as if for initial takeoff roll, to gain altitude to cross the Blue Mountains.

A Senior official in Airservices Australia has assured SACF Inc that the eastern concentrations are *"a choice of Airservices Australia"*, not the government SACF. Thus popular allegations that the member for the liberal seat of Wentworth had something to do with the concentrations over neighbouring labor electorates and the almost complete avoidance of Wentworth may be unfounded. One sincerely hopes so, but it does Airservices Australia no credit in terms of its obligations to minimise the impact of aircraft noise and pollution on the [human] environment [#74] . Thus ASA is not practising the principle of "spreading" as espoused in the LTOP reports.

Airservices Australia should be implementing "spreading" (and any other measure for the relief of residents which does not compromise safety) without fear or favour, even if this results in increased work-load for air-traffic control; or less convenient trajectories for the airlines. If it benefits the aircraft noise beleaguered residents of Sydney it should be introduced. The introduction of spreading for flight paths over the east would greatly relieve the burden for the unfortunate residents now under the Coogee, Maroubra and Paddington flight path superhighways!

It is demonstrated in Section 6.5 that a time sequenced form of spreading of overland departure flight tracks could be effected , for which even a throughput of 40 flights [departures or landings] per hour, would minimally affect most people in sectors such as those of the north west and the north east. Given around 100 degrees of arc, such time sequenced departure spreading means that any one person beyond, say 2-3 km of the runway threshold, should only hear a departing aircraft about once per hour, at the most!

Why hasn't this sensible suggestion being proposed by the government SACF, or even Airservices Australia, in fulfilment of its statutory duty to protect the environment [#75] ?

Cynics have suggested that the initial flight path concentration in the north west could have been part of a "softening up procedure" ordered by either the then Chairman of SACF, the then Minister or the then Manager of Operations [Airservices]. However, closer reading of the LTOP Reports shows that the expressed intention was some vaguely defined concept of "equity" over the north west [#76] . At p. 17 the LTOP Short Report (LTOPSR) states:

> *"It is proposed that, over time, the distribution of traffic on the nominal tracks shown on the plan <u>be equitable</u>, monitoring over a short period, say one hour, may not show that equity if there is a concentration of departures to <u>similar destinations</u>." [Authors' emphases]*

Why, one may ask, should the destination of the aircraft have anything to do with equity, if the first consideration is the human environment [S. 9(2) Airservices Act], and "putting people first" [government policy]? The aircraft destination can only be a factor if the fuel economy interests of the airlines are considered before those of Sydney residents. The emphasis in this Review is that the human environment interest should always be put first .

We return again to Figure 4.4.1 in Section 5 . There it is shown that the present airspace management of LTOP northerly departures (cf. Fig. 4.1.1), raises the risk of both mid-air collisions and heavy jet crashes after takeoff resulting in the possible incineration of Sydney residents. Later it is shown [Section 6.2, 6.3 & 6.5] that only minor changes in the airspace geometry [depending on the prevailing wind] are needed to satisfy safety, equity and noise minimisation objectives together [See Section 5 on Crash Risk under the LTOP].

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74 Airservices Act (1995) SS. 8(1) (d) & 9(2)

75 Airservices Act (1995) SS. 8(1) (d) & 9(2)

76 Departures from Runway 34L -see LTOPSR, p. 17.

<u>Recommendation 4.4.1</u>: Departure flight path spreading should be employed wherever possible to minimise the continuous nature of the noise disruption to any individual residential location under the take-off flight paths.

<u>Recommendation 4.4.2</u>: If possible a time-sequenced continuously variable bearing strategy should be adopted which ensures that in any given day no residence is exposed to departing aircraft noise on more than one occasion as proposed in S. 6.5.

4.5 FAILURE TO INCLUDE "NOISE MINIMISATION OBJECTIVES" IN TERMS OF REFERENCE

Noise minimisation as a principle barely features in the LTOP. At page 103 LTOPSR claims that the internationally recognised International Civil Aviation Organization [ICAO] recognised "Noise Abatement Flight Paths" (ICAO -"A" & "B" [#77]) "are necessary" and LTOP Recommendation 19 requires noise abatement climb procedures to be standardised for all runways. However, these have not been implemented . This is an utter disgrace.

Noise from a sound source decreases in intensity in proportion to the inverse of the square of the distance. For an aeroplane the relevant distance is the height above the ground. This much is "simple" Physics [# 78] [See S. 8 for more on noise and Appendix K , for background to acoustic calculations].

In recognition of this law of Physics , ICAO devised two major "Noise Abatement" tracks for Departing Aircraft [which are the ones which make the most noise] . These procedures involve the aircraft climbing as quickly as possible to 1500 ft [in the case of ICAO - "A"] and 1000 ft [in the case of ICAO- "B"]. ICAO -"A" was designed to provide optimal noise reduction at distances of 3 plus km from the airport; and ICAO- "B" was to minimise impacts closer to sensitive sites near the airport; but provides a worse outcome for intermediate distances [# 79] [# 80] .

Recommendation 19 of the LTOP stated :

> ***"That noise abatement climb procedures be standardised for all runways at Sydney Airport and that an assessment be made to determine whether the International Civil Aviation Organization (ICAO) Procedure "A" or Procedure "B" be mandated for all jet operations".***

This recommendation has not been implemented. During 1998 the government SACF experimented with ICAO-"A" operations over the east, with much reported relief for residents who detected perceptible reductions of noise level. Later in 1998 , a similar test for departures over the north west resulted in similar feedback . Disappointingly, these "experiments" were opposed both in the government SACF and the IMC by the then Qantas representative , Mr. Bill Bourke [#81] and by Ansett representative Mr. Marks[#82].

In August 1998 the then Transport Minister's Office announced :

> ***"As a result of strong community support for steeper climbs by jet aircraft taking off to the north from the new parallel runway at Sydney airport, the Minister for Transport and Regional Development, Mark Vaile announced today that it has been decided that the procedure will be required of all airlines departing north from the parallel runways. "*** [#83]

Although now apparently required by Ministerial Directive [# 84] [See above], ICAO-A departures are not universally carried out during takeoffs from the north bound runways. Moreover no government SACF Chairman since has pressed for compliance with this requirement .

This is disappointing since there are no safety issues with ICAO -A, and CASA is on record stating that ICAO-A & -B [or equivalent - see Notes S. 4.5] are compatible with Runway 34R departures , and generally that:

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77 Note: These are now officially replaced by ICAO NADPs 2 and 1, respectively (1/11/2001)

78 In practice meteorological circumstances will blur this rule, but overall it will apply in still conditions.

79 See ICAO PANS-OPS Doc 8168-OPS/611 "Aircraft Operations" - Procedures for Air Navigation Services - Volume 1 Part V.

80 Note: ICAO "A" & "B" have recently been replaced by ICAO NADP 2 & 1, respectively , [based on US FAA AC 93-51C] but of similar effect. The Airservices Australia Document "AIP" requires effectively NADP 2 procedures with minimum climbout of 1500 ft [AIP ENR 1.5 para 11.1.6] and NADP 1, formerly ICAO-B, procedures do not apply at KSA [DAP -East].

81 See SACF Minutes AI 5 22 May 1998; IMC Minutes No. 13 2/6/98

82 IMC Minutes 13 , 13/6/1998 AI 5

83 Vaile - 28 August 1998 ; T159/98.

84 IMC Minutes 17, 22/9/1998, Item 8c.

> ***"Any aircraft making a turning departure compared with a similar aircraft making a straight departure <u>will suffer a loss of climb performance</u>, hence the climb rate of an aircraft making a turning departure will be less than a similar aircraft making a straight departure under the same conditions."*** [#85]

The result is that at present the residents of the near north east and west are "drowned in noise" from turning low-flying jets [747's to the north west, A320 's and B737s to the east] flying as low as 1400 ft at 8km from takeoff roll. One pretext for this is said to be to *"minimise fuel consumption*" [#86] which was never a principle of LTOP [S. 2], and it blatantly ignores the August 1998 Ministerial directive .

In contrast, with Botany Bay takeoffs , the same jets climb to much higher altitudes more quickly, so that by the time they are over the water off Cronulla they are at about 10,000ft. This is approximately the same distance of travel as applies to departures over the north west when they have reached only between 1-3000 ft.

Despite the above, however, ICAO -A & -B (or equivalent) modes are actually defined in the Airservices "AIP Australia" [#87] [#88] , and are also nominally "required" Noise Abatement Departure Procedures [NADPs] for Sydney in Airservices "DAP-East" [#89] for runways 34L and 34 R [See Noise Abatement Procedures S. 1.2] .

Yet the resulting SIDs [#90] for jet aircraft departing to the north from Runway 34L include turns at 800 ft for jets, and 600 ft for non-jets and for runway 34R a major turn at the ridiculously low altitude for jets of 500 ft [#91] .

Similarly, takeoffs to the East are expected to turn at only 800 ft, while those to the west actually do comply with ICAO-A, ie turns at 1500 ft [although the Canterbury Representative on the Government SACF specifically requested this to be increased to 2000 ft].

Table 4.5 lists the existing <u>*overland*</u> jet aircraft departure SIDs at KSA indicating which runway is employed, the turn altitude specified in the SID and whether or not the SID is ICAO - A [NADP -2] compliant.

TABLE 4.5 JET AIRCRAFT OVERLAND SIDs AT KSA WITH SPECIFIED TURN ALTITUDES SHOWING IACO-A or -B [NADP-2 & 1] COMPLIANCE

DEPARTURE SID	***RUNWAY & TAKEOFF DIRECTION***	***ULTIMATE DIRECTION OF FLIGHT***	***JET TURN ALTITUDE FT***	***ICAO - A or AIP ENR 1.5 - 11.1.6 COMPLIANT***
"SYDNEY ONE"	34L NORTH	ANY N /NW	800	NO
"SYDNEY ONE"	34R NORTH	ANY N/ NE	500	NO
"SYDNEY ONE"	07 EAST	EAST/NE/SE	800	NO
"SYDNEY ONE"	25 WEST	WEST/SW/NW	1,500	YES
"FISHA FOUR"	07 EAST	NORTH OR SOUTH	800	NO
"SOUTH WEST DEPARTURES"	34R NORTH	WEST & SOUTH	800	NO
"RICHMOND TWO"	34L NORTH	NORTH WEST NORTH EAST	1,500	YES
"ENTRA TWO"	34R NORTH	NORTH/NE	500	NO
"MARUB THREE"	34L NORTH	EAST & SE	500	NO

It is therefore clear that in most cases, non-ICAO, non- Noise-Abatement Modes are being used, ***<u>with resulting noise maximisation</u>*** for residents of Greater Sydney. Why, may one ask, pay "lip service" to ICAO - Noise Abatement Departure Procedures when the SIDs employed do anything but that? Indeed they contradict both Airservices own

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85 Memo D. Marland to C. McCurley ASA, CASA SDO 24/12/1997.
86 SACF Minutes 22 May 1998.
87 AIP = Aeronautical Information Publication, Airservices Australia.
88 See para 11.1.2 - ENR 1.5-35.
89 DAP = Departure & Arrival Procedures, Airservices Australia.
90 SID = Standard Instrument Departures
91 See "SYDNEY ONE DEPARTURE" SID -Ref. SSY85DR1.

AIP, and its responsibility for environmental protection under S. 9(2) of the Airservices Act (Cth) 1995. SACF Inc says that LTOP should be implemented fully according to its enunciated spirit, ie. *"Putting People First"*.

<u>Recommendation 4.5</u>: Low altitude turns should be abolished for jet departures at KSA. Low altitude turns are inefficient in terms of permitting aircraft to optimise altitude gain and thus result in greater noise intensity over residential areas around the airport. At the minimum ICAO-A (or equivalent as stated in AIP ENR 1.5 para 11.1.6) noise abatement departure profiles should be enforced out of KSA as envisaged in the LTOP Reports, and 1998 Ministerial Directive. SACF Inc however, prefers a more imaginative approach such as that employed by Calgary or Canberra Airports with turns over residents at not less than 6500 and 4700 feet, respectively.

4.6 FAILURE TO MONITOR RESULTS:

LTOP "Recommendation 23" required the IMC to *:*

"further progress equitable noise sharing by refining:

- *an agreed set of criteria and target values;*
- *developing a practical and publicly accountable monitoring process; and*
- *establishing an agreed mechanism for informing Air Traffic Services of current outcomes in relation to target values"*

[LTOPSR p. 8]

LTOP "Recommendation 25" further required the position of existing permanent noise monitoring terminals to be reviewed, and "Recommendation 26" required a program of short term deployment of portable noise monitors to be developed to provide data to residents in areas where significant problems were identified.

Monitoring of newly affected areas was mandated by then Environment Minister Senator Robert Hill in giving approval for LTOP without an EIS in the following terms: [# 92]

> ***" the responsiveness of the Noise Enquiry Unit should be maintained and enhanced through appropriate staffing and equipment and access to the best available noise monitoring methodology;***
>
> ***" permanent noise monitors should be added to the present noise and flight path monitoring system where appropriate to allow monitoring of aircraft noise in areas affected by changes to flightpaths made as a result of the Long-term Operating Plan. Additional mobile noise monitors should be purchased to improve the effectiveness of responses to noise complaints and improve the coverage of monitoring information ....." .***

That this instruction was honoured in the breach is evidenced by the almost total lack of any attempt to properly implement noise monitoring stations in newly affected areas, at least at the commencement of LTOP. When noise levels were reluctantly measured [by DOTRS] in March 1998 in Croydon in the north west [# 93] , the reported levels over this heavily residential area in early 1998 were 85-90 dB(A).

In May 1998, this failure was brought to the attention of the government SACF by Philip Lingard [of North West Residents Airport Group] and Alister Simington [of Save our Skies] [# 94] . Afterwards David Lidbetter [# 95] attempted repeatedly to have this issue raised on the government SACF and to get the then DOT to release the promised funds for additional, portable monitors in the newly affected areas. However, obtaining monitors for this purpose from DOT and its three successors has been harder than getting blood from stone. In the meantime there have been several noise monitoring studies for Kurnell and Cronulla during the course of LTOP implementation.

Amateur monitoring of noise levels in the Ashfield area in late 2001 showed that levels as high as 80dB(A) were then produced by the ultra-low flying heavy Jets, with a minimum level of 70 dB(A) . In early 2003, Airservices Australia conducted 93 day study at a Summer Hill residence , and found levels for all jet aircraft overflights in excess of 70 dB(A) with the highest mean (for B727-200's) being 86.4 (+/- 5.3 SD) dB(A) and an ANEI [# 96] for the study period of 16.7 dB(A) [#97].

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92 Senator Robert Hill Media Release No. 88/97, 24/7/1997

93 A portable monitor was sited for some time at Presbyterian Ladies College [PLC].

94 This was a *"one off "* proxy for Anthony Albanese, MP [PL] and the then Paul Zammit MP [AS] , respectively .

95 Former community representative for the "inner west" & Drummoyne Resident who was one of the original LTOP architects.

96 Australian Noise Exposure Index , AS 2021 -2000 Section B3

97 "Short Term Study into Aircraft Noise and Flight Paths February -May 2003 Summer Hill, Report No. 1360, Airservices Australia Environment Services Branch, 30 July 2003.

This means that 5 % of maximum levels at this point considerably removed (ca. 8km) from the take-off roll point on runway 34 L would be in excess of 96.9 dB(A), ie (86.4+ 2SD) . These are levels consistent with exposure at runway threshold for some jets. According to Australian Standard AS 2021-2000 the 16.7 dB(A) ANEI level is consistent with 40% of normal people being "moderately annoyed" and 10% of people being "severely annoyed" *[See description in S. 8.1.3]* .

It is abominable that heavily trafficked newly-affected areas such as Summer Hill and Coogee have waited five (5) years from LTOP commencement to have noise monitored effectively, while in the meantime people have been suffering and, in breach of government promises, the Kingsford -Smith Airport has been sold.

Recommendation 4.6: That "Recommendations 23, 25 and 26" and the Environment Minister's Directive of 24 July 1997 be fully implemented in all the areas newly affected by the LTOP.

4.7 FAILURE TO INCLUDE PERSON-IMPACT NOISE METRIC IN FLIGHT PATH PLANNING:
Another reason for the failure of LTOP is the refusal of the authorities to properly assess the dose-response of the revised flight plans to ensure that the outcome produced equitable noise sharing, not merely "Noise Shifting." A proposal for employing a per person impact metric based on area census statistics is described in S. 6.4 (*"Using A Census-Based People-Events Noise Metric"*) , below.

Recommendation 4.7 : A population census -based statistic needs to be developed which can provide a dynamic dose-metric for aircraft noise received by residents so as to ensure that the environmental impact distribution of flight paths employed by Airservices Australia is equitable and fair.

4.8 THE FAILURE OF THE "COMPLAINTS LINE" SYSTEM:
The former Sydney Airport "Noise Enquiry Unit" (NEU) was transferred from the former Federal Airports Corporation to Airservices Australia on 1 July 1996 [#98]. As a condition of approving LTOP without a formal EIS the then Environment Minister, Senator Robert Hill, mandated: [#99]

> "***the responsiveness of the Noise Enquiry Unit (NEU) should be maintained and enhanced through appropriate staffing and equipment and access to the best available noise monitoring methodology;***
> *[Author's emphasis]*

In September 1997 the government SACF succeeded in having the NEU made a Freecall Number [1800 802 584] for the purpose of facilitating residents complaints about the plan [#100] . In late 1997 and 1998, many Local Councils whose residents were to become subjected to new aircraft noise under LTOP distributed 'fridge magnets with the then "Freecall" *"Complaints Line"* number on it with instructions to call it whenever they were annoyed. Similarly, local community group members encouraged neighbours to call the complaints line to indicate their disapproval of the "Noise Share Plan".

The NEU was also employed by government as a means of "polling" residents to ascertain the level of satisfaction with the LTOP "noise share plan" . To this end , fortnightly complaints reports are published by the Minister for Transport's office as "Briefing Notes on Sydney Airport."

Unfortunately, the "complaints line" (officially 'Noise Enquiry Unit' or NEU) has become an utter farce. Its only practical present use is to enable annoyed residents to quiz Airservices staff as to why various situations are allegedly occurring and obtain "Lochard Plots" showing the alleged aircraft movements over selected areas.

There is no doubt that government through its bureaucrats has overtly used the Enquiry Unit as a purported means of "testing of community feeling" about LTOP for public relations purposes. It was thus hardly surprising that in the early days the "complaints line" ["NEU"] was swamped by callers from newly affected areas demanding changes.

Not getting the "satisfaction level" results from the NEU which government "spin-Doctors" liked, in April 1998 Transport Minister Vaile was reported as claiming that *"residents were rorting the complaints line"*, because those using it were obviously troublemakers determined to destroy the system [#101] .

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98 Briefing Notes on Sydney Airport, Hon. John Sharp, MP. 20 June to 3 July, 1996.
99 Senator Robert Hill Media Release No. 88/97, 24/7/1997
100 SACF Minutes, 19/9/1997, Agenda Item 9 [See previous Minutes for background].
101 Vaile Spokesperson, Peter Cassuben, Press Release April 1998.

On the contrary, for many, it took some courage to call the complaints line owing to the fact that:

(a) One is told one's complaint is being "recorded" and one is asked for one's name address and telephone number; which is then used for subsequent identifications on repeat calls; and

(b) The ordinary man in the street is facing an expert about aircraft flight path management who, seemingly, can blind him with "science" .

Although for the most part staff of the Airservices Australia Noise Enquiry Line have been amicable and helpful, there have been reported examples where residents have been belittled and threatened by Enquiry Unit Staff. Such experiences can be intimidating . For those really distressed by aircraft noise, who have "broken down in tears" or have alternatively abused the operators [# 102] , visits by armed Federal Police have been reported. A typical recently used explanation from the NEU for why things are as they are is "to ask the politicians, " or "Speak to John Anderson".

Occasionally residents have been "summonsed" under S. 85ZE of the Commonwealth Crimes Act (1914) [# 103] , when circumstances have caused their anger to run away with them. This is hardly a public-relations climate with which to encourage a frank interchange of useful environmental information between government and affected residents.

For the government and Airservices Australia to now be using the (only-to-be-expected) drop off in complaints as an indication of "popular satisfaction" with the LTOP is absurd. Nor is it surprising that most complaints come from a few stalwarts who have the time to complain more frequently than most. Many people who were the most deeply and personally affected by the introduction of LTOP in the newly-affected areas have already moved out.

This may be good news for the NSW Stamp Duties Office, and possibly the Tax Commissioner, but should residents really be forced to move, by arbitrary government action, from the area in which they chose to live ? It is indeed a fact [contrary to the spurious claims of the Prime Minister [#104]] that many of those newly affected had *never been affected by aircraft noise before*.

It was not good enough for Mr. Vaile [a resident of Taree] to haughtily decry: *"people have to come to terms with living in the big city... they have the right to pull up stumps and move to a nice, quiet provincial centre or country town*." [#105] .

Such words grind hollow with many whose choice of residence was predicated by knowledge of traditional airport flight paths , and based on (in some cases) 30 - 50 years of peaceful residence in the older parts of the inner north west and east. So also do the words of Mr. Vaile that *"Aircraft Noise can be confined as an emotive issue for pockets of Sydney Residents."* [#106] .

The suggestion by government that those who defend their quality of life are emotionally unstable is deplorable and reflects the utmost cynicism which does our politicians no credit.

A recent gambit of Airservices abolished the free-call 1-800 number and replaced it with a 1-300 number in order to *"reduce the number of nuisance calls"*. The Government SACF Meeting on 15/8/2001[#107] spent at least 15 minutes discussing how to eliminate "the multiple callers" from the "complaints statistics"; and at least one member of the government SACF described such callers as "nutters."

The Freecall number change was implemented only in selected areas (all newly-affected in 1998), from which one may conclude that the complaints line number was never intended to realistically assay the depth of public feeling about flight path changes and aircraft noise, but was merely a Public Relations tool for facilitating government pretence of concern about public feeling.

Any responsible system for ascertaining the ongoing public opinion about new flight path arrangements and noise should approach them, rather than requiring people to actively call some number when every annoying event occurs.

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102 Incorrectly assuming they were the ones responsible for the aircraft nuisance, when it is the politicians.

103 Abuse of a (telephone) carriage service -penalty 1 year gaol.

104 Sydney Morning Herald 10/2/1998.

105 Daily Telegraph 8/1/1998

106 Australian 27/7/1998.

107 Chaired by Senator Helen Coonan

Such responses are simply not practical in modern real life, where there are often two breadwinners, children to feed or take to school, jobs to hold down, etc etc. Further, a proper evaluation of new systems should involve scientific measurements and not just a measure of peoples' reactions.

If the government SACF, AirServices or the Government itself, wish to know how people feel about the continuing and increasing levels of aircraft noise over affected areas, then they should contract a properly conducted survey, by properly trained independent surveyors using questionnaires professionally designed to elicit the required [if not necessarily desired] information.

Recommendation 4.8: The complaints line (NEU) should be used strictly for the provision of accurate information to the public. It is unscientific and irresponsible for the government to portray the Noise Enquiry Unit as a means of testing public opinion about the LTOP.

4.9 FAILURES OF MANAGEMENT AND APPROPRIATE REPRESENTATION

4.9.1 *THE WORK OF THE LTOP TASK FORCE*

There was clearly an enormous flurry of apparent consultation in connection with designing and implementing the LTOP, including a public meeting "roadshow" in six suburbs [#108]. Initially there must have been meetings of a mysterious *"LTOP Task Force"* , to which the formulation of LTOP is attributed, but for which there appears to be no evidence in the form of Minutes or any report. However, a claim by government that the Coalition of Airport Action Groups [CAAG] was involved at some early stage has been denied by the former Co-chairman of that organisation [Mr. Rod. Hibberd]. The other consultation bodies include Sydney Airport Community Forum [SACF] and the Implementation and Monitoring Committee (or IMC). The only indication of who the participants on the so-called Task Force were is given in the SACF Minutes for Meeting 6 :

> ***"The Chairman thanked the team which contributed to the preparation of "the report", including Tony Williams[#109] , David Lidbetter and Bill Bourke. "*** [# 110]

There have now been in excess of 35 meetings of the Government SACF and more than 51 meetings of the "supervisorial" , IMC since March 1996. The first meeting of the government SACF was held on 22 July 1996, and the first IMC meeting on August 18 1997. Few of the original LTOP supporters on the Government SACF are now satisfied with the outcomes of the plan to-date, and an independent LTOP Audit is presently in the wings.

The previous sub-sections of this Chapter have identified the most significant failures of LTOP occurring to-date. These are:

- Deficiencies Of The Four-Point Compass Target Goal [4.1];
- Failure To Maximise Over-The-Water Modes [4.2];
- Defects Of The Existing Approach To Equitable Sharing [4.3];
- Inadequate Use Of Spreading [4.4];
- Failure To Include "Noise Minimisation Objectives" In Terms [4.5]
- Failure To Monitor Results [4.6];
- Failure To Include Person-Impact Noise Metric In Flight Path Planning [4.7]; and
- The Failure Of The "Complaints Line" System [4.8].

The failure both morally, and scientifically to address the meaning of "equitable sharing" in both LTOP Reports and in the Proponents Statement is key to the failures of the compass target goal, equitable sharing and spreading discussed above [S. 4.1, S. 4.3 & 4.4]. However, these are minor issues compared to the failure to focus on what was the clearly-stated primary goal [S. 4.2] - ***ie the maximisation of movements over water , and minimisation of movements over residential areas.***

The initial *"LTOP Full Report* [#111]*"* by Airservices Australia canvassed most of the available over-water possibilities for LTOP, but when the "Summary Report" [#112] was published in December 1996, the key SODPROPs "over-the-water" Modes 2 & 3 had been omitted. The reasons for this were never sufficiently justified [See S. 6.3,

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108 SACF Meeting 4 11/11/1996, Agenda Item 5

109 Tony Williams has revealed in personal communications that he argued strenuously in the said "Task Force" over its refusal to realistically consider means of maximising the Botany Bay modes according to the Ministerial Directive [PL].

110 SACF Meeting 6 , 17/2/1997, Agenda Item 6

111 LTOPFR

112 LTOPSR

below], but whenever the issue arose on the government SACF their discussion has always been vehemently dismissed by community representatives on the IMC with assertions to the effect they ***"were not LTOP Modes"*** [#113].

The above omission was also repeated in the Proponents Statement. Likewise there is no discussion of either Modes 2 or 3 or SODPROPs apparent from the SACF Minutes between July 1996 and the December publication of the LTOP Summary Report [LTOPSR] . The only suggestion of an intention by Airservices to ignore the ministerial direction to maximise movements over water may be inferred from the cryptic reference in the point summary of an Airservices presentation to the first SACF meeting:

> *"Issues raised in this session included:*
> .....
> - ***the abolition of the "Bennelong funnel"***
> - ***the time required to turn the Airport around from southerly to northerly flow "*** [# 114]

Given the clear Ministerial Direction referred to in S. 2.1 (iii) above: "***maximum use is to be made of flightpaths over water and non-residential areas***" , why would there be any need to "turn the airport around" , and without written evidence, the only conclusion is that this major change of emphasis was instigated during the *"Task Force"* phase of LTOP development, or by Airservices of its own accord. The above statement at least confirms an Airservices intention to maximise takeoffs to the north as shown in S. 3.3 (above), but no attempt was made to reconcile this with the objective of maximising movements over water. Who is responsible for this change?

The explicit adoption of the least efficient SODPROPs Mode 4 by LTOP also revealed no commitment to maximising Botany Bay movements . Given that Airservices Australia may be assumed to possess superior knowledge as to the rules of flight path trajectory design, one must conclude that this failure to achieve the primary LTOP goal lies at their feet .

The issue of designing a "person-impact metric", though key to quantifying the outcomes of the LTOP in terms of equity, was belatedly addressed in March 2000 (by DOTARs) in its "N70" discussion paper [# 115] However, this DOTARs paper only aims to prove the political point that noise is now "more widely spread" (if not more equitably) than pre-LTOP.

The failure to minimise noise from aircraft, though required by the LTOP terms of reference and enunciated in the LTOP Reports and Proponent Statements as ICAO "Noise Abatement Departure" protocols, had to be subsequently mandated by Ministerial Directive (August 1998) . However, even this Directive has substantially been ignored.

The Minutes of SACF and the IMC suggest this may be a failure by Airservices Australia to face down misguided airline pressure to *"maximise fuel savings "* . The fact that *"maximising fuel savings "* was outside the terms of reference of LTOP , as Ministerially directed , reveals such pressures should have been rejected by the IMC and SACF Chairs.

Moreover, if "fuel saving" is the reason for dropping ICAO-A [NADP-2] at Kingsford Smith , but not at other Australian Airports, it is quite invalid when comparison is made with both local and overseas airports, where many have adopted ICAO-A, or even more efficient noise-abatement climb procedures [See S. 8.2.3-5 & Appendix L].

Most of the north-departing SIDs for Sydney Airport now contradict the stated noise abatement rules in Airservices own "DAP-East" [#116] for Sydney Kingsford Smith , as well as the AIP [#117]. The publication of the contradictory SIDs for jet aircraft at Sydney Airport [cf. S. 4.5] reveals serious flaws in air-space design for the environmental management of this airport.

The Complaints Line failure results from the mis-allocation of human resources. It is hardly the role of off-duty air traffic controllers [# 118] , already scrambling to learn new traffic procedures in the face of unprecedented traffic accidents risks [# 119], to placate angry residents . The disgust of residents with the now dominant overland

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113 Eg. Govt SACF Meeting 26/2/1999, per John Clark; 15/11/2000 in IMC Report.
114 SACF Minutes Meeting 1, 24/7/1996
115 "Expanding Ways to Describe and Assess Aircraft Noise, DOTARS March 2000, D. Southgate et al.
116 Departure and Arrival Procedures - East
117 Australian Instructions to Pilots
118 An Air Traffic Controller's job is sufficiently stressful at the best of times
119 BASI Investigation Report B98/90, August 1998 , Refer S. 5.3.2 below.

low-altitude flight path miasma exceeds all previous levels of airport-related disgust to the extent that the complaints line has frequently been disconnected to shut out the problem.

One could argue that it is more the role of psychoanalysts or priests to undertake this role of placating residents faced with such government-ordained nuisance. If government really wished to research the level of popular satisfaction with the "fair-share-noise-plan" they would use more appropriate methods , or fund a mail-out referendum organised by affected local Councils.

Within LTOP there are two major official fora for "consultation" regarding airport and aircraft impacts in the Greater Sydney Region. These are The "Sydney Airport Community Forum" [Govt SACF] and the "Implementation and Monitoring Committee" [IMC].

Airservices Australia finds itself subject to Ministerial Directions both *"to implement LTOP"* and to follow the dictates of the Government SACF. What is deemed to be "LTOP" by the latter is considered sacrosanct for Airservices, and there is a taboo on receiving input from unrepresented quarters of the community, despite some pretence of openess to community consultation. How then, did this untenable situation come about?

4.9.2 THE SYDNEY AIRPORT COMMUNITY FORUM [GOVT SACF]
The Government SACF was established in July 1996 under the Chairmanship of the Hon. Joe Hockey MP [Member for North Sydney] with these Terms of Reference:

> ***"The role of the body is to act as a forum for:***
> - ***providing advice to the Minister for Transport and Regional Services and aviation authorities on the abatement of aircraft noise and related environmental problems at Sydney Airport;***
> - ***in particular it is the main body for consultation on the Long Term Operating Plan for the Airport.***
> - ***providing advice to aviation authorities to facilitate improved consultation and information flows to the community about the Airport's operations.***

It was to meet not less than quarterly. Sub-Committees could be established as required to report to the main body. The Transport Minister was to nominate the Chair and in consultation with the Chair, to decide on membership of SACF. The Forum was to have *"broad representation of all areas affected by airport operations."* However, there is an organisational bias on the Government SACF (some call it a gerrymander) of representation to the "north-south axis", which pre-LTOP bore the brunt of the post -third-runway aircraft noise. This has resulted in unfortunate outcomes for Mode-use distribution within LTOP.

Those modes which mostly affected the immediate north and south of Sydney were discounted within LTOP (eg. Mode 10) or diverted (Mode 9). Also the over-the-water modes [like 2 and 3], which could be implemented without significantly affecting the suburbs immediately to the south and would benefit everyone, were ignored by SACF. Even discussion of Modes 2 & 3 was forbidden by this government forum [#120] , and hence no exhaustive investigation of their potential was carried out.

The LTOP Full Report [LTOPFR] claimed Modes 2 & 3 would unfavourably affect suburbs south of the airport. Yet even if there were some mild affectation of, say Cronulla , which is refuted in this Review (S. 6.3.2) , the affected populations are miniscule compared to those dominated by the present residential take-off flow. So why does SACF promote the myth that LTOP modes 2 and 3 would prove unbearable for Cronulla?

The composition of the government SACF in mid-2001 is shown in Table 4.9.1 :

Each member of the Government SACF is government appointed, with four so-called "community representatives" (inner west, upper north shore, Canterbury and Kurnell). The Table shows that , although now not as unbalanced as in the planning phase to LTOP in 1996, when the north-south axis had 85% of the votes, the gerrymander, as claimed by SACF Inc in *"The Way Forward No. 1"*, is still apparent .

The government SACF is thus still not fairly representative of aircraft noise-affected areas and requests for community representation from newly affected areas have been routinely rejected by successive Ministers and Chairmen of the Government SACF. The north-south axis gerrymander of the Government SACF and IMC is unacceptable because some affected areas have multiple representatives, while others have none at all.

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[120] SACF Meeting 14, 19/3/1998, Agenda Item 6

TABLE 4.9.1 COMPOSITION OF GOVERNMENT SACF - MID -2001

REGION	**REPRESENTATIVES**	**PERCENTAGE**
East-West	7	28%
North	11	44%
South	5	20%
Industry	2	8%
TOTALS	25	100%
RATIOS	***NORTH/EAST-WEST***	***157%***
	NORTH-SOUTH/EAST-WEST	***229%***

The second body set up for consultation purposes at the commencement of LTOP was the "Implementation and Monitoring Committee" [IMC] .

4.9.3 THE IMPLEMENTATION AND MONITORING COMMITTEE [IMC]
The IMC was established in mid-1997 with the following Terms of Reference:

IMC TERMS OF REFERENCE [# 121]

- ***-oversighting the introduction of the new modes and the changes to airspace and flight tracks in accordance with the recommendations in [the LTOP Report];***
- ***-recommend priorities and timing for the introduction of infrastructure changes [eg. taxiway enhancements];***
- ***-preparing an on-going noise-management plan to progress equitable noise sharing by developing***
  - ***- an agreed set of criteria and target values;***
  - ***- a practical and publicly accountable monitoring process;***
  - ***- an agreed mechanism for informing Air Traffic Services of current outcomes in relation to target values.***
- ***-oversight the preparation of relevant ANEI, and other noise measurement measures.***
- ***-conduct appropriate public consultations and community awareness programs.***
- ***-making recommendations on modifications to proposed operations under the plan in the light of monitoring outcomes.***
- ***-to assess the operational and safety implications of any proposed changes.***
- ***-to assess the efficiency impact of any changes.***
- ***-provide regular reports on progress with implementation of the Plan and the monitoring of the Plan against its objectives.***

In his media release of 27 July 1997, which authorised LTOP implementation without an Environmental Impact Study, then Environment Minister Senator Robert Hill made the following amendment to the IMC terms of reference:

> ***"the Implementation and Monitoring Committee proposed at Recommendation 9 of the Proponent's Statement should be restricted to coordination of the implementation and monitoring of the Long-term Operating Plan "at a technical level." There should be overlap in membership and agenda between this Committee and the Sydney Airport Community Forum"*** [# 122]

and to this the Minister for Transport added the following on 31 July 1997 at the request of the Sydney Airport Community Forum [# 123].

> ***"Oversee the practical implementation of the Long Term Operating Plan to ensure the integrity, intent and targets of the Plan are met."***

The first meeting of the IMC was held on 18 August 1997. Early in the implementation phase of LTOP [mid-1997] attempts were made by government SACF to have two additional representatives appointed to IMC from affected areas in the "east" and "west", though this was disallowed by the Minister for Transport. This refusal further consolidated the representational inequity affecting the practical implementation of LTOP.

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121 See LTOPFR pp. 183-184
122 Ministerial Media Release 88/97, 24/7/1997 Sen. Robert Hill
123 SACF Minutes 20/6/1997 & 31/7/1997

It is the SACF Inc submission that the two resulting so-called "community representatives" [One from the north shore (formerly inner west) , and one from Kurnell] cannot effectively represent the areas newly affected by noise under the "noise share" plan. Without impugning the integrity of these representatives, some of whom have performed sterling voluntary service, the IMC can hardly be considered "representative" of presently flight path affected areas.

The composition of the IMC in 2003 is broadly summarised in Table 4.9.2. :

The Chairman of the IMC is the incumbent Manager (Airservices) of Operations at KSA (presently Mr. Ken McLean). Given the dominance of the transport -industrial lobby on the IMC [Table 4.2] , it may be expected that any proposal which appears to affect this stakeholder group would be resisted. This much is apparent from the Minutes of the IMC in discussion of the implementation of ICAO-A noise abatement protocols in 1997-9 [# 124] .

Similarly a factor constantly being raised by the industry Stakeholder Group in connection with arrival overflying of departures across Sydney and the proposed "high and wide" approaches, necessary to "clear the skies" for departures, is the influence of terminal mileage and fuel costs [# 125] . However, the consequential

TABLE 4.9.2 COMPOSITION OF THE IMC

CONSTITUENCY[#1]	NUMBER	COMMENT
GOVERNMENT (ASA & DOTARS)	7	at least
INDUSTRY (AIRLINES & INDUSTRY ASSOCIATIONS)	6	at least
COMMUNITY [SACF] MINISTERIALLY APPROVED	2	only

[1] Based on minutes of recent meetings

additional track miles involved for departing jets in continuous low flying around the north-west circuit of the Sydney Basin under the arrival overflying regime [See S. 4.1.3] , appears to be totally ignored .

Understanding technical arguments for and against proposals by air-space designers, air-traffic controllers and the airlines, demands considerable technical expertise and understanding from community representatives, and they are placed at a huge disadvantage, both numerically and technically, by the "Transportation Industrial-Bureaucratic Complex" "lobby" on the IMC . That all noise-affected areas do not have committee representatives on this Committee worsens this problem.

This review does not conclude that the *"community representatives"* on the IMC have not tried to be fair. However, the practical outcome raises suspicions that north-south issues have enjoyed greater consultation , and that discussions of over-the water modes and east-west and north west concerns have been consequentially neglected. This reflects the natural colouration of opinion , given the bias of community representation .

The major unanswered question is : ***"How did an operating plan commenced with the objective of maximising movements and crash risk over water conclude by doing the exact opposite?"***

<u>Recommendation 4.9.1</u>: Airservices Australia should be held responsible for the organisational, design and implementational failures of LTOP as only this organisation has the ostensible skills to fashion an airspace design system for Kingsford Smith which truly minimises the environmental impact of the airport over residents.

<u>Recommendation 4.9.2</u>: The Community Consultation process should be reviewed to ensure that all noise-affected areas are represented and that particular area community interests are not permitted to dominate outcomes. Community Consultation should not be viewed as a "one time event". There should be repeated opportunities for the broadly affected community to express its views, as early public understandings of politically-stated objectives [eg. "fairly sharing noise"], may not be borne out in practice.

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[124] See eg. IMC Minutes Meeting 13 2nd June, 1998

[125] IMC Minutes Meeting 51 , 11/2/2003

Recommendation 4.9.3: The IMC should be reformed to represent all affected areas of the Sydney Basin .

The LTOP outcome today does not do that!

While on the subject of the government SACF, an interesting further issue is the proposed Kurnell Australand Development.

4.9.4 POSSIBLE DEVELOPMENT ON THE KURNELL PENINSULA

This issue apparently first reached the consciousness of the Government SACF in May 2001 , and was discussed deprecatingly in several meetings [# 126] . The high rise home unit and multi-unit developer Australand has proposed constructing a major residential / recreational complex right on the Kurnell peninsula adjacent to the existing aircraft flight tracks. A Partial Regional Environment Plan (REP) was submitted to the NSW Department of Urban Affairs and Planning for rezoning of Kurnell , and was to be considered by DUAP in mid-2001.

It was reported that the NSW Planning Minister Refshauge had taken planning controls for the area away from the local Council and an REP was submitted to the New South Wales Government in 2001 . The issue was raised by Kevin Hill (Kurnell Representative) and Bruce Baird (Cook) on the government forum, which resolved against it on 15 May 2001 .

The Commonwealth Department of Transport, The Council, the Community, SACL and the Airlines were reportedly all opposed to the development because of it being too close to the 20 ANEF zone in Kurnell , but the question remains: ***Could development at Kurnell be a hidden , yet underlying reason for abandoning the over-the-water modes and the seaward orientation of Sydney Airport, and what is behind it?*** If Kurnell were to be developed in this way , and given the growth of Sydney Airport , it would be to the environmental detriment of the rest of Sydney.

Nobody denies that Kurnell would be a highly attractive region to develop expensive high rise apartments were it not for the refinery, its zoning for "noxious trades" , the protected wet-lands and the airport. ***Who knows? What happened to the Australand proposal, and is this someone's hidden agenda?***

4.10 NO-RECIPROCITY PRINCIPLE ABANDONED:

The principle of LTOP that wherever possible no area overflown by landings should also be overflown by departures has been ignored, except for residents within the north shore Bennelong Funnel . This means that there are now new areas of Sydney where there is no respite from the intrusion of Aircraft flyovers. These areas are spread as far apart as the inner north west, Coogee and The Hills.

Recommendation 4.10: That the no-reciprocity principle should be strictly adhered to in order to maximise "respite".

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126 Government SACF 16/5/2001, Agenda Item 3.2

5. SAFETY IMPLICATIONS AND DANGERS OF LTOP [#127]

5.1 CRASH ACCIDENT RISK

5.1.1 WORLDWIDE CRASH ACCIDENT RISK:

Crash statistics are collected by the organisation AirSafe.com for most of the major jet aircraft types using Sydney (Kingsford Smith) Airport from 1972 - 2000 . These show that over all jet aircraft types, excluding hijack, 48% of crashes occur in landing , 24% occur during take-off and 28% occur mid-air. Fatalities arising from Hijack incidents amount to nearly 12% of the overall total.

A Summary of the statistics available from AirSafe.com (excluding Hijack -related) appears in Table 5.1.1. The fatalities listed include any ground personnel or residents caught in any subsequent conflagration.

TABLE 5.1.1: PERCENTAGE RISK BY ATTITUDE [LANDING/TAKEOFF/MIDAIR] OF FATALITIES FOR DIFFERENT AIRCRAFT [# 128]:

AIRCRAFT TYPE[#]	**NUMBER**	**LANDING**	**TAKEOFF**	**MIDAIR**
A300	3	100.00%	0.00%	0.00%
A310	4	50.00%	50.00%	0.00%
A320	3	100.00%	0.00%	0.00%
B737	46	60.87%	17.39%	21.74%
B747	25	20.00%	32.00%	48.00%
B757	3	33.33%	66.67%	0.00%
B767	3	33.33%	33.33%	33.33%
MD80	7	57.14%	28.57%	14.29%
DC10	13	38.46%	38.46%	23.08%
MD11	3	33.33%	0.00%	66.67%
DC9	43	48.84%	18.60%	32.56%
TOTAL	153			

Note: Jet Aircraft included in statistics: A300, A310, A320, B737, B747, B757, B767, MD80, DC10, MD11, DC9 - "Accidents" caused by terrorism excluded.

An interesting point, however, is that the aircraft type appears to have a significant effect on whether the fatalities associated with incidents during takeoff are greater or less than those associated with landing. For example the A300 Airbus experienced 3 fatal incidents between 1976 and 1999, but all of these occurred during landing.

Similarly, all 3 fatal incidents involving A320 Airbuses occurred during landing procedures, but only half of the four incidents involving the A310 Airbus occurred during landing. Similarly for the Boeing B737 the risk of death during landing is greater than that during take-off [61% vs. 17% of 46 incidents].

With Boeing's B747 and 757 however [28 incidents overall] the risk of death is higher during takeoff than during landing [See Table 5.1.1]. What technical or other features of the aircraft cause these differences is not the subject of inquiry here. They may include engine failure, bird strike, lightening strike and fuel tank rupture.

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127 H. Richard ; G. Harrison , P.S. Lingard & R.J. Tanner, with suggestions from P. Cork.

128 Source: "AirSafe.com" Copyright Todd Curtis 1999-2001 See http://www.airsafe.com./events/models/rate_mod.htm Revision 6 July 2001.

The fact is that for some aircraft the risk of fatal crash events involving takeoffs is greater than during landing, and the risk to both residents and passengers from a crash during takeoff for large jet aircraft is greater due to the larger fuel loads being carried [See further 5.2 below] .

Airsafe.com defines a "fatal event" as any circumstance where one or more passengers die during any civilian airline flight from causes that are directly related to that flight. For the period considered, the average number of "fatal events" per million flights was a little less than 1 [ie. 0.76], while the number of deaths per million flights averages around 62.

Whilst the "fatal event" figures may not seem excessive, and include instances of hijack (about 12%), the fact is that Sydney Airport during the year 2000 handled around 285,000 "movements".

Therefore in less than four years Sydney Airport turns over 1 million flights involving both landings and departures, and though not every flight involves a jet aircraft, the inevitability of a serious fatal-event involving Aircraft leaving or arriving at Sydney Airport grows nearer by the day.

This section highlights the variability with aircraft type of the crash risk danger. It emphasises that in considering flight path options, the authorities [whether Government, Airservices Australia or CASA] should choose those which minimise crash risk conflagration over residents.

This is because the danger for those on-board is inevitable, the risk of harm for those on the ground can be minimised by proper planning. The danger for those on board is also volunteered. danger for residents and third parties is not.

Failure of Australia to Provide Airport Crash Zones:

Unlike other countries Australia has no requirement for airports to provide uninhabited "crash-zones" in the approaches to Airports [#129] . This is a matter of great concern for Sydney because the default "crash zones" for overland arrivals and takeoffs are the heavily populated residential areas surrounding the airport.

<u>Recommendation 5.1.1:</u> LTOP should be redesigned to ensure the primary over-the-water flight path objective of the plan. Where possible, the predilection of a given aircraft type to crash at take off rather than landing should be taken into account in choosing the departure route for these aircraft.

<u>Recommendation 5.1.2:</u> Australia should adopt the ICAO -recommended practice of creating uninhabited crash zones along major flight routes to all its airports. In the case of KSA, this should mean that an alternative airport site outside the metropolitan residential area should be sought as soon as possible.

5.1.2 CRASH ACCIDENT RISK AT KSA:

The hazards and risks from Sydney Airport operations were examined in the EIS for the third runway [#130] . In that analysis, a key premise was that predicted crash frequency would be positively correlated to the number of overflights, so that if the number of overflights increases, then the probability of a crash would rise.

The Third Runway EIS stated :

> ***"In general, increased flying activity over Botany Bay would result in a corresponding general decrease in predicted crash frequencies in residential areas."*** [# 131]

The LTOP Proponent's Statement then goes on to state :

> ***"One of the key aims of the plan [ie LTOP] is to reduce overflights of residential areas and to maximise them over water. Therefore, overall it would be expected that introduction of the plan would lead to a decrease in predicted crash frequencies in residential areas."***

The current LTOP flight paths are far from achieving this aim. Indeed Airservices Australia have increased the spread of takeoffs over residential areas [# 132], and there has been a reduction in the proportion of both takeoffs and overall movements directly over water [#133] . Whilst we all wish every flight a safe takeoff and landing , it is fortunate that, historically, all the most serious aircrashes at Sydney Airport have occurred over Botany Bay, ie:

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129 CASA NPRM 0101S Para 4.23 Ref. CASA Rule 91.285.

130 See, LTOP Proponents Statement Para 3.6

131 Proponents Statement Para 3.6 at page 3-32.

132 See this Review for North, West and East - above, Table 3.2.2, S. 3.2

- 30 /11/1961 ANA Vickers Viscount Series 700 crashed in thunder storm over Botany Bay with loss of all passengers [#134] ;

- 21/2/1980 Beech Super King Air regional Commuter aircraft taking off to south , got into difficulties, did a "U" turn and crashed into the Airport Seawall with total loss of life [#135].

- 24/4/1994 "Groupair" Douglas DC-3 carrying 25 passengers including 4 crew crashed into Botany Bay after takeoff. Passengers school band from Scots College going to Norfolk Island. Aircraft Overweight. Inlet valve stuck in open position leading to loss of control [#136];

Today's LTOP maximises the risk of crash damage harm to third-party property and non-ticket-buyers . This is because the number of departures from the airport over residents has increased from 29% in 1995 to around 50% . Moreover, the target of only 17% of movements over the north remains ephemeral without a radical change of plan [# 137]. Furthermore , there is a greater opportunity for passenger rescue in crashes over water, whereas in overland crashes involving building impacts death is practically assured.

Moreover, at the Government SACF meeting on 12 July 2002 the IMC representative for Kurnell appeared pleased to report a reduction of Botany Bay movements from 55% pre- September 11 2001 to 49% [ie a decrease of 11%]. This result is diametrically opposite from that expected from the plan, and the reasons for it might justify a separate investigation . Indeed 49 % of Bayside movements is the proferred year 2023 target under the proposed Sydney Airport Master Plan (July 2003) .

Thus far from "maximising movements over water", it is clear that the LTOP has been diverted by its steering committees into a "noise distribution machine", which has the Government SACF fixatedly focussed on noise spreading [like muck spreading], ***instead of*** implementing the Ministerially Sanctioned maximisation of movements [especially takeoffs, and thus risk] over water [# 138] . See Section 3 for further discussion of the actual outcomes of LTOP as compared with the intention, and Section 3.5 for the critical missing "Botany Bay" modes.

This outcome should be deplored because it maximises the risk of aircrashes and resulting third-party property and personal injury over residential areas.

<u>Recommendation</u> 5.1.3 : The well-recognised fact that takeoffs over residential areas involve greater possible mortality and property loss than takeoffs over water should be accommodated to the maximum possible extent in determining preferred runway use at any given time. If there is an available over-the-water mode which can be used, then it should be used rather than blindly trying to equalise noise among heavily populated residential suburbs. All available over-the-water modes, including Modes 2 and 3 should be included.

<u>Recommendation 5.1.4</u>: Aircraft departure routes should be designed to minimise the risk of conflagration over residential areas in the unlikely, but ultimately inevitable, event of a crash over a residential area.

<u>Recommendation 5.1.5:</u> Aircraft SODPROPs traffic modes to- and from- KSA which maximise use of over-the-water operations should be employed to the maximum extent possible - as originally envisaged by the LTOP - not to the token extent employed at present.

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133 KSA Operational Statistics presented to Govt. SACF (12/7/2002).

134 "Into the Storm – the Flight of Tango Victor Charlie" , by Dick Whittaker; Board of Accident Inquiry Chaired by Mr. Justice Spicer August 1962. http://www.surryscene.com.au/Articles/

135 The "Advance Enquiry: , Chair Sir Richard Frost , 1983- Ref. SMH 7/10/1996, Aviation Safety Regulation Chronology 1981-2001 Matthew James Science, Technology, Environment and Resources Group 26 June 2001

136 BASI Report 9401043

137 It should also be remembered that such so-called "movement" targets are meaningless because they fail to differentiate between takeoffs and landings of different noise levels, and do not distinguish between the ultimate direction of the aircraft flow.

138 Ministerial Direction to Airservices Australia 20 March 1996, Clause 2.

5.2 THE DANGERS OF MAXIMISING HEAVY JET DEPARTURES OVER LAND:

5.2.1 CRASH ACCIDENT RISK AND DUTY OF CARE [#] :

Contrary to the popular misconception , CASA never undertook the review of the Safety and Risk Management aspects of LTOP [See S. 5.2.2 & Appendix E] which was promised in the Proponent's Statement .

The Board members of CASA and SACL need to be put on notice that, when there is a downwind of less than 5 knots (9km/hr) from the North, they have a duty of care to the residents of Sydney to ensure that a fully laden aircraft with up to 160 tonnes of fuel on board departs over Botany Bay and the Sand Hills of Kurnell to the open sea rather than over the majority of residents.

The Department of Transport's deliberate deletion of the 5-knot downwind (noise abatement preference) rule ("Recommendation 3" of the LTOP), resulting in a doubling of jet departures over densely populated areas of Sydney instead of Botany Bay, was an extraordinary step driven merely by political forces. The continued maximising of departures over Sydney residents during light winds amounts to 'reckless indifference'. After all, trucks carrying substantially less flammable liquids are banned from certain residential areas and tunnels.

Most of the jets operating at Sydney Airport can easily accommodate downwinds of up to 5-10 knots with factors of safety already built-in to the aircraft designs by the manufacturers. The pilots simply refer to manufacturers' tables and fine tune their payload according to the downwind speed and air temperature. This is in fact what happens during curfew hours, so that movements can all be over water.

A QANTAS pilot has advised that a departing Boeing 747 carries about 160 metric tons (215,000 litres) of aviation fuel to travel from Sydney to the USA. On the other hand, the tonnage of reserve fuel carried by a 747 which is landing in Sydney is typically only 13 tonnes (less than one tenth of that loaded for a departure). He has also advised that one may readily calculate the approximate tonnage of aviation fuel required by a 747 prior to take-off by multiplying the time of flight by 12 (eg 8 hour flight to Singapore = 8 x 12 = approx. 96 tonnes).

Heavily-fuelled departing aircraft crashing into residential areas have devastating effects. Research into the number of persons killed or maimed on the ground as a result of past landing crashes versus take-off crashes into residential areas would support a case in negligence for breach of duty of care.

According to the UK *National Air Traffic Services*, the annual risk of death as a result of a crash is greater than 1 in 100,000 for anyone living or working inside a roughly triangular area extending 3.5 kilometres from the ends of runways . Since 1958 development has been restricted near UK airports to within a wedge shaped zone extending for 1.4 km , and the UK Government was recently reported to be in the process of extending the wedge length to 3.5 km [# 139] . At Sydney there is no such "wedge" or green-belt safety zone.

Those residents going about their business have not solicited the risk by buying a ticket; but they are the people at risk of incineration by up to 160 tonnes of aviation fuel (6 road tankers of fuel) carried by a departing jet. This should be of concern to the insurance industry.

Major departure crashes with high third party (as well as ticket-buyer) casualties in recent years include:

- 4/10/1992 - EL Al Flight 1862 Schiphol, Amsterdam [#140]: - Boeing 747-200F carrying Sarin nerve gas ingredients & depleted uranium . Shortly after taking off from Schiphol Airport, while climbing through 6,500 feet, the No. 3 engine separated from its pylon damaging the leading edge of the right wing. The No. 4 engine and pylon then also separated from the wing. The aircraft crashed into an 11 story apartment building in Bijlmermeer (10 mi from takeoff) while attempting return to the airport. Four people died on the plane, but it killed scores of people on the ground and destroyed the health of thousands of others by exposing them to the toxic chemicals on the plane. The exact number of dead is still not known. This became the worst air disaster in Dutch history . An eyewitness report stated: *"I was in Biafra and Vietnam, but I never saw anything like that crash. It was like looking into a steel smelter. The concrete of the flats was glowing red* [#141] *".*

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139 Hamer, M. (1997) "Bolt from the Blue", New Scientist , 20/27 Dec. p. 20

140 Air Safety Online - http://www.crashdatabase.com 2000-2004 RUPPMEDIA INC. ; "Jetliner Crash Reveals Israel's Weapons Plan " , Christopher Bollyn , http://www.americanfreepress.net, 14/10/2002; Also "Uranium pollution from the Amsterdam 1992 plane crash" By Henk van der Keur, LAKA Foundation, Netherlands , WISE News Communique on December 13, 1996 .

- 8/1/1996 Kinshasa, Zaire ANTONOV -32 [#142]: This cargo plane crashed after takeoff from Kinshasa into the center of the city, killing over 350 people and injuring at least 470.

- 7/1/1997 Irkutsk, Siberia - ANTONOV - 124 [#143]: A military cargo plane with full fuel tanks just after takeoff hit an apartment block in an Irkutsk satellite town setting fire to a residential area killing at least 150 people. The crash first removed the top two stories of a four storey building then demolished a second 4 storey building before setting fire to an orphanage. The plane stopped in front of another 9 storey building but also damaged a 3 storey school, two wooden apartment blocks and a shop . The Antonov-124 has the biggest wingspan of any plane in the world (one third bigger than a jumbo jet) and it was alleged that the crash was caused by engine failure.

- 31/4/1998 Emerald Air Type BAE 748 , Stanstead London [# 144]: This crashed shortly after takeoff with its right engine on fire. The takeoff was aborted at 150 feet. The plane overshot the runway as it touched down . There were 40 passengers on board of which two suffered minor injuries. Fortunately the aircraft stopped within the airport perimeter. According to the Stansted Duty Manager Melvyn Seymour : *"I would think that they had another 30 seconds before there would have been a major fire. The engine shows signs of the fire. I dread to think what would have happened then. You would have been talking about a major explosion and I would think almost certainly fatalities. [The pilot] would probably have had a few seconds to decide to abort the flight. "*

- 3 / 8 /1999 Zhukovsky-"Elf-Air" Illushyn Il -76 at Irkutsk Siberia[# 145]: This was a commercial flight to Beijing-Irkutsk-Perm-Moscow. Local technicians claimed to have thoroughly checked the plane beforehand and it was mechanically sound. The plane carried 133 tons of cargo and 61 tons of fuel and failed to gain the needed liftoff velocity before crashing from 40 meters of altitude. Irkutsk residents said it was a miracle that the plane fell in a field rather than nearby residential areas.

- 22/12/1999 Korean Air 747F cargo jet at STANSTED, England (CNN) [#146] - : crashed on takeoff killing all on aboard . The plane climbed to 300 feet before crashing near Hatfield Forest, one mile (1.6 km) from the airport. Witnesses reported a huge explosion after the crash. Like the El Al plane above, this plane was carrying depleted uranium (D.U) as ballast, which is apparently not unusual .

- 26/7/2000 Air France Concorde at Paris [#147] - Charles de Gaulle Airport (See description above) . This plane destroyed an airport motel and would have crashed into village but for action of pilot (See below).

- 16/7/2001 "Rus" Ilushyn Il-76TD Chkalovsky - Moscow[#148]: This four-engined cargo plane, fuel tanks filled to the brim, crashed shortly after takeoff about 30 kilometers northeast of Moscow, killing all 10 people on board. It abruptly dived to the ground about half a kilometer from the runway and burst into a ball of fire after climbing 400 to 600 meters before crashing into woods. 300 or so firefighters and other rescuers took 40 minutes to extinguish the blaze.

- 12/11/2001 American Airlines Airbus A-300 Flight 587, Queens, N. Y [# 149]: This plane crashed into a residential neighborhood [Rockaway] minutes after taking off from JFK International Airport. All 260 people aboard and 5 on the ground were killed.

- 28/7/2002 Pulkovo Airlines Illushyn LI -86 , MOSCOW, Russia [#150] - This is a four-engined aircraft comparable in size to the Airbus A300 and the three-engined McDonnell Douglas DC-10. It crashed on take-off outside Moscow Sheremetyevo-1 airport. Luckily this 350-passenger aircraft was carrying no

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141 Pierre Heijboer, a senior editor with the Dutch Volkskrant newspaper, Cited by Christopher Bollyn in "Jetliner Crash Reveals Israel's Weapons Plan " , http://www.americanfreepress.net, 14/10/2002.

142 "Aircraft Crashes" - http://www.infoplease.com.

143 LA Times -Washington Post News Service, Sunday, December 7, 1997 , "Russian plane rips through neighborhood".

144 *Commercial Airline Disasters* - 1998 Supplement; http://www/dnet.co.uk ; Bob Sinkinson, BBC News "Crash pilot praised- Fire crews stood by the badly-damaged plane"

145 Source: Avia.ru, 08-03-99;

146 CNN December 22, 1999 Web posted 4:19 p.m. EST (2119 GMT) "Jet Crash in London shortly after take-off:"

147 See, eg. Jamie Walker, "Australian", 2/9/2000. p. 15

148 "Cargo Plane Crashes Near Moscow, 10 Dead" 16.07.2001 By Lyuba Pronina , Moscow Times.

149 TCM Breaking News - 2001/11/12: Airports returning to normal after US plane crash TCM Archives, Monday, Nov. 12, 2001.

150 CNN, Jill Dougherty, July 29, 2002 Posted: 12:36 PM HKT (0436 GMT)

passengers, but 14 out of 16 crew were killed and the plane came to rest just short of a major Moscow freeway . Smoke rose from the smoldering wreckage and a series of explosions rocked the fuselage delaying rescue efforts.

It is a fact that on-the-ground casualties from the numerous landing crashes over the last few years were small in comparison to the above. The most recent non-terrorist event in which major on-the-ground casualties were involved was the Air France Concorde mentioned above . Following the World Trade Centre terrorism attack of September 11 2001, the odds of domestic/residential casualties have increased by orders of magnitude.

The following is the text of a letter from SACF Inc's Vice President - Airport Operations , H. P. Richard published in the *"The Australian"* newspaper in July 2000 following the Air France Concorde crash in Paris:

"The crash of the Air France Concorde on 26 July 2000 into a hotel at Charles de Gaulle airport [which is in a country paddock in comparison with Sydney Airport] highlights the argument for KSA that the nomination at any time in light northerly winds (ie downwinds from the North of less than or equal to 5 knots) of Modes 7, 8 and 9 (take-offs over densely populated Sydney areas) as a priority for operation instead of Modes 5, 14A and 10 (take-offs over Botany Bay's Wanda sandhills and Heads) amounts to reckless indifference on the part of airport authorities.

If it comes to the crunch the politicians will be pointing the finger at the technocrats and they will have nowhere to turn. Had Charles de Gaulle airport been 'in town' such as is the case in Sydney, and the LTOP's absurd philosophy of maximising take-offs over residents been in operation in Paris, the 26,000 gallons of jet fuel might have obliterated a good part of the city.

A few years ago newspapers reported that even Russian authorities were re-routing departure flightpaths away from residential areas following the crash of an Antonov during take-off which incinerated 50 persons in an apartment block [in Moscow]. A typical 747 departing Sydney for Singapore or Bangkok carries about 100 tonnes of jet fuel - about 33,000 gallons. If the destination is the USA that fuel load becomes 160 tonnes or about 50,000 gallons.

Typical fuel loads for landing 747's are about 10% of those figures (as you are no doubt aware planes prefer to land with low fuel loads and sometimes actively dump fuel to do so). Notwithstanding the fact that jets taking-off inflict noise (at greater than 70dBA) on three times the number of residents as do landing aircraft, the policy of avoiding take-offs over Botany Bay in light northerly winds should make KSA uninsurable. In fact, the Directors of Airservices Australia should be working to maximise take-offs over the Bay.

If anyone considers that these statements exaggerate the problem please refer to the attached extract from Airservices Australia's Operational Statistics [# 151] .

Note that in 1995 under the previous Government, 65% of take-offs took place over Botany Bay and 31% over residents but that for the first 6 months of this year [2000] the opposite applies namely: 38% of take-offs took place over Botany Bay and 58% over residents There is no doubt that the airport has been turned around under the guise of sharing noise by putting take-offs which should take place over Botany Bay over densely populated areas in the East and West of Sydney purely to avoid landings from the North!"

In letters to the Sydney Weeklies in April 2001 the Chairman of SACF Inc, Mr. Richard Tanner , wrote:

The 1995/2000 [Aviation Statistics] figures show that takeoffs to the north over residents [LTOP modes 7, 8 & 9] have almost doubled from 29 to 53% of all departures. In the same period takeoffs over Botany Bay to the sea which affect fewer residents [LTOP Modes 5,10 & 14A] have decreased from 65% to 44%. The perverse effect of LTOP has thus been to increase the number of heavily laden jet departures from KSA over populated areas to the north east and west; when an ostensible aim was to maximise movements over the water.

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[151] Included in this document as S. 3.3, above "Turning Around the Airport"

> *Statistically world wide there is a chance of an aircraft crash on take off of about one in three million, but it is now deliberate Government Policy to transfer this risk over heavily populated areas. A big jet such as a B747 will take off with approximately 100 tonnes of highly flammable aviation fuel - equivalent to about four road tankers full.*

Mr. Tanner went on to describe the situation as "*aviation Russian Roulette being played out in the skies over the residents of Sydney.....*" and concluded :

> *"In the present chaos in the skies over Sydney there is an excellent opportunity for CASA to show its real worth by forthwith closing Sydney's KSA until all political parties sign a binding agreement that they will cause the operations at KSA to be conducted in a manner which has at its core the real safety interests of air traffic and the people of Sydney."*
> *[The full text of this letter can be found in Appendix D]*

The major dailies *[Sydney Morning Herald, The Daily Telegraph and the Australian]* deigned not to publish this letter but, in response, the Airservices Manager of Airport Operations at KSA, Mr. Ken McLean wrote: [# 152]

> *"Richard Tanner['s] (Courier, May 9) intent appears to be to mislead and alarm readers about the operation of Sydney Airport's airspace. Contrary to Mr. Tanner's assessment, the total share of air traffic movements (both arrivals and departures), over the north, has fallen from 47 per cent in 1994/95 when the parallel runway opened, to 26.6 per cent in 2000. Also more than 50 per cent (51.5 per cent) of flights were over water at Botany Bay in 2000 which is consistent with 51 per cent in 1994/95. Furthermore, it is irresponsible that Mr. Tanner should suggest that safety is not the number one concern of Air Services Australia in the design and operation of the flight paths over Sydney."*

In this letter, Mr. McLean went on to state that every flight path is subject to stringent safety, environmental and operational assessment prior to implementation - One certainly hopes so! However, Mr. McLean appears to have missed the point - that it is the maximisation of ***"takeoffs"*** over residents which Mr. Tanner complained about, not ***"movements."***

It is the entire fallacy of the LTOP to have concentrated on ***"Movements"*** rather than noise and crash risk, as H.P. Richard eloquently pointed out in his reply that : [# 153]

> *".....Mr. McLean .... did not address the fundamental matters raised by Richard Tanner. Mr. McLean, instead, cleverly lumped aircraft arrivals and departures together to give us his statistic of 51.5 per cent of "movements" over Botany Bay, without telling us that the majority of that 51.5 per cent consists of landings from the south, over the bay, with the commensurate large numbers of take-offs to the north turning right and left (along flight paths never subject to an EIS) over Sydney residents east and west of the airport."*

> *"The tactics of quoting "movements" rather than actual noise is a standard ploy used by Air Services Australia to hide what is really going on at Sydney Airport. ..... Mr. McLean has not refuted any of Mr. Tanner's statistics, nor has he denied that the airport has been turned around so that the percentage of take-offs of heavily laden jets carrying full fuel loads over Sydney residents has almost doubled since 1996... "*

The danger of a major aircrash in a residential area of Sydney involving heavily laden, fuel heavy aircraft shortly after takeoff is horrendous to consider, but it will inevitably and unfortunately happen - sooner or later. Sydney KSA is the closest of Australia's major airports to the heart of its parent City, yet it is right on Botany Bay. Surely the responsible authorities should do all within their power to ensure that involuntary casualties are minimised by maximising takeoffs over Botany Bay.

<u>Recommendation 5.2.1</u>: Bearing in mind the horrendous casualties including burn victims which will result from the crash of a heavily laden fuel-packed passenger jet over residential areas the responsible authorities should do all within their power to ensure that non-passenger casualties are minimised by maximising takeoffs over Botany Bay.

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152 *"Wentworth Courier"* 30 May 2001
153 *"Wentworth Courier"* 13 June 2001

<u>Recommendation 5.2.2</u> : There is an urgent need for a complete review of risk management in connection with the conduct of the LTOP at Sydney (Kingsford Smith) Airport [KSA]. The so-called "watchdog", CASA, needs to activated as a matter of urgency to implement the carefully chosen safety review aspects of the LTOP which were promised by the Department of Transport in the LTOP Proponent's Statement (1996).

5.2.2 LACK OF PROMISED CASA INVOLVEMENT IN LTOP SAFETY CASE REVIEW [#154]

The LTOP Proponent's Statement [Para 3.6] required the Civil Aviation Safety Authority [CASA] to:

> ***"...<u>design and/or approve</u> all new pilot procedures. In particular all new*** SIDs ***(Standard Instrument Departures) and STARS (Standard Arrival Routes) require clearance from CASA before they are approved."***
>
> *[Author's Emphasis]*

and

> ***"in the case of the major changes such as the introduction of additional runway modes of operation, the revised airspace design and associated procedures .... a formal safety case will be prepared. "***

It may surprise those with an implicit belief that regulatory authorities always act in the public interest to discover that CASA has had *<u>no formal involvement whatsoever</u>* in the approval of the LTOP SIDs and STARs and the interoperation of the various Modes. Nor was CASA involved in the design of the, now unnecessarily complex, airspace surrounding Sydney (Kingsford Smith) aerodrome [#155] .

CASA did have one representative on the LTOP Implementation and Monitoring Committee [IMC] for some of its life, but the evidence from CASA Office of Legal Counsel [obtained under the Freedom of Information Act] shows that the only [internal] comment has been on the possibility of propeller flights over Centre-Point Tower, and a criticism of departures from the accepted "flight corridors" involved in proposed left turns from Runway 16R during the operation of SODPROPs [See Appendix E] .

Moreover the Proponent's Statement required Airservices Australia to engage:

> ***"an independent consultant with relevant overseas experience to advise on the safety management process for implementation of the Minister's proposals and to carry out an audit of the total process <u>after completion</u>." ;*** and
>
> ***"prior to the completion of "Stage 1" the consultant will have provided an <u>interim report</u> to a specialist safety committee which is to be established to oversee the <u>safety aspects of the plan</u>."***
>
> *[Author's Emphases]*

The latter named committee was to be called ***"The Safety Review Committee"*** and was to comprise officers from Airservices Australia, CASA, and the independent consultant. A "final comprehensive report" was to be provided to the Committee before the implementation of "Stage 2" [The Modes, 7 - 9 , "High and Wide" and "Trident" Components]. ***There is no evidence that the Committee was ever formed or met.*** However, Airservices Australia apparently did engage a consultant [Praxis Critical Systems, UK] *"who reviewed the implementation process generally and the Stage 1 safety case in particular."* [#156] ***Has only Stage 1 of the "Safety Case" ever been reviewed?*** [#157]

The SIDs [# 158] involved in LTOP are radically different from those previously employed at KSA and include potentially dangerous, acute angled, low, slow turns of departing heavy jet aircraft over densely populated residential areas. This is unlike the situation previously, where takeoffs were "straight up and down the line" of the airport runway. Although turns are not in themselves dangerous above an aircraft's stalling speed, they are safer and more effective in distributing and reducing noise away from the airport when the aircraft has picked up climbing velocity at greater altitude.

The present SIDs further involve departures under the flight paths of arriving low-flying aircraft both to the east and to the north west as well as related complications [See. S. 5.3 below]. There are also conflicts between "missed approach tracks" for LTOP STARs [# 159] and turning departure routes [See S. 5.3.2] . It is suggested that these factors alone should have called for the intervention of an independent safety audit by CASA.

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154 *By P.S. Lingard*

155 See CASA Interoffice Minute, B.L. Browitt to B. Urban dated 14/5/2002, attached as Appendix E.

156 "Summary of Progress towards implementation of the July 1997 Ministerial Direction to Airservices Australia" Govt SACF 4/2/2000"

157 SACF Inc has endeavoured to get an answer to this from Praxis Critical Systems, but without success. DOTARs is playing very hard to get.

158 SID= Standard Instrument Departure

159 STAR = Standard Arrival Route

As shown below [S. 6.2], departure overflying is contrary to the intent of LTOP under the proposed Mode 9, which had arriving aircraft in northerly winds travelling down an offshore corridor to land over Botany Bay, rather than following the Bennelong Funnel to Chatswood prior to turning East or West and over-crossing arriving planes taking off to the north in order to reach the same destination [See Figure 6.2.3].

Recommendation 5.2.3: The proposed LTOP Safety Review Committee should be immediately convened and airspace radically redesigned to maximise movements over the water, and ensure both optimum safety and noise minimisation for overland jet departures . CASA should immediately be instructed to carry out an in-depth safety audit of the LTOP SIDs, STARs and intermodal use.

Recommendation 5.2.3: A truly independent expert report should be contracted forthwith because CASA and Airservices Australia have demonstrated themselves to be incapable of being independent of political direction.

5.3 SPECIFIC DANGERS INHERENT IN THE LTOP:

5.3.1 THE DEPARTURE OVERFLYING REGIME[#160]

Sydney has an enviable record of air safety. However, even with world's best practice methods now coming on stream there is a greater statistical chance of a crash under the current modes of operation compared with those used previously [#161] . In Mode 9, departing aircraft take-off to the north-west and east using radical sweeping low-altitude turns and are restricted to a ceiling of approximately 3000 feet. At the same time and over the same area, arriving aircraft are traversing Sydney from the north, west and east and are restricted to staying above approximately 5000 feet, giving a 1000 feet separation between arrivals and departures.

This simultaneous traverse creates a spiders web of flight paths especially over the north-west and to some extent over the east during the operation of Mode 9. See Figure 5.3.1 below.

In an effort to minimise the inherently unsafe 'criss-cross' of arrival and departing aircraft in Mode 9, departing pilots stay well below the 5000 feet arrival floor level (typically 2500 to 3500 feet). In doing so they inflict more noise over densely populated areas of Sydney all the way from KSA to Kuringai and the Blue Mountains, via Parramatta , Penrith and "The Hills" .

The Safety Issue:

This is a safety issue because the natural inclination of a long haul pilot is to reach cruising altitude promptly[# 162] . Just a single lapse of pilot concentration could result in crossing into the arrival space. There is a thus danger with crossing flight tracks of a collision between an aircraft in one of the arrival streams and one attempting to take-off. Residents have often noted what they consider to have been "near-misses" during the operation of Mode 9 over the inner west [# 163] .

This issue was raised by Pilots and controllers in a brief to the former Bureau of Airline Safety Investigation (BASI) during 1998 [# 164] . The BASI investigation identified a number of aspects of LTOP as presenting serious risk management issues, including the intersection of arrival STARs with departing SIDs from Runways 34L & R, and Runway 25.

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160 *Modified from "The Way Forward from Sydney's Airports Quagmire" - Chapt 3.2 "Safety and Airspace Management Considerations of KSA"*

161 Ratner, 1992 Review of the Australian Air Traffic Services System, Ratner (1992); BASI Investigation Report B98/90, August 1998.

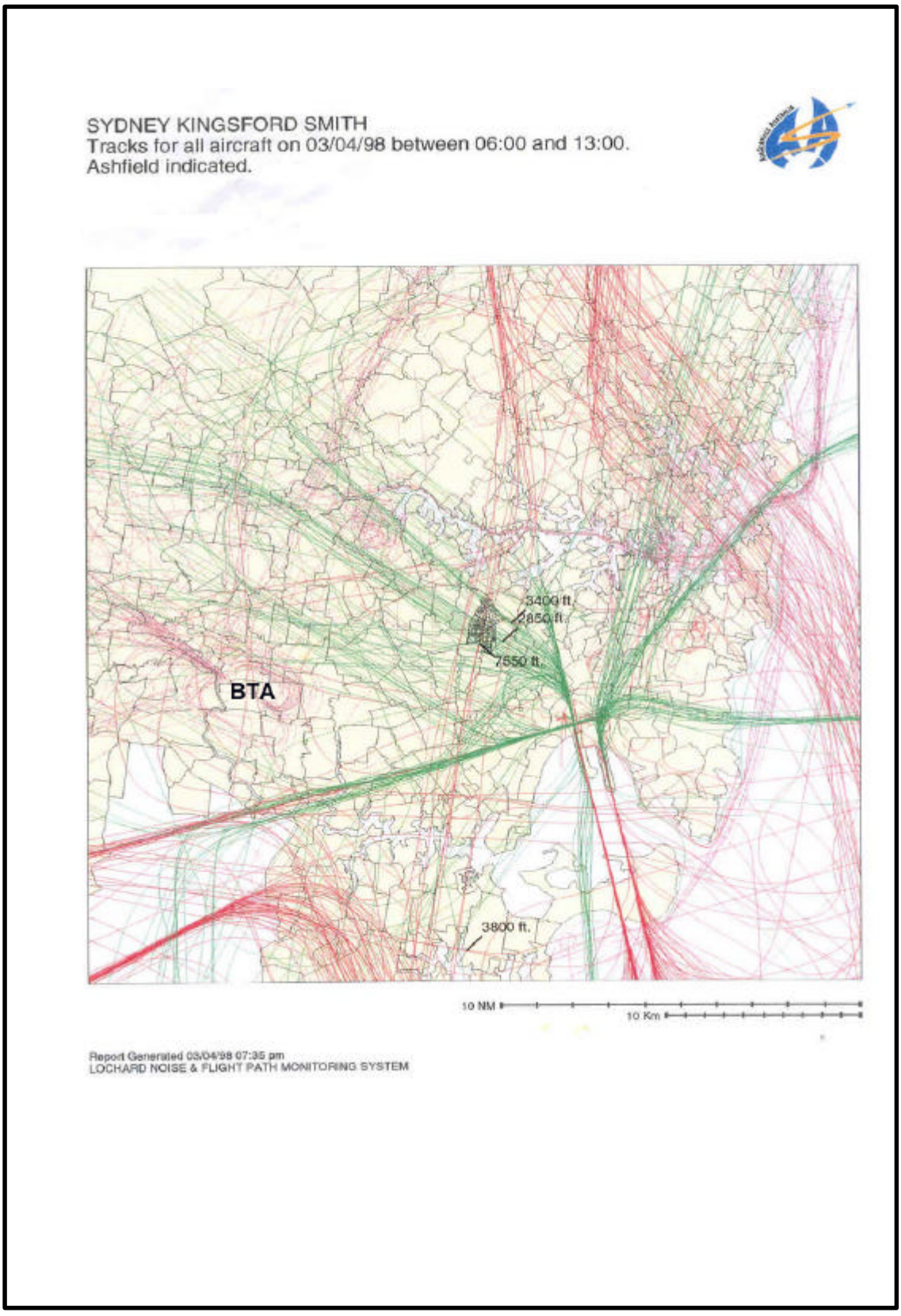
162 New Scientist "Flying High" - "The Last Word" , 31/3/2001; & Zagoren, M (2000) Boeing 747-100 Performance, Doc JT9D-7A / 7AH, p. 7. Also in this way fuel costs for the journey can be minimised.

163 See eg. Glebe & Inner Western Weekly June 9, 1999, p. 7 & June 16 1999, p. 11;

164 BASI Investigation Report B98/90, August 1998.

FIGURE 5.3.1 TYPICAL EARLY LTOP "SPIDERS WEB " DEPARTURE OVERFLYING

This Figure is reproduced and modified for the purposes of review and criticism pursuant to S. 41 of the Copyright Act (1968) from an original Airservices Australia "Lochard" plot supplied on request to residents .



Key : Bankstown Airport Site = BTA

Three so-called ***"separation occurrences"*** [# 165] had been reported up to the commencement of the Investigation. During the investigation a further three such occurrences took place. The investigation revealed safety deficiencies due to "separation assurance" problems which it claimed were caused by defective management of change, and the rate and complexity of change since 1994 . It also highlighted the different controller skills required for a "highly structured" airspace environment (such as after LTOP) compared with operating in straight-on parallel modes [# 166] .

More controller activity is required to keep aircraft within their respective departure and arrival strata when these are frequently crossing, than when departures can be instructed to climb to cruising altitude as soon as possible, and arrivals can go straight to terminus. The BASI Report concluded that putting the onus entirely on ***"[controller management strategies] ... in order to effectively reduce the level of risk of an identified hazard to an acceptable level, are not considered to be acceptable mitigation strategies in the light of known human performance limitations."*** [# 167]

The BASI Investigation adopted the principle of the 1992 Ratner Review of Australian Air Traffic Services [# 168] as follows:

> ***"Ineffective traffic planning is implicated in situations where a breakdown of separation incident could have occurred even though all aircraft complied with their given clearances. A separation breakdown did not occur in these situations simply because of randomness of timing: a breakdown could just have easily occurred . "*** [# 169]

The BASI Investigation specifically revealed ***"separation assurance"*** problems caused by the departure left turns under arrival streams from runway 34L in the northwest [# 170], and right turns from runway 34R [MARUB ONE SID] in the east, and the then CHEZA STAR on radial 084 [# 171] . This problem had been highlighted by Sydney's ATC Manager, but no action taken [# 172], and nothing appears to have been done since! There was also an identified inherent conflict between a right turn SID to the east from Runway 34L at 5000 ft which conflicted with a similar turn from Runway 34R. [# 173]

Also the LTOP "Safety Cases" were criticised for essentially making controllers responsible for "mitigating" problems caused by inherent airspace design defects causing failure of "separation assurance" [# 174] . In addition some "safety case" analyses were described by the investigation as being "simplistic" [# 175] and revealed a failure to adequately consider the cumulative effect of changes and a lack of the necessary skills [# 176] . The investigation also identified the need within LTOP airspace for departures to reduce climb altitude to avoid conflict with arrival overflying [# 177] , but failed to proceed to highlight the non-compliance of the plan as implemented with the original LTOP promise .

These practices are contrary to the description of the LTOP plan by Airservices Australia reported at the Second Government SACF meeting on 26 August 1996 at which it was reported [# 178] :

> ***"Airservices Australia gave a presentation on development of the long term operating plan for Sydney Airport which described indicative new flight paths for the Sydney Basin. These showed aircraft crossing the coast much further north and south than under the current arrangements so that urban areas would not be overflown so frequently at relatively low altitudes. "*** *[Cf. S. 6.2 , Fig. 6.2.3]*

and where the government SACF resolved to :

> ***"Request Airservices Australia to expedite consideration of the development of new flight paths so that aircraft departing to or arriving from the South be required to avoid flying over the Sydney Metropolitan area by crossing the coast line north of Gosford or south of Kiama or otherwise be prohibited from crossing the coastline at an altitude lower than 10,000 feet. "*** [# 179]

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165 A "Separation Occurrence" is when two aircraft approach closer than 1000 ft vertically or 3NM horizontally.
166 BASI Investigation Report B98/90, August 1998, S. 1.3.5 & 1..4.3.
167 BASI Investigation Report B98/90, August 1998, S. 2.4.
168 1992 Review of the Australian Air Traffic Services System, Ratner (1992)
169 BASI Investigation Report B98/90, August 1998, S. 1.7.1
170 BASI Investigation Report B98/90, August 1998, S. 1.7.3
171 BASI Investigation Report B98/90, August 1998, S. 1.7.2.
172 BASI Investigation Report B98/90, August 1998, S. 1.7.2, p.18.
173 BASI Investigation Report B98/90, August 1998, S. 1.7.2, p. 18.
174 BASI Investigation Report B98/90, August 1998, S. 1.7.3.
175 BASI Investigation Report B98/90, August 1998, S. 2.4.
176 BASI Investigation Report B98/90, August 1998, S. 3.
177 BASI Investigation Report B98/90, August 1998, S. 3.
178 SACF Minutes Meeting No. 2 26/8/1996, Agenda Item 5B.
179 SACF Minutes Meeting No. 2 26/8/1996, Agenda Item 7

Observer evidence is available showing that departing jets are flying at 2000 - 3000 feet over Bankstown , Horsley Park, Winston Hills, Baulkham Hills, Castle Hill , Pennant Hills, Cherrybrook and Dural . A similar situation applies in the east. In essence, Sydney's airspace was not planned for the present practice of taking off north over residential areas under Mode 9 as described above. Because of this stupidity there is both an unacceptable crash risk from both collision and mechanical failure, together with unnecessary noise over a vast expanse of residential areas.

The Noise Issue:

The overriding noise minimisation objective should be to get departures to climb as high as possible as soon as possible after take-off. SACF Inc believes the appropriate solution to this problem is to redesign the arrival tracks to ensure that they do not interfere with the departure tracks as originally promised in the Proponents' Statement. Of course increased use of SODPROPs modes such as Modes 2 and 3 would further reduce the overland problem.

Airservices Australia has already admitted that Bankstown and KSA are too close together to enable comfortable implementation of noise sharing modes at KSA under LTOP. The implementation of 2000 foot turns from Runway 25 was delayed (if not prevented) because of unforeseen conflicts with Bankstown airspace [# 180] . The Bankstown Airport Airspace Committee (RAPAC) objected to implementation of 6% gradient KSA Runway 34L takeoff profiles [# 181] . The second airport proposed at the Badgerys Creek site and the proposed expansion of Bankstown for jet aircraft would further complicate this [See typical flight path scenarios Figure 5.3.3.1 -3].

If arrivals were instead tracked widely out to sea in a wide semi-circle for the southern approach to KSA, then all but the largest departing jets could take off more steeply and be at 7-10,000 feet at a six km radius, as they are during the operation of Mode 10 off Cronulla. Moreover, it is more efficient for long distance jets to gain the stratosphere as quickly as possible because the air resistance factor there is less and fuel economy is increased [# 182] .

It is simple stupidity for so much of residential Sydney to be exposed to greater than 70dB(A) levels of departing jet noise when a sensible rearrangement of Sydney's airspace would ensure that this problem could be avoided, together with a significant element of crash risk. A detailed description of existing Sydney Airspace follows [See 6.2].

Quite apart from this departure overflying , even heavy jet arrivals coming into land heading north across Botany Bay from the US West Coast or Tasman are often first traversed north over Manly, then west across the city to Parramatta, before turning south towards the Royal National Park. They then finally turn north across the south western suburbs towards the Botany Bay approach, instead of crossing the unpopulated National Park before landing on 34L across the Bay [#183] . Thus the departure overflying mixes with a "city tour" of arriving jets.

Jim Thorn of ***Australian Aviation*** [See previous footnote] describes this happening time and time again, with 747's , on the last legs of intercontinental journeys, being made to *"overfly every suburb before landing"*, with consequent phenomenal waste of fuel.

The fuel waste for departing jets flying north west under the arrival "ceiling" in northerly winds is comparably huge, and represents crass stupidity by Airservices Australia - one of whose representatives has claimed that the *"Departure Overflying"* is due to the need for arriving aircraft from the north *"to save fuel"* by short cutting northern arrivals across town, rather than heading down off the coast [#184]. Further citing Thorn *[preceding footnote] :*

> ***"The Sydney airspace management plan is a fiasco, an operational joke sponsored by buck passing politicians and implemented by bureaucrats that unfortunately are hands-tied servants to their master - the government of the day."***

In summary, if the government and aviation authorities had deliberately set out to devise a plan to decrease noise over the unpopulated Wanda sand-hills, increase aircraft noise over heavily populated areas, provide a basis for politically inspired flight paths and significantly increased the risks of aircraft disaster, it would be difficult to conceive a plan more successful than LTOP.

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180 SACF Meeting 9/4/1999

181 IMC Minutes 17, 22/9/1998

182 New Scientist "Flying High" - "The Last Word" , 31/3/2001; & Zagoren, M (2000) Boeing 747-100 Performance, Doc JT9D-7A / 7AH, p. 7.

183 See description by Jim Thorn, Managing Editor, in Australian Aviation, March 2001, p. 35.

184 Paul Carroll, Senior Air Traffic Controller, Interview with SACF Inc delegation 22/11/2002.

Recommendation 5.3.1: The Government and aviation industry need to rethink Sydney's airports arrival and departure tracks (including KSA and Bankstown) to reduce dangerous overflying practices, which are statistically more likely to give rise to an air disaster over densely populated areas of Sydney than over the extensive surrounding water areas.

5.3.2 THE CONFLICTING "MISSED APPROACH" REGIME[#185]

Missed Approaches are "escape routes" for landing aircraft whose landings are aborted due to the presence of a slower departing aircraft on the same arrival runway. Typically a missed approach is directed away at 30 º to runway heading with specified climbout procedures, followed by a "go-around" . In the case of simultaneous approaches to parallel runways, the missed approach tracks should diverge.

For northerly traffic flow at KSA [ie Runways 34L & 34 R in use], missed approaches to Runway 34R deviate 30 º to the east, and those for Runway 34L deviate 30 º to the west. [See Figures 5.3.2.1 - 2] . Missed approaches will be ordered if the lateral or vertical separation of one arriving aircraft is too close to that of the previously landing aircraft on the same runway, or if the previously departing aircraft from that runway has been delayed. If departing aircraft from a runway are required to turn sharply immediately after take off, it is possible for the departure track to intersect the missed approach track, thus creating risk of a collision.

There are also a number of northerly non-jet SIDs which conflict with the missed approach tracks for Runway 34 L & R. These are listed in Table 5.3.2.

Any such conflicts with missed approach tracks and departure tracks involving turning aircraft unnecessarily increase the risk of operations from KSA. The fact that all these conflicts occur over heavily populated residential areas only increases the probability of non-passenger fatality. Given the knowledge that the risk of collateral damage is highest for fuel-laden takeoffs and landings over residential areas, this should not be tolerated.

TABLE 5.3.2 MISSED APPROACH CONFLICTS - SYDNEY KINGSFORD SMITH AIRPORT

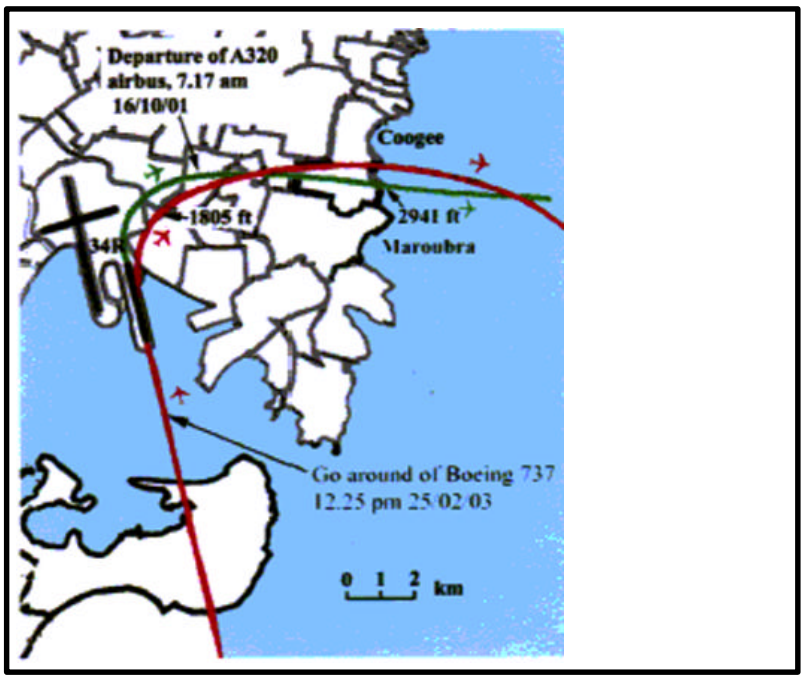
ARRIVAL ON RUNWAY	**CONFLICTS WITH SID**
34R	MARUB THREE (jet)
34R	ENTRA TWO (jet)
34R	KAMBA THREE (non jet)
34L	SYDNEY ONE (jet)
34L	RICHMOND TWO (jet)
34L	SOUTH WEST DEPARTURES (jet)
34L	SOUTH (non jet)

5.3.2.1 *Runway 34R "Type 1" Intersections with Departures*:
Landing go-arounds for Runway 34R [#186] intersect the jet departure route MARUB THREE [# 187] which turns 180 º at 500 ft after takeoff to the north before heading 75 º east, and ENTRA TWO which turns 30 º North East across its track immediately after departure [#188] . This is illustrated schematically using the tracks of two flights (separated in time) in Figure 5.3.2.1.

The data in Fig. 5.3.2.1 is taken from separate Airservices "Lochard" plots for flight tracks on the stated occasions. Though separated in date and time in the figure, the scenario is typical of those which could happen given the present

185 P.S. Lingard, G.P. Harrison, H.P. Richard
186 DAP East SSY85115
187 DAP East SSY85DP8
188 DAP East SSY85DP7

FIGURE 5.3.2.1 LANDING GO-AROUNDS FOR RUNWAY 34R (Type 1 Intersection):



acute low right turns for takeoffs from Runway 34R, which with Mode 9 occur at the same time as landings onto 34R. We will call such missed approach intersections with a departing aircraft a "Type 1 Intersection".

5.3.2.2 *Runway 34R "Type 2" Intersections with Over-City Arrivals*:

Another type of potential hazard from missed-approaches to runway 34R is that posed from intersection of the missed approach track at low altitudes with tracks of arriving aircraft taking the "city short cut" across the eastern suburbs as shown from an actual occurrence in Fig. 5.3.2.2. Although this track results from the circuit of a single aircraft (ie self-intersection), it could just as likely have been another arriving aircraft with which it intersected, with potential catastrophic consequences were there to be an altitude misjudgment.

Moreover, the combination of such an occurrence with a departure [whether a turning one from the same Runway as shown in Fig. 5.3.2.1, or a departure from Runway 7 (East), or both together], could equally result in dangerous collision circumstances.

Such circumstances could be avoided by :

(a) Eliminating the sharp right turns from Runway 34R on departure; and /or

(b) Sending arriving aircraft in southerly winds in a wide trajectory off the coast from West Head, instead of allowing them to cross departure tracks for aircraft taking off to the north over the city.

The latter (b) scenario was in fact the original proposal in the LTOP Proponent Statement [cf. Fig. 6.2.3 - *The "High & Wide"* proposition # [189]]. By some means, however, its utilisation has become clouded by being unnecessarily linked in discussions at the IMC and Government SACF to the original "Trident" proposal for spreading arrivals across the north in southerly winds.

There is no logical reason why this linkage should occur, other than to ensure maximum city-overflying and noise impact for the entire city, which is untenable from both an environmental and safety perspective. Another reason put forward at discussions in November 2002 between Airservices Australia and a SACF Inc delegation by a senior air traffic controller was the ***"need to minimise track miles for arriving aircraft."*** # [190] This is an utterly ridiculous explanation in view of the Thorn "city tour" report in Australian Aviation cited earlier [S. 5.3.1], which shows that arrival tracks for south-easterly approaches are using far more fuel than necessary. While this suggested "reason"

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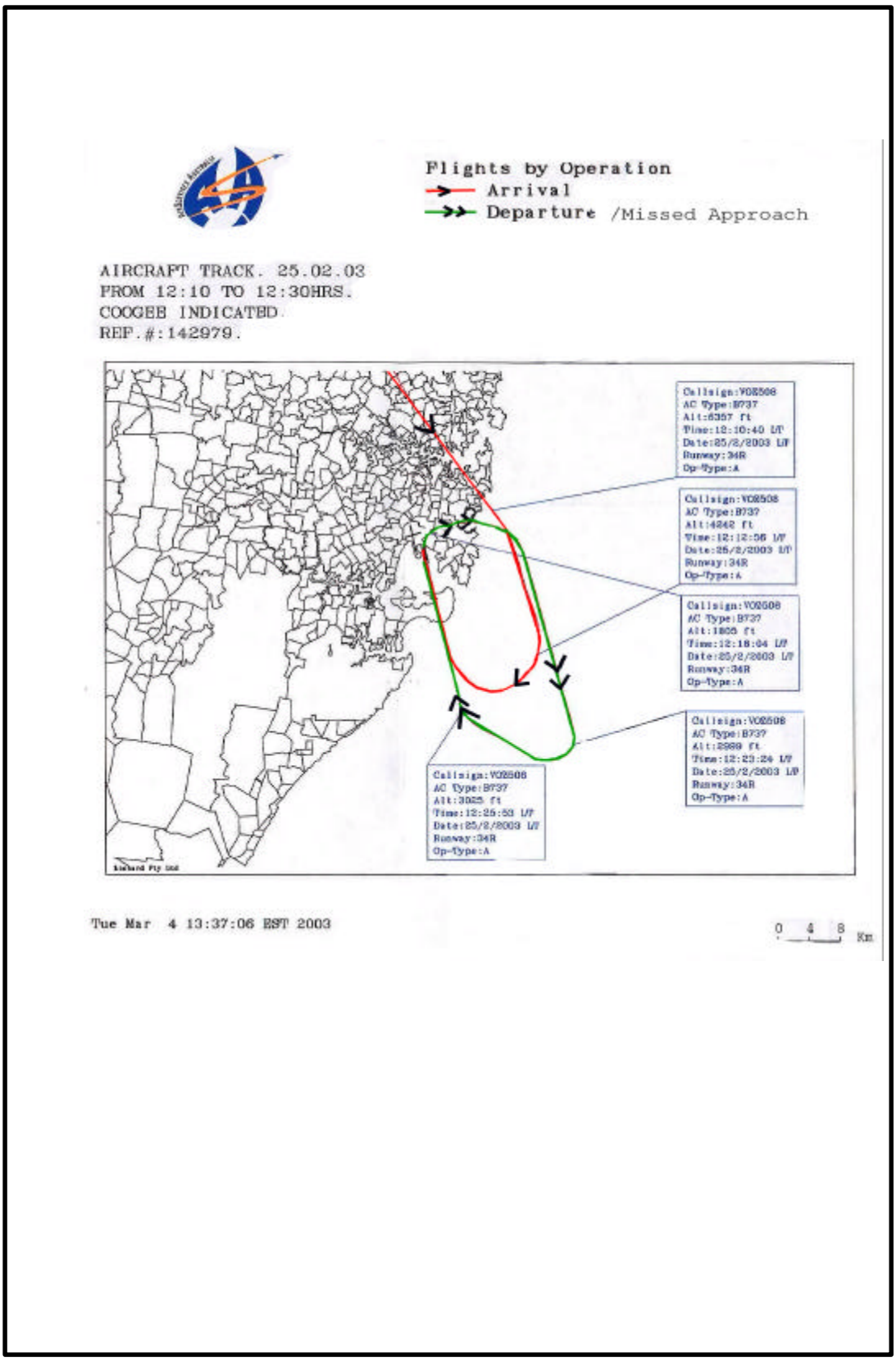
189 LTOPSR p. 62

190 Paul Carroll, 22 Nov. 2002.

FIGURE 5.3.2.2 LANDING GO-AROUNDS FOR RUNWAY 34R (Type 2 Intersection):
This Figure is reproduced and modified for the purposes of review and criticism pursuant to S. 41 of the Copyright Act (1968) from an original Airservices Australia "Lochard" plot supplied on request to residents .



might be valid in a rare fuel emergency, we submit that it is insufficient for the fulfilment of the environmental and safety obligations of Airservices Australia as a matter of general practice.

5.3.2.3 *Runway 34L Intersections with Modes 7 , 8 & 9 Departures*:
The Runway 34L arrival go-around conflicts with runway 34L northerly departures using the Richmond Two SID [#191] , The South West Departure SID[#192] and, in general the SYDNEY ONE SID [#193:] . There are also potential conflicts with simultaneous departures to the west from Runway 25, whether these turn right to travel north, or continue on a westerly course.

Recommendation 5.3.2: SACF Inc recommends that all presently used northerly flow departure SIDs **be carefully scrutinised by CASA for potential conflicts with arrival missed approach tracks from the south. In addition , to the extent that increased risk is created by low-altitude turns in the departure tracks, such turns should be eliminated.**

Recommendation 5.3.3: Simple-to-implement improvements such as the immediate restoration of the originally planned LTOP Mode 9 offshore arrival plan and removal of the acute low-altitude right and left turn SIDs from Departure and Arrival Procedures [DAPs] for Sydney (Kingsford Smith) would provide an immediate enhancement for both operational safety and environmental management by Airservices Australia.

5.3.3 EFFECT OF THE JETS TO BANKSTOWN PROPOSAL OR OPENING BADGERYS CREEK:
The addition of more crossover points and tracks proposed in the Badgerys Creek EIS [# 194] to the present Sydney (KSA) Airspace miasma would even further impact on the aircraft environmental impacts suffered by Sydney residents.

It would also raise the dangers of flying safely over Sydney, and even more significantly enhance the prospects of large numbers of residents being killed in some future air-space disaster. Similarly the introduction of jet aircraft to Bankstown airport, an erstwhile fall-back of the Liberal government in the interregnum following postponement of a decision on the "second airport" in December 2000, will further complicate the LTOP flight path plan.

The flight track examples in Figures 5.3.3.1 and 5.3.3.2 are reproduced from the 1999 DOTARS /PPK Badgerys Creek EIS and from recent documents kindly made available by Bankstown City Council.

The Badgerys Creek example in Fig. 5.3.3.1 is one of six from the 1999 DOTARS/ PPK EIS showing low-level crossings and overflying of existing noise affected parts of inner Sydney should the 1997 Badgerys Creek "Second Airport" proposal be implemented . This aspect of the Badgerys Creek Proponent's Statement was criticised both by the EIS Auditor's Report[#195] and in the subsequent "Environment Australia" Department of the Environment Report [July 1999] [# 196] which recommended that no airport be constructed at Badgerys Creek without a curfew. Readers are referred to Chapter 20 of the July 1999 EIS Supplement for further information.

Additional complications apparent from the government's more recent ***"Jets for Bankstown"*** proposal are shown in Figures 5.3.3.2 . These show further flight track concentrations, airspace compressions and dangerous crossings of jet flight paths in the mainly residential Bankstown Airport region. The location of the proposed "Sydney West" airport at Badgerys Creek in Fig. 5.3.3.2 is indicated by the letters *"BCA"*. Given the fact that optimal spreading under the LTOP for KSA has already been compromised by Bankstown Airspace, that Bankstown does not have a curfew, and the recent [early 2002] collision over Revesby of two light aircraft, any environmental review of the ***"Jets for Bankstown"*** proposal should be highly critical of this proposal.

Recommendation 5.3.4: SACF Inc submits that the airspace around Sydney is already too complex for safe operations at KSA and Bankstown, and that no further consideration should be given to any "in-basin" second airport or to the expansion of Bankstown without a careful initial review of options for the radical reform of Sydney [KSA and Bankstown] airspace.

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191 DAP East SSY85DP9
192 DAP East SSY85DP5
193 DAP East SSY85DR1
194 See Chapter 20 Vol 3 of the EIS Supplement, May 1999.
195 SMEC, July 1999.
196 *"Environmental Assessment Report" - Second Sydney Airport July 1999 ; Department of the Environment and Heritage [Environment Australia]*

FIGURE 5.3.3.1 BADGERYS CREEK FLIGHT TRACK SUPERPOSITION WITH OPTION B/KSA MODE 9

This Figure is reproduced for the purposes of review and criticism pursuant to S. 41 of the Copyright Act (1968) from the original DOTARS / PPK "Supplement to Draft Environmental Impact Statement Second Sydney Airport Proposal " Vol. 3 , May 1999, Chapt 20, Fig. 20.3.

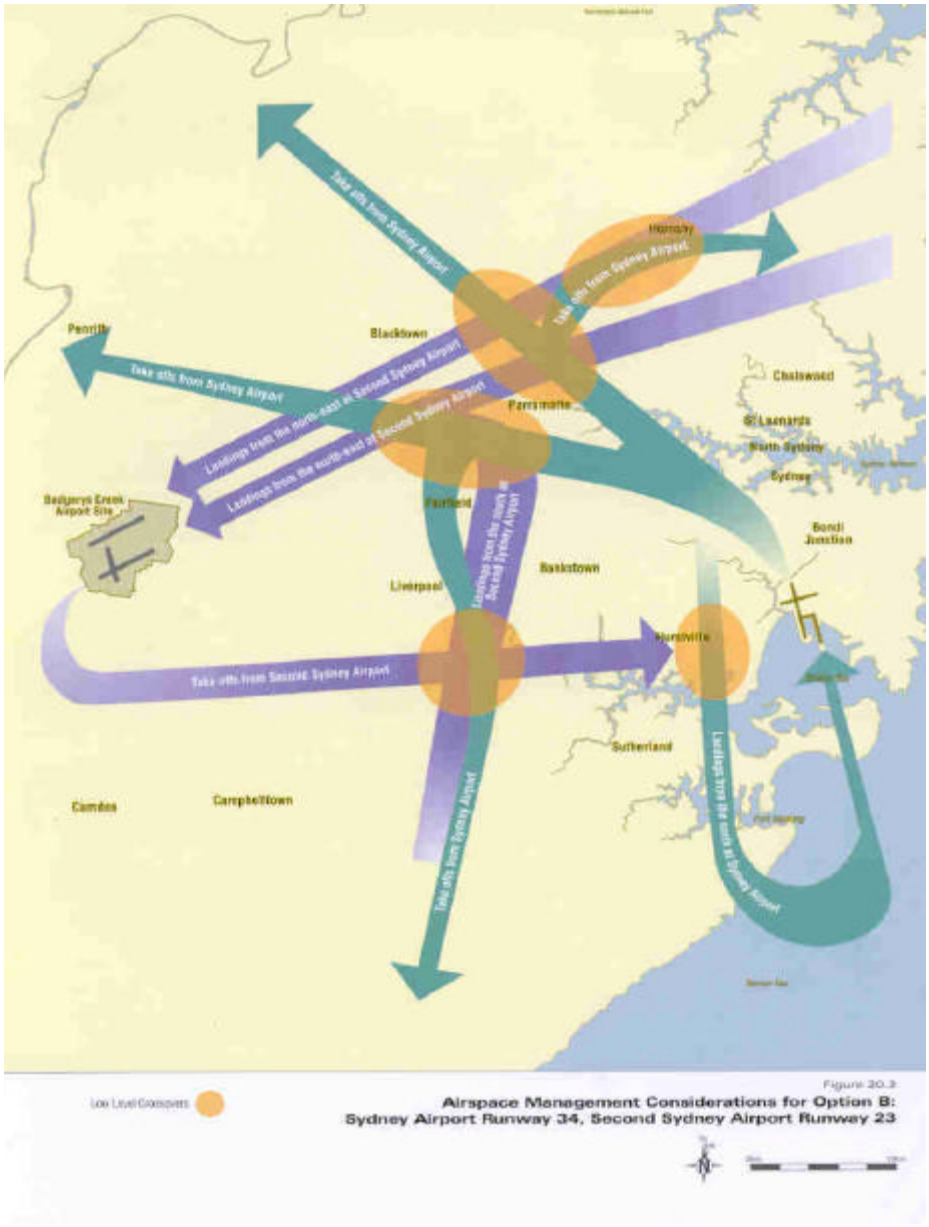
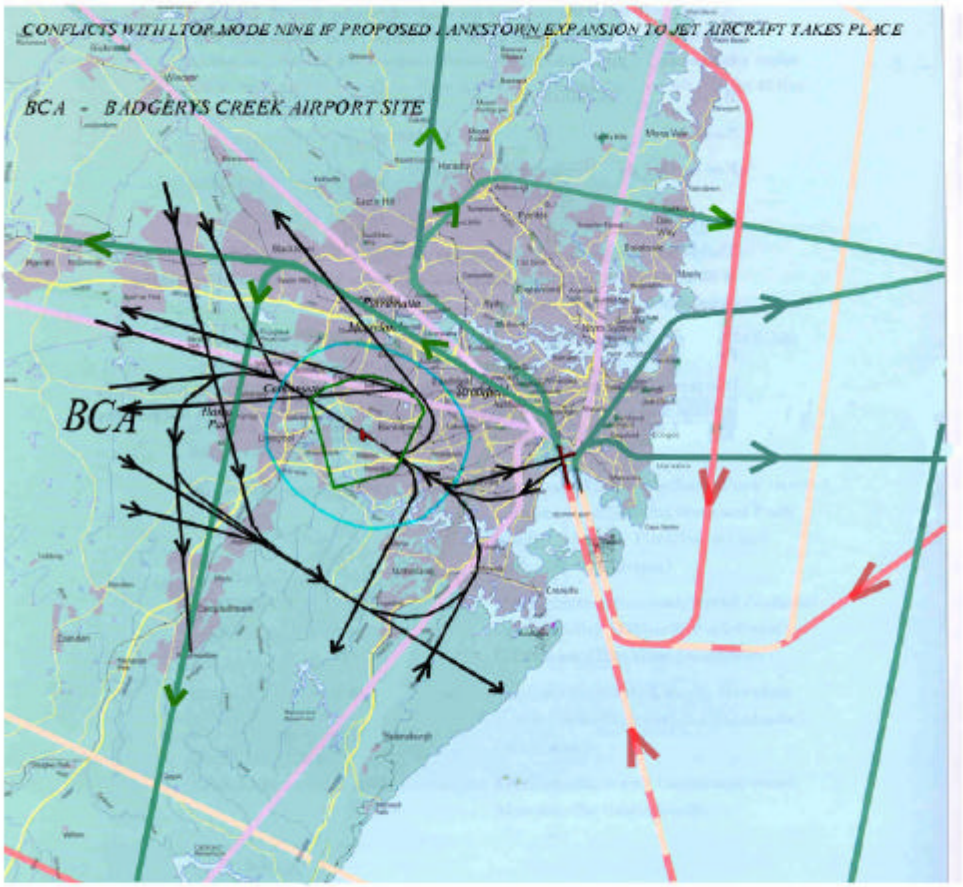


FIGURE 5.3.3.2 ORIGINAL LTOP MODE 9 SUPERIMPOSED ON BANKSTOWN JET CIRCUIT SYSTEM

This Figure is reproduced and modified for the purposes of criticism and review pursuant to S. 41 of the Copyright Act (1968) from p. 62 Airservices Australia original LTOP Short Report [Dec. 1996] entitled: "The Long Term Operating Plan for Sydney (Kingsford Smith) Airport and Associated Airspace - Report Summary" to accommodate the adjusted flight path data from Figure 3.3 of the DOTARS LTOP Proponent's Statement June 1997 and includes the superimposed "Jets for Bankstown" scenario provided Courtesy of Bankstown City Council.



The Mode 8 result is substantially similar.

6. TOWARDS MORE EQUITABLE AIRSPACE MANAGEMENT

6.1 INTRODUCTION :

As stated earlier a major design failure of the LTOP was the exclusion of "Noise Minimisation" from its terms of reference. The LTOP took place under a political imperative to Airservices Australia "to share the noise" [and thus pain]. That this would have resulted in only a crude approach to "equitable" sharing could have been predicted, once the Airservices Australia writers of the LTOP Reports in 1996 admitted that :

> ***"The task force environment working group was not able to identify a single criterion to demonstrate equity but it was able to identify a number of considerations which together, and in balance, could be considered to constitute the basis for a fair and reasonable distribution of noise."*** [#197]
>
> [*Author's emphases*]

Considerations identified included: Average Noise Exposure, Noise Level and Duration of Exposure, Respite, Number of Overflights, Time of Day/Night and Non-reciprocal flight [#198]; but there was no overall vision for approaching a truly equitable distribution; and moreover, no inspiration for maximising movements over water, an approach which would have produced the largest payoff in terms of noise reduction for Sydney's residents.

In addition, the monitoring process, supposed to have been implemented as Recommendations 25 -26, was woefully inadequate [See above, S. 4.6] . Initially no attempt whatever was made to measure noise in the newly affected areas [Coogee, Maroubra , the west and the north-west], apart from the provision of temporary, portable noise monitors as a result of resident demand. Even Mr. David Lidbetter *[a major architect of LTOP, now retired to the Blue Mountains]*, admitted that the provision of even portable monitors was woefully inadequate [#199].

Further, as shown in S. 6.2 , the airspace matrix within which LTOP was developed, without significant redesign, was inherently unsuitable for distributing the resulting noise detriment in an equitable fashion.

It is submitted that the priorities of Airservices in designing LTOP should have been :

(i) To maximise movements over Botany Bay, and any available industrial areas ;
(ii) To redesign the remaining overland airspace to facilitate maximum altitude takeoffs over residential areas when these were necessary due to weather conditions ;
(iii) To minimise noise over residential areas as much as possible;
(iv) To do this by designing flight paths which are unrestricted in their ability to enable aircraft departing KSA to gain cruising altitude at an optimal rate;
(v) Scientifically addressing the problem of what is meant by "equitable sharing."

A suggested approach to *"designing airspace"* to produce more equitable sharing is to :

(a) Properly and professionally assess the true capability of the over-the-water SODPROPs modes as suggested in S. 6.3, below;
(b) Systematise the Measurement of "Dose-Response" -using methodologies similar to those used in assaying radiation dosages to bacteria [See S. 6.4, below] ;
(c) Design the Airspace to Time-Sequence departure tracks on a geographic continuously-rotating radial basis to ensure proper and equitable distribution of offending noise [See S. 6.5, below] ;
(d) Re-design the Airspace to *minimize* aircraft noise at ground level from overflying aircraft by ensuring optimum altitude gain following takeoff [See S. 8.2ff, below]; and
(e) Separate arrival and departure sectors to ensure that departing jets can always overfly arriving jets and minimise the high thrust jet engine takeoff noise to residents beyond the airport perimeter [See S. 6.2, below]

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197 LTOPSR 1996 at p.102

198 LTOPSR 1996 at p. 103

199 Govt SACF 22/5/1998 ; Note: Whether noise monitoring should be necessary, is questionable , because noise on the ground for given aircraft type and thrust setting is calculable. This is no excuse, however, because the Directive was "to Monitor" ; and had these calculations been carried out and the information promulgated, it would be evident that the noise levels were unacceptable.

This Section first reviews the nature of existing Sydney Airspace, highlighting some problems which might result from nearby Military, "Prohibited, Restricted and Danger" (PRD) Zones, and how these might be surmounted. [S. 6.2]

It then goes on to review the conditions applicable to Simultaneous Opposite Direction Parallel Runway Operations (SODPROPs). First we point out that Mode 4 is both inherently unsafe and difficult to operate due to its requiring takeoffs and landings in opposite directions on the same runway. It must be abandoned.

The proper application of both ICAO and AIP Rules to the remaining SODPROPs Modes 2 & 3 reveals how the original LTOP Reports significantly underestimated the ability of SODPROPs to aid in maximising over-the-water movements at KSA. By leaving only the limited-capability SODPROPs Mode 4 within the "official LTOP", its architects hamstrung attempts to maximise over-the-water mode operations as required in its terms of reference [See S. 2.1 (iii) above] . It is then submitted that given historical weather patterns at KSA there should be no difficulty reaching almost totally Bayside movement percentages of from 74 to 94.5% . [S. 6.3, below]

Discussion follows of the requirements for a scientifically based population census-based noise dose-metric for the planning and quantification of equitable noise spreading. Failure to develop such a statistic explains why LTOP is not the "fair-share" noise plan which was proposed. [S. 6.4]

An airspace management (traffic control) protocol is suggested for Sydney Airspace which employs two great circles in the sky as rendezvous loci for departing and arriving jets and a "catherine-wheel" -style , time -sequenced jet departure protocol. If implemented, this should ensure that no two aircraft travel along the same radial to the departure circle in the same hourly interval. It is submitted that, coupled with a census- based noise dose-metric such as mentioned in section 6.4, and maximal use of steepest climb noise abatement departure procedures, this system (or one like it) could ensure truly fair sharing whenever aircraft cannot avoid departing over Sydney's Residential hinterland. [S. 6.5, below] .

Finally the history of the now famously contentious "Precision Radar Monitor" (PRM) is reviewed and concludes that the arrival noise created by aircraft approaching the PRM-ILS Glide Path entry point in the Hornsby Area could be reduced by either: (1) Increasing the Glide Path to, say four (4) degrees; or (2) Introducing Continuous Decent Approach (low power , low-drag) procedures such as recommended by the Australian Airline Transport Association [AATA] , and proved beneficial at airports overseas [See. S. 7, below].

6.2 EXISTING SYDNEY AIRSPACE [#200]

To understand why Airservices [ASA] tolerates the "overflying" described in the previous paragraph, one requires some knowledge of the constraints inherent in the system of Tracks ["highways in the sky"] , Standard Instrument Departure procedures [SIDs] and Standard Arrival Routes [STARs], by which Air Traffic Control [ATC] strive to prevent air-traffic chaos in the skies over Sydney .

In addition to political considerations and "Ministerial Edicts", constraints on airspace and operational planning freedom include prevailing wind conditions, and the military "Prohibited, Restricted and Danger" zones [PRDs] around Sydney airport .

These factors all potentially interact to produce the state of affairs with which Sydney's residents now contend in attempting to understand why there are at present so many low-flying noisy jets all over the Sydney Metropolitan area, and a larger proportion than ever of the heaviest jet departures taking off over residents.

6.2.1 TRACKS, SIDS & STARS:

There are 18 major "Tracks" available to ASA in the Greater Sydney airspace region focussing on KSA-Centre.

These are best described with reference to the "Terminal Area Chart" -TAC-2 in Fig. 6.2.1 and Table 6.2.2.

FIGURE 6.2.1 TAC-2 EXTRACT SHOWING PRDS

This Figure is reproduced and modified for the purposes of criticism and review pursuant to S. 41 of the Copyright Act (1968) from Airservices Australia " Terminal Area Chart " TAC- 2 effective12/6/ - 27/11/2003

tac2zig.tif

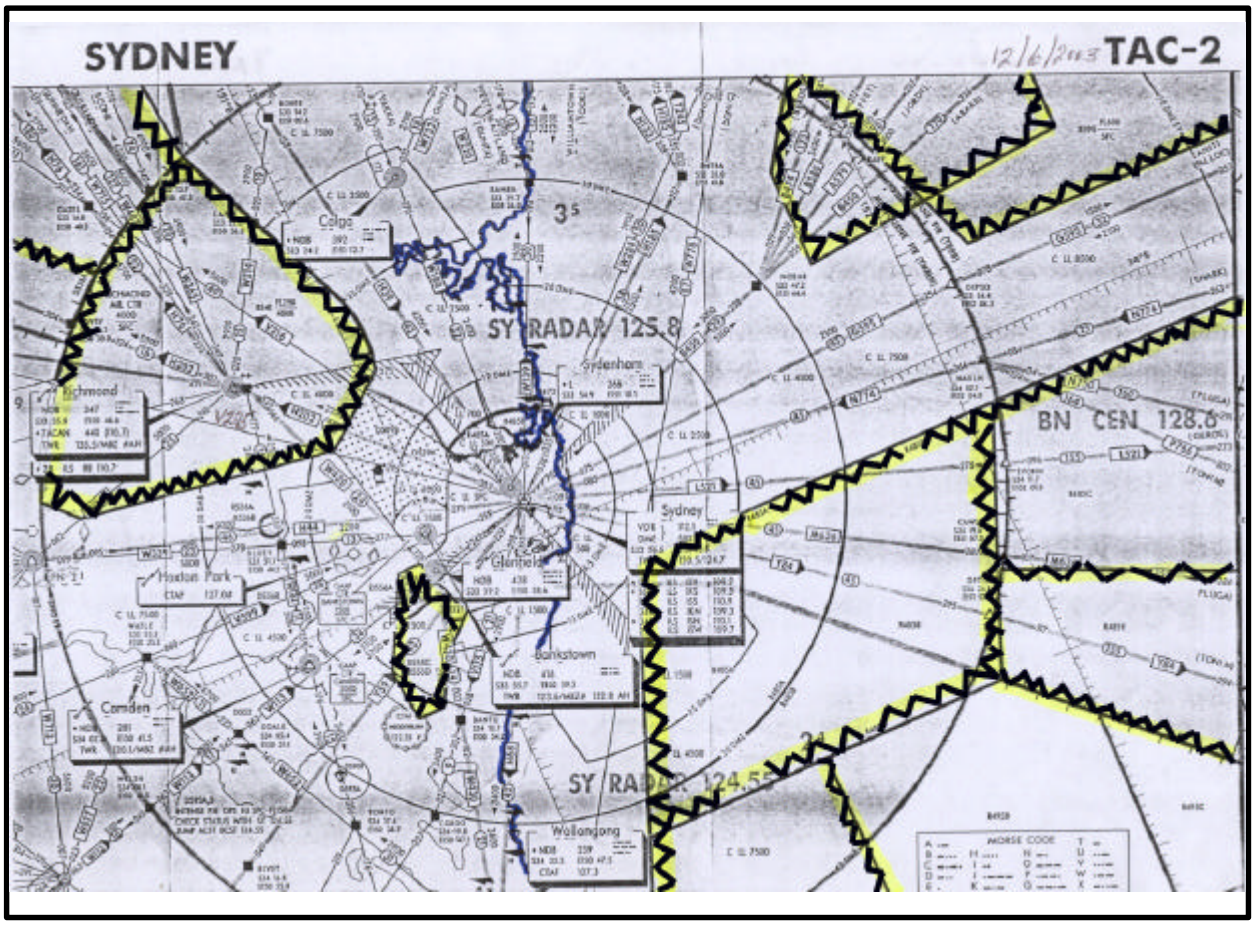

Figure 6.2.1 is modified from Airservices TAC-2 dated 12/6/2003 . The only major change since November 2001 is the addition of a new south -east track across the Tasman Sea "Y84" at bearing 117 ° . This figure charts operations from ground level upward surrounding Sydney Kingsford Smith Airport [KSA] and the added yellow-outlined

[200] Research by P.S. Lingard

(black zig-zagged) zones are what are called military "PRD" zones. PRD stands for "Prohibited , Restricted and Danger" and these zones will be described in detail later.

Similar charts called "Enroute Charts" are available from Airservices which show the "low"- [ERC-Low] and "high"- [ERC-High] level arrangement of flight paths over Sydney and NSW in general. It is possible to interpolate major jet flight path routes between these Charts because some paths on the TAC are not on the ERC-High and so forth.

In addition to these Charts, ASA promulgates a series of "Standard Instrument Departures" [SIDs] and "Standard Arrival Routes" [STARs] for KSA in a document known as "Departure & Arrival Procedures" [The DAP-East]. Reference will be made to these documents below.

In the Charts, all incoming flight paths to KSA are directed towards the centre of KSA [KSA-Centre]. Tracks generally follow magnetic compass bearings measured from due-north as zero, going clockwise around the KSA-Centre so that a track due east will be at 90 degrees, and a track due west at 270 degrees and so on.

A summary of Tracks with relevant SIDs, STARs and other airspace affectations, together with the Charts from which the data originated is provided in Table 6.2.2 .

The following description will be divided into Arrivals and Departures, concentrating on the northerly or near-northerly wind situation which is when low-flying departing aircraft mostly annoy Sydney's heavily residential areas.

6.2.2 ARRIVALS IN NORTHERLY WINDS

Arrivals patterns will now be described from the northwest, south-west and east.

(a) <u>Flights from the North West</u>:

Flights from the northwest use tracks W180 (CALGA 6) and H39 (BOREE 3) [#201] . These STARs [See ASA DAP-East] instruct flights to descend to less than 7000 [Calga] or 9000 [Boree] feet, respectively, on reaching distances of 20 nautical miles [20 n. mi] from KSA-Centre. From there they are expected to receive "RADAR VECTOR" instructions by radio as to how to manoeuvre to approach the current prevailing runway being used for landing. W180 (CALGA 6) does not appear on ERC-H and is therefore a track used by aircraft flying predominantly below 20,000 ft.

As can be seen from the layout of Tracks [Fig. 6.2.1], the normal situation is for aircraft to approach fairly close to KSA -Centre prior to getting instructions to turn onto an appropriate vector for the landing runway selection.

In the meantime they continue to travel at between 7000 - 9000 feet and the minimum specified altitude. Inside the 20 n. mi circle around KSA-Centre this is 2300 feet for CALGA-6 and 2500 feet for Boree! [Figure 6.2.1, TAC-2].

The runway instruction provided by Air Traffic Control [ATC] will depend on the prevailing wind direction, but if the wind is from the north and the landing is to be over Botany Bay on Runway 34L [main north-south], jet aircraft will most probably be instructed [#202] to first head directly for a point over KSA-Centre [SY VOR] at 4000 feet , then turn to the south west across Port Hacking at 178 º followed by a left turn over Bundeena at 14 n. mi prior to descending on runway heading [335 º**]** to land on Runway 34L.

If it is to land on runway 34R from the south [The "third runway"] it will be brought to a point off the coast at 3000 feet and 10 n. mi south east of KSA-Centre prior to making its descent [#203] . How it is brought there depends on the "Radar Vectoring" instructions given by ATC to the Pilot in charge.

All these aircraft now first traverse over the city and the lowest safe altitude [LSALT] is 2500 feet between 12 and 20 n. mi, 1000 ft between 8.5 & 12n. mi and only 500 foot within 8.5 n. mi radius of KSA-Centre. The indicated lowest minimum altitude on CALGA 6 is 4200 feet and that on the BOREE -3 is 2400 at about 18 n. mi radius from KSA-Centre!

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201 Calga 6 & Boree 3 are the names of the relevant STARs

202 STAR SSY85114; RWY 34L ILS/DME or LLZ/DME

203 STAR SSY 85115

It is hardly surprising, therefore, that departing aircraft to the north must be restricted in altitude gain until they have cleared the greater metropolitan area and it is safe to climb to cruising altitude without conflict with arriving streams, which should be off the eastern seaboard as originally planned [See S. 6.5].

TABLE 6.2.2 SUMMARY OF TRACKS TO AND FROM KSA WITH ALTITUDE AND OTHER LIMITATIONS

TRACK	DIRECTION	ARRIVAL /DEPART	CONNECTING SID/STAR	ALTITUDE RESTRICTIONS FEET	AT DISTANCE n. mi	CHART
W139	13º N	dep	SYDNEY ONE; RICHMOND 2	/< 2200	25	TAC-2;ERC-L ;
W284	35º NNE	arr/dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO; ENTRA TWO; CALGA SIX	/<1900	30	TAC-2;ERC-L ;
H185	38º NNE	dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO; ENTRA TWO	/<2500	30	TAC-2;ERC-H
B450	59º NE	dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO;	/<2100	25	TAC-2;ERC-H
G595	75ºENE	arr/dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO; CALGA SIX	/<2100	25	TAC-2;ERC-H
N774	85º ENE	arr	MARLN THREE	/<2500	20	TAC-2;ERC-H
L521	102º E	dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO	/<2500	20	TAC-2;ERC-H
M636	115º	arr/dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO; MARLN THREE	/<2500	20	TAC-2;ERC-H
Y84 (Introduced 12/6/03)	117º ESE	dep	SYDNEY ONE; FISHA FOUR; KEVIN TWO; MARLN THREE	/<2500	20	TAC-2;ERC-H
H68	195º	dep	SYDNEY ONE; FISHA FOUR; DEENA THREE; KAMPI ONE; SWD; MARUB 3	/<3400	30	TAC-2;ERC-L
V175	208º	dep	SYDNEY ONE; FISHA FOUR; DEENA THREE; KAMPI ONE; SWD	/<2900	12	TAC-2;ERC-L
Y59	229º SSW	arr	RIVET EIGHT	/<2500	12	TAC-2;ERC-H
W113	242º SW	arr	ODALE THREE	/<3700	20	TAC-2;ERC-L
V599	259º WSW	arr	ODALE THREE	/<5000	20	TAC-2;ERC-L
H44	275º W	dep	SYDNEY ONE; SWD; DEENA THREE	/<5000	30	TAC-2;ERC-L ;ERC-H
V295	295º WNW	dep	SYDNEY ONE; RICHMOND 2	/<4000	25	TAC-2;ERC-L
H202	303º NW	dep	SYDNEY ONE; RICHMOND 2	/<4000	25	TAC-2;ERC-L ;ERC-H
V316	316º NNW	dep	SYDNEY ONE; RICHMOND 2	/<4000	25	TAC-2;ERC-L
H39	338º NNW	arr	BOREE 3	/<4200	20	TAC-2;ERC-H
W180	350º NNW	arr/dep	SYDNEY ONE; RICHMOND 2; BOREE 3	/<2400	15	TAC-2;ERC-L

(b) <u>Flights from the North</u> :

Flights may theoretically approach approximately directly from the north via track W284 at 035 º but this is bidirectional, is not a designated STAR, and only carries Newcastle traffic. The minimum stated altitude for this track is 1900 feet at 30 n. mi from KSA-Centre and the "lowest safe altitude" [LSALT] is 1000 foot in that sector. If the wind is from the north and instructions are given to land from the south over Botany Bay then the pilot approaching from this direction is at present given instructions to join a procession of aircraft leading from just north east of Bobbin Head down across the city to Botany Bay [See Fig. 4.2.1] .

There is no standard route laid out for this operation. The aircraft will then be flying quite low [the lowest permissible just off shore within 8.5 n. mi of KSA-Centre in Class C airspace is 500 feet], but if the aircraft is a jet it will have to be at least at 3000 feet for the STAR approach over Botany Bay [#204] , or for landing on the east-west runway from the east: STAR MARLN THREE.

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[204] STARs; SSY85114; SSY85115;SSY85V04

(c) Flights from the East and North East:
The major tracks with incoming arrivals potential here are G595 [bearing 075 º bidirectional] -designated ALLOC, N774 [bearing 085 º inward only] designated SHARK and M636 [bearing 115 º bidirectional] designated NELSON.

These are all high level tracks [ie appear on ERC-High & TAC-2 but not on ERC-Low] for operations at altitudes greater than 20,000ft.

The only STAR described for eastern arrivals is designated "MARLN THREE" [#205] which requires aircraft to be below 9000 feet within 20 n. mi and to follow RADAR arrival instructions [By radar vectoring] within 10 n. mi of KSA-Centre [From "PRAWN"] . However, all southern and eastern runway approaches commence at 3000 feet from the 10 n. mi (18.4 km) point away from runway threshold. [#206] .

(d) Flights from the South, West and South-West :
The tracks bringing arrivals from the south-west are W113 [bearing 243 º] , Y59 [bearing 229 º] and V599 [bearing 259 º] . The first two are covered by the STARs ODALE 2 (W113) and RIVET 8 (Y59) , which specify altitude reduction to below 7000 & 9000 ft, respectively, within 20 n. mi [36.8 km] . Radar vector instructions are given to aircraft for ODALE-2 within 20 n. mi and within 10 n. mi for RIVET - 8. In northerly winds such aircraft are likely to head either for the western end of the east-west runway [RWY 07] or for a landing over Botany Bay bringing them low over residents in the south-western suburbs on parts of the final approach.

There does not appear to be a STAR for Track V599 [from Cowra, and crossing Hoxton Park] , but it is given a minimum 500 ft altitude marking within 20 n. mi radius of KSA-Centre. This track and ODALE-2 do not appear on ERC-H, and are therefore not routes used by traffic above 20,000ft.

6.2.3 DEPARTURES IN NORTHERLY WINDS

These are the so-called LTOP "Mode 9" (and to a minor extent LTOP Mode 8) operations at KSA.

(a) Flights to the North and North West:
These employ Tracks V295 [bearing 295 º], V316 [bearing 316 º], H202 [bearing 303 º], H185 [bearing 038 º] , W139 [bearing 013 º] and W284 [bearing 035 º] . Of these only H202 and H185 appear on ERC-High indicating an eventual flight exceeding 20,000 feet.

H202, V295 and V316 travel northwest directly through Richmond Military Airspace and then continue across the north-west of New South Wales [See Influence of PRDs for discussion of effect of Richmond and associated military airspace - S. 6.2.5]. For brevity these will subsequently be referred to as ***"The Richmond Tracks"***.

Of the north-heading tracks, W139 and W284 only appear on the TAC-2 and ERC-Low charts and terminate at Newcastle; whereas H185 heads all the way up the coast at least to Coolangatta. H185 later splits into Y43 and H133, which eventually tracks to Brisbane just east of the Dividing Range.

(b) Flights heading North -East , East and South-East :
The tracks for aircraft heading north-east or east are B450 [bearing 059 º], G595 [bearing 075 º -bidirectional], M636 [bearing 115 º - bidirectional] and Y84 [bearing 117 º -departures only]. B450 splits into A579, B850 and B474 at 30 n. mi out from Sydney at a point named NOBAR. All these tracks are high level tracks appearing on the chart ERC-High heading for altitudes greater than 20,000 feet.

B450 specifically heads directly into Military Restricted airspace which extends for up to 440 km up the coast north of Bobbin Head and out to 177 km offshore [See discussion of PRDs , S. 6.2.5 below]. This particular PRD extends from the surface to 60,000 feet and operates for 24 hours per day, 365 days of the year.

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205 DAP East SSY855R2
206 STARs; SSY85114; SSY85115;SSY85V04; SSY85116, DAP East

(c) Flights heading South:
These are Tracks H68 [bearing 195 º - ERC- High to Melbourne] and V175 [bearing 208 º ERC-Low to Canberra]. Aircraft heading in these directions after taking off to the north in northerly winds are required to undertake a large left turn prior to heading on course direction.

(d) Flights heading West:
The only Track heading approximately due west is H44 [bearing 275 º - ERC- High to Katoomba and beyond] . This track is unaffected by PRDs.

6.2.4 APPLICABLE STANDARD INSTRUMENT DEPARTURES [SIDS]

The Standard Instrument Departure [SID] instructions for jet traffic using the above described routes are as follows:

- "Sydney One" [ALL RUNWAYS - SYY85DR1] ;
- "Richmond 2" [RWY 34L - SSY85DP9];
- "Entra Two" [RWY 34R - SSY85DP7]l
- "Marub Three" [RWY 34R - SSY85DP8];
- "South West Departures" [RWY 34L - SSY85DP5]. [# 207]

All these SIDs require sharp turns to be carried out at low altitude by jets within minutes of lift off. The turn requirements are listed in Table 6.2.4;

TABLE 6.2.4 CLIMBOUT /TURN REQUIREMENTS FOR JETS UNDER KSA SIDs

SID	RUNWAY	1ST TURN ALTITUDE FEET	MAX AIRSPEED Knots	2ND TURN ALTITUDE FEET	ULTIMATE COURSE ROTATION
SYD 1	34L	800		NA	NA
	34R	500		1,500	
	O7	800		1,500	
	24	1,500		2,500	
	16L	500		1,000	
	16R	800		1,000	
RICHMOND 2	34L	1,500			30 º
ENTRA -2	34R	500		1,500	85 º -63 º
MARUB 3	34R	500	180	1,000	180 º then 90 º
S. WEST	34L	800		7,000	180 º
FISHA FOUR	O7	800			0 º

There are four initial points to make about the climbout/turning requirements in these "northerly departing" SIDs:

1. None of the Runway 34L climbout /turn requirements except for "Richmond 2" comply with the minimum ICAO standards for optimal protection of residents from aircraft noise beyond 3km from the airport. The optimal (ICAO-A/NADP 2) Noise Abatement requirement for residents at a distance from the airport, which is optional per jurisdiction, is for the first engine power change to be carried out at 1500 ft (with turns if necessary). The requirement is then for a minor power reduction to altitude 3000 ft and thenceforth on to cruising altitude. This was an objective of the LTOP [#208] and is specified in the AIP at ENR 1.5 11.1.7. The application subject to jurisdiction point is made absolutely clear by ICAO [#209] .

2. No attempt was made with LTOP to design airspace which enables sustained and continuous reduction of noise for residents on the ground below either the north-west or eastern corridor after northerly takeoff.

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207 For details see ASA DAP -East; Departure and Arrival Procedures - East , Airservices Australia
208 LTOPSR p. 102
209 ICAO Doc. 8168 "Aircraft Operations" Vol 1, Flight Procedures, Part V - "Noise Abatement Procedures" p. Chapt 2.

3. Reasonably rapid altitude gain is a pre-requisite for noise MINIMISATION for residents beyond any area close to the airport precinct itself. The use of ICAO-B/NADP-1 [1000 foot turns] or less, only benefits those at the airport itself, or those very close to it. Better practice is carried out at San Francisco Airport [SFO] where the minimum SID height for initial turns is 1600 feet and that over residents to the east of the airport is 6000 ft [#210] . Even at Canberra the requirement is for initial climbs to 4700ft! [Cf. S. 8.2.3]

4. If these low turns increase noise impact on residents subjected to aircraft noise, then why are they implemented at all and why are aircraft still flying [in the case of the north-west] at only 2-3000 feet all the way to Parramatta , then to The Hills, Richmond, Dural and beyond?

5. Considering the east-bound tracks from Runway 34R , instead of performing ICAO (AIP ENR 1.5 11.1.7) climbs to maximum altitude while still over airport land, the SIDs require sharp right turns at low altitude into narrow corridors all affecting residential areas to the maximum possible extent.

Why, one may ask, aren't these heavy jet aircraft [often bound for destinations 180 ^{o} rotated from their initial direction of flight] not being allowed to gain cruising altitude at an optimal rate?

Given average wind conditions, a fully laden 747 can be at 2000 ft within 3 km of the lift off point, and have reached 3000-3500 ft. within 6 km. In a good strong northerly these altitudes could be exceeded.

Yet under present LTOP operating conditions, with northerly takeoffs aircraft are required to turn steeply at 800 feet, and 500 feet in the case of takeoffs from the (third) north-south runway (apparently pretending to take off from the east-west runway) when travelling east. This is both less fuel efficient and more dangerous from an aircraft control and aerospatial structural engineering perspective, not to mention being inefficient as a purported method of reducing noise [#211] . It is well recognised that the noise footprint from a turning aircraft is much greater than that from one taking off straight ahead.

As stated earlier, when departing over Botany Bay, and despite the double twist avoiding Kurnell, 747's are reported to have reached 10,000 feet in the distance between the runway end and the ocean off Cronulla. The noise from subsonic jet aircraft at 10,000 feet on the ground (or ocean) is miniscule compared to that from those at 2000-3000 feet.

Why, therefore, is this practice not carried out for takeoffs to the north? Then , as mentioned previously [S. 4.4 *Failure To Include "Noise Minimisation Objectives" In Terms of Reference* **]** the Noise Abatement Protocols for KSA prescribe ICAO-A /NADP-2 Noise abatement Protocols [with 1500 ft initial climbout - See ENR 1.5 11.1.7]. Yet unfortunately, some SIDs contradict this protocol by requiring turns at 500 and 800 feet .

What is the real explanation for continuing the torture by ultra - low-flying jets of residents to the north west and east of KSA?

6.2.5 THE INFLUENCE OF PRDS

PRDs are "***Prohibited, Restricted or Danger"*** Zones. They are usually associated with military airport operations. In the near vicinity of KSA these are Richmond and Williamtown (Newcastle). PRDs are sub-divided into "24 hour" and "NOTAM " zones . "NOTAM" refers to the fact that these zones are activated and deactivated by Airservices Australia "Notices to Airmen" , presumably in response to Military directions. A fuller review of the PRDs associated with Sydney (KSA) airspace will be found in Appendix F .

The AIP [ENR1.4] asserts that clearance will only be withheld when activities hazardous to Aircraft are taking place or when military activities requires it [#212] . Also the AIP says that when compliance with Air Traffic Control requires flight through into or out of restricted airspace the pilot in command *"may assume"* that ATC[#213] has obtained approval for the flight [# 214] . However, the flight path must still comply with prescribed controlled airspace procedures.

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210 SFO SID REBAS THREE
211 Memo D. Marland to C. McCurley ASA, CASA SDO 24/12/1997.
212 AIP ENR1.4-7 PARA 3.4
213 ATC = Air Traffic Control
214 AIP ENR1.4-7 PARA 3.3

What this means in practice would require more expert analysis, but it is illuminating to consider the theoretical possibilities.

We shall here deal in summary only, with the implications of PRDs for the Richmond and the Offshore (East-North-Eastern) Tracks in turn:

6.2.5.1 North Western (Richmond Track) PRDs:

There are three main north western tracks [V316, H202, and V295 - See Table 6.2.2] . The PRD system affecting these tracks is a roughly trapezoidal three-dimensional zone, approximately centred on the Richmond Radial [310º] at 32 km from KSA -Centre. This extends northwest to a distance from KSA of 277 km, with a commencing width of 15 km and a final width of 105km at from 165 to 277 km from KSA. The altitude of the zone ranges from 4000 feet to 60000 feet in places, and its lateral and vertical extent is variable, as is whether the airspace volume which is affected is a "NOTAM" or 24 hour PRD.

In all there is a total of 5 "Restricted" (R) and 1 "Danger" (D) NOTAM -affected PRDs , and 1 "Restricted" and 2 "Danger" zone 24 hour PRDs affecting the Richmond tracks [See Appendix F].

The effect of the above-described PRDs on a typical Richmond Track flight path (V295) is shown in Figure 6.2.2

From Figures 6.2.2 and those shown for Tracks H202 and V316 in Appendix F , one can only conclude that there is significant potential for PRD-type airspace restrictions to affect outgoing traffic from KSA-Centre along the Richmond Tracks. The nearest [NOTAM-implemented] restricted zone, R541, can prevent flying between 4000 and 28000 feet for all the Richmond Tracks. Those further out variously affect immense multi-hundred cubic km trapezoidal volumes of airspace at altitudes between 6500 - 28000ft (R542) , surface to 6500 (D554) , surface to 8500 feet (D 558), unspecified above 6500 feet (R543), 7500 to 28000 feet (R586A) 1000 to 60,000 feet (R586C) and 28000 to 60000 feet (R586B), respectively.

6.2.5.2 Discussion of Richmond Track PRDs:

Without detailed information about the implementation of the NOTAM PRDs it is virtually impossible to predict which section of airspace will be barred to civil traffic on these routes and for what time, or - indeed - within which altitude range. Tracks V295 & H202 are approximately equally affected by "R" (restricted) - and "D" (danger) - Zone PRDs. Residents of the Coolah/Mudgee corridor beyond the Blue Mountains are well acquainted with the roar of F111 Fighter-bombers doing simulated bombing runs.

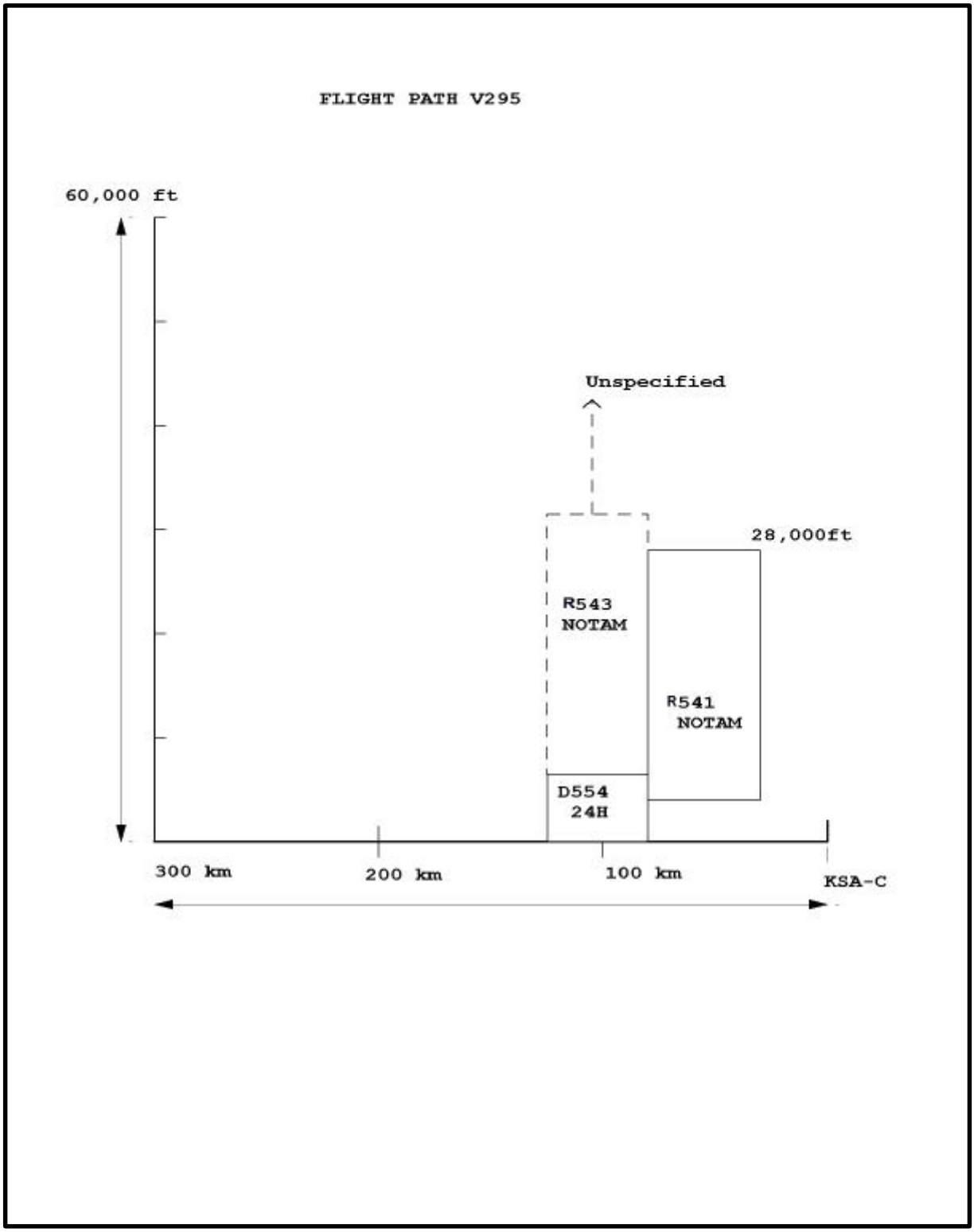
Undoubtedly, the track most affected by PRDs is V316 which is blocked by a 24 Hour "D" Zone below 6500 feet for nearly 100 km at low altitude beyond R541, and a further NOTAM-implementable "D" Zone blocking below 7500 feet for 100 km beyond! Moreover, above these "Danger" zones at 80 km is a 24 hour restricted band between 6500 feet and 28000 feet with a NOTAM-implementable Restricted zone from 28000 - 60000 feet for 164 km beyond.

Given the above-described complexity of the northwest airspace , the prospect of ASA thus "playing it safe" and adopting the "path of least disturbance" (ie flights below 4000 feet up to 80 km and then wherever seemed available beyond) would appear to be a significantly likely outcome.

If this is so, it seems regrettable that the long-suffering residents of Sydney must bear the brunt, when one would have expected negotiations between DOTARS and the Department of Defence (DOD) might have provided far more environmentally friendly outcomes.

If the Richmond PRD restrictions are such a problem, then perhaps Airservices would be better advised to devise a new, more southerly set of tracks, to the southwest of the radial bearing 275 º. One possibility would be to fly steeply out over Katoomba and then turn north west, putting civilian fights well outside the Richmond military airspace trap.

FIGURE 6.2.2 PRD AFFECTATION OF FLIGHT PATH V295
fpv295xf~1.bmp



6.2.5.3 Offshore PRDs:

These are also outlined by the yellow lines in Fig. 6.2.1. As with the Richmond tracks, there is again a mixture of "Restricted" (R) and "Danger" (D) zone PRDs , some of which are "NOTAM" designated and others of which are 24 hour.

(a) Northern Zone PRDs [north of radial 078 º]:

From about 80 km north of Sydney there commences an immense rectangular 24 hour "Restricted" Zone PRD [R 595] which extends roughly parallel to the coast up to 444 km from KSA-Centre, ending around Coffs Harbour. This zone is roughly 80 km wide and is expressed to affect flights at altitudes from the surface to 60,000 feet.

The main track affected is B450 [bearing 059 º] . B450 ultimately divides, with the addition of B474, B580 and A579 heading off on different radials into the north west Pacific [See Figure 6.2.1]. The most southern edge of this restricted zone follows the radial at bearing 078 º from KSA-Centre. As these civilian flights are unlikely to be higher than 60,000 feet under normal circumstances, then special dispensation must be provided to permit these flights. In any event, they do not affect airspace outcomes in the immediate vicinity of KSA-Centre.

It is presumed that because of these restrictions, most of the domestic traffic to the immediate north appears to hug the mainland immediately east of the Dividing Range.

(b) Southern Zone PRDs [south of radial 078 º]:

The next most southerly batch of PRDs immediately off Sydney's Eastern Suburbs is a generally triangular shaped south-easterly inclined wedge with its northern edge bearing 078 º with its apex off Sydney's Royal National Park and its most western edge approximately 22 km off shore, heading south beyond Wollongong. [See Figure 6.2.1].

The closest restricted zone to Sydney within this wedge is R 485A, whose boundary runs approximately north-east parallel to the southern boundary of R 595 and is about 20 km off-shore. This initially imposes a surface to 1500 foot restriction from 22 km offshore. The restriction extends to 7500 feet from 35 km further out (R485B) and is again increased to 8500 foot at 77 km (R485C) and 20,500 feet at 80 km (R485E) .

The "R485" NOTAM restricted south-easterly wedge accommodates Tracks L521 [bearing 102 º - labelled "AUCKLAND"] , M636 [bearing 115 º] labelled "NELSON" and, since 12/6/03, a new one Y 84 [bearing 117 º].

(c) East Bound Flight Corridor:

The airspace between "R595" (Northern zone - see (a) above) from approximately due east and south of the Hawkesbury estuary, and the boundary of the above-described R 485 "wedge" opposite Sydney's Royal National Park is a parallel sided corridor without altitude restrictions heading directly east-north-east across the Pacific. This corridor is about 15 n. mi wide and contains one bidirectional track [G595 -bearing 075 º] and one incoming Track [N774 - bearing 089 º].

6.2.5.4 Discussion:

Given the average distance of 20 km of the closest of the coastal PRD zones from the coast off Sydney, there seems no good military reason why altitude restrictions should affect air-traffic immediately off the Eastern Suburbs coast of Sydney such as appear from currently designed airspace [See discussion of low-flying takeoffs and low-altitude approaches from the north off Sydney's Eastern Suburbs: S. 4.4; S. 5.3.1]. However, there may be some limitations to offshore flying north of Newcastle as described in 6.2.5.3 (a) above.

6.2.6 CONCLUSION - INADEQUATE AIRSPACE PLANNING

Whatever the explanation for the extended low-flying of jet aircraft departure patterns across residential Sydney, and their simultaneous cross-over with over-flying arrivals, Figs. 4.4.1 and 5.3.1[#215] show that in northerly winds there is a bilateral (east-west) divergence of northerly arriving tracks. The eastern branch crosses the south eastern seaboard at about Maroubra in the Eastern suburbs prior to tracking further south east and commencing a procedure turn onto a northerly heading across Botany Bay to land. The western branch crosses "mid-western" suburbs such as Canterbury and Hurstville prior to turning left onto runway heading towards Botany Bay.

This divergence is caused by the need to change course from converging track headings all directed towards KSA-Centre, to a course bringing the aircraft sufficiently far south to permit a landing in across Botany Bay.

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[215] See SS. 4.4 & 5.3.1 above.

A proportion of the arriving aircraft are simultaneously crossing down the western side of the greater metropolitan area, to join a south westerly stream of aircraft which are likewise being deviated from an original heading towards KSA-Centre, into a ninety degree left turn to the south-east, again prior to the procedure turn into Botany Bay.

All this turning occurs close in to the city above residential zones, and over the north west and east, at altitudes barely sufficient to clear the departing jets which are taking off.

Figure 5.3.1 is similar to numerous similar examples obtained by residents from Airservices Australia during the operation of the LTOP since early 1998 [See also Figs. 4.1.1 - 2 & 4.4.1 in this Report] . This now well established flight track pattern, together the PRD effects discussed above, was not part of the original LTOP plan! The original plan shows that the overflying problem could easily be avoided by Air Traffic Control, and is the result of lazy Airspace Planning (See S. 6.2.7; Fig. 6.2.3 below).

We conclude that in northerly winds, departing jets on the Richmond Track cannot gain altitude due to the danger of interaction with arriving aircraft that are heading south and crossing their path overhead. Then once the departing aircraft enter Richmond Airspace at low altitude they may be "trapped" into further low flying for at least another 100 km [See Fig. 6.2.2 & Appendix F].

However, this conclusion requires assessment against the frequency of NOTAM implementation for the "R" and "D" type PRDs discussed above, and the requirements for compliance with military prescribed controlled airspace procedures beyond Richmond.

A previously-mentioned problem with the present system [Cf. S. 5.3.2] is that the Runway 34R *"missed approach track"* (at 30 ^{o} east from runway heading) during landings from the south, turns into the path of aircraft proceeding southward down the coast prior to executing their "Procedure Turn" before getting on runway heading to land over Botany Bay. This could easily be avoided if these arriving aircraft were positioned at a substantial fixed altitude well off shore. As shown in S. 5.3.3 , the interposition of further complexity, with larger jets using Bankstown Airspace, or the proposed "Sydney West" airport at Badgerys Creek, will merely complicate the above position and produce even worse environmental outcomes for the heavily populated north west.

6.2.7 SUGGESTED SOLUTION FOR AIRSPACE PLANNERS:

With changing winds, a time is reached when Air-traffic Control [ATC] must decide whether to bring aircraft in from the north or south. For environmental reasons we question whether the decision must be made as close to the residential heart of Sydney as now . Given a northerly wind change why cannot ATC divert all subsequent northerly arrivals to an offshore track, from about the latitude of the Hawkesbury, at around 3000 feet and 10 km offshore -as foreshadowed in the original LTOP plan?

Then aircraft departing east, either from Runway 07 or right from Runway 34R with a right turn, could gain an altitude of at least 7000 feet at maximum climb rate [this is understood to be about 3000 ft/minute] before crossing the tracks of the southerly wending arrival train. Similarly if the present "west branch" of the diverging arrival train was brought in down the eastern branch, and 1000 ft higher, it could safely cross the runway 34R procession beyond Botany Bay to make the higher entry point for approaches to Runway 34L. This technique would put all departures safely above any conflicting arrival stream, on a trajectory for cruising altitude, instead of flying under them as at present .

It has already been demonstrated that operating ICAO-A /NADP-2 "Noise Abatement Mode" [#216] over the east and north west produced measurable benefit to residents in Coogee and Maroubra [See S. 4.4], although this was at the time discouraged by the Qantas [#217] . These noise abatement procedures , subsequently mandated by Ministerial Decree [#218] , and "required" by AIP Noise Abatement Procedures [#ibid] , are now honoured mainly in the breach due to the existence of conflicting SIDs.

Similarly, the proposed deviation of northerly arrivals to a parallel offshore route will enable northwest departures to gain significantly greater altitude directly on takeoff, thus minimising noise under the flight paths .

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216 AIP ENR 1.5 11.1.7

217 SACF Minutes 22 May 1998.

218 28 August 1998 ; T159/98

The present low-altitude turns should thus be abolished for all jet SIDs, and noise abatement departure protocols at least equal to or better than ICAO-A /NADP-2 (AIP ENR 1.5 11.1.7) introduced. San Francisco Airport now requires 1600 ft ICAO -A type initial climbs for aircraft departing over the Bay. All SIDs on 28L & R (over SFO residential areas) direct climbs to at least 8000 feet until over the Pacific Coast before turning on course. Air traffic controllers from the Bay Area have advised that (for the most part) all departing aircraft are instructed to climb to an initial altitude of 11,000 ft, despite there being a multitude of surrounding general aviation airports and one major commercial airport (Oakland) only 3 miles north west. We are similarly informed that at a distance of 2 nautical miles [3 km] from takeoff roll a 747-400 aircraft departing New York Kennedy airport will be at twice the altitude of the same aircraft leaving KSA overland [#219].

Table 6.2.7 lists the major overseas airports where the normal clearance following take off is to higher initial altitude than at KSA . Considering that 3 major airports (Kennedy, LaGuardia & Newark) are in such close operating proximity to each other, not including the multitude of general aviation and military airports littering the tri-borough areas around New York, there is no excuse why aircraft from KSA cannot be departing at higher altitudes over residential areas than at present [# 220]. There are also steeper climb procedures at other airports in Australia before turning over residential areas, eg. Canberra Airport (4700ft) [# 221] .

Following the San Francisco /Canberra model a solution for the Richmond Track problem is thus to climb as high as practicable before turning [eg. to 8000 ft]. Then after turning , ATC should direct all northwest - heading aircraft out high over Katoomba followed by a north-west turn to destination heading well out beyond the Richmond Military Zone PRD wedge . To complement this proposition, the S. 6.3 and 6.5 proposals in this Review are recommended in order to comply with the original Ministerial Direction to maximise movements over water.

With regard to the issue of PRDs, LTOP Recommendation 31 required:

> ***"That Airservices Australia and the Australian Military Forces enable implementation of the in principle agreements for changes to military airspace surrounding Sydney through the Air Coordinating Committee."*** [# 222]

The original LTOP Proposal required that Mode 8 & 9 arrivals from the north be swept out widely in a south westerly direction over the ocean from the vicinity of Palm Beach. Similarly those arriving from the south and south west were to be swept out north easterly to the ocean across the Royal National Park in northerly winds [# 223] . This has not been implemented since LTOP commenced.

The originally suggested Mode 9 arrival path scenarios for northerly wind conditions is reproduced from the LTOP Reports [# 224] in Figure 6.2.3. It is thus evident that if arriving aircraft executed such over-the-water approaches at about 10 km off-shore, there would be no requirement for the current ceiling with massive close overflying of departing aircraft which now occurs in Mode 9 operations (Figure 3.6.1).

Departing jets could then gain cruising altitude at an optimal speed free from interference from the presently ad-hoc arrival stream now crossing Sydney from north, west , south and east. It is simply unacceptable for Airservices Australia to plead excessive track miles[#225] to excuse these practices when the residential amenity of Sydney is so much at stake.

SS. 4.5 and 8.1.6 report the current high noise levels being created by low-flying heavy jets across Summer Hill, an area of Sydney never previously affected by aircraft noise .

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219 Steve Summers (2002) Private Communication
220 Steve Summers (2002) Private Communication
221 Airservices DAP - East 5 Oct 2000, SCB77NA3
222 LTOPSR p. 9 Rec. 31
223 See LTOPSR pp. 55 & 62
224 LTOPSR, pp. 55 & 62
225 See IMC Minutes Meeting 51 ; 11/2/2003; SACF Inc Delegate discussions with Paul Carroll, 22/11/2002

TABLE 6.2.7 LIST OF US AND EUROPEAN AIRPORTS WHERE STEEPER TAKEOFFS ARE THE NORM

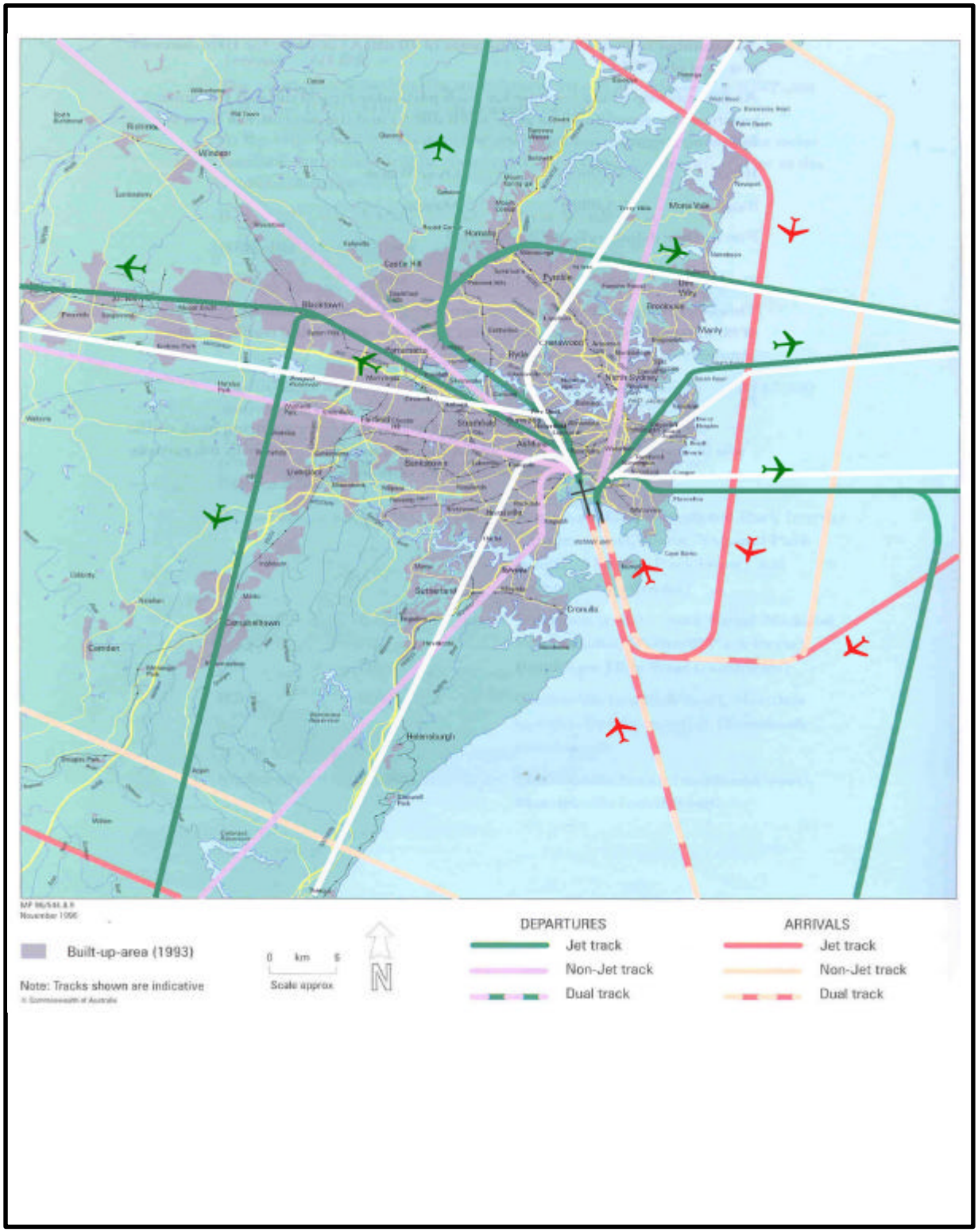
STATE #	**CITY**	**INITIAL CLIMB ALTITUDE**
USA	LOS ANGELES	
	LAS VEGAS	
	SAN FRANCISCO	800,1500,6000
	PORTLAND ORE	
	SEATTLE - TACOMA	3000,4000
	NEW YORK KENNEDY	
	NEW YORK LA GUARDIA	
	NEW YORK NEWARK	
	WASHINGTON DULLES	
	WASHINGTON NATIONAL	1,500
	ORLANDO	
	DALLAS/FORT WORTH	
	BOSTON LOGAN	
	SAN DIEGO -LINDBERGH	
	PHOENIX SKY HARBOUR	
	DENVER	
	SALT LAKE CITY	
	CHICAGO	3000 or SID
	MIAMI	
	ATLANTA GA	
CANADA	VANCOUVER	
	TORONTO	
	QUEBEC	
	EDMONTON	
	CALGARY	6,500
EUROPE		
HOLLAND	SCHIPHOL	1,500
GERMANY	FRANKFURT	
GERMANY	MUNICH	
HUNGARY	BUDAPEST	
FRANCE	ORLY	1500,3000
FRANCE	CHARLES DE GAULLE	
FRANCE	NICE	
PORTUGAL	LISBON	
SPAIN	BARCELONA	
SWITZERLAND	ZURICH	
SWITZERLAND	GENEVA	
AUSTRIA	VIENNA	
ITALY	ROME FIUMICINO	

Source S. Summers 4/7/2002; [See also Appendix L]

FIGURE 6.2.3 SUGGESTED FLIGHT PATH SCENARIO FOR ARRIVALS IN NORTHERLY WINDS

This Figure is reproduced and modified for the purposes of criticism and review pursuant to S. 41 of the Copyright Act (1968) from p. 62 Airservices Australia original LTOP Short Report [Dec. 1996] entitled: "The Long Term Operating Plan for Sydney (Kingsford Smith) Airport and Associated Airspace - Report Summary" to accommodate the adjusted flight path data from Figure 3.3 of the DOTARS LTOP Proponent's Statement June 1997.

mode9_p4.tif



Key: The White tracks in Fig. 6.2.3 are those originally proposed by Airservices Australia in Dec. 1996. The Green ones are those subsequently approved by the Department of Transport in the Proponent Statement of June 1997 showing more circuitous routing around the Bennelong , Bradfield and Wentworth Electorates and a more acute right turn over Maroubra in the East.

RECOMMENDATIONS S. 6.2:

Recommendation 6.2.1: With changing winds, a time is reached when Air-traffic Control [ATC] must decide whether to bring aircraft in from the north or south. This decision must be made further from the residential heart of Sydney than at present as foreshadowed in the original LTOP plan. ATC should deviate all the northerly arriving traffic to a track at , say 10 km off shore, at around the latitude of the Hawkesbury, at around 3000 feet. Then easterly departing aircraft could gain at least 7000 feet at maximum climb rate prior to crossing the southerly arrival train and would then be safely above it.

Recommendation 6.2.2: Similarly, north-westerly departing aircraft could then gain significantly greater altitude immediately after takeoff thereby minimising noise on the ground over the entire Sydney Basin.

Recommendation 6.2.3: The appropriate ICAO or AIP "Noise Abatement Mode" over the east and north west should be reinstated and all the contradictory SIDs in Airservice's "DAP East" should be removed. All the existing low-altitude turns must be abandoned for all SIDs, and ICAO-A or, better Noise Abatement Procedures should be researched and introduced.

Recommendation 6.2.4: The Richmond Track problem should be resolved, following the San Francisco /Canberra model, by aircraft climbing as high as practicable [to at least 8000 ft] before turning, and then vectoring all northwest - heading aircraft out high over Katoomba, with a following northwest turn at a point well beyond the Richmond Military Zone PRD wedge.

Recommendation 6.2.5: With regard to PRDs, the LTOP Recommendation 31 should be immediately implemented, ie :

> *"That Airservices Australia and the Australian Military Forces enable implementation of the in principle agreements for changes to military airspace surrounding Sydney through the Air Coordinating Committee."*
>
> *[LTOPSR p. 9 Rec. 31]*

If this objective cannot be achieved then new in- and out-bound tracks which bypass Richmond Airspace should be devised .

Recommendation 6.2.6: If there is any unrepealed regulatory impediment to the implementation of full SODPROPs operations and the maximisation of over-the-water modes, then such regulations should be repealed.

Recommendation 6.2.7: The original LTOP proposal for north and north-westerly arrivals in Modes 7 , 8 & 9 should be implemented forthwith by causing the aircraft to be swept out widely in a south easterly direction over the ocean from the vicinity of West Head . Similarly southerly and south westerly arrivals should be swept north easterly to the ocean across the Royal National Park. Departing jets could then gain cruising altitude at an optimal speed free from interference from the ad-hoc arrival stream now crossing Sydney from north, west , south and east.

These improvements would eliminate [excepting for emergencies] the current massive overflying of residential areas by departures that characterises current operational practice in northerly winds .

Recommendation 6.2.8: That it is unacceptable for Airservices Australia to plead excessive track miles when the residential environment of Sydney is at stake.

6.3 MAXIMISATION OF OVER WATER MOVEMENTS[#226]

6.3.1 UTILISATION & POTENTIAL FOR OVER-THE-WATER MODES

6.3.1.1 Introduction:

"The Way Forward from Sydney's Airports Quagmire" [SACF Inc July 1999] suggested that maximising arrival and departure flight path usage over Botany Bay would entail resurrecting the abandoned "SODPROPs" Modes 2 & 3. "SODPROP"s is short for "Simultaneous Opposite Direction Parallel Runways Operation" s.

The purpose of this section is to strengthen the pro-SODPROPs argument in "The Way Forward" by examining the current ICAO and Australian operating rules [The AIP*[#227]*] relating to parallel runways and the restrictions actually placed on Simultaneous Opposite -Direction Parallel Runway Operations [or SODPROPs] .
Appendix "D" to the *"The Way Forward"*, which raised a number of questions regarding the "Over -the Water Modes", is reproduced here as Appendix G for completeness. In the absence of any sensible response from Airservices Australia to the questions raised in *"The Way Forward"* , the SACF Inc working group has carried out its own analysis of the potential availability of Modes 2 & 3 which is presented here.

In *"The Way Forward"* several hypothetical impediments to SODPROPs operations [as stated in Airservice's LTOP Reports] were examined and found questionable, if not frankly wrong. These were {with answers in brackets} :

(i) The assumption that the required divergence of 15 º for traffic from the two runways would place departing jets over Cronulla **{Wrong}** ;

(ii) The uncertainty created over whether the divergence angle should be 15 º or 30 º **{Should be 15º}**;

(iii) Whether the operational movement targets specified by SABRE [LTOP Proposal Consultants] could be increased **{Yes}** ;

(iv) Whether for Air-Traffic Control or other reasons the system would be inherently unsafe **{No}**;

(v) Whether the limiting downwind criteria of 5 knots placed on landings & departures is too conservative, thus unnecessarily restricting the wind pattern availability of SODPROPs **{Yes}** ;

(vi) The uncertainty regarding possible conflicts between "Tower" (ie visual) and Radar Air Traffic Control [# 228] **{Should not be a problem with precision radar & up-to-date communications}**;

(vii) The claim that without independent operations traffic movements rates would be "little better than Mode 1" [# 229] despite their own data showing they were substantially greater [Table 3.2.1] **{Wrong} ;**

(viii) An alleged limitation of SODPROPs to low wind and good visibility conditions in off-peak periods. **{Wrong}**

These issues are now further analysed with reference to Airservices own [The AIP] and ICAO rules, and a system proposed for enabling <u>*at least*</u> the best possible application of these modes for Noise Abatement Use at Sydney Airport. In the LTOP Reports, the consultants, SABRE Decision Technologies [# 230] considered Modes 2 & 3 as well as the only presently used daytime "SODPROP"s Mode 4.

At the time the LTOP was being considered, the Precision Radar Monitor (PRM) had not been deployed on the southern approaches, so that fully independent parallel or SODPROPs operations were not then available. PRM has been available for southern approaches since 1999. This availability impacts on the "weather minima" assumed by SABRE for SODPROPs with Modes 2 & 3. The impact of such weather minima, and the technologies deployed to overcome them, determines the extent to which parallel runway independence can be maintained. This is highlighted

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226 Research by P.S. Lingard with input from S. Summers & H.P. Richard
227 AIP=Aeronautical Information Publication -Australia
228 LTOPSR p. 32.
229 LTOPFR p. 73.
230 Consultants employed by Airservices Australia to undertake the LTOP feasibility analysis - (LTOPFR)

in the Airservices March 2000 PRM Notice of Intention [NOI] for the northern approaches which is considered below in Section 6. It also impacts on whether "independent", in distinction to "dependent" operations may be carried out. Obviously, if only Mode 4 is available for totally "over-the-water" operations, then severe limitations on operational capacity will be imposed due to the simultaneous use of the main N-S runway [34L/16R] for opposite direction landings and takeoffs. This explains the current only infrequent use of SODPROPs as shown in Table 3.2.1 (above).

6.3.1.2. AIP Provisions for SODPROPs:

SODPROPs may be conducted where the Runway centrelines are separated by at least 860m [#231] . This is satisfied for the two parallel runways at KSA which are separated by 1037 m [#232] .

Operations must be in meteorological conditions "equal to or better" than "MINIMUM RADAR VECTORING LEVEL", or the lowest ***"minimum commencement level for instrument approaches to the arrival runway"***, whichever is lower [#233] . The *Minimum Vector Altitude* is the lowest altitude which a radar controller may assign to a pilot in accordance with the "Radar Terrain Clearance Chart" [# 234] .

Cloud base & Visibility:

For departures, there is no cloud base ceiling limit, but the minimum visibility must be 800 m [#235] .

However, for SODPROPs an overall injunction is that, *without prior approval*, the meteorological minima shall not be less than cloud base 2500 ft & visibility 8 km in the arrival and departure sector concerned. This is less strict than the initial limits set for Mode 2 & 3 operations in the LTOP Reports [#236] where the limits were stated to be 3000 ft and 10 km, respectively. This AIP SODPROPs cloud base/visibility requirement also differs from that cited for ILS-PRM operations in the PRM Proponent Statement, ie 220 feet and 800m, respectively, for simultaneous parallel approaches with PRM [#237] . However, it will become clear below that for maximum utilisation of SODPROPs continuous radar monitoring is necessary for each runway.

One might have supposed that the two cloud base/ distance criteria should be the same given radar monitoring, ILS and appropriate radar guidance [PRM & SSR -see below], ie. the 220 foot/800 m condition might be applied to SODPROPs after some experience has been gained with good weather operations.

Track Divergence:

The AIP requires that the Departure runway course for SODPROPs must diverge by at least 15 º from the approach course of the other runway [#238] . That clearly resolves the question raised by the conflicting LTOP Report statements as to whether the track deviation should be 15 or 30 º [See (i) and (ii) above & Appendix G Q 5.4 ; LTOPFR p 72 cf. p.73], and as shown in *"The Way Forward"* [# 239] this need not result in takeoffs from Runway 16R flying over Cronulla , nor even over Kurnell. Similarly takeoffs from Runway 16L can turn left out across Botany Bay Heads as presently occurs.

Intersection on Approach:

Arriving aircraft on runway approach must be vectored to intercept the final track at angle /> 30 º and retained on radar controller frequency until established "on final" (ie. a straight line extending through runway centreline) not closer than 10n. mi (18km) from touchdown. This 10 n. mi criterion may be adjusted for local circumstances [#240] .

The AIP conditions for SODPROPs require that certain traffic information must be communicated between aircraft which look likely to conflict, such as runway, position and aircraft type. Arriving aircraft must be advised of all those departing, and departing aircraft must be advised of all arriving aircraft expected on final for the opposite

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231 AIP ENR Para 41.1 (a).
232 AIP ENR 1.1-59 ; Paras : 41.1 - 41.4.
233 See AIP ENR1.5-2 Para 1.6, & CAR 257.
234 See Definitions- AIP Gen 2.2-15 ***;*** AIP ENR1.1 para 41.1 (b).
235 AIP ENR - 1.5 - 4.2.2.
236 LTOPFR p. 73 & 77; See Table D1 of Appendix G.
237 Introduction of a Precision Runway Monitor on Runways 16L and 16R - Notice of Intention Airservices Australia, October 1999, S. 2.2.1.1; PRM NOI Chapter 5.1.2.1, Oct 1999.
238 AIP ENR1.1 para 41.1 (d).
239 See Appendix G Vol 2 s. 11 this document
240 AIP ENR1.1 para 41.2 (a) - (c).

direction runway and likely to pass within 10n. mi of their respective positions. The 10 n. mi limit can be reduced for deviations between approach and departure path greater than 15 ^{o} [#241].

[Aside: One might question why a 10 n. mi criterion is required in an over-the-water situation, at least in good weather conditions, when 3.5n. mi is currently applied to turning approaches onto final of large jet aircraft from the north west [eg. over Lewisham Hospital]; although it may be claimed that the latter only occurs in Visual Conditions.]

6.3.1.3 Longitudinal Separation Provisions Required to be Observed:

SODPROPs is a form of "segregated" (see definition below) operation using parallel runways. As there is no separate statement of arriving and departing aircraft separations under SODPROPs , guidance must be sought from general principles and analogies from established procedures for same-direction single and parallel runway operations. Indeed, SODPROPs as such is not referred to in the ICAO Documents considered.

In discussing Modes 2 & 3, the LTOP Reports state that:

> *"Unless 'independent' operations are available, traffic movement rates can be little better than Mode 1 with the enhancement of a left turn for departures"* [#242] *;* and
>
> *"'independent' operation to the two runways is not permitted when the cloudbase and visibility is less than 2500 ft/ 8km (3000 ft /10 km used for initial implementation). 'Dependent' operations require additional spacing of arriving aircraft to sequence departures and provide the required radar separation and would severely limit capacity."* [#243] .

Although a stated reason for failure to include SODPROPs in LTOP was an alleged limitation to low wind and good visibility conditions in off-peak periods, the stated *meteorological operational availability* of both Modes 2 & 3 was said to average 46%, with a resulting sustained movement capacity of between 49 - 56 operations per hour [# 244]. However, this depends on what "downwind" maximum condition is applied to arrivals which limits the maximum southerly wind for which landings are permissible over Botany Bay [See 6.3.3, below]

To gain a better understanding of the necessary principles we must first outline the ATC concepts of "independent", "dependent" and "segregated" operations on parallel runways and the requirement for radar.

6.3.1.4 Independent Segregated Operations And The Use Of Radar -Various Definitions:

As stated above, the optimal deployment of non-curfew LTOP SODPROPs "over-the-water" modes, Modes 2 & 3 requires their implementation as "independent", "parallel", and "segregated" operations. [#245]

"Segregated operations " are defined as a condition during simultaneous operations on parallel instrument runways in which one runway is used exclusively for approaches and the other is used exclusively for departures. Radar monitoring is always required, and there must be a minimum divergence of 30 ^{o} between the departure track and the "missed Approach Track" of the arriving runway [#246] . Normally, however, segregated operations are "same-direction" only [#247, # 248]. As SODPROPs is an "opposite-direction" form of segregated operation, the requirement for 30^{o} divergence between tracks for missed approaches is unnecessary because there is no possibility of the missed approach track for arrivals crossing a departure track (See Mode Descriptions Appendix G). With respect to missed-approach conflicts the system is safer and superior to that being operated now (S. 5.3.2).

Stated advantages of same direction ***segregated*** operations are :

- *(a) Separate monitor controllers -for independent approaches- are not required ;*
- *(b) There is no interaction between arriving and departing aircraft on the same runway;*
- *(c) There is a less complex ATC environment for both radar and tower controllers;*
- *(d) Reduced possibility of pilot error due to selection of wrong ILS frequency.* [# 249]

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241 AIP ENR1.1 para 41.3.

242 LTOPFR p. 73, in discussing Mode 2.

243 LTOPFR p . 78 in discussing Mode 3.

244 LTOPFR pp 71 & 77.

245 AIP GEN2.2-20 definitions & abbreviations.

246 See ICAO Circ. 207-AN/126, Chapt 5 p. 23; AIP ENR 1.1 Para 39.1.

247 ICAO Circ 207-AN/126 ; AIP GEN ENR1.1 Para 39.

248 ICAO Circ 207 -AN/126 Simultaneous Operations on Parallel or Near-Parallel Instrument Runways

249 See ICAO Circ 207-AN/126, 5.1.5.

For parallel, *same direction* runways, segregated operations may be conducted with Visual, ILS, Surveillance- or Precision- Radar Approaches [#250] , but there must be Secondary Surveillance Radar [#251] .

"Independent " or "Dependent" Approaches

There are two categories of approach specified by ICAO and the AIP for parallel runway operations, "independent", and "dependent".

"Independent" parallel approaches [IPAs] are defined as simultaneous (same direction) approaches to parallel instrument runways where *radar separation minima* between aircraft on *adjacent* extended runway centrelines are NOT prescribed [#252] . This means that operations must either be in "visual" conditions, or that ILS-PRM must be employed to maintain parallel track separations and throughput in low cloud and visibility.

For ***"independent"*** approaches, the only separation requirement [normal and wake turbulence limited] is that for each runway treated in isolation, ie. 3 n. mi (5.4km) . ***Independent*** approaches are permitted by ICAO where the runway centrelines are not less than 1037 m apart [#253] ; but ICAO requires that all parallel approaches, regardless of weather conditions shall be radar monitored [#254] . The parallel runways at KSA are just 1037m apart, so that independent approaches are possible, even in poor weather if Secondary Surveillance or suitable PRM radar system is available [#255] .

Otherwise "***dependent"*** approaches are required, which requires enforcement of additional diagonal radar separation between aircraft on adjacent runways. This is applicable to same-direction operations.

"Dependent" approaches involve "radar separation minima" being required between aircraft on *adjacent* runway centrelines arriving *from the same direction*. This means that no two planes on adjacent runways may be a diagonal distance less than 3.7 km [2 n. mi] apart, ie. movement on adjacent runways must be staggered. Dependent approaches require a runway separation of at least 915m and a longitudinal separation (without wake turbulence) of 3n. mi [5 km].

However, secondary surveillance radar [SSR] is also required with dependent approaches to ensure adequate separation between arriving aircraft on the same runway as well as proper diagonal separation between aircraft on adjacent parallel runways. The ICAO /AIP Secondary Surveillance Radar requirement is summarised in Table 6.3.1.1 below:

TABLE 6.3.1.1 MINIMUM SECONDARY SURVEILLANCE RADAR [SSR] SPECIFICATION FOR IPAs:

RUNWAY SEPARATION	**CONDITION**	**NOTES**
1035 - 1310 M The situation at KSA	SECONDARY SURVEILLANCE RADAR (SSR) ACCURATE TO 0.06 DEGREES WITH UPDATES AT 2.5S	HIGH RES DISPLAY
1310 - 1525M	SECONDARY SURVEILLANCE RADAR (SSR) ACCURATE TO >0.06 DEGREES WITH LESS FREQUENT UPDATES	SUBJECT TO OPERATIONAL SAFETY
>1525M	SECONDARY SURVEILLANCE RADAR (SSR) ACCURATE TO 0.3 DEGREES WITH UPDATES AT 5S	
See ICAO PANS-OPS Doc 4444 (Ed. 14) , Para 6.7.3.2.1 (a), & AIP ENR 1.1 Para 37.1.1.		Nb. KSA has 1037m separation with > 700 m threshold stagger

250 ICAO Circ 207-AN/126 5.2.1
251 ICAO Circ 207 Para 5.2.2
252 AIP Definitions AIP GEN 2.2.
253 ICAO PANS-OPS Doc 4444 (Ed. 14) , Para. 6.7.3.2.1 (a) (1).
254 ICAO PANS-OPS Doc 4444 (Ed. 14) , Para. 6.7.3.2.7.
255 ICAO PANS-OPS Doc 4444 (Ed. 14) , Para. 6.7.3.2.7

While, strictly speaking, the above requirements do not apply to SODPROPs which has takeoffs and landings segregated onto separate runways in opposite directions , the application of radar separation requirements between aircraft on the same and adjacent runways should ensure that fully independent operations can be safely carried out.

In terms of specification [#256] , what is described in ICAO literature as SSR looks suspiciously similar to PRM [ie. 1 second update, and 0.06 degree azimuthal accuracy]. Whether this is so or not is immaterial as long as its functionality is the same.

Clearly, with opposite direction traffic flows of different climb/descent gradients, the imposition of a "dependent" or diagonal [inter-runway] separation condition is quite meaningless. Also although both arrivals and departures can be "independent", only arrivals separately approaching two adjacent parallel runways , or departures separately leaving them in the same direction can be "dependent" in this way. This means that the statement concerning "dependent" operations in the discussion of Mode 3 [#257] should be ignored.

6.3.1.5 General Separation Requirements between Arriving Aircraft :
In the AIP the general separation minima for landing of successive aircraft on the same runway may be summarised as follows. The runway threshold cannot be crossed until either :

(a) A preceding departing aircraft is airborne and has either commenced a turn or is beyond the landing roll completion position of the landing aircraft [#258] with sufficient manoeuvring distance for a missed approach. If the landing and departing aircraft have MTOW[#259] s less than 7000 kg and 3000 kg, respectively, the departing aircraft must be at least 1000m from runway threshold and have commenced the take-off run, so that there is no collision risk; OR

(b) A preceding landing aircraft has left the runway or will have done so without collision risk if it has an MTOW less than 7000 kg.

The above does not directly immediately provide guidance as to the potential throughput for the runway, but the wake turbulence separations of Table 6.3.1.3 will apply.

Other conditions applicable to landings under independent parallel runway operations which could be applied under SODPROPs are listed for reference in Table 6.3.1.2 [#260] :

TABLE 6.3.1.2 AIP REQUIREMENTS FOR LANDINGS UNDER INDEPENDENT APPROACH CONDITIONS

ITEM	CONDITION	REFERENCE
(a)	The Aircraft must have a straight-in approach track	AIP 37.2.2 (d)
(b)	There must be an Instrument Landing System (ILS) on the landing runway	AIP 37.2.2 (d)
(c)	There must be a minimum 1000 ft vertical or 3 n.mi [5.4km = 1.3min at 250km/h] radar separation provided until establishment on localiser course for arrivals	*AIP 37.2.2 (f) ; See also S. 6.3.1.9 for application to SODPROPs*
(d)	Arriving aircraft established on same ILS localiser course are radar separated by a minimum 3 n. mi [5.4km; 1.3min] WITHOUT WAKE TURBULENCE.[1#1]	*AIP 37.2.2 (h)*
(e)	Missed approach track for arrival runway diverges > 30 ° from departure runway [#22]	*AIP 37.2.2 (i)*
(f)	For arriving aircraft radar vectored to ILS intercept the final vector must not be greater than 30 ° & it must have not less than 1 n. mi straight in flight prior to ILS course intercept	*AIP ENR 1.1 37.2.2 (j) & AIP ENR 1.1 41.2*
(g)	Arrival Aircraft must be cleared to descend to the appropriate glidepath intercept altitude soon enough to provide level flight period to dissipate speed.	*AIP 37.2.2 (k)*
(h)	Arriving Aircraft must be transferred to ATC Control no later than 2nm before ILS PRM glide path intercept .	*AIP 37.2.2 (l)*

[1]***Note1*** *: Wake Turbulence Minima are about 2 minutes for all aircraft except heavy following heavy (ie > 136,000 kg) when it is 1.5min : See AIP ENR 1.4 Para 7 Table 6.3.1.3, below* **.**

[2]***Note 2:*** *This will inevitably be the case for SODPROPs operations at KSA.*

256 See PRM NOI Attachment B1-2
257 LTOPFR p. 78.
258 AIP ENR 1.1 11.5.2.
259 MTOW = Maximum Take Off Weight
260 From AIP ENR 1.1 Paras 37.1 - 37.3.

For maximum throughput under SODPROPs it would appear sensible to employ the techniques of *"radar separation minima"* between successive arriving aircraft, as used for simultaneous arrivals on parallel runways [#261] . This requires the use of ILS [#262] and PRM/ SSR facilities on the adjacent runways and maintenance of a minimum 1000 ft vertical or a 3 n. mi [5.4 km] longitudinal radar separation between Aircraft during turn-on to the ILS localiser course. It should be noted that if either 1000 feet altitude separation, or 3 n. mi longitudinal separation is achieved then that should be enough [#263] .

Applying this to SODPROPs means that only one runway will be used for arrivals, and the other runway is treated as a separate and independent entity which is used exclusively for departures with radar separation conditions, ie operations are *segregated*. In such conditions, aircraft could land at 1.3 min intervals on either runway assuming the 5.4km separation and an average speed of 250 km /hour, ie a throughput of 46 per hour without wake turbulence.

6.3.1.6 General Separation Between Departing Aircraft

AIP Single Runway Operations:

Minimum departure separation conditions for single runways are summarised in Table 6.3.1.3 from the AIP [#264] together with the radar wake turbulence condition separation minima where applicable. *[Note: ICAO requires a 45 degree divergence of tracks for the one minute separation criterion [# 265]]*

In Australia [#266] a minimum 1 minute interval is specified *"with specified tracking requirements and specified speed differentials"* for same direction departures from the same runway If there is no vertical separation [< 1000 ft between levels on identical tracks], and the leading aircraft is 18 km/hr or 10% faster than that following [Table 6.3.1.3, row 2] Australia employs a minimum 2 minute separation rule, and if the following aircraft is climbing to a lower level its cruising speed must not be greater than the climbing speed of the preceding aircraft.

TABLE 6.3.1.3 TABLE OF AIP [# 267] REQUIRED DEPARTURE SEPARATIONS

Condition	**Time mins ***	**Distance at 300 km/h**	***** **Radar Wake Turbulence Separation (mins)**
Specified Tracks & Speed Differentials [#a]	1	5 km	1.5- 2.0[#b]
Leading A/C 18km/h or 10% faster same track no vertical separation	2	10 km	1.5- 2.0[#b]
No Vertical Separation, flying through level & both on same track no speed difference	5	25 km	1.5- 2.0[#b]
Table based on ICAO PANS-OPS Rules of the Air & Air Traffic Services Doc 4444 (Ed 13) Part IV & (Ed 14) Chapt 5.6; as mod by AIP GEN 1.7-25 (19/4/01) Nb (a) This applied to single runways; See AIP GEN 1.7-25; Nb (b) Subject to Wake Turbulence Conditions			

The condition of no vertical separation in Table 6.3.1.3 is defined as vertical separation less than 1000 ft [# 268] .

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261 AIP ENR 1.1 para 37.1.1.
262 ILS = Instrument Landing System
263 ICAO PANS-OPS Doc. 4444, Para. 6.7.3.4.2.
264 AIP Paras GEN 1.7-25
265 ICAO PANS-OPS Doc 4444 (Ed. 14) , Para 5.6.1
266 AIP GEN 1.7 -25.
267 AIP = Australian Instructions to Pilots GEN 1.7-25 (19/4/01) & ICAO PANS-OPS Doc 4444 Part IV S. 3
268 ICAO Doc 4444 (Ed. 14), Para 6.7.3.4.2 .

For a given runway in Australia, takeoff is not permitted until either :

(a) A preceding aircraft of MTOW greater than 7000 kg has crossed the upwind end of the runway, and commenced a turn , and for runways longer than 1800 m, has become airborne and is 1.8 km ahead; OR
(b) A preceding landing aircraft has left the runway [#269] . Reduced requirements are in place for aircraft of MTOW less than 7000 kg.

At a takeoff velocity of 250 km/hr, this means a departure separation time of as little as 0.5 minute, though in practice, this time is extended due to wake-turbulence and other requirements [See. S. 6.3.1.7].

Parallel Runway Operations:

A variety of Parallel runway operation modes are discussed in the informative ICAO Circular No 207-AN/126, ***"Simultaneous Operations on Parallel or Near-Parallel Instrument Runways" ,*** including "Segregated approaches/departures" which is called *"Mode 4"* [Chapt. 4]; but there is no discussion of "SODPROPs" . Note that this "Mode 4" has nothing to do with the LTOP Mode 4 operation at KSA.

For Independent Instrument Departures from Parallel Runways (ICAO Mode 3) in simultaneous operations the ICAO Circular No 207-AN/126[#270] states :

> ***"There is no requirement, other than satisfactory two-way radiocommunications, for another specialized form of control or navigation aid facility for the conduct of independent instrument departures, except where spacing between parallel runways is less than 1525m (5000ft) and a course divergence after take-off of 45 º or more cannot be achieved. UNDER THESE CIRCUMSTANCES RADAR SHOULD BE PROVIDED! [Para 4.2.1]"*** ; and
> ***"Where radar is a requirement, its technical specifications should be of an order which would enable identification of aircraft within 2 km (1n. mi) of the departure end of the runways in use. PRIMARY RADAR DATA MUST BE AVAILABLE! "*** *: [Para 4.2.2]* [# 271] .

Independent Departures may be conducted at Australian airports provided the courses of successive aircraft are permitted to deviate by at least 15 º immediately after takeoff and radar is available which can identify aircraft within 1 n. mi of the upwind (departure) end of the runway [#272] .

Thus for the parallel runways at KSA, where the spacing is 1037m, radar must always be provided, there should be no divergence requirement excepting for the 15 º divergence requirement for SODPROPs and the one minute separation criterion [Table 6.3.1.3] as applied in the absence of wake turbulence which is discussed below (S. 6.3.1.7).

6.3.1.7 Wake Turbulence Separation Requirements :

Unfortunately for throughput maximisation, "wake-turbulence" of both landings & departures must be considered. The proportion of long-haul heavy jet (eg. B747) movements at Sydney Airport is roughly 15%[#273] (ie 7.5 % arrivals and departures) . Wake turbulence is governed by aircraft size and "Mean Takeoff Weight" [MTOW]. The turbulence requirement is different depending on whether a light aircraft is following a medium size aircraft, or a medium size aircraft is following a heavy weight aircraft. Table 6.3.1.4 shows the Wake Turbulence Separation criteria to be applied under different conditions. This AIP data agrees with the ICAO Wake Turbulence data in ICAO PANS-OPS Doc 4444 (Ed 14) Para 8.7.4.4. Table 6.3.1.5.shows typical aircraft types in each wake-turbulence class.

From the Tables (6.3.1.4.& 5) it can be seen that a medium weight aircraft following another arriving medium or an arriving heavy aircraft following a medium can ignore wake-turbulence, and the required separation minimum will correspond to the 3 n. mi standard, ie. about 1.3 minutes at 250 km /hr [or 46 per hour]. For medium- following heavy- aircraft there will be a requirement for at least 5 n. mi or 2 minutes between successive arrivals. This corresponds to about 30 landings or takeoffs per hour.

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269 AIP ENR 1.1 para 5.5.1.
270 Simultaneous operations on Parallel or Near-Parallel Instrument Runways -ICAO Circ 207-AN/126
271 See also AIP ENR1.1 Para 40.1 (b)
272 AIP ENR 1.1 para. 40.1; cf. Table 7.2.1.2.
273 LTOPSR p. 2

For successive heavy aircraft of MTOW greater than 200,000kg [eg. 747's] the requirement is for only a 1.5 minute separation or 40 per hour. For a "mixed bag" or sampling of equal numbers of large heavy (> 200000kg), heavy (136000-200000kg) and medium (< 136000kg) planes per hour, the average maximum landing rate on one runway would be about 34 per hour (ie 60/1.75). A similar picture emerges from the consideration of the separation criteria for departures, where the AIP and ICAO Radar based wake turbulence separation standards are similar [# 274] [See Table 6.3.1.4, below].

Given the more generous "radar separation" provision when all takeoffs are large heavy jets [MTOW > 200,000kg], a maximum throughput of 40 per hour would be possible, but given a mixed sample of medium - heavy aircraft types this would be reduced to 30 per hour at an average wake turbulence radar separation of 2 minutes. The above considerations exclude the possible interposition of "light aircraft" [MTOW < 7000kg., ie 2.5 minutes/24 per hour], which should be avoidable on the main N-S runways at KSA.

TABLE 6.3.1.4 WAKE TURBULENCE SEPARATION UNDER RADAR SEPARATION CONDITIONS

CATEGORY					Data from AIP ENR 1.4 Para 7.2.1. & 7.2.2
Leading	**Following**	**Arrival & Radar** **N. Mi MIN**	**Displaced Landing** **MIN**	**Opposite Direction** **MIN**	**Departure Full Length** [#1] **N. Mi MIN**
HEAVY >200,000KG	HEAVY >200,000KG	1.5 MIN	1.5 MIN	1.5 MIN	1.5 MIN
HEAVY	HEAVY	4n. mi 2MIN			4n. mi 2MIN
	MEDIUM	5n. mi 2MIN	2	2	5n. mi 2MIN
	LIGHT	6n. mi 3MIN	2	2	6n. mi 2MIN
MEDIUM	HEAVY	(1.3)[#2]			(1 or 2)[#3]
	MEDIUM	(1.3)			(1 or 5)[#4]
	LIGHT	5n. mi 5MIN	2	2	5n. mi 2MIN
[1]	Assumes each aircraft uses full runway length on takeoff; & Table 6.3.1.3 separations without wake turbulence				
[2]	This Document : S. 6.3.1.5 arrival radar separation applied without wake turbulence				
[3]	Numbers in brackets without wake turbulence condition [Table 6.3.1.3 or S.6.3.1.6]				
[4]	5 minutes assumes medium planes of equal velocity, no vertical separation				

TABLE 6.3.1.5 TABLE OF AIRCRAFT SHOWING WAKE TURBULENCE CLASS

WEIGHT CLASS	TYPICAL AIRCRAFT WITHIN CLASS [# 1]
HEAVY > 200,000kg	B747-400; B747; MD11; B777; DC-10; A340; A330; LOCKHEED Tristar.
HEAVY < 200,000kg	Concorde; B767;A300;A320;B707;DC-8;A310;
MEDIUM < 136,000 kg	B757; B727; B737-300/-400/-500; DC-9; B737-100/200; F100; F28 Fellowship
[1] # Jane's Aircraft Recognition Guide (1995) , Harper Collins	

6.3.1.8 Summary of Estimated Independent Arrival & Departure Capacities :

An estimate of optimum mode capacities [assuming no runway length limitations] for various "mixed bag" operational scenarios is shown in Tables 6.3.1.6 (A to D) below.

The movement scenarios are built up assuming three (3) conditions with mixed flows of "Heavy" and "Medium" class aircraft according to Tables 6.3.1.4 & 5 above. Arrivals and Departures are dealt with separately because the non-wake-turbulence radar separation requirements are different and, in the case of departures, differ depending on velocity difference between successive aircraft and whether they are subsequently directed onto separate "tracks."

274 ICAO PANS-OPS Doc 4444 (Ed. 14) , Para 8.7.4.4

TABLE 6.3.1.6(A) ARRIVAL TRAINS

MIXTURE	***ASSUMED SEQUENCE*** (Intervals in minutes) m = "medium weight" & h = "heavy-weight" aircraft	***AVERAGE INTERVAL***	***MOVEMENTS/ HOUR***
10% HEAVY[#1]	-(1.3)m-(1.3)m-(1.3)m-(1.3)m-(1.3)m-(2.0)h-(1.3)m-(1.3)m-(1.3)m-(1.3)m	1.37	43.8
20% HEAVY	-(1.3)m-(1.3)m-(2.0) h-(1.3)m-(1.3)m-(1.3)m-(1.3)m-(2.0)h-(1.3)m-(1.3)m	1.44	41.7
50% HEAVY	-(1.3)m-(2.0)h-(1.3) m-(2.0)h-(1.3)m-(2.0)h-(1.3)m-(2.0)h-(1.3)m-(2.0)h	1.65	36.4

[1] For Sydney runway 34R this is limited to dry landing conditions, and possibly non-longhaul heavies due to limited runway length

TABLE 6.3.1.6(B) DEPARTURE TRAINS (OPTIMUM THROUGHPUT - DIVERGING TRACKS)

MIXTURE	***ASSUMED SEQUENCE*** (Intervals in minutes) m = "medium weight" & h = "heavy-weight" aircraft	***AVERAGE INTERVAL***	***MOVEMENTS /HOUR***
10% HEAVY[#1]	-(1.0)m-(1.0)m-(1.0)m-(1.0)m-(1.0)m-(2.0)h-(1.0)m-(1.0)m-(1.0)m-(1.0)m	1.1	54.5
20% HEAVY	-(1.0)m-(1.0)m-(2.0) h-(1.0)m-(1.0)m-(1.0)m-(1.0)m-(2.0)h-(1.0)m-(1.0)m	1.2	50
50% HEAVY	-(1.0)m-(2.0)h-(1.0)m-(2.0)h-(1.0)m-(2.0)h-(1.0)m-(2.0)h-(1.0)m-(2.0)h	1.5	40

[1] For Sydney runway 16L this is limited to Heavy (eg. 747- type) aircraft under around 600,000lb ie no long haul heavies due to limited runway length.

TABLE 6.3.1.6(C) DEPARTURE TRAINS (MEDIUM THROUGHPUT)
Notes: - SAME TRACKS, DIFFERENT LEVELS); A 10% or 10 kt speed differential is applied

MIXTURE	***ASSUMED SEQUENCE*** (Intervals in minutes) m = "medium weight" & h = "heavy-weight" aircraft	***AVERAGE INTERVAL***	***MOVEMENTS/HOUR***
10% HEAVY[#1]	-(2.0)m-(2.0)m-(2.0)m-(2.0)m-(2.0)m-(2.0)h-(2.0)m-(2.0)m-(2.0)m-(2.0)m	2	30
20% HEAVY	-(2.0)m-(2.0)m-(2.0) h-(2.0)m-(2.0)m-(2.0)m-(2.0)m-(2.0)h-(2.0)m-(2.0)m	2	30
50% HEAVY	-(2.0)m-(2.0)h-(2.0)m-(2.0)h-(2.0)m-(2.0)h-(2.0)m-(2.0)h-(2.0)m-(2.0)h	2	30

[1] For Sydney runway 16L this is limited to Heavy (eg. 747- type) aircraft under around 600,000lb ie no long haul heavies due to limited runway length.

TABLE 6.3.1.6(D) DEPARTURE TRAINS (WORST CASE THROUGHPUT)

MIXTURE	***ASSUMED SEQUENCE*** (Intervals in minutes)	***AVERAGE INTERVAL***	***MOVEMENTS /HOUR***
ALL CASES	*SAME SPEED, LEVEL & TRACK*	5	12

6.3.1.9 APPLICATION TO SODPROPs:

6.3.1.9.1 Arrivals:

Although the Secondary Surveillance Radar [SSR] described in Table 6.3.1.1 was evolved for *"independent approaches to (two) parallel runways"*, there is no apparent obstacle to its employment with PRM for monitoring and control of aircraft with the runways in a segregated, SODPROPs operation, so as to maintain accurate angular separation minima between arriving and departing aircraft travelling in opposite directions on separated parallel runways. There may, however, be a need to facilitate additional vertical angular variation of the radar beam.

The application of suitable radar [PRM OR SSR] to SODPROPs would facilitate maximum use of LTOP Modes 2 & 3 for over-the-water operations at Sydney Kingsford Smith Airport [KSA], and given that such radar is mandatory for parallel same-direction operations, there will be no extra cost.

For ***"independent"*** approaches under "Instrument Meteorological Conditions" (Cloud Base < 2100 ft) at KSA , the runway separation of 1037m demands Secondary Surveillance Radar [SSR] of at least 0.06 degree resolution with updates of 2.5 seconds [Table 6.3.1.1] . For this runway separation the AIP states that, regardless of weather, *Aircraft MUST be radar monitored as being established* on the ILS Localiser for arrivals until [paraphrasing four conditions] "the aircraft has virtually landed" [#275] . According to Airservices Australia [# 276] the existing PRM provides an update rate of 1 second and 0.06 degree resolution, ie equivalent to "Secondary Surveillance Radar" per Table 6.3.1.1. The general landing separation criteria are set out in Section 6.3.1.5 above.

6.3.1.9.2 Departures:

For Independent Departures the AIP requires the courses of the successive aircraft to diverge by at least 15º immediately after takeoff and the radar must be capable of identifying the aircraft within 1 n. mi of the upwind [departure] end of the runway [#277] . The departure separation criteria are set out in Section 6.3.1.6 above.

Applying precision radar to departing aircraft in SODPROPs operations should ensure adequate vertical and horizontal separations until they are on their respective climb tracks to cruising altitude.

6.3.1.9.3 Conclusion:

Given the requirement for radar monitoring on parallel runways of the spacing of those at KSA, all the hedging in the LTOP Reports [Proponent's Statement] about possible "conflicts between radar and tower controllers" appears beside the point (cf. S 6.3.1.1 point (vi), above). Radar is required in any event. Admittedly, however, the southern approaches PRM /SSR had not been implemented when LTOP was designed (it was introduced in 1999), and without PRM all-weather independent operations are not possible and so the Mode 2 & 3 movement capabilities predicted in the LTOP Reports may not be optimum.

If air-traffic control can operate same-direction parallel runways without throughput reduction in bad weather conditions using PRM, then there seems to be no reason why they cannot operate SODPROPs with PRM and /or secondary surveillance radar , possibly down to cloud base 220 ft and visibility minimum 800 m as stated in the PRM NOI [#278] . This would optimise the SODPROPs system. Even full scale operation down to cloud base 2400 ft would be a massive improvement over present performance. Given the need for radar monitoring anyway, and the current availability of radar with suitable accuracy and resolution at KSA, there is no practical obstacle to much greater exploitation of SODPROPs than at present.

The above presented movement capacity calculations [Section 6.3.1.8] show that, given suitable means for regulating arrival and departure aircraft trains [eg. a computer] , and appropriate flight track planning , there appears to be no reason why SODPROPs Modes 2 & 3 could not be employed with radar control and independent approaches to facilitate quite adequate movement levels over Botany Bay. In most operational circumstances, arrival rates of from 35 - 45 movements per hour could readily be accommodated; while corresponding departure rates of from 30 - 55 should be sustainable given suitable traffic control systems.

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275 AIP ENR 1.1 37.3.

276 Introduction of a Precision Runway Monitor on Runways 16L and 16R - Notice of Intention Airservices Australia, October 1999, PRM NOI Attachment B1-2

277 See AIP ENR 1.1 Para 40.

278 Introduction of a Precision Runway Monitor on Runways 16L and 16R - Notice of Intention Airservices Australia, October 1999, PRM NOI Ch. 2.2.1.1.

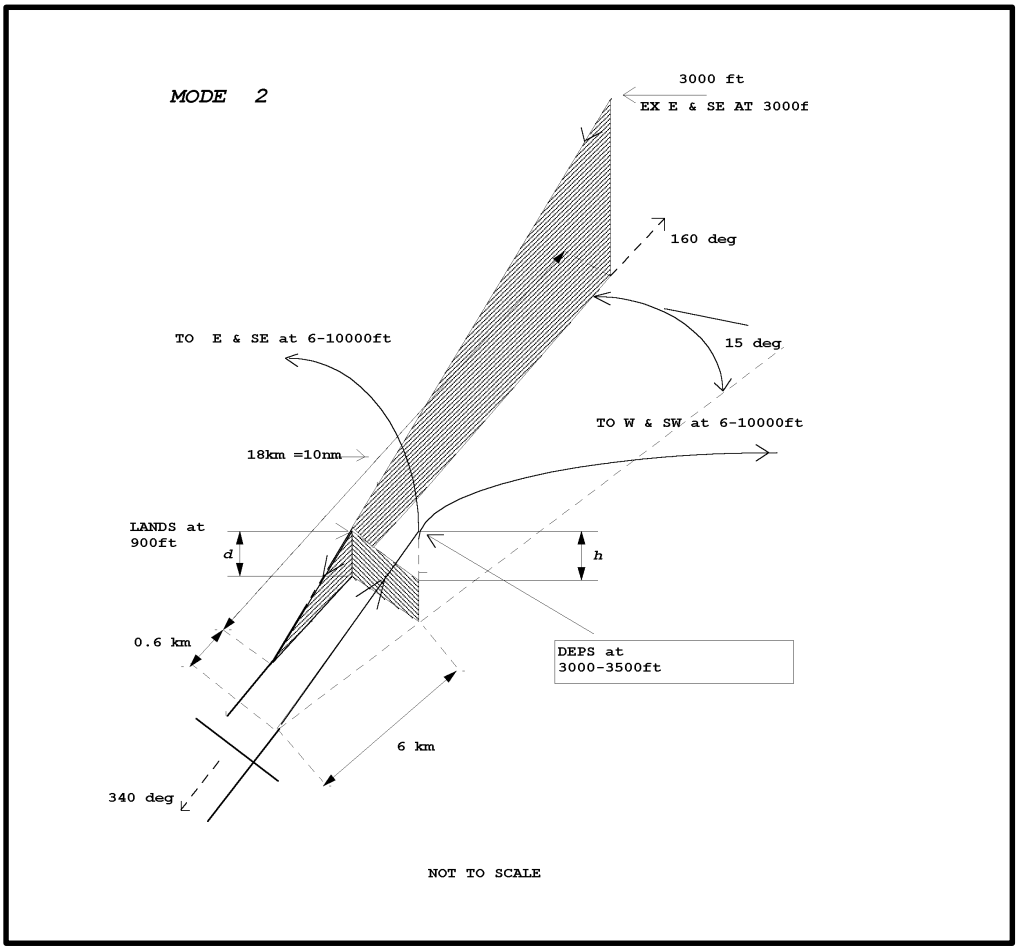
The above estimates for movement capacity [Tables 6.3.1.6 (A - D)] exceed those for arrivals and departures for Modes 2 and 3 in the LTOP Reports where figures of 20-27 were calculated for arrivals and 28 - 30 for departures. The Medium Throughput , "mixed-bag" departure figure is, however, about the same.

A consideration of the required three dimensional geometry, assuming ICAO [or better] Noise Abatement climb procedures are in place, is detailed below in Section 6.3.2.

6.3.2 *3D AIRSPACE REQUIREMENTS FOR OPTIMAL SODPROPS OPERATIONS AT KSA:*
Appendix D of *"The Way Forward #1"* [SACF Inc July 1999], demonstrated that the 15 ^{o} track divergence requirement[#279] can easily be met *without aircraft needing to fly over Cronulla*. For completeness, that appendix is reproduced as Appendix G in this LTOP Review. The question therein raised due to ambiguity in the Airservices Australia LTOP Reports [#280] as to whether the divergence requirement were 15 or 30 degrees is now resolved. It is in fact only 15 degrees.

Present operational requirements for SODPROPs [#281] require that arriving Aircraft on either instrument or visual approaches to a runway be established on final approach no later than 10n. mi (18km) from touchdown. At 10 n. mi the prevailing STARs [#282] for arrivals over Botany Bay require descent from 3000 ft at 10n. mi [18 km] miles for arrivals turning in from the south east over the ocean, or from 4000 ft at 14 n. mi for arrivals turning in from the south west overland. The three dimensional separational conditions discussed below are illustrated for Mode 2, with arrivals being fed in from the south-east , in Figure 6.3.2:

FIGURE 6.3.2 3D DIAGRAMMATIC REPRESENTATION OF SODPROPs FOR MODE 2
SODP5u.tif



The situation for Mode 3 is very similar (See Table 6.3.1.7).

279 AIP ENR 1.1 Para 41.1 (d).
280 LTOP Report LTOPFR p 72 cf. p. 73.
281 AIP ENR 1.1 Para 41.2 (c).
282 See DAP East SSY85114 & SSY85115.

A departing B747 aircraft climbing under ICAO NADP-2[#283] conditions using maximum climb out thrust prior to turning on to cruising climb could have reached an altitude of 2000 feet within 3 km, ie before reaching the sandhills of Kurnell. By the time it is turning east over Wanda [ie 6 km] it could be at least at 3000-3500 feet as commonly observed at present! Lighter jet aircraft can reach even greater altitudes following takeoff. Such altitudes may be contrasted with the only 1400 - 3000 feet altitudes now being attained over the heavily populated north west in the vicinity of Leichhardt, Lewisham and Summer Hill due to arrival overflying.

At this distance (6 km), Mode 2 arrivals descending from the southeast along the parallel opposite direction ILS approach track [to Runway 34R] will be at 900 feet, ie at least 2000 ft below any parallel departing aircraft [height "h" in Fig. 6.3.2]. This separation is more than the required 1000 ft vertical separation distance from the aircraft below. Similarly , arriving aircraft descending from the southwest will be at 833 feet and thus also well within the required vertical separation tolerance [h = 2165ft] for aircraft turning right over the arrival flight track [#284].

Table 6.3.2 lists the vertical separations achievable for SODPROPs Modes 2 and 3 for arrivals from the south-east and -west, respectively. The vertical separations for Mode 3 are seen to be similar.

TABLE 6.3.2 SODPROPs CROSSOVER LANDING AND SEPARATION HEIGHT DIFFERENCES

	MODE 2	**MODE 2**	**MODE 3**	**MODE 3**
Refer Fig. 6.3.2	*SE Arrivals from 10 n. mi/3000ft*	*SW Arrivals from 14 n. mi/4000ft*	*SE Arrivals from 10 n. mi/3000ft*	*SW Arrivals from 14 n. mi/4000ft*
Crossover landing altitude (d) ft	900	833	1,100	1,019
Separation height difference (h) ft	2,100	2,165	2,000	1,980

These vertical separations could be increased for smaller jet powered aircraft than the 747 at takeoff because they climb more steeply during initial climb out . It should therefore not be difficult, with adequate secondary surveillance radar and /or precision runway monitoring, to ensure safe longitudinal and vertical separations at most times for intensive SODPROPs operations. The above discussion shows that operations could thus be optimised for maximum departure and arrival use of at least between 30 and 40 movements per hour [ie. total movements up to 70/hour].

6.3.3 THE DOWNWIND OPERATIONAL MAXIMUM:

As shown in Appendix G , LTOP Modes 2 and 3 are meteorologically complementary in operation. Thus Mode 2 is optimisable for maximum Bayside heavy jet takeoffs in southerly winds and northerly winds [*of less than some threshold value*], with arrivals predominantly on Runway 34R and Takeoffs over the Bay from Runway 16R. Mode 3 is optimisable for operations in both northerly winds and southerly winds [*of less than some threshold value*], with arrivals predominantly on Runway 34L and takeoffs through Botany Heads from Runway 16L.

With Mode 2 a few (2-3/hour, max - 1996 conditions) long haul arrivals per hour must land on runway 16R from the north and in the case of Mode 3 (2-3/hour) long hauls per hour must depart from Runway 34L to the north due to runway length considerations. In these scenarios only the smallest fraction of heavy long-haul jets need land (in Mode 2) or takeoff (Mode 3) over residents north and east of the airport.

Given the present threshold downwind condition of 5 knots applied without an overland noise abatement bias [LTOP Recommendation 3], in dry conditions with a crosswind not greater than 15 knots, the theoretical movement maximum under Modes 2 & 3 is around 70 / hour (arrivals and departures taken together).

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283 NAP = Noise Abatement Departure Procedure [See ICAO PANS-OPS Aircraft Operations, Doc 8168, Part 5 Chap. 3]

284 *Calculation: at 10* n. mi *(18 km) aircraft is at 3000ft therefore at 6 km it will be at 3000*(6-0.6)/18= 900ft, at 14* n. mi *(25.2 km) aircraft is at 4000ft therefore at 6 km it will be at 4000*(6-0.6)/25.2 = 833ft*

6.3.4 WHAT ARE THE "CROSSWIND" AND "DOWNWIND" CONDITIONS?

The *crosswind condition* is the maximum crosswind that an aircraft should be permitted to experience during landing or taking off. A Boeing 747 is tested for operations in crosswinds up to 30 knots [#285] but ICAO aircraft operational rules require that noise abatement *should not* be the determining factor in runway nomination when the crosswind (including gusts) exceeds 15 kt [28 km/hr] [#286] .

The *downwind condition* is the maximum tail wind that an aircraft is permitted to experience in landing or taking off, and ICAO rules require that noise abatement should not be the determining factor in runway nomination when the tailwind component (including gusts) exceeds 5 kt (9 km/hr). In Australia the AIP generally requires crosswind/downwind conditions of 20 kt /5 kt, respectively [#287] . If the runways are not completely dry, the above reduce to 20 kt and 0 kt, or 15 kt with a 5 kt downwind, respectively [#288] .

Prior to LTOP a downwind condition of 5 knots was applied with a bias for movements in the north -south direction. At Brisbane Airport a 10 knot downwind criterion is requested , but not required, for Noise abatement purposes [#289] .

If a noise abatement downwind criterion was prescribed for KSA it would enable a greater proportion of departures to takeoff over Botany Bay than otherwise possible, since historically northerly winds in excess of 10 knots are only experienced from 3 - 8% of the time [#290]. With the introduction of LTOP the downwind bias [for noise abatement] was abolished at KSA [#291] , whereas Boeing 747's are tested for operations with downwind takeoffs and landings up to 10 knots [#292].

Downwind "bias" enables take-offs and landings *with the wind* when otherwise they would be proceeding in the opposite direction, eg. to the north in a light to medium northerly wind. At Sydney , this enables a greater fraction of departures, which are the noisiest movements, to take off over water.

However, Brisbane airport in Australia publishes a 10 knot downwind rule for Noise Abatement purposes [Runways 01 & 19]. Although this is stated to be "optional", pilots are required to inform air traffic control before commencing descent if they cannot comply [#293]. If this is permissible for Brisbane, where the airport is farther from residential areas , why is it not applied in Sydney , where it would assist the LTOP meet both its runway end "targets" with maximum movements over water?

6.3.5 SODPROPS AVAILABILITY:

In SODPROPs, the existence of a noise abatement downwind bias rule would enable southerly takeoffs over Botany Bay in conditions of northerly winds, when otherwise a northerly takeoff would be required. Landings from the south, across Botany Bay can still be continued normally because the wind is from the north. Similarly, takeoffs over the bay are not a problem in southerly winds, and landings from the south across the bay can be continued until the southerly wind speed component reaches the downwind "bias". Thus Mode 2 or 3 SODPROPs operations would be permissible in all wind conditions between +/- b (knots), where "b" is the noise abatement bias wind speed to be applied (eg. 5 or 10 knots). Mr. Ken McLean, Manager Airservices Operations at KSA, is on record as saying that a ten (10) knot downwind criterion would be perfectly safe at KSA [#294] . Additionally Boeing 747's are rated to operate in up to 10 knot downwind conditions[#295].

The availability of SODPROPs is thus determined by the prevalence of appropriate wind conditions. The overall estimate of Mode 2 & 3 availability in the LTOP Reports [#296] [from SABRE Decision Technologies] was from 36

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285 Zagoren, M. (2002) See "Miscellaneous General Limits" - Boeing 747-100/SP/200B Limitations.
286 ICAO PANS-OPS, "Aircraft Operations", Doc 8168, Vol 1, Part V Chapt. 2.1.3
287 AIP ENR 1.5- 11.1.2
288 DAP East, Doc. SSYNA2 [22/2/2001]
289 DAP East, Doc. BBN79NA1 [22/2/2001]
290 O' Brian, N.R. (1995) Sydney Airport: Longterm weather patterns are likely to invalidate EIS forecasts, http://www.maths.usyd.edu.au:8000/obrian/airport.html
291 See LTOP recommendation 3 - LTOPSR p. 4.
292 ibid, Zagoren, M. (2002)
293 DAP East, Doc. BBN79NA1
294 Govt SACF Meeting 26/2/1999
295 Zagoren, M. (2002) ibid
296 LTOPFR pp 71 & 77

% in January to 57 % in May and July. These estimates were said to be based on Bureau of Meteorology (BOM) wind data for the 55 years to December 1995. Given some "down-wind" latitude for the purposes of noise abatement (at present countermanded by Recommendation 3 of the LTOP Ministerial Approval [#297]) these proportions could be increased.

The range of wind conditions at KSA historically exceeding 5 & 10 knots north or south is shown in Table 6.3.5.

Thus it appears that if a 5 knot downwind abatement rule were to be applied, either Mode 2 or 3 would be available, on average, for 82.5% of the time in northerly winds and 73% of the time in southerlies. Similarly, if a 10 knot downwind noise abatement rule were to be operated, SODPROPs availability would increase to 94.5% in northerlies and 86.25% in southerlies.

This would avoid the need for northerly wind jet takeoffs [Mode 3] and landings [Mode 2] across the north excepting for around 2-3 long-haul 747-class and similar planes per hour [See Table 3.2.1]. The long haul heavier jets will still need the main north-south runway for takeoffs (in Mode 3), and landings (Mode 2- in wet weather).

TABLE 6.3.5 STATISTICS OF WIND CONDITIONS EXCEEDING 5 & 10 KNOT THRESHOLD

Downwind Threshold	***5 KNOT*** [#1] ***NORTH***	***5 KNOT SOUTH***	***10 KNOT NORTH***	***10 KNOT SOUTH***
Percentage time exceeded	9 - 26%	17.5 - 36%	3 - 8 %	7.5-20%
Percentage time below threshold	***74 - 91%***	***64 - 82.5%***	***92-97 %***	***80 - 92.5%***
Average Availability	82.5%	73%	94.5%	86.25%

[1] Data from O' Brian, N.R. (1995) ibid - http://www.maths.usyd.edu.au:8000/obrian/airport.html
Note: O' Brian uses fifty (50) year Bureau of Meteorology statistics from 1945- 1995 based on ten(10) minute average wind speeds recorded at three (3) hour intervals.

Given that there need be no ceiling to the north of the airport with properly designed wide ocean approaches for LTOP [Fig. 6.2.3] , these few long-haul takeoffs [Mode 3] could be spread widely and climb quickly to minimise noise. For long-haul landings [Mode 2] , in good visibility their arrival trajectories could again be spread widely to avoid concentrating impacts down the "Bennelong Funnel. " This would apply except in poor visibility and low cloud, when ILS PRM glide-path landings would be required [See. S. 7]. At the present time wide approaches are already conducted when visibility permits from the north west when jet aircraft follow the Parramatta Road route until they reach Lewisham Hospital where they undertake a 45 degree turn onto final approach. Despite this being contrary to the stated LTOP "no reciprocity" principle, it is presently carried out. There should therefore be little objection to its use with SODPROPs Mode 2 for spreading of arrivals, provided departures could be correspondingly spread. Overall, Mode 2 is preferable to Mode 3 because it eliminates takeoffs, in appropriate wind conditions, to the north.

6.3.6 WILL SODPROPS ADVERSELY IMPACT CRONULLA OR KURNELL?

1. Cronulla and Sutherland:

In Appendix G it is shown that, contrary to one of the excuses in the LTOP Reports [#298] for not using Modes 2 & 3, departures and arrivals using this mode need not overfly Cronulla.

First, as confirmed above (S. 6.3.1.2) the deviation required by the AIP between arrival and departure tracks is only fifteen (15) degrees, not 30 degrees as stated in one version of the LTOP Reports.

Second, with the currently used Mode 10 Runway 16R departure track bending across the Wanda sandhills, there is absolutely no requirement for either Cronulla (or Sutherland) to be overflown.

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297 LTOPSR, p. 4.
298 LTOPFR pp. 72 & 74 .

Departures from Runway 16L ["third runway"] should continue to turn sharp left through Botany Bay heads, thus avoiding both Kurnell and Cronulla. Arrivals to both runways 34 L & R from the south, on ILS (straight) trajectories should not overfly Cronulla. Provided disciplined arrival procedure turns complying with the LTOP Report predictions (either out over the Royal National Park - from the south west- or out over the ocean off Cronulla - from the south east) are enforced by air traffic control, there should be no impact either on Cronulla or the Port Hacking/Sutherland area.

Only if (as currently practiced) "lazy" early procedure turns are conducted (over Cronulla or close to "Tom Ugly's" bridge), would significant noise be a problem in built up areas to the south. It should be emphasised, however, that the present early turns are not part of "LTOP", merely the failure of air traffic control to properly implement LTOP according to its stated spirit.

2. Kurnell:

Given that jet departures from runway 16 R and L should proceed over Towra Point/ Wanda and Botany Bay Heads, respectively, there is no reason for concern Kurnell in relation to departures. Similarly, arrivals to runway 34L will only impact Kurnell with sideline noise in strong westerly cross winds . Arrivals on a straight line ILS (ie 3 degree glidepath) approach to runway 34R ("third runway") do overfly the western edge of Kurnell village, and at this distance from runway threshold (ca. 6 km) are at around 1000 feet. Given that such aircraft are on a "glide path", and using minimal power, noise levels experienced by Kurnell from such approaches is significantly less than that from departing aircraft at the same altitude [eg. ca. 10 dB(A), see , Table L.5 for T= 15s] .

Although it is preferable to avoid aircraft noise effects for everyone, it seems far better to expose a few hundred residents of one small village to relatively minor landing noise than it is to expose the residents of the much more heavily populated northern and eastern suburbs , all much closer to the northern runway ends, to both landing and takeoff noise orders of magnitude greater. This is what is happening now . With SODPROPs Mode 2, landings will occur mainly over the tip of west Kurnell, and takeoffs across Wanda Beach. With SODPROPs Mode 3, landings will occur over Wanda and takeoffs should turn off through Botany Heads without impacting on Kurnell.

It was suggested by former Transport Minister Vaile that those who lived close to an airport can expect to experience aircraft noise, and if they do not like it they can move to a quiet country town [#299] ! The residents of Kurnell are in the same boat as anyone else in Sydney. But it is totally irresponsible, and unreasonable, given the close proximity of Kingsford Smith airport to the ocean, to expect the millions of residents in the northern, western and eastern hinterland to bear the brunt of airport affectation. And who could reasonably justify residents as far away as Strathfield, Parramatta, the Hills (Baulkham and Winston), Richmond and Kuringai being continually exposed to noise from extremely low flying jets in the manner now imposed under LTOP. In addition, the Kurnell peninsula is land zoned "for noxious trades" - hence the oil refinery.

It is submitted that the cost of noise insulation for the few hundred residences of Kurnell, is far less than the cost of insulating the proportionately greater number of homes to the north, north west and east. This is not to mention the heart-ache and virtual "forced-draft demolition" of entire suburbs to the north, as occurred at Sydenham under a previous government . Moreover, if "Continuous Descent Approach" arrival STARs are introduced *[refer S.7 - Discussion of PRM]* , the landing noise from these arrivals at Kurnell would be further reduced [ie. 3-6 dB(A)] .

It is not clear who or what was the major opponent of SODPROPs on the LTOP "Task Force". Whoever it was succeeded beyond measure in frustrating the 1996 Ministerial Direction to maximise movements over Botany Bay! Whether the community lobby from Kurnell, or North Cronulla exerted such influence as a result of genuine misunderstanding is not yet known. However, the inexorably decreasing fraction of movements taking place over Botany Bay now highlights the continuing inequity of having only two (2) community representatives (being those for the north and south) on the IMC.

It is submitted that permitting Kurnell to continue to gain, by minimising movements over the Bay, at the expense of immensely harmful *"noise sharing"* across hundreds of square kilometres to the north, northwest and east, cannot be tolerated. It is unfair for the sake of one small village to cause such affliction to millions of homes and even more millions of people all over the residential hinterland of Sydney. This is like the Kurnell "tail" wagging a metaphorical Sydney dog. It is contrary to the principles of equity, justice and common sense.

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[299] Daily Telegraph 8/1/1998

6.3.7 CONCLUSIONS:

The above considerations mean that the ostensible objections in the LTOP Proponents Statement to the use of SODPROPs for alleviating residential Sydney from most of its present jet noise are of a structural and political nature, rather than due to inherent technical difficulty. Only SODPROPs when fully operational with Modes 2 and 3 can really maximise the deployment of aircraft operations over Botany Bay, as properly demanded by the original LTOP principles.

It is demanded that Airservices, or some suitable independent airspace management consultant be immediately contracted to draw up plans for the optimisation of SODPROPs over-the-water modes, for maximum possible exploitation in all weather conditions at Sydney Kingsford Smith Airport.

A recent DOTARS[#300] paper showed conclusively that, at least for the 6:00 -7:00am time slot, Mode 4 SODPROPs produced more beneficial noise outcomes for the majority of Sydney Residents compared to the overland longhaul takeoff modes [Modes 5, 7, 8 and 14A] during the "Long Hauls Arrivals Peak" at KSA. No comparable study was conducted for the "Long Haul Departure Peaks" in sensitive times which now affect millions of residents for tens of kilometres north, east and west of KSA, when the availability of Modes 2 & 3 is completely ignored.

The present and continual decline in the proportion of both movements and departures over Botany Bay [from 55% movements in 1996 to 45% in 2002] is hardly fulfilling the principal objective of LTOP which was to maximise movements over the Bay [S. 2.1 (iii), above] .

Must one therefore conclude that parochial and/or political interests benefitting from the now noxious conditions across the north and parts of the east are behind the ban on sensible over-the-water modes, as discussed in SS. 3.1 & 4.1, above? This is not a surprising outcome given the strong south-north bias on both the SACF and IMC.

<u>Recommendation 6.3.1</u> : That LTOP Recommendation 3 [the discontinuance of the 5 knot downwind noise abatement rule for southerly arrivals and departures] be abandoned. Recommendation 3 is inconsistent with the principle LTOP objective of maximising movements over water. It is also recommended that the 5 knot rule be increased to ten (10) knots (as formerly applied at KSA) , as used at Brisbane, and that the downwind noise abatement requirement be employed to favour over-the-water operations whenever meteorological conditions permit safe operations.

<u>Recommendation 6.3.2</u> : That a system of precision scheduling be employed by Airservices Australia, in conjunction with Secondary Surveillance Radar to optimise Mode 2 & 3 SODPROPs operations over Botany Bay.

<u>Recommendation 6.3.3</u> : That any adverse influence of these proposals on Kurnell be fully compensated by the provision of totally effective noise insulation for this suburb . This is a far better and less costly proposition than to continue to inflict the present impost of ever increasing noise on ever greater sections of the Sydney Basin as far away as Hornsby and Winston Hills, as well as to an even greater extent to the suburbs immediately north of KSA.

<u>Recommendation 6.3.4</u> : It is proposed that Airservices, or some suitable airspace management consultant be immediately contracted to draw up plans for the optimisation of the full SODPROPs over-the-water modes, for maximum possible exploitation in all weather conditions at Sydney Kingsford Smith Airport.

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300 DOTRS = [now DOTARs] Department of Transport & Regional Services, "Noise Exposure Patterns of SODPROPs Compared to Other Noise Sharing Modes" [SACF 2000/010, January 2000]

6.4 SYSTEMATISING THE MEASUREMENT OF DOSE-RESPONSE OR USING A CENSUS-BASED PEOPLE-EVENTS NOISE METRIC # [301]:

SYNOPSIS The design work performed by Airservices Australia (ASA) and the Australian Department of Transport (DoT) in 1995-7 to develop the so-called Long Term Operating Plan (LTOP) for Sydney's Kingsford Smith Airport (KSA) was essentially devoid of any rigorous scientific method. While most would agree with the stated goals of the LTOP, to maximise use of water and non-residential land and then fairly share the remaining noise, the actual operational procedures proposed in the LTOP are amongst the worst possible scenarios for achieving these goals.

But to prevent the public from readily appreciating this fact, the LTOP avoided any overall measures of noise or fairness. The driving force was clearly the political bias being shown to certain blue ribbon Liberal electorates. To hide this fact and stifle debate, the government exempted the process from the normal environmental review and requirement for an EIS. The government sold the LTOP on the basis that it delivers "fair sharing".

While "fair sharing" was indeed a stated goal of the LTOP, any analysis of the resultant flightpaths and noise contours confirms that the LTOP (especially the changes subsequently made to the plan) goes to considerable lengths to ensure against fair sharing where such sharing would negatively impact a federal Liberal electorate. This allegation is supported by a ministerial media release from Andrew Thomson, (former) Member for Wentworth.

This paper sets out the appropriate classes of mathematical models to allow quantitative measures of the effectiveness of proposals and modifications. The method also ensures that policies are assessed and implemented without electoral bias. The method proposed allows the government to still set policy with public consultation, without allowing politicians to continue the misuse of power to bestow favours on electorates held by their own party, thereby shifting pollution to electorates of the opposition party.

The paper also recommends a properly representative body, where all affected residents are equally represented, to replace the practice of the government hand-picking representatives it would like to have on such a body. The proposal is to turn Sydney Airport Community Forum (SACF) from a government-appointed body to a true community forum, to enable it to live up to its name.

The full proposal is set out in Appendix H.

<u>Recommendation 6.4.1</u>: SACF Inc recommends that a system employing quantitative methods be employed for ensuring the equitable distribution of noise from aircraft forced to depart and land over residential areas and that a modification of the ANEF coupled with census population statistics be employed which better reflects the immediate noise impact over residential zones. It is proposed that such a system be coupled with an automated time-sequenced methodology for spreading departure movements such as that proposed in S. 6.5.

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[301] From G. Harrison BE(Syd), BSc(VUW), MBA(Harvard), FAIM, MNIA, MIEAust, MIEEE, MACS, MIREE, MACM, AMAusIMM, MAIE, JP. 7 March 1998 ***"A Quantitative Solution To The Problem Of Fair Distribution Of Aircraft Noise*** " - For full paper see Appendix H.

6.5 TIME-SEQUENCED CATHERINE-WHEEL DEPARTURE PROTOCOL [#302]

[MECHANISM FOR SAFE- IMPLEMENTATION OF FLIGHT PATH SPREADING.]

The following proposal was originally developed by the author in February 1998, at the commencement of the LTOP, but has not been previously published. The following is a precis only. The full proposal appears in Appendix I .

6.5.1 Introduction :

The Long Term Operating Plan for Sydney (Kingsford Smith) Airport [LTOP] is a plan for airport departures and arrivals which has been in the process of implementation since December 1997. It has introduced additional aircraft noise to many suburbs (including the North West, the East and the North East) not previously affected in this way. It was billed by Government as *"The Fair Share Noise Plan"*, and unwanted noise is what many people, previously unaffected by the airport, finally got.

In proposing the ANEF -ANEI system for monitoring the LTOP Noise distribution, the "LTOP-96" Summary Report at page 102 observes that :

"The Task Force considered a wide range of inputs and parameters that might be used to monitor the *equidistribution* of noise": para 7; and

> "To achieve this there has to be a wide understanding of what is meant by fair and equitable. The task force environment working group was not able to identify what is meant by fair and equitable." *The task force environment working group was not able to identify a single criterion to demonstrate equity* BUT it was able to identify a number of "considerations" which together, and in balance, could be considered to constitute the basis for a fair and reasonable distribution of noise. "
>
> *[Author's emphases]*

Then follows a list of parameters which include the "Average Noise Exposure" (ANEF); "Noise Level and Duration of Exposure" (T70); "Respite" ; "Number of Overflights " (involving a "Noise Metric" (N70)); "Time of Day or Night" and the specification of "Non-Reciprocal Flights".

First, in failing to address the meaning of ***"fair and equitable"***, the so-called *"Sydney Air Traffic Management Task Force"* aborted its allotted goal to achieve "fair sharing" [#303] of noise which could not be directed over the water or non-residential areas.

Second, the "LTOP-96" Reports reveal the Task Force restricted consideration to departure plans, defined by the various operating "LTOP MODES", to pathways effectively comprising "FREEWAYS IN THE SKY". Although in some areas these appear more like multi-lane freeways (over the north west); in others (eg. Coogee-Maroubra), the flight tracks were highly concentrated. Perhaps an unintended consequence of LTOP is that aircraft do not begin climbing to cruising altitude until the very outermost limits of Greater Sydney have been reached. For nearly all this distance they travel at only 2500 - 3500 ft above sea level.

The noise exposure for residents of areas immediately underlying these departure "FREEWAYS" is thus concentrated by LTOP Modes 7, 8 and 9 for considerable distances. These modes are those most affecting the residential areas to the west, northwest, east and northeast of the city. Although some spreading was subsequently introduced in the inner northwest, elsewhere there can be all-weather concentrations [eg. Strathfield, Parramatta, Winston Hills] .

Inevitably, such flight path concentration exposes more people in the underlying specific areas to aircraft noise, to which people in other areas of the Metropolitan Area are never exposed, even though Airservices Australia alternates use of the various Modes from time to time and from day to day.

6.5.2 Local Experience:

In the first phase of the "LTOP" beginning with December 4 1997, departure "Freeways in the Sky" were being used over many residential areas in the north west and east, and numerous complaints were made by many people to the Noise Enquiry Line by newly affected residents. From about February 1998 (whether because of complaints is

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302 Proposal by P.S. Lingard

303 LTOPSR p. 10.

difficult to assess), less concentrated, spreading flight paths came to be employed for Mode 9 over the inner north west, but these benefits were not introduced in the east .

From both personal and reported observation of aircraft trajectories in the sky, and the provision by AirServices of "Lochard Noise and Flight Path Monitoring " reports to residents, there is still much concentration of flight paths in narrow low-altitude corridors [both east and west] , resulting in excessive exposure to noise in contravention of Recommendation 5 of the "LTOP-96" Report Summary.

6.5.3 Proposed Alternative Modus Operandi for Departures [The Catherine Wheel Proposal]:

The "Catherine Wheel" proposal is based on the following premises:

- *(a) That at Take-off aircraft must be travelling parallel to their respective runway;*
- *(b) That by some distance from the runway end the aircraft can have reached a particular height setting which is both safe, above "noise critical" and achievable;*
- *(c) That there must be some distance interval during the climbing process when it is not desirable for the aircraft to bank or execute turns;*
- *(d) That depending on wind conditions certain operating "Modes" for Take off and Landing are available and that others are not. Some of these "Modes" are discussed in the "LTOP-96" report;*
- *(e) That beyond some distance from the airport, the aircraft must join some air corridor on its journey to its ultimate destination*

In relation to premise (b) trials of heavy jets by Qantas and Ansett have shown that a height of 3000 feet is reachable by the heaviest aircraft [climb attitude 15 degrees] within 3 km of the airport. This is confirmed by Boeing manuals of procedure [# 304] . At the original time of writing this , ICAO -"A" [#305] operations with initial climbout to 1500 feet had been trialled over both the east and the north west, but have not since been consistently employed over either.

In relation to premise (c) it is understood from discussions with pilots [and the LTOP Report[# 306]] , that turns may be executed at or above 1000 and 1500 ft depending on aircraft type and load [ICAO "A" and "B"/NADP 2 & 1 specify turns at 1500 and 1000 ft. respectively]. It is not essential to know the precise constraints on turning for this proposal. For more detailed discussion of Noise Abatement Departure procedures see S. 8.2.2 below.

In relation to premise (d) it is accepted that there may be technical and safety considerations immediately following take-off which may limit the trajectories which a given jet may employ from a given runway.

Such constraints might be determined by the fact that other aircraft may be taking off simultaneously from an adjacent parallel runway, or from a runway at right angles to the given runway. Alternatively arriving aircraft may be overflying those departing as with the present Modes 8 & 9. There may also be constraints resulting from the aerodynamic and inertial characteristics of the plane.

6.5.4 The Catherine Wheel or Clock-Hand Proposal:

Two Great Circles:

This submission is based on the idea that beyond some critical radius from the runway centre [described as "KSA Centre" here] , it should be possible for Airport Traffic Control to direct each successive aircraft to turn into a trajectory differing from that of the previous one by some increment of a few degrees. The critical radius may vary depending on the aircraft operating characteristics, aircraft type, weight and speed.

The resulting trajectories would thus be successively displaced, like the second hand of an analogue clock, each successive departing plane ascending long the path of a different spoke of an imaginary wheel on its own assigned compass bearing until it reaches the outer perimeter of a defined "great departure circle" [GDC]. [See Fig. 6.5.4.1].

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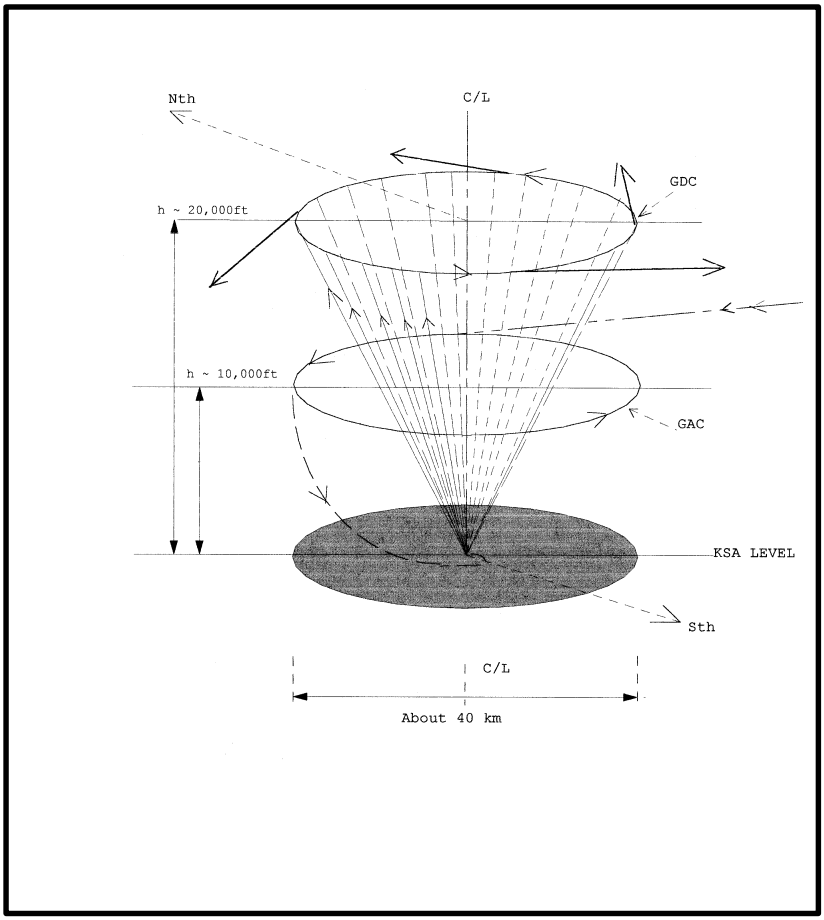
304 "747 Procedures" Zagoren M. (2000)

305 Now ICAO NADP 2; AIP ENR 1.5 Para 11.1.6

306 LTOPSR (1996) p. 102

FIGURE 6.5.4.1 ELEVATION CONCEPT OF THE TWO GREAT CIRCLES
Cth_Fig3.tif



This latter circle would be set at a radial position well beyond the boundaries of the greater metropolitan area , say at around 20,000 ft [See Fig. 6.5.4.1] .

By the time each aircraft reached the defined great circle its altitude should be high enough to enable it to peel off into its respective air navigational corridor and head for its destination.

In addition to the Great Departure Circle, there should also be a "Great Arrival Circle" [GAC], one possible position for which is also shown in Fig. 6.5.4.1, say at around 10,000 ft [See further discussion in S. I.6.4, Appendix I].

A Giant Catherine Wheel:
From a birds eye view , the resulting departing movement pattern would appear as ***Giant Catherine Wheel*** in the shape of an inverted cone, whose hypothetical axis of rotation is through the centre of Kingsford Smith Airport. This appearance is due to the fact that each aircraft will peel off successively from the Great Departure Circle, into designated corridors corresponding to their ports of destination. For a more detailed description of this see Appendix I Fig. I.1.

The departure trajectory for each successive aircraft [in whatever "LTOP" MODE] first tracks along its assigned and necessarily different climbing spoke of an imaginary "dished" wheel. Because each subsequent spoke lies on a slightly shifted compass bearing from that of the preceding aircraft , the *locus at ground level of aircraft noise impact* will continually change.

For points closer to the airport the resulting clockhand-like rotation will result in noise being spread precisely and more equitably. Moreover, suburbs further out, lying below the catherine wheel spokes, will hear little if any noise. This is because the early "steepest possible" climb towards cruising altitude will have put the aircraft above their notional "noise critical altitude" [Cf. S. 8.2.3] .

The Angular Displacement of "Spoke" Trajectories:
When writing the LTOP proposal the Department of Transport and Regional Services (now DOTARS) estimated there would be a total of 316,000 aircraft movements in the Sydney Basin region by 1999-2000[#307] . For 2001-2 there were about 250,000 movements [Sydney Airport data] , down from over 300,000 in 2000-2001 (The Olympic year), due partly to the 9/11 World Trade Centre Terrorist attacks and aftermath.

Using the larger figure results in an average of about 866 movements" per calendar day. Given that approximately half of these will be arrivals and half of them departures, one arrives at a figure of some 433 departures per operational day. This translates to around (433/17 = 25) per operational hour given that there are 17 non-curfew hours each day.

Given that some arrivals and departures will normally take place during curfew using "LTOP" MODE 1**,** the above estimate of average departures and arrivals per hour requiring to use non-curfew Modes is a little less than 25 per hour; although in the early morning period there can be considerably more. Mode 9 is considered as a practical example, because this mainly affects the most densely populated areas of residential Sydney [East, North East, West , and North-west].

In Mode 9 around 270 degrees of arc is potentially available to accommodate the "spokes" of the "Great Circle" comprising the conical Catherine Wheel trajectory plan. This arc is considered as being centred on the intersection point of the "East-West" and the Long parallel runway and lies between compass bearings approximately South by South West and East of KSA [#308]. There is therefore notionally available about 10 degrees of angular deviation between each successive trajectory for the Catherine Wheel/Clock Hand proposal considered above.

The Spatial Displacement of Trajectories near Ground Level:
The proposal implies a possible lateral separation of about 0.7 km between successive trajectories at 4 km from the centre of KSA ("KSA-Centre"; ie. by a circle approximately including Marrickville and Brighton-Le-Sands) ; or laterally about 0.5 km at 3 km from KSA (ie. by a circle approximately including Sydenham and Arncliffe).

Temporal Distribution of Noise Impacts at Ground Level:
Because each departure trajectory is only needed about once per hour (using the estimates of departure frequency given above), people at most points on the ground would only be exposed to the maximum jet noise around once per hour; or at the most perhaps twice at extremely busy times. Furthermore there would be absolutely no need to concentrate all the flights over the 5 discrete MODE 9 "Freeways" in the sky as occurs now.

Once on its pre-determined trajectorial "spoke", a given aircraft will stay there, climbing steadily until it reaches the Great Departure Circle [GDC]. Thus as the aircraft climb further and higher from KSA the spatial separation of their Noise Imprints increases until they join the GDC . At the circle [GDC] they will all traverse in the same rotational direction until arriving at the appointed position for peel-off to their respective destination corridors.

At some times of the day the number of aircraft departures will exceed 25 per hour; resulting in a theoretical noise exposure at each radial position of at the most twice per hour. A "Lochard" plot received by the author for Mode 9 operation between 7:00am and 9:00am on 12/2/98 shows around 55 departures in that two hour period. To accommodate such increased spoke densities a staggered spoke pattern could be employed, filling in the gaps between the 10 ° [nominal spoke positions] , eg. at 5 degrees - therefore further temporally spreading the noise imprint for each point on the ground.

This present proposal demonstrates that there is no inherent requirement for all departing aircraft traffic in the vicinity of Sydney Airport to remain in the same notional spatial Freeway; or even one of five.

Average Noise at Ground Level:
With the Catherine Wheel the proposed spreading of trajectories will reduce the Noise impact for Mode 9 "Freeways" to between one 25th and one 50th of the present projected annual average levels. This is because the frequency of exposure in terms of Noise Incidents Per Hour must be reduced in proportion to the number of Departure Radii (number of "spokes") intersecting the Great Departure Circle on different bearings.

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307 *See "Sydney Basin Air Traffic Projections" - Aircraft Movement Outlook http://www.dot.gov.au/progams/avpol/avstats /sydbasin.htm.*

308 See LTOPSR p. 62 - Sydney MODE 9 departures.

It is submitted that this would be a far more acceptable result for all but possibly the few remaining residents with a 2-3 km radius of the airport runway centre [KSA Centre].

6.5.5. Conclusion:

It is submitted that the above proposed method of operation could significantly reduce the overall impact of aircraft noise resulting from departures during the operation of "LTOP" Modes 7 , 8 and 9.

The distribution of Aircraft Noise achieved by employing the Catherine Wheel proposal would be more "Fair and Equitable" in terms of "sharing" than that achieved by the present "noise share Freeway" plan.

To the proponents of the current LTOP scheme, it submitted that any reasonable examination of the proposed Catherine Wheel or Great Departure Circle model will show that it is capable of achieving significantly fairer and more equitable sharing of the necessary aircraft noise than is being achieved now. Moreover, its substantially steeper departure flight paths will effectively completely clear Bankstown airspace, thus avoiding the present unnecessary flight path diversions and concentrations in the inner south west.

The fact that the model is only here discussed with application to Mode 9 does not imply that it should not be applied to the other LTOP "residential " modes, where these involve overflying of residents [Eg. Modes 7 & 8].

It is proposed that time-sequenced Catherine Wheel departure trajectories be employed in conjunction with a suitable noise metric system for quantitative dosimetry of noise impacts across residential areas reflecting the perception of impact by residents, but with the overall objective of minimising aircraft noise for residents everywhere. A possible quantitative methodology for noise impact dosimetry was described in S. 6.4 *[Systematising The Measurement Of Dose-Response]* above. A more detailed discussion of Noise Metrics is provided in S. 8.2.3. Further Technical Considerations associated with the "Catherine Wheel" proposal are discussed in Appendix I .

<u>Recommendation 6.5.1</u>: That Airservices Australia implement a reorganisation of the airspace above Sydney Kingsford Smith Airport to eliminate the practice of departing aircraft being required to fly below arrival routes, and implement a system of departure track rotational sequencing so that no single point on the ground in any residential area hears more than one aircraft movement per hour during daylight hours.

<u>Recommendation 6.5.2</u>: The Catherine Wheel system should be employed in conjunction with a quantitative methodology for monitoring the dose of noise impacts across residential areas which reflects the perception of impact by residents, but with the overall objective of minimising aircraft noise on residents.

<u>Recommendation 6.5.3</u>: That trajectory- time-sequenced (Catherine Wheel/clockhand) departures for <u>*unavoidable*</u> residential overflying should cater all flights which cannot be directed across Botany Bay . Bearing in mind that we estimate that, properly implemented, SODPROPs over-the-water modes could accommodate at least 70% of the maximum movement capacity of KSA [100 % for arrivals] for between 85 & 95% of the time, depending on meteorological cycle (S. 6.3 *[Utilisation & Potential For Over-The-Water Modes)* **.**

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7. PERMISSIBLE USES OF PRM - HISTORY AND IMPLEMENTATION

7.1 WHAT IS PRM?

PRM or Precision Radar Monitoring is a radar system used for the purpose of facilitating maximum flight path utilisation in simultaneous same direction approaches to parallel runways. At KSA these are the "main", north-south, known as Runway (34L/16R) and the so-called "third" runway, known as Runway (34R/16L). It is understood [from informal conversations with the ASA Manager Operations at KSA] that it can also be used to ensure separation of parallel same- and opposite-direction departures and approaches [eg. SODPROPs] from parallel runways across Botany Bay.

A PRM system became operational for approaches over Botany Bay from around 1999 , but due to public opposition its introduction for the northern approaches [across Sydney's North Shore] was delayed until the traffic throughput stimulus provided by the Sydney-2000 Olympic Games.

Until 2000 the northern approaches PRM equipment had been warehoused at KSA for close on ten years, and it was not until the run up to the Sydney Olympics and the proposed sale of KSA that the Government pushed Airservices Australia to proceed with implementation.

As a result of community pressure, Airservices Australia's "Notice of Intention" (NOI) for the [northern] PRM emphasised that it would only be employed in "bad" weather conditions [meteorological condition approaches] and only used to facilitate the "normal frequency of approaches" within the movement cap which are enabled in visual flight and instrument landing [or good weather] conditions. Another aspect was said to be that northerly approaches in bad weather could be conducted more safely.

Thus in theory there should be no more approaches per hour to Sydney Kingsford from the north with PRM in use than could be expected under unassisted good weather Instrument Landing conditions involving "independent approaches". It must be recognised, however, that approaches which otherwise would be impossible due to bad weather conditions, are made possible using PRM -thus increasing total movements.

Community groups from the north of Sydney vehemently opposed PRM because of its potential to raise movement capacity, and due to the apparent need under PRM for lower altitude approach trajectories than required for visual and/or instrument landings . Some justification for this scepticism is found in the continual reference by Airservices Australia in its Notice of Intention, to the need to raise arrivals movements from the north in poor weather conditions.

7.2 AIRSERVICES NOTICE OF INTENTION [NOI] , ENQUIRY, TRIAL AND IMPLEMENTATION

In October 1999 a "Notice of Intention" [#309] [NOI] under the former "Environment Protection (Impact of Proposals) Act" 1974 was published by Airservices Australia. At the request of the Government's Sydney Airport Community Forum [SACF], the then Environment Minister [Robert Hill] ordered a Commission of Enquiry into its environmental effects which was conducted through March 2000. A monitored PRM trial was ordered by the Minister on May 10 2000, and the trial contracted by Environment Australia to Wilkinson-Murray Consultants between July & December 2000. Clarifications as to flight path true locations produced by the *"Lochard Noise Monitoring System"* was assisted by Consultants Ambidji Group Pty Ltd and both consultants produced their final reports in April 2001. The Environment Minister adopted the findings of the Reports in a cryptic final press release dated 10 April 2001.

7.3 FOUR PRM PROPOSED APPROACH TRAJECTORIES

In its NOI, Airservices considered four PRM flight path approaches, which it compared with the then existing Instrument [ILS] Landing approaches, concluding that Option 1 was to be preferred on operational and environmental grounds. The airspace dimensions for the various Options are summarised in Table 7.3.1.

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309 "Sydney Airport - Introduction of a Precision Runway Monitor (PRM) for Operations on Runways 16L & 16R, Notice of Intention - Airservices Australia, October 1999.

TABLE 7.3.1 PRM AIRSPACE APPROACH GEOMETRIES

APPROACH TYPE	***MAX ALTITUDE*** ALT_{max}	***DISTANCE (km/n. mi) ON APPROACH AT = < ALT_{max} NORTH***	***DISTANCE (km/n. mi) ON APPROACH AT = < ALT_{max} EAST & S. WEST***	Necessary Distance from T_R [#1] km/n. mi	Necessary Distance from T_L [#1] km/n. mi
DEPENDENT ILS	***28-34 /hour***				
RUNWAY 16L	3,000	20/11	20/11	15/7	17/9
RUNWAY 16R	3,000	20/11	20/11	17/9.3	20/11
Independent VISUAL APPROACH (IVA) [#2]	***42-44/hour***				
RUNWAY 16L	4,000	20/11	11 /6 - 26 /14	20/11	23/13
RUNWAY 16R	3,000	20/11	11 /6 - 26 /14	17/9.3	20/11
PRM OPTION 1 [#3]	***40-44 /hour***				
RUNWAY 16L	4,000	26 /14	26 /14	20 /11	23/ 12
RUNWAY 16R	3,000	20 /11	32 /17	17 / 9	20/11
PRM OPTION 2	***36-38 / hour***				
RUNWAY 16L	4,000	24 /13	24 /13	20 / 11	23 /12.6
RUNWAY 16R	3,000	20 /11	20 /11	17 / 9	20/11
PRM OPTION 3	***40-44 /hour***				
RUNWAY 16L	5,000	32 /17		26 /14	29/ 16
RUNWAY 16R	3,000	20 /11		17 /9	20/11
RUNWAY 16L	5,000		32 /17	26 / 14	29 / 16
RUNWAY 16R	4,000		37 /20	23 /13	26 /14
PRM OPTION 4	***46 /hour***				
RUNWAY 16L	3,000	46 /25	32 /17	15 /8	17 /9
RUNWAY 16R	4,000	32/ 17	32 /17	23 /13	26 /14

Notes: Re. Table 7.3.1 :

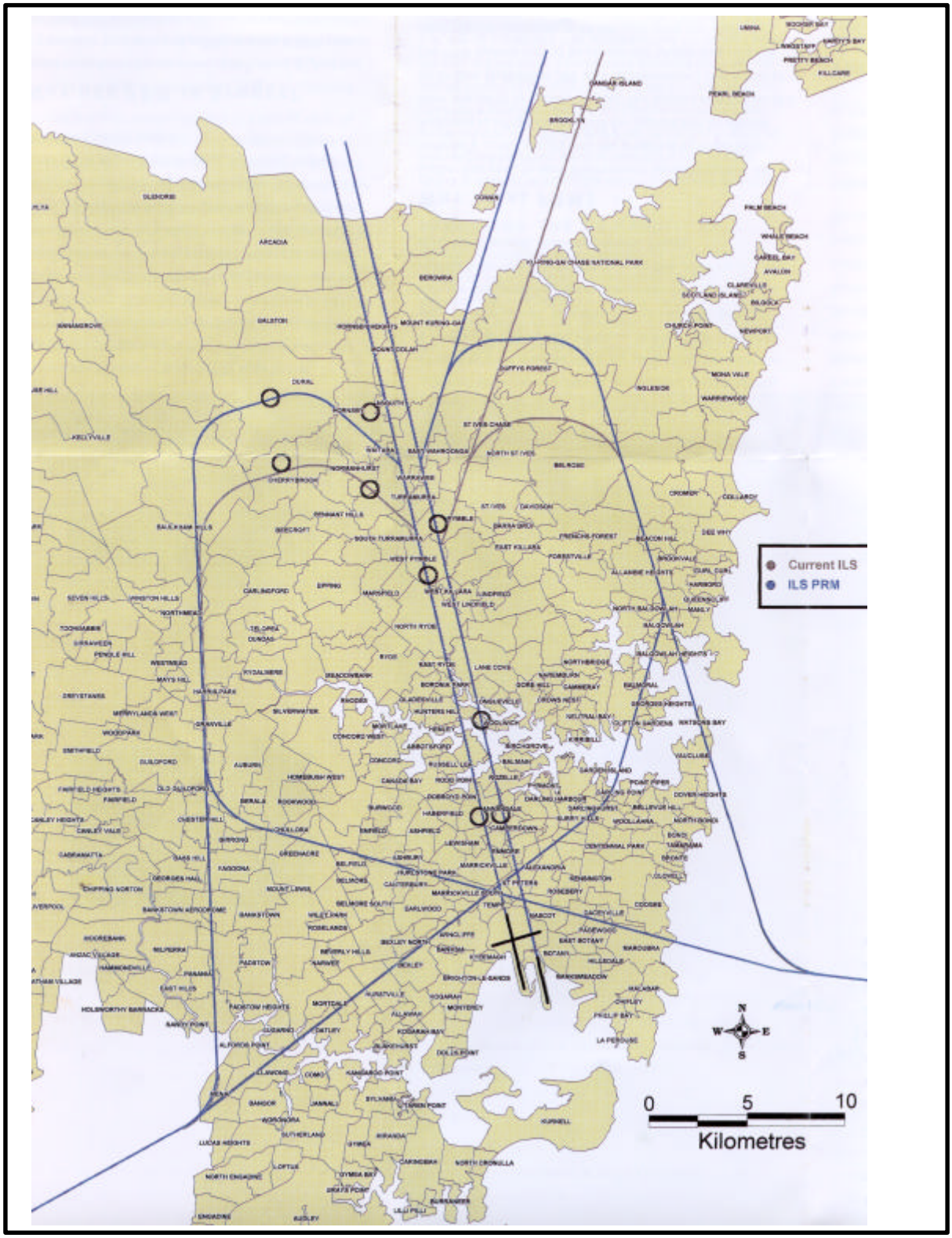
1. $T_{R,L}$ are Runway Thresholds for Rwy16R & Rwy 16L, respectively; "Necessary Distance" is absolute minimum distance from threshold at which aircraft must join three (3) degree glide path to achieve stated altitude (See Illustration of glidepath geometry in Fig. 7.1).
2. "IVA" = Independent Visual Approach - is preferred normal good weather operating mode, reducing aircraft times & distances on glide path almost to minimum for approaches from east and south west.
3. Airservices Australia Preferred Option, Selected for Trial by Commission of Enquiry, April 2000

The general flightpath arrangement for PRM operations is shown in Figure 7.3.1

FIGURE 7.3.1 ARRANGEMENT OF FLIGHT TRACKS UNDER ILS & ILS PRM (SOUTHERLY FLOWS)

This Figure is reproduced for the purposes of criticism and review pursuant to S. 41 of the Copyright Act (1968) from Environment Australia PRM Trial Publicity Brochure # [310] 2000.

prmapp1.tif



[310] "Precision Runway Monitor for Sydney Airport Operational Trial", Environment Australia 2000

(a) Option 1:

This Option proposed "independent" [#311] approaches to Runways 16R and 16L with commencing altitudes of 3,000 ft and 4,000 ft at 14 & 11 n. mi for Runways 16L and 16R , respectively, for approaches from the north; but at 14 & 17 n. mi , respectively, for approaches from the east and southwest. This meant that the average downwind leg for both flight paths would be longer than for dependent ILS [11 n. mi], meaning the distances from KSA for which the maximum jet approach altitudes would be less than 3000 and 4000 ft, respectively, would be increased.

The claimed advantage was a predicted arrival rate of from 40 - 44 per hour with reduction of peak period "bad weather" delays of up to 80% compared with dependent ILS approaches. The Glide Path geometry for Option 1 is shown in Figure 7.6.1 (below) by the solid lines [3 degree gradient exaggerated] , while that for an alternative (proposed by SACF Inc) 4 degree Glide path providing greater ground clearances, and reduced noise , is shown by the dashed lines in the figure.

(b) Option 2:

This Option proposed "dependent"[#312] approaches to Runways 16R and 16L with longitudinal separation set by aircraft on the adjacent runway instead of the vertical separation requirement used by Option 1. Although the same flight tracks were to be used as for Option 1 the altitude requirements were less restrictive, with aircraft potentially at higher altitudes. The predicted maximum arrival rate was to be of 36 – 38 per hour, with peak period delays reduced by up to 60%.

(c) Option 3:

This proposed "mainly independent operations" with initial approach altitudes said to be 4,000 ft and 5,000 ft for Runways 16R & L, respectively [but see Table 7.3 (NOI Table 3.4) showing 3000 ft for 16R -North] . Option 3 , like Option 1, enabled a theoretical maximum arrival rate of from 40 – 44 per hour, but required the longest downwind leg (with additional noise exposure) . It was also expected that the predicted maxima were unachievable because of "breakout" losses [#313] .

(d) Option 4:

This Option proposed fully independent approaches with commencing altitudes of 4,000 ft and 3,000 ft for Runways 16R & L , respectively, and was claimed to reverse the altitude requirements of the pre-existing ILS, though the ILS data given for comparison contradict this claim. The downwind legs of Option 4 were longer than both existing ILS and Options 1 and 2, and technical difficulties due to "breakouts" were to be similar to those for Option 3, giving a theoretical maximum approach rate of 46/ hr.

The Airservices Proposal:

Airservices Australia (ASA) preference for PRM was Option 1, and is called "ILS_PRM". All the above proposed PRM Options required longer downwind legs than with the existing use of the dependent Instrument Landing System (ILS). They said this is necessary to meet the relevant ICAO and CASA standards for the use of the PRM system, which requires aircraft to fly a straight and level segment prior to commencement of descent on the 3 degree glide path. This requires aircraft to reach their initial approach altitude (3,000 ft or 4,000 ft) some 4 – 6 n. mi further out than in a normal ILS approach.

Weather Limitations:

Maximum arrival throughput can only be obtained in Mode 10 with "independent visual approaches" under optimal weather conditions: ie . cloudbase is 4,000ft or above with visibility exceeding 10km [#314] . Below cloudbase 4000 ft but above 2100 ft "dependent" visual approaches must be employed [#315] , and below cloud base 2100ft, "dependent" ILS approaches are required without PRM . With "dependent" approaches, maximum traffic throughputs are less than for "independent" approaches because air traffic control must maintain specified diagonal distances between aircraft on *adjacent approach tracks* as well as longitudinally between aircraft on the same tracks.

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311 See S. 6.3.1.4 for definition

312 See definition of "dependent" in S. 6.3.1.4 (above)

313 "Breakout" - Collision avoidance procedure between aircraft straying between approach tracks.

314 PRM NOI Ch. 2.2.2.1.

315 PRM NOI Ch. 5.1.2.1.

The use of ILS PRM allowed "independent" approaches to be carried out in weather conditions down to a cloudbase of 220 ft with visibility minimum 800 m [#316] , whereas the previous "dependent ILS" approaches are possible only for cloud bases of more than 2100 ft with a visibility minimum of 5 km [ie "Instrument Meteorological Conditions"]. Below cloud base 220 feet and visibility 800m no operations were previously possible [#317] .

The NOI continually referred to the need to "raise movement targets" from the north in cloud base conditions below 4000 feet.

Times of Use:

The LTOP-based runway selection criteria provide that, if required for traffic management purposes - during the peak hours (07:00 – 11:00 and 15:00 – 20:00) –Sydney Airport operates in Mode 10 (16L & 16R for arrivals and departures) and it was proposed that ILS PRM be introduced for peak periods only in three stages.

(a) Stage 1 – Morning peak periods Monday to Friday – average 5.4 hours per week or 4.5% of non-curfew hours;

(b) Stage 2 – Stage 1 plus morning peak period on Saturday – average 6.5 hours per week or 5.5% of non curfew hours;

(c) Stage 3 – Stage 2 plus afternoon peak periods Sunday to Friday – average 13.7 hours per week or 11.5% of non curfew hours.

Airservices Australia's Environmental Conclusions:

Airservices Australia claimed that the ensuing environmental consequences would occur only during ***"PRM hours"*** and only when aircraft were to be at 3,000 ft or above at the commencement of approach. The basic assumption used by Airservices Australia in the PRM NOI is that ILS - PRM would be in use 50% of the time in "PRM hours" when arrivals were using the "16" Runways, that is for around 57 movements per day [# 318] .

It was emphasised by Airservices Australia that PRM would only be sparingly used in practice because of the increased track miles required, which increases the cost to affected airlines. However, at the PRM Enquiry [See below] , the Airlines stressed the importance of supporting PRM for the purposes of "maintaining adherence to schedules" in the early morning hours and reducing costs through fuel wastage, which was estimated by Qantas to be 16,000 tonnes per year [# 319] . For "Stage 3" the stated PRM Hours are listed in Table 7.3.2:

TABLE 7.3.2 PRM HOURS STAGE 3

Day of Week	***Hours***
Mon - Fri	7:00 - 11:00 am 15:00 - 20:00 pm
Sat	7:00 - 11:00 am 15:00- 20:00 pm
Sun	15:00 - 20:00 pm
Total	54 hours/week
% Non-Curfew Hours	45%

Airservices Australia then claimed that the total environmental impact would be as follows:

1. The total number of people under the flight paths for all options is fewer than for the current ILS operations. This was said to occur because flight paths were moved further north into less populated areas. They claimed that up to 177,000 people would no longer be overflown, but that up to 52,000 people would be newly overflown. With preferred Option 1, 18,000 people would be newly overflown, and 136,000 people would no longer be overflown (during PRM operations, that is);

316 PRM NOI Ch. 2.2.1.1.
317 PRM NOI . Ch. 5.1.2.1.
318 See Transcript of Evidence, PRM Commission of Enquiry, per Dahl 13/3/2002
319 See Transcript of Evidence, PRM Commission of Enquiry, per Forsyth & Bourke, 14/3/2000

2. That areas *newly overflown* would experience an average of up to 19 jet aircraft per day for arrival on Runway 16R and an average of up to 12 jet aircraft per day for arrival on Runway 16L;

3. That Suburbs beyond Pymble would be newly affected and experience increased flights under the centre line approach. Depending on the option and the lateral spread of flight tracks the number and location will vary. They claimed that the daily increases in overflights would not exceed around 19 jet aircraft heading for Runway 16R with an average of 12 jet aircraft heading for Runway 16L;

4. That ground noise levels would not vary greatly between options and not differ markedly from then current ILS noise levels. For a B767 (the largest aircraft for the PRM flight paths), noise levels do not exceed 70 dB(A) at any point not already experiencing higher levels under ILS conditions;

5. That there would be minor redistributions of aircraft between the parallel runways (16L & 16R) - an average of four jet aircraft moving from runway 16R to 16L and being replaced by an equal number of propeller aircraft per day.

7.4 THE PRM COMMISSION OF ENQUIRY [THE MCMICHAEL COMMISSION]

The terms of reference for the Commission of Enquiry were to examine:

"(1) The changes in the environmental impacts associated with aircraft noise which will occur as a result of the introduction of the PRM, in particular through changes in aircraft noise exposure patterns."

"(2) The nature and extent of the changes referred to in (1) in terms of their impact on the residents of Sydney."

"(3) Actions that might be taken to minimise the exposure of the residents of Sydney to the effects of introducing a precision runway monitor and to minimise the impacts of such aircraft noise exposure." and

"(4) The nature and extent of the environmental benefits that might arise from the use of a precision runway monitor."

After hearing submissions over ten sitting days from more than 200 respondents, and viewing 182 Exhibits. the Commissioner [Dr. D.F. McMichael, CBE] produced his report on 14 April 2000. He concluded [paraphrasing and condensing]:

1. Insufficient information was available to conclude whether the proposal would or would not have an adverse effect and so the proposal should not be rejected at that time. However, the potential impacts were sufficient to warrant more careful analysis based on good information.

2. There would inevitably be some adverse environmental impact on several groups of residents of Sydney, especially those north of the airport in suburbs beneath or adjacent to the extended runway centrelines, in particular on those living in a group of suburbs extending from West Pymble towards Hornsby Heights. These impacts would arise mainly from an increased frequency of overflights during morning and evening peak hours with consequently altered levels of aircraft noise experienced.

3. It was impossible to conclude that introduction of PRM would have unacceptably adverse impacts on health, education, amenity and lifestyle, property values, or the natural environment, due to lack of adequate quantitative information provided by "Aviation Administration", which needed to act to remedy these shortcomings.

An Environment Australia Supervised PRM "Trial": Dr. McMichael recommended that a trial of PRM should be conducted supervised by "Environment Australia", with support from an "Advisory Group" including (Government) SACF, "community" and Airservices Australia representatives.

The trial was proposed to permit legitimate comparison between the existing levels of impact and those under PRM. Dr. McMichael concluded that for the true impacts of PRM to be captured, the trial must measure a range of environmental parameters and correlate these with aircraft movements over at least two (2) months, both with and without PRM, each phase involving at least 1000 measured PRM landings. Moreover the trial was to be initiated in time to allow PRM to be used during the Sydney Olympic Games [August-September 2000]. This left an interval of only three (3) months between the completion of the McMichael Report and the start of the Games.

[Aside : As it happened, the "Trial" was conducted from July through December 2000, including the peak Olympic Games period in September - See below. The "cynic" might be excused for believing that the only reason for the proposed introduction of PRM at this time was to provide for an ample margin of safety during the peak anticipated movement targets for the Olympic period should the weather turn unfavourable. As it happened, the weather during the Olympic period was almost picture perfect, and little use of PRM would have been justified, but for the trial.]

Long-term Use of PRM to be Based on Trial: Dr. McMichael further concluded that the results of the trial should be the basis for decision-making about the long-term introduction of PRM, or whether it should be rejected. Among considerations for its adoption were :

(a) Limiting the hours and days of usage by appropriate legislation;

(b) Only Option 1 of the proposal to be adopted for PRM operations.

In Chapter 7.8.3 of the Commission report Dr. McMichael suggested that there was little point in making provision for PRM operations other than between 7:00 am and 9:00 am (the period of high density arrivals), and he was highly sceptical about the request to deploy PRM at weekends *[ie a maximum usage of 10 hours per week]* . This was in sharp contrast to the "Stage 3" proposal of Airservices Australia's NOI which forecasts 54 hours of use for 45% of the time from Sunday through Saturday.

Consequences for LTOP: In considering the potential impact of PRM on the Government's noise sharing policies [LTOP] (though not within his brief) the Commissioner recommended that:

(a) Airservices Australia should seek ways to move towards achieving the LTOP mode-sharing targets, with or without PRM;

(b) There should be an overall review of airspace management in the Sydney Basin, to optimise LTOP implementation and design better approach paths to Sydney Airport from the north;

(c) Ways of limiting demand growth for movements at KSA should be investigated, to ensure the viability of LTOP; and

(d) A decision should be taken as soon as possible on the second Sydney Airport proposal, so as reduce demand for continuing expansion of KSA.

7.5 THE PRM TRIAL

A monitored PRM trial was ordered by then Environment Minister Hill on May 10 2000. The conduct of this trial was contracted to Wilkinson-Murray Consultants between July & December 2000. Clarifications as to the true locations of flight paths produced by the "Lochard Noise Monitoring System" was assisted by a further Consultant report by the Ambidji Group Pty Ltd and both consultants produced their final reports in April 2001.

7.5.1 THE WILKINSON MURRAY REPORT [#320]

This was principally an acoustic study of noise exposure patterns comparing "Base-line ILS" with "PRM -ILS" conditions. The principal findings are summarised below:

(a) Some areas of Sydney experienced lower noise exposure compared with the alternative Base-Line

[320] "PRM Trial - Assessment of Noise Exposure" , Wilkinson Murray Pty Ltd April 2001, Report #000124 Rev. D

ILS operations, while others experienced higher exposure;

(b) Between Gladesville and the Airport, noise levels for PRM and Base-Line ILS operations were very similar, except there was a 10% increase in movements /hour under PRM, resulting in increased noise exposure. This contradicted the pre-trial claim that the movement rate under PRM would have been approximately the same as that on days under IVA conditions [#321];

(c) Cherrybrook, Pennant Hills, Normanhurst and North Epping were subjected to less exposure with PRM, to the extent of 1-2 events per hour above 60dBA;

(d) Noise in the area from Baulkham Hills north to approximately Glenorie and Arcadia increased by an amount comparable to the reductions found in (c) above. Higher increases were experienced from Arcadia south to Macquarie Park;

(e) Noise exposure with PRM increased from approximately Hornsby Heights to Turramurra, where there were at least an additional ten events per hour greater than 60dBA, and two events per hour greater than 70dBA compared with "baseline ILS" conditions.

The report concluded that noise exposure under PRM was reduced in some areas, but larger areas experienced increases of greater magnitude.

The reported increased noise exposure with PRM was produced by the extension of flight tracks to the north of the airport for aircraft arriving from the south, and the consequently long periods of flight at relatively low altitude- to the extent of as much as 45 km at around 3000 ft [See Ambidji Report (below) for the cause of this]. These increases were also coupled with flight track concentration producing areas of substantially increased average noise intensity.

Wilkinson Murray concluded that with then prevailing conditions, PRM would likely be employed approximately 4 hours per day on 2 days per week (on an annual average basis), mostly in the morning peak period 7am-11am, and that usage might be higher in summer than in winter.

7.5.2 THE AMBIDJI GROUP REPORT [#322]

This report is mentioned here because it concerns the accuracy of the Wilkinson -Murray results, and differences between the "noise predictions" by Airservices Australia in the PRM NOI and those which were observed. The Ambidji study arose because of findings in the PRM Noise study that aircraft positions were often elsewhere than the "Lochard" predictions of Airservices Australia. In other words, the predicted flight path positions were uncertain.

The Ambidji Report concluded that the aircraft position reports produced by the Lochard system were out by amounts ranging from 200 m at the airport to as much as 1.2 km at 50 km [30n. mi] from KSA. At distances of a few kilometres, Ambidji found that errors of between 50-100 m were common. The report concluded that the problem arose from mathematical "spline fitting functions" employed by the "Lochard" system to allow for flight path curvature, assuming older style (pre-TAAATs pre-1999) radar data formats. When the previously necessary spline corrections were applied to up-to-date radar data which had already been corrected for flight path curvature, the outputs became erroneous. No comment was made as to whether the *"spline fitting errors"* also applied to aircraft altitudes predicted through the Lochard system.

Further errors in the Lochard system were discovered due to an incorrect projection of street plans in the display of flight paths over suburbs. This resulted in apparent positioning errors of 200 m at about 21 km from runway threshold. The Ambidji Report, published simultaneously with the Wilkinson-Murray Acoustic Report in April 2001, claims that the Lochard algorithms had been corrected by August 2000, and that any maps published from that time contain correct positional information. They also found that maps produced between December 1999 and August 2000 could be "corrected" using a correction algorithm, but that earlier data could not. The Report further claims that there are no historically significant consequences for air-traffic safety in the findings, because the aircraft "relative positions" were always accurately known (if not reported) , even prior to TAAATs.

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321 Not surprising considering the good weather conditions during the trial.

322 "Sydney PRM Trial Aviation Report" Ambidji Group Pty Ltd, April 2001

Flight Path Extensions to the North:

The Ambidji report chides Airservices Australia because the PRM flight paths extend further North and are more widely dispersed than promoted in the NOI charts presented to the Commission of Inquiry [Ambidji Ch. 10.1] .

The northerly flight path extensions under PRM were due to :

(a) The timing and detail of communication between pilots and air traffic control ; and

(b) Variations in the techniques used by individual controllers.

Ambidji directly observed air traffic control procedures and detected up to three different [control] patterns related directly to individual controller techniques. Controller techniques differed in relation to the position and timing of instructions for (1) descent steps; (2) "distance to run"; (3) downwind heading (relative to the prevailing wind); and (4) the base turn. They also found weather effects.

Ambidji further reported discussions with ATC Management seeking improved methods of confining flight paths more to the South. They report being informed that the proposed improvements would require changes to TAAATS and additional training of ATM staff. This makes Airservices Australia appear reluctant to implement innovations involving changes to established practices or which may involve some training, even if the result could improve the living environment of Sydney residents.

7.6 WHY MUST AIRCRAFT USING PRM BE ON GLIDE-PATH "LOW-ALTITUDE" APPROACH FOR LONGER?

Table 7.3.1 shows that the required distances on approach for both ILS & ILS-PRM are all greater than the minimum distance [Two right hand columns] necessary to hit the glide path for Runways 16L & R at the respective target altitudes of 4000 and 3000 feet.

At first sight it appears as if the glide paths being employed are less than the claimed "minimum" standard of three (3) degrees. Given that the system is employed almost exclusively in conditions of poor visibility, Air Traffic Control must allow for a stabilisation distance on approach at the target altitude prior to intersection of the glide path. This permits the respective PRM-radar and ILS-radio beams to locate and pick up the approaching aircraft as explained in Attachment B 1-5 to the NOI, where it specifies at least 2 n. mi from "Initial Approach Fix" [IAF] .

Another requirement is that prior to location on the beams, aircraft separately approaching each runway heading must maintain lateral or vertical separations of 3 n. mi & 1000 feet, respectively from aircraft approaching the adjacent runway.

This is not difficult for aircraft coming from the north. For those approaching from the west, southwest and east, however, there are possibilities for dangerous crossover interaction. This is because some aircraft approaching from the south and west must land on Runway 16L , and some [eg. long hauls from Pacific ports of origin] must cross over the approach path to Runway 16R . The glide path approach geometry is shown in Figure 7.6.1 *[Glide Path Geometry For Option 1]* .

7.6.1 ILS & ILS-PRM

7.6.1.1 Glide Path Angle:

Whenever Instrument Landing Conditions [ILS] are in use, then the "angle of the glide path" cannot normally be greater than 3.5 degrees [# 323] . Three (3) degrees is the angle of approach for which today's commercial jetliners are supposed to be designed [# 324] . Three (3) degrees is also the angle stated in the PRM NOI employed for the ILS glide path at KSA by Airservices Australia [# 325] . This is also the angle at which the radio localiser beacon used in ILS is tilted up from the horizontal [# 326] .

According to ASA, for simultaneous parallel approaches under independent ILS-PRM , an aircraft must be "level on station" at around 3000 feet by 20 km [ca. 11 n. mi] from runway threshold. This is to enable the ILS-PRM "No-Transgression-Zone" (NTZ = 610m) to be enforced between adjacent runway approach tracks [The NTZ is intended to prevent collisions between aircraft simultaneously approaching adjacent runways] .

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323 ICAO PANS-OPS Doc. 8168 (Ed. 4) "Aircraft Operations" ; Part III, Chapt. 3.5.6.1.2

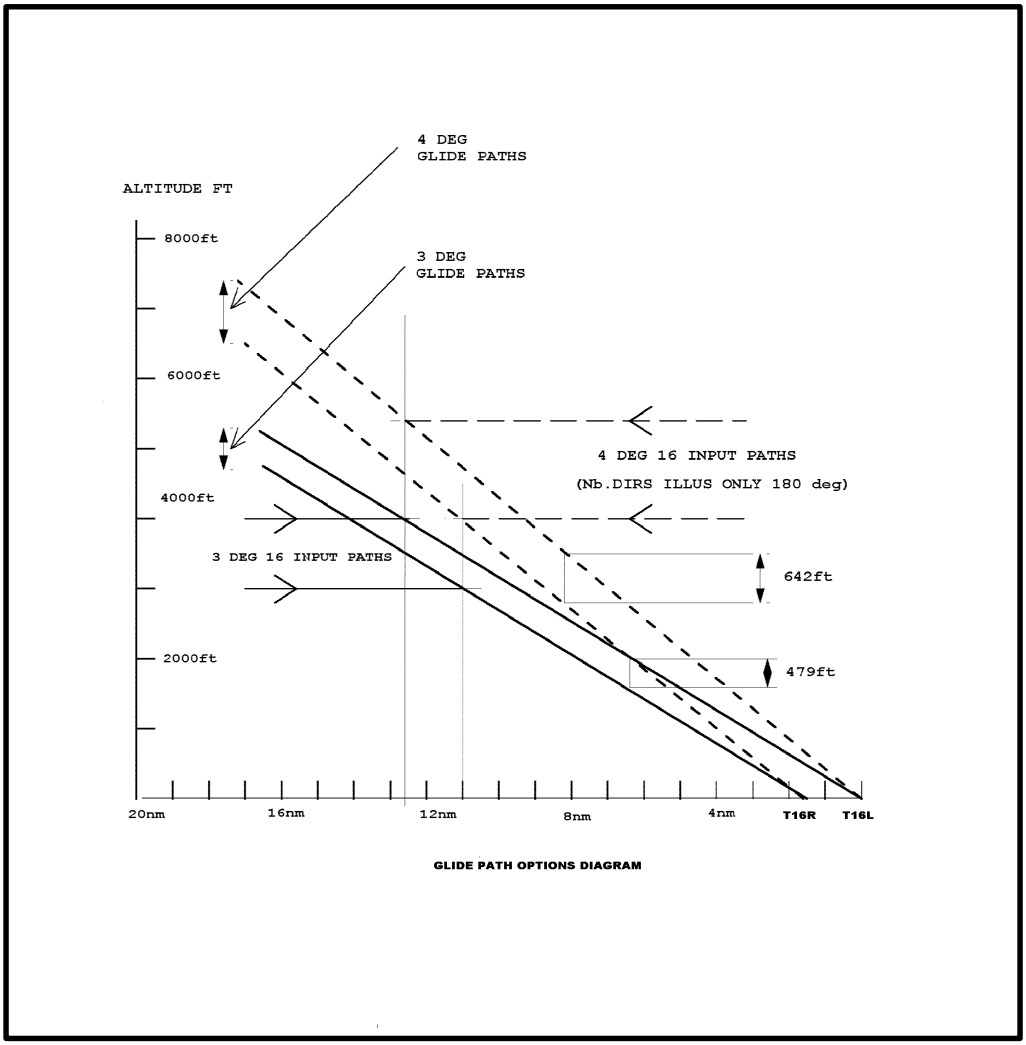
324 See Ambidji Report Ch. 12

325 PRM NOI Para. 3.4.2.1

326 See discussion in Ambidji Report, April 2001, Chapt 12

The 3000ft commencement for glide paths is almost an internationally accepted standard, and is higher in fact than used at many overseas airports and requires a glide path intersection at 19 km (10 n. mi) from runway threshold [# 327]. Thus in ICAO terms the ILS /ILS PRM at Sydney is among the "high" level approaches [# 328] . Figure 7.6.1 shows the Glide path geometry [altitude versus distance in nautical miles] for the currently operated Option 1 ILS-PRM configuration.

FIGURE 7.6.1 GLIDE PATH GEOMETRY FOR PRM OPTION 1



Airservices require aircraft using KSA to be at an "initial approach fix" [IAF] at altitude station 3000 ft by at least 11 n. mi (20km) for both dependent ILS and independent ILS-PRM. For PRM ILS at KSA for southwestern arrivals on Runway 16R [main north south] the requirement is more stringent, and the IAF is set at 13-18 n. mi (24- 33km), depending on approach direction . The reasons for this is said to be the requirement for separation and stabilisation on the PRM-radar and ILS-Radio beams as noted above [S. 7.6].

The problem for residents in the area of Turramurra - Hornsby-Heights, is that the altitude at ground level is from 600-800 feet above sea level. This means that aircraft approaching at only 3000 ft [above sea level] are really only 2200-2400 ft above peoples' heads and travelling level prior to reaching the glide path intersection point. This means that the aircraft are using power and travelling dirty and noisy with maximum flaps to maintain altitude on station.

Once they are on and able to maintain glide path slope from 3000 ft [inwards from 9.3 n. mi (17 km) for Runway 16R], power can be reduced and they can "glide in" towards runway threshold. Thus, as shown in the PRM Trial Report [Refer S. 7.5.1 above] areas around Hornsby Heights are subject to increased noise levels when PRM is used.

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327 See Appendix L

328 ICAO PANS-OPS Doc. 8168 (Ed. 4) "Aircraft Operations" ; Part III, Chapt. 3.5.5.2

However, whatever glide path angle is employed the ILS "Radar separation" requirements [of 2n. mi (3.7 km) or 1000 ft vertically] allow only from 4-5 aircraft to be on the extended localiser beam at any given time [# 329] .

7.6.1.2 The Extended ILS Glide Path:

It is not totally clear why such an extended approach to the PRM-ILS glide path is deemed necessary by Airservices Australia, as questioned in the Ambidji "Aviation Report". In addition to the low commencing altitude to the approach "glide path", pilots must approach the Initial Approach Fix" [IAF] from below the glide path, ie. from less than 3000 feet in the case of Runway 16R. The Ambidji report further states that *"although theoretically possible, approaching a glide slope from above causes difficulties with stabilising an aircraft on the glide slope,"* and there is a risk of "controlled flight into terrain" [CFIT] which is unsafe and cannot be tolerated.

7.6.1.3 Glide Path Angles Greater than 3.5 º are non -standard, but practiced at some airports:

Could Glide Paths of greater inclination be employed to reduce noise on residents below the ILS-PRM Glide path? ICAO states that glide paths greater than 3.5 degrees are non-standard, and *"are not to be used as a means to introduce noise abatement procedures"* [# 330] .

Also, any angle causing the aircraft nominal rate of descent [V_{at} x sine (Glide Angle)] to be greater than 5 m /sec is "Non-standard". However, there seems to be no reason why 3.5 degrees [which corresponds to a 6% gradient] could not be employed if this provides for the majority of aircraft. A glide path of 4.0 º instead of 3 º would permit approaches to commence at 4000 instead of 3000 ft for runway 16R from 11n. mi, and at 5000 ft instead of 4000 ft for Runway 16L. This is shown by the dashed lines in Fig. 7.6.1.

Thus all altitudes both on approach and on the glide path to KSA would be increased, with corresponding noise reduction , both on the glide path, and in the south-westerly and easterly approaches to the procedure turn. For a fully loaded B747 [700,000 lb] at 240 km / hr air speed, the maximum nominal descent rate would be 4.1 m/sec for a glide angle of 3.5 º which is less than the critical maximum 5m/sec.

Again using the B747 as an example, the nominal descent rate for a four (4) degree glide path is 4.65 m/sec, which again is less than the 5 m/sec critical limit. Support for this suggested noise abatement practice is found at Ostende airport [Belgium], which requires a glide path of up to 3.5 º for certain aircraft, and the airport at Marseille International [France] which requires descent glide paths of between 3 and 4 degrees [# 331] [Gradients: 5 & 7%].

7.6.1.4 Summary:

"Independent PRM-ILS" as practiced by Airservices Australia at KSA entails lower flying for longer and, in the initial approach, along a near-horizontal path, which requires greater engine power to maintain the altitude station.

The practices of Airservices Australia at KSA also entail greater track mileage [from the southwest and east] & thus fuel consumption, than necessary for independent approaches. There seems to be a possibility of tolerating an increase in nominal glide path slope [from 3 to up to 4 degrees for some aircraft], provided the aircraft nominal descent rate does not increase above 5m/sec. This would produce an altitude at the Runway 16R glide path entry point of 4000 feet [5000 ft for Runway 16L] , resulting in the availability of correspondingly increased altitudes and reduced noise on the ground for all approach paths as well as from 11 n. mi to runway threshold at KSA.

7.6.2 CONTINUOUS DESCENT APPROACH [CDA]

An alternative approach method considered by Ambidji was the "Continuous Descent Approach" [CDA] method in which the aircraft are used to set their own descent profile so as to minimise engine use and fuel consumption on approach [See Ambidji Report Chapt. 12]. Ambidji state that this is a well recognised methodology at overseas airports.

In mid-2000 Qantas [#332] proposed that CDA be trialled at Sydney while monitoring systems were in place for the ILS-PRM trial, and claimed that use of a CDA "STAR" [Standard Arrival Route] would reduce both track miles and ground noise levels by from 5 - 10 dB(A) compared to "dependent ILS" and "Independent ILS" with PRM. The first

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329 ICAO PANS-OPS, DOC 4444 (Ed. 14), "Rules of the Air and Air Traffic Services", Chapt. 6 Para. 6.7.3.2.4

330 Ibid . ICAO PANS-OPS Doc 8168 (Ed. 4) , Part III, Chapt. 3.5.6.1.2

331 Collected Noise Abatement Regulations by Boeing Corp: See http://www.boeing.com/commercial/noise

332 Correspondence: D. Forsyth, CEO of Qantas to Minister Anderson dated 21/8/2000 & 1/11/2000

live trial of CDA was conducted in the US in 2003 and showed that noise levels from 10-30 miles were reduced by 3- 6 dB(A) [# 333] , though no trial has so far been conducted here.

Unfortunately, despite the support in 2000 for this extension of the PRM trial by the then Chairman of the Government SACF [Dr. Brendan Nelson], the Forum itself refused to condone the trial [# 334]. Such loss of opportunity for all residents around KSA is shortsighted and difficult to justify.

7.7 MINISTERIAL CONSIDERATION OF PRM

On April 11 2001 the then Environment Minister issued a short media statement, reporting :

> ***"The noise-monitoring program has confirmed that the corridor between Turramurra and Hornsby Heights beneath the approach path for the main runway at Sydney Airport would be the area most affected by the PRM, should the Government approve its use,"***
>
> ***"Also affected would be the general area of Arcadia and Galston to the west of Hornsby Heights. Although these areas have been exposed to aircraft noise in the past, use of the PRM would cause more aircraft noise exposure."***
>
> ***"Areas experiencing lower exposure include Cherrybrook, Pennant Hills, Normanhurst and North Epping."***

The Media Release also stated, quoting Senator Hill:

> ***"I will take into account the final advice from my Department, the consultants' reports, any advice that might be given on the reports by the consultative committee and any variation to the proposal that Australian Aviation may make, before conveying my decision to Mr Anderson," and***
>
> ***"The PRM will not be used for approaches from the north unless it is approved for use by Mr Anderson. "***

The April 11 release went on : ***"Senator Hill must now conclude the environmental assessment of Airservices Australia's original proposal and convey advice to the Minister for Transport and Regional Services, John Anderson."***

No subsequent media release accompanied the conclusion of the PRM enquiry reporting a recommendation to the Minister for Transport, however, on 16 May 2002 (more than 12 months after the Environment Minister's media release, Airservices Australia announced: " after careful consideration, ***it*** *had decided that full operation* of the Instrument Landing System (ILS) - Precision Runway Monitor (PRM) air traffic management tool at Sydney Airport, would commence in June."

There was no subsequent statement from Minister Anderson reporting his justification for permitting the use of PRM, though a cynic may guess that it probably has something to do with the then in-process sale of Kingsford Smith Airport to Macquarie Bank.

7.8 THE SACF INC POSITION ON PRM

The position of Sydney Airport Community Forum Incorporated [SACF Inc], the non-Government Forum representing areas not represented on the Government SACF, was that PRM, if introduced bona-fide for the purposes of more safely enabling "normal northerly traffic flows" in poor weather, should not be condemned.

However it should only be employed in circumstances which positively minimise noise impacts over residents. Any application which leads to lower altitude, engine-on, flaps down, "dirtier" approaches than applicable to Instrument Landing or Visual approaches should be resisted , as also would its use for increasing movement rates above the legislated cap of 80 per hour. It should only be employed for the purposes of:

(a) promoting safety;
(b) permitting continuous normal operational flows in bad weather and
(c) promoting flight path spreading in landing and departure Modes; and
(d) facilitating continuous all-weather operation of bidirectional parallel runway SODPROPs modes over Botany Bay if *at all possible*.

7.9 CURRENT OPERATIONS

Since the introduction of PRM, community groups from the Hornsby-Hornsby Heights area have reported that instead of the 3000 - 4000 foot approach levels promised for the NOI Option 1, Airservices may now be practicing the use of around 2000 foot approaches to the glide path, over similar distances. If so, this is entirely unacceptable,

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333 "Noise Regulation Report" , J-P Clarke , 21/2/2003: bells@friend.ly.net
334 Minutes Govt. SACF 15/10/2000

and the relevant Minister should order its cessation forthwith. It is understood, however, that the proposed commencement altitudes for glide path approach in the NOI are "above mean sea level" , and given the ground level of the Hornsby region, the resulting actual heights above ground level will be in the region of 2200 - 2400 feet.

Recommendations

Recommendation 7.1: That if Airservices has no better method for ILS approaches from the north than to persist with an ILS flight track limiting the descent glide paths to three (3) degrees , a study be carried out to investigate whether a glide path of up to 4 º gradient could be tolerated by the capabilities for typical customer aircraft, as practiced at Marseille and at Ostende for the Illushin II-76.

Recommendation 7.2: Airservices Australia should be requested to examine the capabilities of the range of aircraft using KSA and carry out a feasibility study on the possibility of introducing steeper glide paths [of up to 4.0 degrees], with higher intersection altitudes for aircraft approaching the localiser beams for Runways 16L & R.

Recommendation 7.3: Given that there now appear to be better methods for reducing noise impacts from arrival aircraft approaching runways from the north in the form of "Continuous Descent Approach" or CDA, SACF Inc recommends that early consideration be given to this modus operandi.

Recommendation 7.4: Given that CDA cannot apply in all weather conditions, and that a form of ILS-PRM may continue to be necessary, Airservices should employ an airspace consultant to consider methodologies of increasing the glide path descent angle for arriving aircraft to parallel runway systems over residents.

Recommendation 7.5: Given that Options involving greater altitude approaches were put forward but rejected in the NOI [eg - Option 3], consideration should be given to their implementation wherever possible in order to reduce the noise impact on residents from descending aircraft closer to the airport, *if this would be its effect.*

Recommendation 7.6: SACF Inc supports the LTOP Proposal of the "Trident" for northerly approaches, as a means of spreading landing noise impacts among locations, and suggests that Airservices Australia continue to investigate ways, using new technology if necessary, for its implementation.

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8. PROPOSED IMPROVEMENTS TO LTOP NOISE MANAGEMENT

8.1 ESTABLISHING A PROPER NOISE MINIMISATION REGIME:

8.1.1 EXISTING PROBLEMS WITH AIRCRAFT NOISE REGULATION [#335]

[The following is adapted from Chapt 3.6 in the SACF Inc Position Paper, *"The Way Forward, No. 1"- "**Environmental Protection From Overflying Aircraft"*** , prepared for Sydney Airport Community Forum Inc [SACF Inc] ; 12 June 1999

Once aircraft become airborne from any airport in Australia, existing State Government and Commonwealth environmental legislation provides no protection for residents on the ground. The relevant legislation controlling aircraft use in general [other than safety aspects] are the ***Airservices Act (1995) Cth***; and the ***Air Navigation Act (1920) Cth***.

To be certified to fly in Australia an aircraft must comply with the Navigation Act (1920) Cth. Regulations which specify the maximum noise and gaseous emissions from an aircraft engine at 650m from the engine on the tarmac. However, there is no comparable restriction of noise impacts from overflying aircraft experienced by people on the ground. Thus the ***Air Navigation Act (1920)*** only indirectly modifies the effects of aircraft engine noise and emissions on the ground. These depend on the flight path chosen and the aircraft altitude .

Contrary to natural expectation , the ***Airports Act (1996)*** and Regulations regulate only the use of airport property by the airport operator and the noise and pollution emissions from the airport in general terms. It does not purport to regulate the compliance with land use regulations pertaining to noise and pollution impacts of aircraft after takeoff, or even when idling on the tarmac under their own power [#336] .

The ***Airservices Act (1995)*** [AA Act] , Regulations and Operational Instructions [#337] under it control the manner in which aircraft are operated after take off, including the flight path selected by air-traffic control. One function of Airservices Australia prescribed in the AA Act is the *"**carrying out [of] activities to protect the environment from the effects of, and the effects associated with, the operation of Commonwealth jurisdiction aircraft" (s. 8(1)(d)) .***

Commendably the AA Act requires AA to regard the safety of air navigation as the most important consideration in exercising its powers and performing its functions [s. 9(1)] ; but it must also act in a manner that ensures that, as far as is practicable, the environment is protected from the effects of the operation and use of aircraft; and the effects associated with the operation and use of aircraft [s. 9(2)].

However, the Act in practice provides no such protection because Parliament has not seen fit to enact any regulations under the Act to cover the protection of the environment (including the human environment) from aircraft impacts (whether of the noise or pollution kind). However, s. 77 of the Act gives "The Governor-General" power to make regulations prescribing matters: ..... ***" regulating the environmental effects of the operation of Commonwealth jurisdiction aircraft"*: s. 77(2)(f) .** The Governor General in this context is generally understood to mean "the parliament" , the Minister by Direction; or the relevant department.

By s. 19 (1) of the Air Services Act, Airservices Australia (AA) is also exempted from the obligation to comply with State and Territory "land use laws"; which would include State Noise Acts and laws regulating gaseous emissions, so that unless the Commonwealth parliament explicitly prescribes the maximum effects on land of overflying aircraft, there is no reason to expect Airservices to consider this aspect without a direction from the appropriate [Commonwealth] government authority.

This abnegation of responsibility for the impacts on land of overflying aircraft is continued in the more recently enacted ***National Environment Protection Measures (Implementation) Act 1998 Cth*** [The NEPM Act] .

The NEPM Act is the Act empowering State and Federal cooperation in the area of environmental protection through the use of so-called "National Environmental Protection Measures [NEPMs] which are implemented under the ***National Environment Protection Council Act (1994) Cth.***

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335 Added to and modified for this Review - By P.S. Lingard

336 Regulation 1.03. AIRPORTS (ENVIRONMENT PROTECTION) REGULATIONS .

337 Australian Instructions to Pilots (AIP) and Departure & Arrival Procedures [DAP -East & West]

In Parts 2 and 3 the NEPM Act has exempted National Environmental Protection Measures [NEPM's] cooperation with the States under ***"Intergovernment Agreements on the Environment "*** [IGAs] for matters of "national interest" which is defined as :

> *"(a) a matter concerning:*
> *.....(i) Australia's relations with another country or Australia's international obligations; or*
> *.....(ii) -(iv) [national security; defence; or emergency -paraphrased]; or*
>
> *(b) a prescribed matter relating to:*
> *..... (ii)* ***the management of aviation airspace or airports, including aircraft emissions, aircraft noise and on-ground airport management****, but not including matters specified in subregulation 1.04(2) of the Airports (Environment Protection) Regulations* [#338] *; or*
>
> *(c) any other matter agreed between the Commonwealth, the States and the Territories."*

While it appears from the Senate second reading speech for the introduction of the NEPM Act that noise and other emissions from aircraft in flight were considered to be effectively regulated by the Air Navigation (Aircraft Noise) and the Air Navigation (Aircraft Engine Emissions) Regulations [# 339] ; there is in fact no such regulation under the Air Navigation Act specifying the minimum impact at ground level of noise and emissions from aircraft when in flight.

From the standpoint of the protection of residents underlying flight paths over Australia's towns and cities, this appears to be a serious omission from the regulatory protections afforded Australia's citizens; and is one which could be satisfied by prescribing for different aircraft the maximum noise impact they may impose at given radial distances following takeoff, or prior to landing ; allowing for the typical climbing and or approach characteristics of that aircraft, and requiring these to be optimised both for noise and emissions impact at ground level; with exemptions for emergency operations etc. ***In conclusion there seems to be no good reason at all for exempting overflying aircraft from the norms of environmental controls which are applied to land-based activities and it is high time that our politicians were made to realise this.***

8.1.2 THE GOVERNMENT RESPONSE:

In 1999 SACF Inc raised these issues with Dr. Brendan Nelson, then Chairman of the government's Sydney Airport Community Forum [SACF]. At a subsequent meeting in March 2000, Dr. Nelson agreed to pursue with the Attorney General the issue of what actual noise regulation existed for overflying aircraft . He had been asked to raise certain questions in Parliament on notice for the Attorney, but declined because he could not be seen to be attacking the government position.

Instead Dr. Nelson wrote to the Attorney General , raising substantially the issues raised by SACF Inc , in the letter attached in Appendix J . In turn the Attorney General referred the question to the Minister for the Environment [See Appendix J], who in turn responded in terms of the letter dated 19 June 2000 included in Appendix J.

In this letter the Minister [then Sen. Robert Hill] substantially agreed with the SACF Inc interpretation of the legislation in 8.1.1 (above) and stated that "aircraft flight paths and altitudes are controlled through <u>*operational requirements*</u> ; and that the present system of flight paths was derived from the "*a major consultative process during the development of the Airport's Long Term Operating Plan (LTOP).*" He further states :

> ***"In developing these operational procedures and requirements the Air Services Act 1995 explicitly places a responsibility on Airservices Australia to ensure that as far as possible the environment is protected from the environmental effects of the operation and use of aircraft."*** [# 340]

This, of course is just the point that SACF Inc , was making in *"The Way Forward #1"*, and the fact that the flight paths have been developed "through *a major consultative process"* , essentially with the government SACF, places

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338 Subreg. 1.04(2) of the Airservices (Environmental Protection) Regulations only applies to provisions about motor vehicle pollution; occupational health and safety matters; emissions of substances that deplete stratospheric ozone; or pesticides.

339 Senator Campbell ; WA 21/10/1997 Hansard p. 7721

340 S. 9(2) of the Airservices Act 1995.

the onus on that forum to police and ensure that the flight tracks developed and proposed adhere to acceptable criteria for noise minimisation on the ground. This has not been done.

The fact that the LTOP refers to various "criteria" which could be used, and invokes the ANEF /ANEI system of averaging aircraft noise exposure, does not mean that the flight tracks comply with the much stricter conditions, which, in other spheres of industrial activity, are accepted without question as applicable to noise exposure of residential premises from neighbouring industrial plant.

Significant effort was expended in developing the LTOP to "spread the noise" of landings and departures over a range of compass bearings, but almost no attention was paid to what constituted either "equitable spreading" or "noise minimisation" from the chosen tracks distributions.

In a response to Dr. Nelson to Minister Hill's reply, Dr. Philip Lingard [Secretary SACF Inc], pleaded with Dr. Nelson to raise the issue of suitable regulation under the Airservices Act, specifying what noise maxima should normally be tolerated from aircraft overflying residences. This SACF Inc letter and Dr. Nelson's reply are also included in Appendix J. Apart from an emotive statement of commitment to the resolution of the aircraft noise problem in the last paragraph, Dr. Nelson's response is a typical "Departmental Spin-doctor-style" communication reciting banal generalities concerning the difficulties of noise regulation in circumstances of intermittent affectation.

Dr Nelson's response fails completely to grasp the nettle offered, namely to propose a practical solution, based on existing "Land Use" Noise Regulations [# 341], which applies a 5 dB(A) limit above quiet ambient on the continuous 15 min average noise from the industrial source, and imposes maximum suburban levels of 50 and 45 dB(A) [LAeq 15min] for day and night conditions. Although this is an extremely brief preliminary statement of the problem of identifying suitable noise criteria, the nature of the problem is quite clear.

The 1995 Senate Select Committee Enquiry on Aircraft Noise in Sydney [# 342] criticised the present logarithmic system [ANEF] of averaging noise impacts from continuous aircraft flight paths, and recommended a complete National Acoustic Laboratory revision of Aircraft Noise Evaluation. This criticism was repeated in the seminal book by Paul Fitzgerald [# 343] on the politics of Sydney Airport, and again in the Environment Australia Report on the Second Sydney Airport EIS [#344]. It is thus high time that this issue was addressed, either by regulation or by a fresh, human environment sensitive approach to the measure of aircraft noise impacts.

<u>Recommendation 8.1</u>: SACF Inc recommends that politicians grasp the regulatory nettle and develop a Noise Impact Regulation under the Air Services Act 1995, which independently of "operational requirements" [Cf. Senator Hill's Letter] provides adequate protection of the human environment from the disturbances created by gratuitous aircraft noise; always having due regard for safety. [#345]

Given a proper solution of this particular problem, residents should be able to rest assured that airline imposed fuel cost minimisation criteria cannot dominate discussions of flight path planning again [# 346].

The proposed regulations should result in complete redesign of present airspace for Sydney ensuring that departure overflying is prohibited, both for the minimisation of departure noise and the maximisation of flight path safety. This is because the ceilings impose artificial restrictions on departure climbs, thus maximising noise - See S. 8.2.5 - 8.2.6.

In 2001 this issue was again raised with the third Chair of the Government SACF, Senator Helen Coonan in two meetings with a SACF Inc delegation [# 347], where it received an apparently sympathetic hearing, but nothing more was done.

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341 NSW EPA Document "Industrial Noise Policy - ISBN 0 7313 2715 2 EPA 00/1

342 "Falling on Deaf Ears" - November 1995 - The Parer Committee Report, ISBN 0 642 24416 2, AGPS

343 "The Sydney Airport Fiasco" , Fitzgerald, F. (1998) Hale & Iremonger, Sydney, p. 76ff

344 *"Environmental Assessment Report" - Second Sydney Airport July 1999 ; Department of the Environment and Heritage Environment Australia.*

345 Appendix J contains the SACF Inc/Nelson Correspondence, the Environment Ministers Reply , and subsequent correspondence with Dr. Nelson.

346 See SACF Minutes, May 1998 - where even the imposition of ICAO recognised standards for Noise Abatement flight paths was opposed by the two major Australian Airlines.

347 13/8/2001 & 2/10/2001

8.1.3 THE AUSTRALIAN STANDARD FOR BUILDING SITING SUBJECT TO AIRCRAFT NOISE [AS 2021][#348]

8.1.3.1 **Overview**:

The sole "pseudo-regulatory" instrument in relation to aircraft noise intrusion in buildings for human habitation is Australian Standard [# 349] - AS2021 - 2000. It is cited in a number of Statutes & Regulations [eg. The Airports Act (1996)] as being binding for noise mapping purposes in connection with Airport Master Plans. It is employed by many Municipal Councils across Australia for the land-use planning purpose of ensuring adequacy of building insulation standards of construction in the vicinity of airports .

"Australian Noise Exposure Forecast" (ANEF)

The "Australian Noise Exposure Forecast" (or ANEF) reference metric criteria were determined under uniquely Australian conditions, by the National Acoustic Laboratories (NAL) in 1982 [# 350] [The NAL Survey]. It is employed for major aerodromes.

The formula for ANEF is :

$$ANEF = 10 \log_{10} \sum_{i=1}^{i=I} \sum_{j=1}^{j=J} \log_{10}^{-1} \{ANEF_{ij}/10\}$$

where:

$$ANEF_{ij} = EPNdB_{ij} + 10 \log_{10}(Nd + 4\,Nn) - 88$$ [# 351]

where $ANEF_{ij}$ = noise exposure due to aircraft type "i" on flight path "j";
$EPNdB_{ij}$ = effective perceived noise level in decibels of aircraft type "i" on flight path "j"; and
Nd, Nn = number of flights during the day and night, respectively of aircraft type "i" on flight path "j".

To obtain the ANEF for a given location the above equation is summed for all overflying aircraft types and flight paths . For the purpose of counting the day and night-time numbers (Nd and Nn) daytime is considered to be from 6:00 am to 7:00pm and night-time from 7:00pm to 11:00pm at Sydney KSA.

Thus the ANEF is a cumulative measure of noise exposure from aircraft travelling along fixed "flight paths" and is effectively a "dosage". It is a summation of the *"effective perceived noise level in decibels"* [EPNL in dB(A) or EPNdB] resulting from the engines of individual aircraft. EPNdB is measured for new aircraft following US Federal Aviation Administration [FAA] Title 14 Rule FAR Part 36 [# 352], which is cited for the purposes of aircraft licensing and certification. The US certification noise levels are adopted for aircraft permitted to use Australian airports by Aircraft Noise Regulations to The Air Navigation Act (1920).

In practice, the *"EPNdB"* is around 13 dB(A) greater than the "maximum measurable" noise level in A-weighted decibels [dB(A)], which people are exposed to at ground level [# 353]. This decibel increase is included to reflect the perceived annoyance level of residents to the noise.

The ANEF therefore sums the logarithms of the number of flyovers (combined with aircraft types) over a period of time (usually one whole year). This greatly reduces the apparent "impact" (in decibels) of the "perceived effect" of the noise heard by individual persons at ground level in comparison to noise levels in common experience (eg. Vacuum cleaners, motor mowers etc). For this reason the ANEF has been criticised as unfairly biasing noise impact outcomes to benefit transportation interests (See later in this section). To overcome this, the Australian Department of Defence recommends that ANEFs (for military airbases) be computed using averages over only the time for which residents are actually exposed to aircraft noise . This provides a more realistic estimate of the true harm created by exposure during aircraft operations. Since year 2000 there is a separate section of the Australian Standard AS 2010-2000 dealing with military airports[# 354].

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348 By P.S. Lingard, assisted by discussion & correspondence with H.P. Richard & J. Dale, Member of Standards Committee EV/11.
349 AS2021 -2000 "Acoustics - Aircraft noise intrusion - Building siting and construction"
350 Hede A.J. & Bullen R.B. (1982) "Aircraft Noise in Australia: A survey of community reaction, NAL Report No. 88, p. 153 Figure 9.7.
351 AS2021-2000 "Acoustics - Aircraft noise intrusion - Building Siting and Construction" Eqs A2 & A1 respectively
352 ICAO Annex 16, Vol. 1 Part II
353 Hede A.J. & Bullen R.B. (1982) "Aircraft Noise in Australia: A survey of community reaction, NAL Report No. 88, p. 128 Table 8.1
354 AS2021 - 2000 "Acoustics - Aircraft noise intrusion - Building Siting and Construction" Section A2.4

A typical maximum EPNdB level at 6.5 km from take-off roll at altitude 210 m (853ft) considered acceptable for a "Stage 3" aircraft such as a Boeing 747 - 400 aircraft [4 Rolls Royce "RB211-524G" engines [#355] of takeoff weight 875,000 lb] is 103.8 EPNdB . The ANEF is compared to related local and overseas noise metrics in Appendix K *[Vol. 2 S. 11 of this Review]*. This comparison assumes repeated, regular overflights of aircraft producing the same maximum noise level [in dB(A)] at ground level. Table 8.1.4 of S. 8.1.4 summarises these for convenience.

ANEF contours are generally made available for large commercial airports where flight path positions and characteristics are historically and geographically fixed in nature. Table 8.1.3.1 lists the ANEF requirements of AS2021 -2000 for various building types [#356].

TABLE 8.1.3.1 TYPICAL ANEFs CONSIDERED ***ACCEPTABLE*** FOR SELECTED BUILDINGS

Building Type	**Acceptable ANEF**
Houses, home units	< 20 ANEF
Hotel, Motel, hostel	< 25 ANEF
School, University	< 20 ANEF
Light Industrial	< 30 ANEF

The Standard (AS 2021-2000) prescribes that for the 20 to 25 ANEF noise zone, residential occupation is, at best, *conditionally acceptable*. Furthermore, no new home should be constructed where it will be exposed to over 25 ANEF. The Standard also specifies the minimum acceptable exposure to aircraft noise in a habitable residential dwelling as being 50 dB(A) in a typical bedroom (See Table 8.1.3.3, below).

The ANEF 25 dosage level was exceeded for about 14,000 homes after opening of the third runway , yet compensation and/or government promised noise insulation was ultimately provided to only about 400 residences exposed at the 30 ANEF level [instead of 25] .

Light General Aviation Airports [LGAs]

AS 2021 -2000 recognises that people near *"Light General Aviation Airports"* [LGAs], which carry insufficient traffic to justify production of an ANEF exposure chart, may also need protection. For these people, the standard specifies an ***"acceptable"*** maximum aircraft noise level (at the ground) of less than or equal to 80 dB (90+ is considered unacceptable) for a home exposed to 20 or less flights per day, and less than or equal to 75 dB (85 + is unacceptable) for more than 20 flights per day [# 357] . Table 8.1.3.2 lists the absolute decibel levels which the Standard considers acceptable under flight paths near LGAs (Table D1 of AS2021-2000).

TABLE 8.1.3.2 TYPICAL NOISE LEVELS dB(A) FOR LIGHT GENERAL AVIATION AIRPORTS

Building Type	**< = 20 flights per day**	**> 20 flights per day**
House, home unit etc	< 80 dB(A)	< 75 dB(A)
Hotel, motel etc	< 85 dB(A)	< 80 dB(A)
School, University etc	< 80 dB(A)	< 75 dB(A)
Commercial	< 90 dB(A)	< 80 dB(A)

The 1995 Senate Committee inquiry into the EIS for the Third Runway (which opened Nov. 1994) criticised the ANEF measure as being insufficiently protective of residents affected by aircraft noise . The Inquiry recommended that the government again fund NAL to produce a more up-to-date assessment of noise impacts [# 358]. Funding has never been provided for this work.

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355 FAR Pt 36, Appendix 3; ICAO Annex 16 Vol. 2 Part II Chapt. 3.

356 AS 2021-2000 Table 2.1

357 See Table D1, AS2021 - 2000

358 "Falling on Deaf Ears" Report of the Senate Select Committee Enquiry on Aircraft Noise in Sydney, Chair Sen. W. Parer, Nov. 1995, ES para 1.54.

With the start of LTOP "noise sharing" in 1997 continuous changing of flight paths made ANEF forecasting difficult. Indeed no ANEF was published until the Draft Sydney Airport Master Plan release on 31 July 2003. This "Master Plan" purports to forecast outcomes to the year 2023, and produces an ANEI (retrospective ANEF) for 2001.

It confirms that by 2001 around 12600 existing and many newly affected homes impacted by the Long Term Operating Plan [LTOP] were outside the 25 ANEF boundary within which noise insulation should be advisable for new homes under the AS 2021 ANEF guidelines.

Given that many areas under the newly spreading flight paths under LTOP now experience more than twenty (20) overflights per day (cf. Table 8.1.3.2) for much of the year, there is a strong argument for noise insulation to be provided to homes and home units exposed to more than 75 dB(A) twenty times per day [Table 8.1.3.2].

A simpler option is for flight paths imposing such noise levels on homes and home units to be redesigned to minimise their noise impact [See S. 8.2 below].

8.1.3.2 <u>Architectural Design Recommendations of AS 2021-2000</u>:
The standard further specifies noise levels which are considered acceptable for different room usages in different building and room types , eg. hotel rooms, offices, living rooms and bedrooms.

Table 8.1.3.3 partially reproduces the AS 2021 Table 3.3 of deemed permissible noise levels in residential rooms.

The Standard states *[at Footnote 1 to Table 3.3]* that the indoor design levels referred to are *"hypothesized values based on <u>Australian experience</u>* [#359] *"* and constitute design sound levels being the maximum level in dB(A) from external noise of an aircraft which the average listener will not deem to be intrusive. the footnote also states:

> ***"Owing to the variability of <u>subjective responses</u> to aircraft noise, these figures will not provide sufficiently low interior noise levels for occupants who have a particular sensitivity to aircraft noise."***
>
> *[Author's emphasis]*

There has been reported criticism within Standards circles [from airport, airline and transport department sources] to the effect that the above level recommended for relaxing and sleeping rooms in homes [ie 50 dB(A)] should "be relaxed" to a higher level.

The above footnote statement as to the *"hypothesisation of values"* in AS 2021 is suspiciously vague, and open to the charge that the data may not be scientifically well-founded. However, the above, or even more stringent criteria are supported by several independent authorities, for example:

(i) American Institute of Physics Handbook 3rd. Edition 1972 Table 3j-4
[Page 3 -153]; [Data from V.O. Knudsen & C.M. Harris "Acoustical Designing in Architecture" John Wiley & Sons, Inc New York, 1950];

(ii) "Community Noise" (1995) Berglund, B. & Lindvall T. Centre for Sensory Research Stockholm, WHO Contracted Report ISSN 1400-2817; ISBN 91-887-8402-9]; and

(iii) "Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety" March 1974, US EPA Office of Noise Abatement and Control US GPO Doc 550/9 - 74-004 [See on-line Library at http:\\www.nonoise.org]

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[359] Author's emphasis - Note: AS 2021-1992000 described it as "some overseas research and Australian experience"

TABLE 8.1.3.3 AUSTRALIAN ARCHITECTURAL INDOOR DESIGN LEVELS FOR NOISE

Building Type *(From Table 3.3 AS 2021-2000)*	Design Sound Level dB(A)
Houses, home units etc Relaxing, Sleeping areas Normal domestic & Utility rooms	 50 dB(A) 60 dB(A)
Hotels etc Sleeping, relaxing Social activities Service rooms	 55 dB(A) 70 dB(A) 75 dB(A)
Hospitals etc Wards, treatment & consulting rooms Laboratories Service Areas	 50 55 75
Offices & Shops Private office; conference room Shops, supermarkets	 55 75
Churches	50
Industrial	75 - 85

Table 8.1.3.4 shows some recommended architectural design levels from the above three sources :

TABLE 8.1.3.4 SOME INTERNATIONALLY RECOMMENDED SOUND LEVEL GUIDELINES FOR ARCHITECTURAL DESIGN

Building type or room • *from USA EPA Doc 550/9/-74-004*	Noise Level Recommended Range dB(A)
Houses, home units etc Relaxing, Sleeping areas Normal domestic & Utility rooms	 25 - 47 30 - 45
Hotels etc	30 - 54
Offices & Shops Private office; General Office	 30 - 50 35 - 65
Hospitals	20 - 45
Church	25 - 42

There is thus ample international support for the "Indoor Design Levels" published in AS 2021 (Table 3.3), and the data even suggest that in some areas the recommended Australian values may err by being set too high , rather than being too protective .

<u>Recommendation 8.2</u>: It is submitted that now that many areas under the newly spreading flight paths of LTOP are subjected for much of the year to more than twenty (20) flights per day, there is a strong argument for noise insulation to be provided to homes and home units exposed to more than 75 dB(A) twenty times per day using the "Light General Aviation Guidelines" of Table D1 of AS2021-2000.

<u>Recommendation 8.3</u>: Alternatively it is submitted that flight paths imposing such noise levels on homes and homes units should be redesigned to minimise their noise impact.

Recommendation 8.4: Criticism that the level of 50 dB(A) max recommended for relaxing and sleeping rooms in homes should be "relaxed" to a higher level to accommodate transport interests should be ignored and instead of being relaxed , the Standard should be strengthened to accommodate the more stringent international guidelines summarised in Table 8.1.3.4.

8.1.3.3 Standards Australia AS2021 Standards Committee EV/11:

AS2021 is produced by Standards Australia [SAA]. Like other Standards , it is regularly reviewed by a technical committee . The Committee responsible for AS 2021 is called "Standards Committee EV/11" and the last review was in 2000.

The present chair is an employee of Airservices Australia. The Committee has a membership of about fifteen (15) acoustical experts who are either academics, local government and State EPA officers, and/or "independent" consultants in private practice. It includes representatives from the Department of Defence, Airservices Australia and the airlines.

The Standard prescribes guidelines for determining levels of aircraft noise intrusion which are acceptable for human habitation of dwellings and buildings . It is therefore imperative that the Chair has no actual or implied pecuniary or personal conflict of interest in determining outcomes of deliberations of this Committee. Recent reports to this Forum [SACF Inc] suggest that "the industry" is promoting changes to some prescriptive elements of AS 2021 , even recommending that the Standard's indoor design levels should be "relaxed", eg. AS 2021 - Table 3.3 [Cf. S. 8.1.3.2] .

Given such attempts to influence Australia's only environmentally protective instrument governing aircraft noise impacts , we submit that Chairmanship of this Standards Committee be held by an independent architectural acoustics expert . It should certainly not be held by an airline , an airport owner or government agency employee under the Transport Minister's control.

Morever, the Committee should call on independent medical-acoustic expertise for the purpose of assessing threshold noise levels having regard to noise impacts on human health. These changes are vital to ensuring transparency and public accountability of the standards setting process.

There is a clear pecuniary interest of Airservices Australia in promoting airline transportation, and the commercial interest of the airlines in increasing aircraft movements. These interests are not compatible with protection of the human environment around Australia' airports.

Historically, DOTARs -affiliated agencies [eg. the former Federal Airport Corporation] have opposed the residential community interest in mitigating noise and pollution outcomes near airports [#360] . While this is not to suggest that the present Chair [from Airservices Australia] has ever used his position improperly, there are uncontestable conflicts of interest involved and the aircraft noise-affected communities of Sydney would be better served if this important Committee were Chaired by someone with no conflict of interest .

Recommendation 8.5: That the Chairmanship of the Standards Australia Committee responsible for developing standards of architectural acceptability and measurements for representing aircraft noise to affected residential communities be independent of any corporation or public authority which may stand to benefit from any relaxation of those standards.

The Role of DOTARS in promoting changes to the existing AS 2021 must be rigorously scrutinised to ensure that residential community interests are not compromised.

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[360] Fitzgerald, P. (1998) *"The Sydney Airport Fiasco"*, Hale and Iremonger, Sydney.

8.1.4 COMPARISON OF SOME INTERNATIONAL REGULATORY NOISE METRICS[# 361]:

Several "Noise Metrics" have been developed internationally to represent the annoyance level of aircraft noise near airports. Table 8.1.4.1 compares the current Australian ANEF [Australian Noise Exposure Forecast] with the DOTARS- promoted N70 against the currently used American DNL and CNEL (a metric formerly used in California). Also shown is the L_{eq} [# 362] for the equivalent energy averaged exposure.

TABLE 8.1.4.1 COMPARISON OF NOISE METRICS USED FOR REGULATORY PURPOSES
70 dB(A) max events

				Calculated for 0.5 min events	**Calculated for 0.5 min events**	**Calculated for 0.5 min events**
	MOVEMENTS PER DAY	**ANEF dB(A)**	**N70 PER DAY**	**DNL *** N> 65**	**CNEL N>65**	**LA eq [1, 24 hrs]**
70 dB(A) EVENTS PER HR				US EPA (1974)		NSW EPA
2	**34**	**13.06**	**34**	**52.41**	**52.76**	**50.77**
4	**68**	**16.07**	**68**	**55.42**	**55.77**	**53.78**
6	**102**	**17.83**	**102**	**57.18**	**57.53**	**55.54**
8	**136**	**19.08**	**136**	**58.43**	**58.78**	**56.79**
10	**170**	**20.05**	**170**	**59.4**	**59.75**	**57.76**
20	**340**	**23.06**	**340**	**62.41**	**62.76**	**60.77**
30	**510**	**24.82**	**510**	**64.17**	**64.52**	**62.53**
40	**680**	**26.07**	**680**	**65.42**	**65.77**	**63.78**
50	**850**	**27.04**	**850**	**66.39**	**66.74**	**64.75**
60	**1,020**	**27.83**	**1,020**	**67.18**	**67.53**	**65.54**
80	**1,360**	**29.08**	**1,360**	**68.43**	**68.78**	**66.79**
120	**2,040**	**30.84**	**2,040**	**70.19**	**70.54**	**68.55**

A simple way to visualise the meaning of the various aircraft noise metrics, such as ANEF , DNL , CNEL and L_{eq} is to calculate the expected outcome from a continuous sequence of flyovers for a series of aircraft producing the same given *maximum* noise level on the ground . The 70 dB(A) level characterises the regulation maximum level most household power tools (eg. Electric Chain Saws) are permitted to produce under State laws . For example, a typical electric vacuum cleaner produces around 65 dB(A). A typical noise level which results in a 5 % loss of speech intelligibility in living areas is around 63 dB(A) , while for 100% intelligibility of speech its level should exceed the external noise level by 15 - 18 dB(A) [#363].

Table 8.1.4.1 shows each Noise Metric value assuming a given number of flights per actual hour per day, which reflect the real effect for actual exposure at the time. These are typical of current aircraft operations over residential suburbs. The assumption in the Table is that all flights above a fixed ground "target point" produce a maximum *"A-weighted"* noise level [L_{max} [#364]] of 70 dB(A) . Flights are restricted to the non-curfew hours at KSA, ie a seventeen hour day (06:00 am to 23:00 pm) . Each noise exposure event is assumed to last 30 seconds [ie 0.5 minute], and corrections are applied for the variable noise impact caused by the jet engine approach/ retreat effect of a typical flyover. Calculation details are shown in Appendix K .

Tables 8.1.4.2 shows the variation of ANEF vary for different constant maximum decibel levels (from 50 to 80 dB(A)) for the same range of overflight events, assuming continuous day-to-day exposure .

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361 By P.S. Lingard & H.P. Richard, with assistance from J. Dale.

362 L_{eq} is the "Energy Averaged" cumulative noise exposure level (ie "L") for all similar events in a defined period (See Appendix K,S. K4).

363 Berglund, B., & Lindvall , T (Eds) "Community Noise", Arch. Center for Sensory Research (1995) 2(1), S. 7.4.5 & Fig. 7. Report prepared for World Health Organisation.

364 L_{max} is the maximum noise level experienced at the target point .

TABLE 8.1.4.2 HOURLY AND DAILY NOISE EVENTS PRODUCING GIVEN ANEF LEVELS
for various maximum noise event levels in dB(A) (See Table K.10 from Appendix K).

	dB(A) max	**50dB(A)**	**55dB(A)**	**60dB(A)**	**65dB(A)**	**70dB(A)**	**80dB(A)**
EVENTS PER HR	**N{Db(A)} PER DAY**	ANEF	ANEF	ANEF	ANEF	ANEF	ANEF
	(= N70 for > =70dB(A)						
2	34	-6.94	-1.94	3.06	8.06	13.06	23.06
4	68	-3.93	1.07	6.07	11.07	16.07	26.07
6	102	-2.17	2.83	7.83	12.83	17.83	27.83
8	136	-0.92	4.08	9.08	14.08	19.08	29.08
10	170	0.05	5.05	10.05	15.05	20.05	30.05
20	340	3.06	8.06	13.06	18.06	23.06	33.06
30	510	4.82	9.82	14.82	19.82	24.82	34.82
40	680	6.07	11.07	16.07	21.07	26.07	36.07
50	850	7.04	12.04	17.04	22.04	27.04	37.04
60	1,020	7.83	12.83	17.83	22.83	27.83	37.83
80	1,360	9.08	14.08	19.08	24.08	29.08	39.08
120	2,040	10.84	15.84	20.84	25.84	30.84	40.84

This Table shows that outdoor speech communications will begin to be affected around 10 times per hour for ANEF levels between 10 and 15 .

Table K.9 in Appendix K also show how the L_{eq} varies when setting different constant maximum decibel levels (from 50 to 80 dB(A)) for the same range of overflight events .

8.1.5 CRITERIA FOR HOME NOISE INSULATION:

In Australia, the critical ANEF above which Councils may require *new homes* to have noise insulation is 25 [See Table 8.1.3.1 above]. The (former Third Runway) Community Advisory Committee [CAC], NSW Environment Protection Agency, and the Commonwealth Environment Protection Agency all recommended noise insulation for homes in areas within the ANEF 25 -contour . Such homes are classified ***"unacceptable"*** for human habitation without acoustic treatment by Australian Standard AS 2021-2000 so there are justifiable environmental grounds [# 365].

With LTOP , the 25 ANEF level is now exceeded at some 12600 homes in many areas of suburban Sydney[# 366]. Yet almost none of the around 13000 (3rd Runway) homes originally recommended for insulation including the ANEF 25 level were ever insulated .

Table 8.1.4 (above) shows that for the 25 ANEF level to be reached the number of 70 dB(A) (max) exposures per hour must be around 30 , ie. around one every two (2) minutes. Note that this presently applies to newly constructed homes, not those existing which become newly affected.

The ANEF 30 level is defined as ***"significant"*** under the Airports Act Cth (1996) . The Australian Government only funds *retrospective noise insulation* (paid for by the aircraft noise levy) above an ANEF of 30 . Homes affected by the Third Runway opening in 1994 are still being insulated ! Table 8.1.4 shows that this ANEF corresponds to between 1400 and 2000 70 dB(A) flights per 17 hr day ie around 80 per hour. The resulting noise levels in sleeping and relaxation areas of homes would therefore massively exceed the Table 3.3 recommendation in AS2021(ie 50 dB(A)), whatever the type of home .

In America the US FAA [# 367] requires new home insulation at 65 DNL (or L_{dn} [# 368]) the "day, night level". The former Californian CNEL[#369] = 65 level results in a similar outcome to that provided by DNL 65 . These metrics

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

366 Data calculated from ANEF for 2001 published in the Preliminary Draft Master Plan for Sydney Airport July 2003.

367 Federal Aviation Administration, Regulations FAR Part 150.

368 L_{dn} is the "Day and night level" . See explanation in Appendix K , S.K5.

provide similar outcomes to that of "ANEF 25" (Table 8.1.4), and represent about thirty (30) 70dB(A) events per hour. Thus even Americans live under more beneficial conditions near airports than provided by the 30 ANEF deemed "significant" insulation criterion of the Australian Government! However, none of them comply with the US EPA (1974) recommended home insulation level of DNL = 55 dB(A) [# 370] (ca. 4 events / hour).

<u>Recommendation 8.6</u>: The Australian government needs to redefine its subsidised noise insulation standard to comply at least with the US 65 DNL (ca. 25 ANEF) level.

8.1.6 TRANSPORT LOBBY - INDEPENDENT METRICS

More environmentally appropriate measures for assessing the human health related impacts of aircraft noise are provided by the World Health Organisation (WHO)-recommended level of 55 dB [L_{eq}] [#371] for (note) <u>exterior</u> living areas; and of 45 dB [L_{max}] for interior rooms [# See 372] .

The New South Wales EPA [#373] recommends similar effective energy averaged indoor noise levels [$L_{eq\ ,\ 15\ minute}$] for suburban residences exposed to noise from industrial sites of 40, 45, and 50 dB(A) for night, evening, and day, [# 374]; with absolute maximum levels of 45, 50 & 60 dB(A), respectively. The previously referenced World Health Organisation's study by Berglund and Lindvall concludes that the maximum noise level in sleeping areas at night should be <u>*no more*</u> than 45 L_{max} (max).

Table 8.1.4 shows that the NSW conditions (40, 45, & 50 dB(A) L_{eq}) are exceeded for as few as two (2) 70 dB(A) (max) flights per hour. The Table also shows that the US EPA (1974) recommendation of 55 DNL would result in homes being insulated for a 70 $dB(A)_{max}$ event incidence of 4 times per hour [ie around 16 ANEF] . Such levels are exceeded almost daily both in the new- and formerly-affected zones under the LTOP in the Sydney Metropolitan area as close in as Summer Hill [# 375] .

<u>Recommendation 8.7</u>: SACF Inc recommends that all State Governments demand that the Federal Government impose aircraft noise environmental outcomes not worse than the current NSW EPA and World Health Organisation recommendations laid down in the WHO "Community Noise" and the NSW EPA "Industrial Noise Policy" documents, ie. no more than 45, 50 and 60 dB(A) Maximum levels inside suburban residents for night, evening and daytime, respectively.

The US EPA Position :

In 1974 the US EPA reviewed the criteria for minimal interruption to intelligible speech between human beings, and other health impacts such as noise-induced deafness [#376]. It recommended that the 55 dB(A) DNL [L_{dn} ; ca. ANEF 15] be used as the noise exposure criterion for residential areas, rather than the higher DNL 65 level imposed by the US Federal Aviation Administration. The US EPA standard of 55 dB(A) permits 100 % intelligible speech indoors, providing a 5 dB(A) margin of safety. Furthermore it guarantees outdoor sentence intelligibility of 95% with normal noise levels at a distance of 3.5 meters. The US EPA (1974) concludes (at p. 22):

> ***"L_{dn} of 45 dB indoors and of 55 dB outdoors in residential areas are identified as the maximum levels below which <u>no effects</u> on public health and welfare occur due to interference with speech or other activity. These levels would also protect the vast majority of the population under most conditions against annoyance, in the absence of intrusive noises with particularly aversive content. "***

The US EPA position is supported by an authoritative study carried out by the US NGO known as the ***"Natural Resources Defense Council"*** (NRDC) in its seminal report ***"Flying off Course"*** [# 377] . The NRDC recommends that

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369 Day, evening, night - "Community Noise Exposure Level" . See explanation in Appendix K , S. K6.

370 "Information on Levels of Noise Requisite to Protect Public Health & Welfare with an Adequate Margin of Safety, US EPA, March 1974, Doc. 550/9-74-004

371 Note: L_{eq} = 55 corresponds to around 15 events per hour at 65 dB(A) or 5 events per hour at 70 dB(A); but none at 80 dB(A).

372 "Community Noise" (1995) Berglund, B. & Lindvall T. Centre for Sensory Research Stockholm, WHO Contracted Report {ISSN 1400-2817; ISBN 91-887-8402-9], at p. 178.

373 NSW Environment Protection Agency (EPA) Document "Industrial Noise Policy" - ISBN 0 7313 2715 2, EPA 00/1, Table 2.1.

374 Note: L_{eq} (T) is the time and energy averaged equivalent noise produced by summing all the events occurring in the stated time T (See Appendix K Para K4 for definitions].

375 "Short term study into aircraft noise and flight paths" Feb. - May 2003, Summer Hill, Airservices Australia Environment Services Branch, Report No. 1360 , 30/6/2003

376 "Information on Levels of Noise Requisite to Protect Public Health & Welfare with an Adequate Margin of Safety", US EPA, March 1974, Doc. 550/9-74-004

377 "Flying Off Course", Environmental Impacts of America's Airports, Natural Resource Defense Council (NRDC) , New

the following factors should be taken into account in noise planning and policy:

1. *Duration of intruding noises and frequency of occurrence;*
2. *Time of year (windows open or closed);*
3. *Time of day of exposure;*
4. *Outdoor noise level in community when intruding noises are not present;*
5. *History of prior exposure to noise sources;*
6. *Attitude toward the noise source;*
7. *Presence of pure tones or impulses.*

By rejecting the US EPA (1974) human health impact-based recommendations in favour of the FAA's 65 dB(A) DNL, the NRDC said that the US FAA had chosen :

> ***"to balance the protection of public health and welfare with competing economic and technological considerations."***

The result is that many residents in areas outside the US 65 DNL noise map are disturbed by airport noise, yet have no recourse under (US) federal regulations.

This position applies to a worse extent for most residents affected by aircraft noise at airports around Australia, because the ANEF 30 criterion for "severe" noise affectation is above the US DNL 65 (ca. ANEF 25). The NRDC further emphasises that the policy imperative of the US FAA is to foster the *"safety and economic development of American Aviation."*

In contrast , Airservices Australia (the Australian counterpart of the US FAA) has a duty to *"protect the environment"* under s. 9(2) of the Airservices Act (1995). Given this significant policy difference, Australian citizens exposed to aircraft noise are entitled to expect a more sympathetic stance from that organisation.

<u>Recommendation 8.8</u>: Given the significant expansion of Sydney airport operations put forward in its July 2003 Draft Master Plan SACF Inc recommends that serious consideration be given by the environmental authorities to implementation of the more strict human health determined US EPA guidelines for residential noise insulation [55 Dnl; ca. 15 ANEF] and that the Airport Corporation be made liable for any resulting costs.

8.1.7 AIRSERVICES AUSTRALIA ENVIRONMENT TARGET [$L_{eq\ 24}$ =60 dB(A)]

Airservices Australia has stated that:

> ***"No residential area should receive more than 60 Leq 24, i. e., no residential area should receive more noise exposure than that which is considered "unacceptable"*** [#378] ***for residential housing under Australian Standard AS2021"*** [#379] ....

Table 8.1.4 shows that at this noise dose there would be around twenty (20) 70 dB(A) events per hour, around the clock (ie. 340 per 17 hr day) , ie ANEF 20-25. This represents 5 times the 70 dB(A) aircraft overflight frequency of the US EPA recommendation for home noise insulation, yet Airservices Australia considers it acceptable for our homes. Though actually less damaging than the US Federal Aviation Authority [FAA] level of > thirty-five (35) 70 dB(A) flights per hour (D_{nl} =65), it greatly exceeds the recommendations of infrastructure independent bodies such as WHO and the NSW or United States EPA.

The weak environment protection target of 60 $L_{eq\ 24}$ set by Airservices Australia must be opposed by architectural and medical acousticians, and all interested in preserving the sanctity of human dwellings in Sydney. This is necessary because, while the $L_{eq\ 24}$ = 60 dB(A) level may be superficially low , it is misleading , and a practical outcome of the equivalent of thirty-five (35) 70 dB(A) flights per hour is unacceptable . It is submitted that instead the target should be a maximum actual ground noise impact of 60 dB(A) !

York, October 1996, Chapt. 6.

378 Logically, this statement means that Airservices Australia expects <u>all</u> residences to be exposed to "unacceptable" noise levels, though perhaps they might deny this if the question were to be put. In practice, the level recommended lies in the *"conditionally acceptable"* range according to AS 2021.

379 *ENVIRONMENTAL PRINCIPLES AND PROCEDURES FOR MINIMISING THE IMPACT OF AIRCRAFT NOISE* Airservices Australia , Environment Branch 19 August 1997, Principle 6.

The inadequacy of the present ANEF criterion used for noise insulation was demonstrated by the extensive community noise research in the early nineteen- eighties [# 380]. This study resulted in the ANEF definition used in AS 2021-2000. The Study showed that up to 45% of people are in fact moderately to severely affected by aircraft noise for ANEFs above only 20. At 15 ANEF still around 35% of people are "moderately to severely affected" [# 381] . Furthermore some experts recommend [# 382] a "noise bonus" of 8 dB(A) to bring the notional tolerable level (45% moderately - severely affected) down to only 12 [# 383] ANEF for people *in newly affected areas* . This must also be provided for in the requirements for noise insulation.

Recommendation 8.9: SACF Inc submits that the present stance of Airservices Australia on the environmental impact of overflying aircraft is unacceptable. A more reasonable standard to defend is that of the US Environmental Protection Agency (1974) position to the effect that a DNL 55 equivalent level is to be considered appropriate and acceptable for daytime application . This corresponds to maximum overflights of approximately four (4) 70 dB(A) max events per hour, providing a roughly five (5) dB(A) bonus over the daytime L_{eq} (15, 60) of 50 dB(A) recommended by the NSW EPA. It is approximately equivalent to an $ANEF_{max}$ = 16 boundary for continuous activity . Evening and Night-time activity should therefore be reduced to the NSW EPA guideline LAeq (T) of 45 and 40 dB(A), respectively, for each period (T) of activity.

Recommendation 8.10: The practice of averaging of events over twenty-four hours, or even a year, when no events occur for a significant part of that time, should be abolished as recognised by the Department of Defence in submissions to the Standards Committee EV11 . This will produce a level of ANEF which is far more realistic having regard to the actual impact of noise on the health and welfare of residents.

8.1.8 CONCLUSIONS AS TO NOISE METRICS AND REGULATION:

This *SACF Inc "**LTOP Review**"* approaches "noise sharing" from the standpoint of the need to:

(i) Maximise aircraft movements and especially departures over Botany Bay [S. 6.3] ;

(ii) Establish a metric by which noise dose and exposure can be measured and allocated with spatial equity among all residents, not merely just among those along currently allocated flight tracks: see S. 6.4 *[Quantitative Methods]*;

(iii) Eliminate the mere superimposition of LTOP on a pre-existing substratum of out-dated flight path patterns. This pre-existing and antiquated airspace management system is totally unsuited to the requirements of a three dimensional distribution pattern sufficient for ensuring true equity in noise distribution. For discussion of proposed solutions to this problem see S. 6.5 *[Mechanism For The Safe Implementation Of Flight Path Spreading]*; and

(iv) Implement a Noise Minimisation Policy regardless of whether Legislative Protection is enacted by government [S. 8.1].

SACF Inc submits that the primary LTOP goal for flights over residential areas should be the minimisation of noise . It is insufficient to concentrate merely on "detriment sharing, " as in the current plan. Further, detailed research is urgently needed into how *every available* "over-the-water" mode can be used to promote the true *maximisation of jet aircraft movements* over water [# 384] [See S. 2.1 (iii), above].

It is time a maximum permissible noise level at ground level is regulated beyond some critical distance (eg. 3 nautical miles) from take-off roll [S. 8.1] . Such legislation must provide no more than a 45 LA_{Eq} [17 hrs] outside this range, and should be enforced with strict monetary penalties. If this is the practice at Boston Logan and Washington National (opposite the White House) in the USA then it should be possible at KSA [See S. 8.2.3 below].

SACF Inc therefore recommends that the Federal Government implement Ground Level Noise Impact Regulations for flight paths under the Airservices Act 1995 stipulating maximum permissible "normally acceptable" noise levels above which communities cannot be exposed . This will entail Airservices Australia undertaking some innovative flight path research to ensure that all aircraft comply with the noise rules or be banned from Sydney Airport.

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380 National Acoustic Laboratories Report No. 88, Hede J. & Bullen R. (1982).

381 Acoustics - Aircraft noise Intrusion- Building siting and construction, AS2021-2000, Fig. A1.

382 See Second Sydney Airport EIS , PPK .

383 PPK DRAFT EIS Second Sydney Airport S. 11.3.2; Supplementary EIS Chapt. 8.3.3

384 LTOP Terms of Reference Item No. 3, LTOPSR p. 10 .

If the Federal Government does not have the courage to proceed with such reform, then it should relax its prerogative over existing State land-use laws affecting aircraft noise and pollution impacts and permit the States to apply their industrial noise policy guidelines to aircraft noise. State Governments can then fine the airlines, Airservices Australia and the airports for breaches of acceptable conditions.

As a guide, the Australian Standard AS 2021-2000 [# 385] 's recommendation for an instantaneous level of not more than 50 dB(A) in the relaxation and sleeping areas of residential buildings should be regarded as an absolute maximum tolerable level in homes . This is because, as shown above, in comparison to many overseas studies, these recommended indoor design levels may be considered almost "too liberally disposed towards unfettered airport development".

The 1974 US EPA[#386] recommendation of a DNL [L_{dn}] of 55 [ANEF = 15] in residential areas should be seriously considered as a maximum permissible for *"land use planning purposes"*. The January 2000 NSW EPA [# 387] "Noise Policy Guidelines" recommend a daytime L_{eq} (15min [# 388]) of no more than 50 [night-time 45] as being acceptable for residences in suburban areas exposed to industrial noise. It is submitted that one of these properly considered criteria be made applicable to Aircraft Noise impacts in the same way that they apply to noise emissions from industrial areas in the neighbourhood of residential homes.

There are grave dangers in accepting the N70 as the primary means of "communicating " community noise as proposed in the recent DOTARs discussion paper [# 389] because, in itself, it provides no means of implementing a regime of community noise regulation based on objective standards for noise impacts on community health.

Recommendation 8.11: SACF Inc recommends that the Federal Government enact Ground Level Noise Impact Regulations for flight paths under the Airservices Act 1995 stipulating maximum permissible "normally acceptable" noise levels which the community should be expected to bear; or alternatively it should relinquish the existing Commonwealth prerogative over existing State land-use laws in respect of aircraft noise and pollution impacts and allow the relevant State Environment Protection Authorities to apply their existing industrial noise policy guidelines to aircraft noise over residents.

Recommendation 8.12: In addition to noise limits which provide realistic protection of the urban residential environment, the Government should enact world's best practice enforceable penalties for breaches of quantifiable noise offences, such as those in place at Boston Logan and Washington National airports in the USA.

Recommendation 8.13: Any move to implement the N70 as the primary means of communicating noise information to the public should be resisted because it is inherently misleading and does not provide any means of implementing a regime of community noise regulation based on objective standards for noise impacts on community health. If the "N{dB(A)}" format is to be adopted for more detailed reporting, then the reports should include the full spectrum of recorded levels [eg. 65 - 100 dB(A)] in 5dB(A) steps as superimposed areal contours, so that concerned residents can fully appreciated the extent to which they are, or are likely to be, noise exposed.

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385 *"Acoustics - Aircraft noise intrusion - Building Siting and Construction"* - AS2021 - 2000

386 "Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety" March 1974, US EPA Office of Noise Abatement and Control US GPO Doc 550/9 - 74-004 [See on-line Library at http:\\www.nonoise.org]

387 NSW EPA Document "Industrial Noise Policy" - ISBN 0 7313 2715 2 ' EPA 00/1

388 Given a constant rate of repetition of the noise event, there is no difference between an L_{eq} (15minute) , (60 minute) or (17hr) result.

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

8.2. TOWARDS NOISE MINIMISATION :

8.2.1. NOISE-MINIMISATION BY CONTROL OF AIRCRAFT FLIGHT PATHS:

The perceived noise intensity resulting from any source depends on the distance of the hearer from the source according to the well-known "inverse square law". This means that for every doubling of the distance from the source the intensity reduces to a quarter of what it was before.

The simplest way to minimise aircraft noise on the ground is therefore to fly the planes as high as possible. During takeoff and landing, however, aircraft must approach close to ground level to access the airport runway.

During landing, both noise and pollution will be minimised if the aircraft can glide in relatively steeply, avoiding the need to power its engines, until a little reverse thrust may be required to bring it to a halt after touchdown. However, many overseas airports prohibit reverse thrust during landing to enhance noise abatement, although this practice is frowned upon by ICAO [#390] .

During the takeoff of jet aircraft it is well recognised that the greater the altitude of the aircraft, the less noise is experienced immediately below the aircraft at points under the flight path which are relatively distant from the runway takeoff threshold [#391] .

8.2.2 NOISE ABATEMENT PROCEDURES:

A number of noise abatement departure procedures (NADPs) have been developed over time, mainly by the International Civil Aviation Organisation [ICAO] and the US Federal Aviation Administration (FAA).

8.2.2.1 <u>ICAO - Procedures</u>: The International Civil Aviation Organisation [ICAO] has developed the "Noise Abatement Departure Protocols", commonly known as "ICAO -A " and "ICAO-B". The ICAO-A & -B procedures require a minimum climb out rate without turns before minimum altitudes of 1500 and 1000 ft , respectively.

The procedures were developed by ICAO to maximise safety requirements for jet aircraft departure, while minimising exposure of the relevant class [near (ICAO - B) or far (ICAO-A)] of residents to the resultant noise[#392] .

Where there is a need for noise abatement procedures , the operating principle is that preferred runway directions should be nominated for takeoff and landing[#393] , having regard to the need for noise abatement over airport adjacent residents[#394] . The objective is to use wherever possible those runways that permit aeroplanes to avoid noise sensitive areas during the initial departure and final approach phases of flight.

Then depending on the location of the most noise sensitive area [ie, whether close to or distant from runway departure threshold], air-traffic control should determine whether the ICAO-B or -A procedure, respectively should be adopted.

ICAO-A was designed for operation where it is primarily required to protect noise-sensitive areas in the latter part of the departure procedures, whereas ICAO-B would be selected where the most noise sensitive regions are closest to the airport. The ICAO specifies that in unusual circumstances where neither of the two take-off climb procedures is appropriate, "a special procedure" meeting certain limitations should be developed[#395] . Table 8.2.2 lists the critical safe climb requirements for aircraft using the ICAO-A and -B procedures:

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390 ICAO PANS-OPS Doc 8168 Vol. 1(1/11/01) , Part V Chapt. 3.5

391 ICAO A cf. B in ICAO PANS-OPS Doc. 8168, Vol. 1 Part V .

392 ICAO PANS-OPS Doc. 8168, Vol. 1 Part V Chapt 2.

393 ICAO PANS-OPS Doc. 8168, Vol. 1 Part V Chapt 1.2.

394 ICAO PANS-OPS Doc. 8168, Vol. 1 Part V Chapt 2.1.

395 ICAO PANS-OPS Doc. 8168, Vol. 1 Part V, Chapt. 3.1.1.

TABLE 8.2.2 CRITICAL SAFE CLIMBOUT REQUIREMENTS FOR AIRCRAFT ICAO PROCEDURES.

ICAO - "A"	**Min Climbout Altitude (ft) /Range**	**Flight Conditions**	**Velocity Range [kt]**
	1,500	Take-off power; take-off flap	V_2 +(10-20) or body angle limit
	1500-3000 ft	Reduce thrust to not less than "climb power/thrust"	V_2 + (10-20)
	>= 3000ft	Accelerate smoothly	To en-route climb speed
ICAO -"B"	1,000	Take-off power/thrust & flap	V_2 + (10-20)
	at 1000 ft	Accelerate to "zero flap" minimum safe manoeuvring speed V_{ZF} , Maintain positive rate of climb	
	1000 -3000 ft	Climb at not more than V_{ZF} + 10 kt	
	> 3000 ft	Accelerate smoothly	to en-route climb speed

ICAO procedures "A" or "B" , or improvements and modifications thereof, have been adopted by many airports around the world. [See S. 8.2.3; Appendix L].

8.2.2.2 FAA Procedures - AC 91-53A: FAA Advisory Circular AC91-53A provides two alternative noise abatement departure profiles or NADPs. These were developed independently by the US Federal Aviation Administration which regulates flight path procedures in the United States. There are two published so-called NADP's or "Noise Abatement Departure Profiles", namely the "Close-in Community Profile" and the "Distant Community Profile".

Both profiles mandate thrust reductions at *no less than 800 feet*. The only discernible difference between the protocols is that in the "close-in" profile initial thrust cutback is initiated before flap or slats retraction, whereas in the "distant" profile initial thrust cutback is initiated after flap or slats retraction has taken place.

The FAA claims these profiles significantly benefit residents under flight paths in the two area categories, although to the amateur they may appear indistinguishable. Following flap retraction and thrust reduction in both cases the profiles mandate a thrust setting enabling a slow altitude gain to 3000 ft and thereafter to an "enroute climb configuration".

8.2.2.3 Specific Aircraft Manufacturer Noise Abatement Procedures:
These are doubtless numerous, but access has been provided to instructions for the Boeing 747 (-100, -200 & -SP) [#396] which shows that a minimum initial climb to 1000 ft is recommended at V_2 + 10k climbing at 15 degrees to the horizontal. Beyond 1000 ft the pitch angle is reduced and flaps are retracted with acceleration to V_2 + 80 k at from 500 -1000 ft/ minute, until 3000 foot is reached, after which the plane should *accelerate to cruising altitude* at 250 knots (ie 470 km /hr).

8.2.2.4 New ICAO [post-1/11/2001] Procedures (Replacing ICAO-A & -B): Two new "Noise Abatement Departure Procedures" [NADPs] have been published by ICAO replacing the former ICAO-A & -B [#397] . Both require that noise abatement procedures should not be initiated at less than 800 feet. The first (NADP 1) is designed to facilitate noise reduction for noise sensitive areas close to the airport, while NADP 2 (cf. ICAO-A) is designed for noise reduction in areas more distant from the airport. The procedures are intended to be developed *"by the operator for each aeroplane type and agreed to by the State of the Operator"* [#398] :

396 Zegoran, M. (2000) Boeing 747-100/SP/200B Procedures
397 ICAO PANS-OPS Doc. 8168 Vol. 1(1/11/2001) "Aircraft Operations - Flight Procedures" ; Part V Chapt 3 Appendix

(a) *ICAO NADP 1* : This requires a power reduction "*at or above*" a "*prescribed minimum altitude*" [not below 800 ft] , and delay of flap/slat retraction until a prescribed maximum altitude (3000 ft) has been attained at V_2 + (10-20) kt, whereupon flaps are retracted and normal climb speed is resumed. In Australia this corresponds to the Australian AIP ENR 1.5 Para 11.1.7 procedure, where the initial "minimum" altitude is stated to be 1000 feet. This is not mandated for Sydney Airport [# 399] .

(b) *ICAO NADP 2*: This requires power reduction and retraction of flaps/slats at the "minimum prescribed altitude" [eg. min. 800 ft] , with an initial climb speed of V_2 + (10 - 20) kt. The aircraft body angle is decreased at the minimum altitude, with a positive rate of climb maintained at V_{zf} + (10-20) kt. Above 3000 ft (the "maximum prescribed altitude") the aircraft should be transitioned to normal en-route climb. In Australia this corresponds to the AIP ENR 1.5 Para 11.1.6 procedure where the initial "minimum" altitude is stated to be 1500 feet. This was formerly equivalent to ICAO-A and is mandated by DAP-East for KSA. Its observance, however, is mainly breached because of the numerous conflicting SIDs at KSA.

8.2.2.5 ICAO Approach Procedures: ICAO prohibits noise abatement approach procedures which require an aircraft to be in other than *"final landing configuration"* closer than the "outer marker" or 5n. mi , whichever is earlier[#400] . It also prohibits a restriction on the use of reverse thrust [Ch. 3.5] , and states that "excessive rates of descent shall not be required" [Ch. 3.4.1 (b)] . The standard (which is based on equipment available in 1982) also requires that glide path approach angles shall not be "above the glide path angle" [Ch.. 3.4.2(a)(1 - 3)], and not be greater than 3 degrees (3^o) except where the glide path has been *"operationally set"* at greater than this angle [Ch. 3.4.2 (a) (4)]. However, the Standard does remark that "new procedures will need to be developed as and when the introduction of new systems and equipment makes possible the use of significantly different approach techniques" [Ch. 3.4.2 Note 1] .

However, the use of "continuous descent and reduced power/drag techniques (CDA) "are stated to be "effective and operationally acceptable". The objective of such procedures is said to achieve uninterrupted descents at reduced power and with reduced drag through delayed extension of wing flaps and landing gear until the final stages of approach. This results in higher descent speeds, but has been demonstrated to reduce maximum noise on the ground from between 3 and 6 dB(A) [See discussion of PRM in S. 7].

8.2.3 NOISE ABATEMENT PRACTICES AT OTHER AIRPORTS[# 401]

8.2.3.1 Introduction:

This section attempts to answer the questions: (a) *"What noise abatement procedures and/or regulations are in place at similar airports around the world?"* and (b) *"Can it be determined from these practices which is, or perhaps, what approaches can be taken , that may be considered 'World Best' "* . The detailed background to this section, with supporting Tables is included in Appendix L.

This review surveys published airport noise abatement procedures, curfews and noise policies for 59 well-established airports in the "developed" world. Much source data on "Noise Abatement Regulations" is conveniently collected together in one place by aircraft manufacturer Boeing[#402].

The survey shows that airports may be divided into approximately geographical groupings based on whether flight path altitude and "attitude", or "noise impact control" is employed primarily for the purpose of noise abatement. In some cases a combination of control elements is in use (ie. Noise Abatement Flight Paths & noise level control - with or without penalties). In others, penalties are invoked for breaches of either flight path conformity, or for exceeding regulation noise impacts either case by case, or by way of generalised noise taxes and surcharges.

While some penalties are significant [ie. $25000 at KSA for failure to follow set allocated flight tracks; $5000 at Washington National for breach of a 72 max dB(A) departure noise level], others are merely nominal. Typical surcharges are expressed either "per tonne" or "per aircraft type" and are applied mainly at European & British

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398 ICAO PANS-OPS Doc 8168 Vol. 1 (1/11/01) Part V Chapt. 3.3 .

399 See AIP DAP -East.

400 ICAO PANS-OPS Doc 8168 Vol. 1 (1/11/01) Part V Chapt. 3.4.1. ICAO PANS-OPS Doc 8168 Vol. 1 (1/11/01) Part V Chapts. 3.4 -3.6

401 Research by P.S. Lingard.

402 See http://www.boeing.com/commercial/noise

airports. In addition to a surcharge at French airports [eg. Le Bourget, Paris, & Marseille] fines of up to FF80,000 per airline and FF10,000 per pilot may additionally be imposed for breaches of noise procedures.

8.2.3.2 Summary:

It is difficult indeed for the common man to understand the meaning of much of the airport environment jargon he is presented with. Nowadays , in Management and Quality Assurance Circles much emphasis is placed on the concept of *"world's best practice"*. First we consider the range of noise metric systems employed by the surveyed airports, asking ourselves which system provides the greater protection for the human environment. Then we consider what approaches, from a human environment perspective, represent present worlds best practice:

8.2.3.2.1 Airport Noise Metrics:

The most straight forward metric, and the most easily understood by communities used to the sound of machine tools and such like is the maximum noise level experienced in decibels on the "A-" weighted scale.

TABLE 8.1.4 (Section 8.1.4 above) translates a commonly experienced situation of a repeated sequence of half minute aircraft impacts, each of a 70 dB(A) maximum level, into the parameters L_{dn}, L_{eq}, L_{max}, and ANEF.

The use of broadly averaged indices such as the DNL [= L_{dn}] , and the ANEF is difficult for the man-in-the-street to comprehend, and mostly will not reflect his annoyance and disturbance level with aircraft noise events. This is because the quoted decibel "levels" appear to underestimate the level he is experiencing. For this reason, the ANEF as currently at Australian Airports was criticised in submissions to the Senate Select Committee Enquiry into the failure of Sydney's Third Runway EIS [# 403].

Among the airports cited, "Defined maximum limit" airports, such as Boston Logan , Washington National and Munich, where strictures of between 74 & 85 dB(A) maximum levels are applied for noise penalties, appear to provide the best immediate protection for residents on the ground below.

In Washington DC this is coupled with a suitably large penalty ($5000) for exceedances, and the provision of suitable noise monitoring equipment, which coupled with the adoption of a sensible residential curfew [10:00 pm to 8:00 am] and an ICAO-A 1500 ft mandated initial climbout along the Potomac River, ensures that the city is optimally protected from undesirable aircraft noise. Moreover, the large international jets are forbidden access to this airport.

Boston Logan claims to achieve a similar result by trying to ensure that certain noise impact levels are not exceeded beyond a specified boundary. This implies, as argued in the SACF Inc submission on the need for legislative protection from the noise of overflying aircraft [S. 8.2.1, above [# 404]] , that departing aircraft ***must*** follow a flight track trajectory suitably configured for this outcome by ensuring that aircraft altitudes are sufficiently elevated that noise levels on the ground are appropriately low.

Munich has no noise penalty as such, but imposes a surcharge, based on aircraft type, which in turn depends on the monitored noise levels for those aircraft. At Munich, noise levels are monitored at numerous locations around the airport, in units of dB(A), and it is these levels which the city uses to calculate the impacts of given aircraft for the purposes of its Noise Surcharge.

Airports adopting a criterion based only on the noise certification level for each aircraft type such as PNdB or EPNdB in our view merely pay lip-service to the cause of noise abatement. They could avoid this by enforcing adherence to a properly designed flight path system which assures a minimum level of actual noise exposure on the ground.

8.2.3.2.2 What is World's Best Practice?

Reading the previews of the so-called environmental "Master Plan" which Sydney Airport Corporation Ltd [SACL] must present to the Minister for Transport by 31 December 2003, one could be forgiven for thinking that this corporation believes it has already reached the status of "World's Best Practice". If that is so, then the question to be asked must be *"by whose standards?"* . It is submitted that an airport corporation which puts itself forward as

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403 The Parer Report, *"Falling on Deaf Ears"* July 1995, AGPS.

404 The Way Forward from Sydney's Airports Quagmire, SACF Inc, July 1999.

providing *"worlds best practice"* without either justification or adjudication, cannot be taken seriously . Merely chanting the refrain, *"we are a worlds best practice airport"* does not make it one.

But what is "world's best practice" for the environmental management of the human environment of an airport which is as close to heavily settled residential areas and as near to the ocean as KSA?

When Sydney Airport was preparing its so-called *"Environment Strategy"* in 1998-9, it employed ***"The Schiphol Group"*** , a subsidiary of Amsterdam Airport at Schiphol, to advise it as to what was required to achieve "World's Best Practice" in environmental management. The report responded in the following terms [#405] :

> ***"Achieving this will require a very progressive and sometimes nearly aggressive approach to environmental issues. Very active and in some cases even not shying from taking the lead to further develop "the world best practices" in environmental management. "***
>
> ***"Among others this would require at least a formal commitment as an airport to act as a <u>good neighbour</u> and to undertake every reasonable and practicable action to prevent or minimise affecting the environmental quality in populated areas near the airport. This is not yet clearly stated as an important aim. ....."***
>
> ***"An integrated approach and a total-airport environmental management are essential to achieve "worlds best practices" and the "best environment management". However, the impression is that <u>due to existing legislation</u>, a really integrated approach and a total environment management addressing all issues in a coherent way cannot be achieved at this moment. "***
>
> ***"For instance the environmental impact of aircraft operations outside the airport boundaries (like noise, air pollution, third party safety risks etc.) cannot be addressed in this proposed Environment Strategy. Still, experience at almost all major airports shows that it is outside the airport boundaries where the biggest environmental problems lie and will need to be solved or controlled. These must be addressed in a coherent way together with the "inner-airport" environment issues if good neighbourhood and support is to be continued in the future. "***
>
> ***"Therefore either <u>changing this restrictive legislation should be set as an additional prime target and an essential condition</u> to achieve the ambitious goal of becoming "the best"....."***

The Schiphol Benchmark went on to say:

> ***"The draft Environment Strategy reveals a rather formal approach, which seems to aim mainly at complying with formal obligations by establishing systems and procedures, and gathering relevant information and far less at achieving specific results. " and***
>
> ***"..... This is, ... illustrated [by] the prime objectives of Sydney Airport's environmental strategy [being] <u>are</u> not to prevent or minimise pollution or noise, but to <u>establish systems to manage this</u>. In practice such management systems should be just essential tools to achieve the environmental targets. Such environmental targets should be specified and where possible quantified. "***

and , later:

> ***"Yet some <u>aspects of the environment outside the airport boundaries</u>, which may be far more important for the environmental quality for the neighbouring population, <u>are not well addressed</u>. It is not unlikely that surrounding communities would be interested in the future prospects and possible effects in their neighbourhood of subjects like:***
>
> - ***- operational aircraft noise***
> - ***- air pollution due to aircraft***
> - ***- external safety risks for third parties***
> - ***- airport related odours and smells***
> - ***- land use planning and zoning***
> - ***- airport related ground traffic (density, congestion, pollution etc.)***
> - ***- recycling/ re-use of materials***
> - ***- recognition and compensation of environmental damage***
> - ***- handling of complaints***
>
> ***'These subjects would need to be addressed equally well if one aims at becoming the airport with "the worlds best environment management system"***

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[405] Sydney Airport *"Environment Strategy"* , Nov. 1999, Appendix "D" *"Amsterdam Airport Schiphol Benchmarking Study"*.

This illustrates one approach to airport environmental management which is radically different from that permitted by the legislation governing airports in Australia. Schiphol earns an estimated 2% of Dutch GDP yet this is an airport which is voluntarily restricting growth for the sake of the surrounding community[#406].

The Five Essential Paradigms :

It is submitted that there are five essential paradigms for world's best practice at City-based ocean-threshold airports such as Sydney (Kingsford Smith) :

1. ***The noise impact over residential areas must actually be minimised;***

2. ***The noise impact which must unavoidably occur* over residents, after *all efforts* have been made *to put it elsewhere , should be fairly and equitably shared.***

   Noise sharing should NOT BE for its own sake. ie as in to masochistically share a detriment;

3. ***Pollution impacts over heavily populated residential areas should also be minimised. This means (a) flying the aircraft over water wherever possible, and (b) flying them as high as possible as soon as possible after take off to get above the "mixing layer" , and also minimising engine use by aircraft during descent;***

4. ***Whenever possible, aircraft movements should be over water, and more especially take-offs, because these are both the most polluting and they produce the greatest noise.***

5. ***There must be a respectable "noise critical altitude" specified over residential areas below which jet aircraft may not fly.***

Because of the variety of international noise abatement practices observed, and the absence of a suitable internationally recognised standard, this Review will focus instead on those perceived to be offering "better practices" by reference to objective standards, rather than presume that any is offering "best" practice, per se. Keeping in mind the four paradigms, we therefore ask which airports could be said to be in the "world's better practice" league?

Maximum Direct Impact Parameter Control:

Those airports which are controlling and penalising noise using a maximum direct impact parameter [ie dB(A), or dB(D) max] have in this view approached a better practice situation through paradigm (1), provided the noise level is set at a reasonable level from the listeners standpoint. Of the foreign airports surveyed in Appendix L , candidates achieving this would appear to include Boston Logan, Munich and Washington National.

Steepest Possible Take-off Paths and Noise Critical Altitude: :

Also those which practice steeper take-off paths over residential areas so to reach inaudible altitude levels as quickly as possible must also come close to being in the "better practice" league, for paradigms (1) and (2). So must airports which enforce an altitude limit below which residential overflying is prohibited [noise critical altitude]. Among such airports are Oslo, Auckland, Athens and Brussels, and to a lesser extent Lapeeranta, and Helsinki [Appendix L Table L.4.1].

Schiphol Amsterdam (referred to above) is one of the airports adopting a minimum ICAO-"A" class 1500 ft initial climbout at takeoff power, followed by "climb power" to 3000 ft and thereafter at a maximum 250 kt air speed to 10000ft. Its procedures also state that:

> ***"..... standard instrument departure routes avoid residential areas as much as possible and must be considered minimum noise routes."***

"Noise Critical Altitude" is that altitude above which an aircraft flying overhead can be considered either inaudible, or of no significant nuisance value, to persons on the ground.

The Noise Abatement Regulations for Norway's Oslo [Gardermoen] airport define a "noise critical altitude" above which aircraft noise may be ignored for most purposes on the ground. This is an important starting point. At Oslo, the

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406 Echikson, W. (1997) "An Airport may get its wings clipped", Business Week, Sept. 29, p. 4.

noise critical altitude for jet aircraft with noise certification in excess of 88 EPNdB at departure is 5000 ft. While for jet aircraft with lower noise certification levels, the noise critical altitude is 4000 ft.

The Oslo regulation states that above the noise critical altitude the planned departure route (SID) may be deviated from, but not otherwise. It also states that when air traffic capacity allows, a noise critical altitude of 5000 ft AMSL shall be applied to all jet aircraft operations. At night the noise critical altitude is 7000 ft for all jet operations. This appears to be the most enlightened discussion of aircraft noise impacts in relation to the influence of altitude among the 59 airports studied.

Within Australia, Canberra, Melbourne and Brisbane each have better noise abatement climb procedures than those found at Sydney Kingsford Smith Airport, and they all have minimum noise critical altitudes for residential areas which put Sydney Airport to shame.

In Australia, Canberra (the seat of Federal Government) excels with a noise critical altitude for jets over the city of 7000 ft. , while overseas Auckland (NZ) at 5000 ft, and Oslo-Gardermoen at 4000-5000 ft (7000 ft at night) excel. Finnish Airports with a specified overflight altitude of 2000 ft are as bad as Sydney now.

The actual minimum overflight altitude for Sydney is the CASA "Safety Standard" of 1000ft! It is clear that both in terms of principle and operation Sydney has a long way to go to reach "world's (- or even Australia's) best practice standard." Perhaps a little research of practices at overseas airports might have produced an improved environmental approach to LTOP from the outset.

Averaging Noise Metrics & Standard Surcharges:

Those using Noise Metrics which ***average*** impact [eg. ANEF] so as to make it appear that an individual aircraft's impact (however loud) does not matter, must be considered to be substandard in terms of paradigm (1). The use of standard "surcharges" - ostensibly contributing to noise insulation programmes - but often used for "forced draft urban relocation" programs [ie Minneapolis -St. Paul and (formerly) Sydney], can only really benefit a local policy purpose of inhibiting the use of the noisiest airplanes. This has occurred for the ICAO Annex 16 Ch. 2 type plane in Europe, and some places in the USA. But by the time sufficiently large areas have received noise insulation, or the offending aircraft type has disappeared, horrendous social damage can been done.

Penalties may be useful, if they enforced a pattern of adherence to strict noise guidelines, as with Washington National or Boston Logan, but not if they are mainly honoured in the breach, or if the penalty is so merely nominal that it must be on the books for cosmetic reasons [ie . Newark NJ, See Appendix L, Table L.5] .

8.2.4 SPECIAL FLIGHT PATH NOISE ABATEMENT PROCEDURES:

According to ICAO Rules [#407] Airport Traffic Control is at liberty to develop individual noise abatement procedures not inconsistent with the safety standards of ICAO- NADP 1 or 2 . In developing special procedures the minimum specified steady climb out speed should not be less than V_2 + 10 kt [or that prescribed for aircraft operation if greater than V_2 + 10kt] . The maximum acceptable "Body Angle" shall not be exceeded.

ICAO previously stated that power reductions shall not be required below 1000 ft[#408] , and that a standard power setting should be used to enable a steady climb gradient of 4% at a speed of at least V_2 + 10. Also, the takeoff path must ensure clearance of all obstacles by an adequate margin, and before reaching any noise sensitive area the aircraft should climb at maximum gradient consistent with the maintenance of at least V_2 + 10 knots or the minimum "body-angle limit" speed. The body angle limit speed depends on the centre of gravity of the aircraft, the fuel load and the aircraft's bank limit .

The above altitude limit for power reduction has now been reduced to 800 feet [#409], presumably for consistency with the US FAA AC91-53A advisory (S. 8.2.2.2 above), although Airservices AIP DAP East NADP for Sydney Airport remains at 1500 /3000 ft [# 410]. Thus it appears that Airservices Australia at Sydney , if freed from extraneous interference, might adopt more people friendly environmental flying practices.

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407 ICAO PANS-OPS Doc 8168, Vol. 1 (1/11/01) Part V Chapt.. 3.3.
408 ICAO PANS-OPS Doc 8168, Vol. 1 (11/11/93) Part V Chapt. 3.1.2.3
409 ICAO PANS-OPS Doc 8168, Vol. 1 (1/11/01) Part V Chapt. 3.2.3
410 AIP ENR 1.5 11.1.6

One example of a beneficial "Special" Noise Abatement Flight Path is the former "Quiet Two" procedure used at San Francisco Airport for departures over heavily populated residential city areas to the north of the airport.

At San Francisco (SFO), the airport is located close to the sea and city, on the south west bay arm of the San Francisco Caldera. Northerly departures take-off over heavily populated residential areas, and the minimum prescribed turn altitude used to be 6000 ft. However, in line with many formerly community-centred US airports - [eg. Raleigh & Indianapolis] SFO has since reduced this to comply with ICAO- and FAA AC91-53A. At SFO the terrain rises above 1000 ft beyond 3.5 n. mi [5 km] to the north west and a minimum climb of 425 ft per n. mi is now required to at least 1500 feet [# 411].

As mentioned earlier [S. 4.5, above] the problem with the LTOP formulations of Air Traffic Control at Sydney Airport is that no importance was attached to noise minimisation. This is despite the "LTOP Reports" and DOTARS Proponent Statement requiring adoption of ICAO-A or -B protocols in the development of LTOP, and the August 1998 Ministerial Directive requiring ICAO-A adoption for all takeoffs over residents (S. 4.5) .

The example of Oslo [cited above] of a deemed " noise critical altitude" for jet aircraft of 5000 ft at daytime and 7000 ft at night, coupled with the requirement for an initial climb out to 3700 feet, appears among the most enlightened of the noise abatement flight track controls being applied oversees. Other airports preferring initial *"high climbout"* procedures are Bristol (3000 ft), Athens (3000 ft), Brussels (1700), Liege (2100), Calgary (6500), Helsinki (2000), Chicago (O'Hare) (3000), Indianapolis (2500), Seattle SeaTac (3000,4000), Nagoya, and Osaka ("steepest climb"). Even within Australia, Canberra, Cairns, Melbourne and Brisbane have more enlightened procedures than Sydney.

If the Sydney branch of Airservices Australia applied its collective mind one might reasonably hope for some improvement over the present hotch-potch of low-altitude turning SID turns for overland departures from KSA.

Recommendation 8.14: That Airservices Australia be instructed to revise its arrival and departure SIDs to ensure that in addition to "noise sharing", noise will also be minimised over residential areas, where this is compatible with safe flying procedure. Some overseas airports, using better practices than at KSA, employ much steeper initial departure profiles than recommended by ICAO, and some even apply a high altitude minimum for residential areas.

Recommendation 8.15: That the use of the ICAO-A /NADP 2/AIP ENR 1.5 para 11.1.6 noise abatement procedure should be mandated and, if possible procedures better than these should be custom developed by Airservices Australia if KSA is to become "human-environment friendly" and remain Australia' premier international gateway .

Recommendation 8.16: A high non-emergency "noise critical altitude" should be defined for Sydney, and noise penalties introduced for exceeding specified maximum sound level limits. SACF Inc recommends 70 dB(A) beyond 3 km from take-off.

8.2.5 REMOVING THE DEPARTURE CEILING FOR TAKEOFFS OVER LAND:

The fact of the northerly departure ceiling was described above in the context of safety [Section 5.3.1], and was further considered because of its preventing a noise minimised implementation of LTOP Modes 8 and 9 as originally conceived [S. 6.2]. Its existence has also been formally acknowledged in correspondence from Mr. Ken McLean [# 412] .

While Mr. McLean denies publicly that there is any safety concern with the departure ceiling in northerly winds (S. 5.2.1) , there is little doubt that removing it would assist departing aircraft reach cruising altitude more rapidly over both the north west and eastern suburbs. This would facilitate a rational noise minimisation flight path regime for the whole of Sydney, which (as described S. 5.3.1) , is now drastically and unnecessarily affected by aircraft noise from low-flying jets circumnavigating the entire 60km diameter greater Sydney area prior to getting clearance to climb to cruising height.

Recommendation 8.17: That in northerly winds Airservices Australia be instructed to remove the departure ceiling across Sydney by directing all arrivals from north and west to track well clear of the departure tracks and at a lower altitude bringing them in to a point north of West Head and then tracking 5 nm off

411 See http://www.flysfo.com

412 Airservices Australia Manager Operations KSA - See Appendix M

shore southwards until in position for the final procedure turn for a Botany Bay approach to Sydney Airport as per the original LTOP Plan. Similarly, aircraft arriving from the south and south west should likewise be tracked well south of Bundeena, across the Royal National Park, prior to approach over Botany Bay and Wanda .

8.2.6 MAXIMISING ALTITUDE GAIN FOR ALL DEPARTURES:

Given that the optimum noise abatement condition for jet departures over residential areas includes maximising the initial climb rate [See S. 8.2.1 above] then at least ICAO-A equivalent [# 413] and, if feasible, better noise abatement climb procedures must be implemented as soon as possible. The turns inherent in the LTOP SIDs [See Table 4.5] are achieved at the expense of altitude gain essential for noise minimisation.

This proposal is not inconsistent with "noise sharing" , it is just that the resultant noise to be shared would be so much less and more consistent with Airservices environmental obligations under S. 9(2) of the Airservices Act (1995). Sharing the residual noise can still be implemented by the execution of appropriate turns at higher altitudes.

At takeoff a typical Boeing 747 is travelling at 180 knots [300 km / hr] or 300 km /hr. This is the take-off roll velocity V_2 in Table 8.2.2 above and equivalent to a ground speed of 5 km / minute. It is travelling at between 15 and 20 degrees to horizontal. This corresponds to a climb rate of around 30% or 300 m [1000 ft] per km. At 5 km per minute without change of angle of attack the altitude gained should thus be around 5000 feet at 5 km, provided the initial climb rate is sustained.

At 300 km /hour a maximum climb gradient of around 1000 ft per km can be achieved, meaning that, at the very least, a possible altitude of 5000 feet could be achieved over Dulwich Hill [5km]. This is above the noise critical altitude set for many airports [See S. 8.2.3.2.2, above] .

These technical data confirm the observations of frequent travellers who have monitored the on-screen altimeters of 747's during departures over Botany Bay, when the altitude of 10,000 ft is frequently reached when offshore from Cronulla [ie 12.8 km, or 2.6 minutes from runway end].

Even if only 3000 ft were to be achieved consistently, and turns executed at this altitude, instead of the present low 500, 600 800 and 1500 ft turns , the ground noise experienced by underlying residents would be far less. A ground noise reduction of approximately 3.5 dB(A) per 1000 feet is to be expected for a 747 - 400 between around 1500 and 3000 feet *[See Appendix K. 7 - Flyover calculations]*.

Back-Draft Noise Considerations:

Some might assert that back-draft noise for residents south of the airport should be considered when contemplating steeper takeoffs [with consequently increased engine thrusts] over residents to the north.

Residents of the Dulwich Hill /Hursltone Park and South Ashfield area of the north west know historically [ie pre-LTOP] what it is like to be in the back-draft when Jet Aircraft are taking off over Botany Bay. In strong- moderate southerlies and certain weather conditions they have historically often experienced the resulting "sound of rolling thunder" from Bayside takeoffs. However, the noise levels from this are much lower than the noise presently experienced by residents north of the airport from low-flying departing jets which are also turning at low altitude.

<u>Recommendation 8.18</u>: That in northerly winds Airservices Australia be instructed to maximise the climb rate for all jet aircraft departing Sydney over residential areas in a manner consistent with safe operational requirements for each aircraft and so as to permit sufficient early optimal altitude gain, with possible later turns, for ground noise to be minimised over residential areas outside the airport boundaries.

8.2.7 NOISE-MINIMISATION APPROACH TRAJECTORIES FOR LANDING:

The Australian Airline Transport Association proposed in November 2000 that "Continuous Descent Approaches" [CDA] be adopted for overland arrivals into Kingsford Smith. CDA means that the aircraft descend under glide conditions from a higher altitude. At present this can be as low as 2000 feet above ground level over Hornsby Heights for arrivals from the north .

CDA allows the aircraft to descend under "clean" (power off, reduced drag) conditions, with engines idling, instead of at present where they are forced to frequently power up to maintain an approach altitude of 3000 ft for nearly

413 NADP 2/AIP ENR 1.5 para 11.1.6

20 km when arriving from the southwest in southerly winds. CDA means that the only power requirement for the aircraft to land safely may be some reverse thrust at touch down. This has been demonstrated recently in overseas trials to result in from 3 - 6 dB(A) noise reduction at points 10 - 30 miles from the airport on the ILS glide path .

Unfortunately the sitting Government Airport Forum [the Govt SACF] *rejected this proposal* in October 2000 and the proposal is now in limbo [#414]. Perhaps it was unfortunate that the proposal coincided with the PRM trial. Nevertheless, one might have thought that a forum so ostensibly dedicated to the implementation of better aircraft noise environment for Sydney KSA would have agreed to trial such a proposal at the first opportunity, but it has not.

Recommendation 8.19: That Airservices Australia be instructed to trial Continuous Descent Approach STARs for arriving aircraft over land and to compare the noise outcomes with pre-PRM conditions.

8.2.8 CONCLUSIONS :

1. Effective regulation of noise and pollution on the ground from over flying aircraft must be introduced under the Airservices Act (1995) Cth. Such a system should be compatible with State Government Noise and Pollution regulations applicable to industrial sites. Additionally, Commonwealth pre-emption of State rights over environmental and land-use regulation at Australian airports should be abolished.

2. The protective measures in Australian Standard AS 2021- 2000 must be prevented from dilution by transportation interests whose objectives do not coincide with the health and welfare interests of citizens subjected to aircraft noise. An absolute maximum noise level based on World Health Organisation recommendations (or New South Wales Government Policy applicable to noise from industrial sites) is recommended for all residential areas of the greater Sydney area.

3 A comparison of aircraft noise metrics used for regulatory purposes shows that neither the present ANEF (as presented) , nor the Department of Transport- proposed "N70" informative metric provides as effective protection for residential areas as that of the WHO recommended Leq and NSW Government recommended Leq (15) for a constant repetition of events comparable to continuous aircraft flyovers.

4. Noise minimisation techniques should be adopted by Sydney (Kingsford Smith) Airport which should include at least the following :

   - **Noise minimisation by control of aircraft flight paths where these must be overland;**
   - **The adoption of internationally best practice noise abatement departure and arrival procedures;**
   - **The removal of the present departure ceiling for jet takeoffs over land with implementation of a *"noise critical altitude"* for the greater Sydney residential region which is comparable to world's best practice (eg. 7000ft);**
   - **The maximisation of altitude gain for all jet aircraft departures;**
   - **The adoption of noise minimisation approach trajectories .**

[414] Minutes Government SACF 15/10/2000

9. COMPENSATION FOR SEVERELY AFFECTED RESIDENTS [#415]

Once an adequate SODPROPs formula is found it may be necessary to review the position of Kurnell residents.

It is glib to talk in terms of the greater good, but when only one thousand residents will increasingly be affected, compensation of a generous kind and offers of a Government buy out become imperative. It is not the purpose of this paper to specify the exact form of compensation and, at the very least the Constitutional Requirement for property acquisitions and compensation on "just terms" [s.51(xxxi) - Australian Constitution] must be adhered to, but the following could be considered:

1. Government to be generous buyer of last resort at a Sydney-wide average price;

2. A generous once only reimbursement for each property; and

3. Reimbursement for historical financial loss based on the period of residence.

<u>Recommendation 9.1</u>: The issue of what is appropriate compensation on "just terms" for loss of amenity due to aircraft impacts should be addressed by a Parliamentary Select Committee and an Airport Impacts (Residential) Compensation Bill should be enacted.

10. CONCLUSIONS OF THIS REVIEW:

10.1 THE INTENTION AND OUTCOMES OF LTOP:

The stated intention of the Long Term Operating Plan [LTOP] to maximise movements over water and non-residential areas, and to share the rest fairly is considered both laudable, and supportable in principle by reasonable people everywhere. However, in execution, it has become an operational disaster. Movements over Botany Bay are now fewer than ever before. Departure overflying ceilings, poor airspace design and crossovers with Military restricted zones have produced a preponderance of completely unnecessary low altitude flying by noisy departing jets all across the Sydney residential hinterland, north, north-west and east of the airport. This is because LTOP was flawed at the outset by its failure to include "Noise Minimisation" as a major objective.

10.2 SAFETY IMPLICATIONS OF LTOP:

There is now a significantly greater danger to non-ticketpayer life and property from crash risk when heavily-laden long- to- medium-haul, jets take off over residential areas. It is a matter of serious public concern that the safeguards promised from the beginning in the LTOP Proponents Statement, that there should be an *<u>independent review</u>* by the Civil Aviation Safety Authority (CASA) of the safety of all new LTOP flight paths, and that a "Safety Review Committee" should be established to monitor ongoing safety concerns, have never been implemented. Safety concerns described include the departure overflying ceiling, conflicts of missed approach paths with curving departure tracks from Runways 34 L & R; the maximisation of departures by fully-fuelled long-haul aircraft over residential areas ; the absence of a regulation safety crash area for takeoffs over residents from KSA; and the actual and potential airspace conflicts presented by the proposed expansion of Bankstown Airport and the possible construction of Sydney West Airport at Badgerys Creek.

10.3 REASONS FOR FAILURE OF LTOP:

The reasons for these failures appear to have their origin partly in the LTOP consultation process and partly in the failure by Airservices Australia to exhibit appropriate airspace design innovation. Both the introductory consultation process and the Government "Sydney Airport Community Forum" were gerrymandered from the beginning against representation from newly-affected areas. Likewise, the Implementation and Monitoring Committee [IMC], which liaises with Airservices Australia in supervising plan implementation was , at Ministerial direction , always unrepresentative of newly-affected areas. In short, the implementation of LTOP appears to have been, perhaps unwittingly, hi-jacked by IMC "community representatives" who, because of parochial blindspots, were unable to fight effectively for a fair deal for the Sydney Community as a whole.

A major consequence of such blindspots was the early elimination of the only viable SODPROPs Modes, ie. 2 & 3, which could have aided the primary goal of maximising movements over Botany Bay. As shown above, why this occurred has never been adequately explained .

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[415] Text below is taken from "The Way Forward No. 1" 1999.

10.4 IMPEDIMENTS PLACED ON AIRSERVICES AUSTRALIA:

It appears significant that, in the early *"consultation process"* , the maximum possible number of impediments were placed on Airservices Australia against maximising over-the-water modes including: The abolition of the downwind noise abatement rule [*LTOP Recommendation 3*]; The removal of Modes 2 and 3 from consideration as official "LTOP Modes"; The requirement for fixed runway end *"movement targets"* which artificially constrained the maximum Bayside operations to 55% of movements - a figure far below the real potential for over-the-water operations at KSA; The adoption of the mistaken assumption that over-the-water modes would adversely affect Cronulla and Sutherland, when proper Bayside flight path design could readily have overcome this problem.

10.5 FAILURE TO IMPLEMENT LTOP AS PROCLAIMED:

When notified by communities outside government forums, Airservices Australia has ignored suggested changes in many practical directions which would facilitate the fulfilment of the LTOP original goals. For example, the failure to implement the original LTOP offshore arrival flight path layout for Modes 7,8 and 9.

It is submitted that correct LTOP Mode implementation would immediately remove the departure ceiling due to departure overflying. This would avoid the present extensive noisy low departure flying over much of Sydney's residential hinterland. Also dismissed was the sensible and fair suggestion that "spreading" (mandated in the LTOP Reports) should be employed for noise sharing in the east, as well as in the north west, to replace the three concentrated flight corridors presently used. In regard to admitting such LTOP failures, when raised by communities without access to government forums, Airservices Australia has been evasive .

Similarly , the original LTOP goal of maximising movements over water was not addressed with the gravity it deserved. Meanwhile Airservices Australia fumbles with Mode 4 , a SODPROPs mode of very limited operational flexibility, when some elementary research would have suggested that, given the availability of modern radar monitoring systems, SODPROPs Modes 2 & 3 were much more viable.

10.6 PROBLEMS WITH NOISE REGULATION AND MANAGEMENT:

The legislative framework governing the environmental impact of noise and pollution from aircraft is examined and found wanting. The main problem is the lack of regulations under the Airservices Act (1995) quantifying the maximum permissible noise impact over residential areas. It is submitted that impact regulations should be enacted which have comparable effects to those of State Land Use Regulations applicable to noise and gaseous emissions from Industrial Areas in residential suburbs. The pre-emption by the Commonwealth of the application of State Land Use laws in relation to either Airport Operation, or Aircraft Flight Path impacts is a major problem causing a serious regulatory vacuum in this area.

Similarly the preclusion by legislation of any responsibility of the incumbent Airport Corporation for downstream [aircraft borne] noise and pollution effects eliminates the nexus of responsibility between the commercial imperative which drives the airport owners (to increase traffic flows), and the environmental consequences for its neighbours. This situation is completely unsatisfactory . All Sydney-based politicians, in conjunction with the Environment Minister , are requested to undertake a legislative drafting exercise, with the guidance from appropriate human health and welfare consultants, to oversee the implementation of environmental regulations under the Airservices Act which are compatible with existing State Land Use laws.

Although promised in the LTOP Reports and Proponents Statement, and mandated by the Minister for Transport in August 1998, no consistent attempt is being made to minimise noise impacts on the ground from aircraft over residential land through implementing internationally recognised Noise Abatement Department Procedures. Examples of far better practices at other airports include the imposition of "noise critical altitudes" for aircraft over residential areas (eg. Canberra -7000 ft) ; and the imposition of penalties for breach of critical noise thresholds (Eg. Washington DC).

10.7 PROBLEMS WITH SYDNEY AIRSPACE AND ITS REMEDY:

A detailed study of Sydney Airspace has led to several suggestions for improvements in airspace design to minimise noise impacts over Sydney's large residential hinterland. It is submitted that all north-westerly traffic presently routed via Richmond at low altitude, whether due to the existence of overflying, or the extensive Military PRD zones beyond, should instead be routed either west along the Katoomba track at high altitude, with a subsequent northerly turn beyond the Richmond Military Wedge; or alternatively tracked north by north-west of Richmond at comparably high altitude. In strong northerly winds when departures must take off over land, all the departure overflying ceilings should be removed by immediate implementation of the original LTOP offshore arrival tracks .

10.8 POTENTIAL OF OVER-THE-WATER MODES (SODPROPs):

It is shown that the fullest possible introduction of SODPROPs Modes 2 and 3, putting arrivals and departures simultaneously over Botany Bay in an independent simultaneous segregated opposite direction operation could amply cater for traffic flows , including peak periods , up to at least 80 movements per hour. It is also shown that these modes are potentially available in meteorological conditions from 73 to 94% of the time depending on the selected noise abatement downwind condition. It is proposed that for the maximum benefit to the whole of Sydney, a ten (10) knot downwind noise abatement rule be introduced, in the form currently practiced at Brisbane Airport.

An independently conducted detailed professional airspace study should be immediately launched to verify the predicted capabilities of SODPROPs forecast in this Review, and Airservices Australia should be instructed to fully implement any resulting proposals for the implementation of SODPROPs Modes 2 & 3 to the maximum safe operational extent.

10.9 OTHER SUGGESTED IMPROVEMENTS:

Other innovations suggested to make LTOP a more truly "fair -share" noise minimisation plan include:

(1) The use of noise dose metrics based on area population census figures for the quantitative administration of flight path direction without fear or favour;
(2) The use of flight track spreading for departures over the east;
(3) The use of a time-sequenced catherine-wheel pattern spreading of departures by radial, where takeoffs *are unavoidable* over residential suburbs, to ensure that no-one radial receives aircraft noise more than once per hour; and
(4) The Airline-suggested implementation of "Continuous Descent Approach " (CDA) for northerly arrivals ; together with the adoption of a steeper glide path descent profile [up from 3 to 4 degrees] for the northerly approach PRM ILS system to reduce noise impacts from arriving jets on the upper north shore.

[END]

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