SENATE STANDING COMMITTEE ON RURAL & REGIONAL AFFAIRS & TRANSPORT

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Inquiry into the Effectiveness of Airservices Australia's management of aircraft noise

CANBERRA, 10 JUNE 2010

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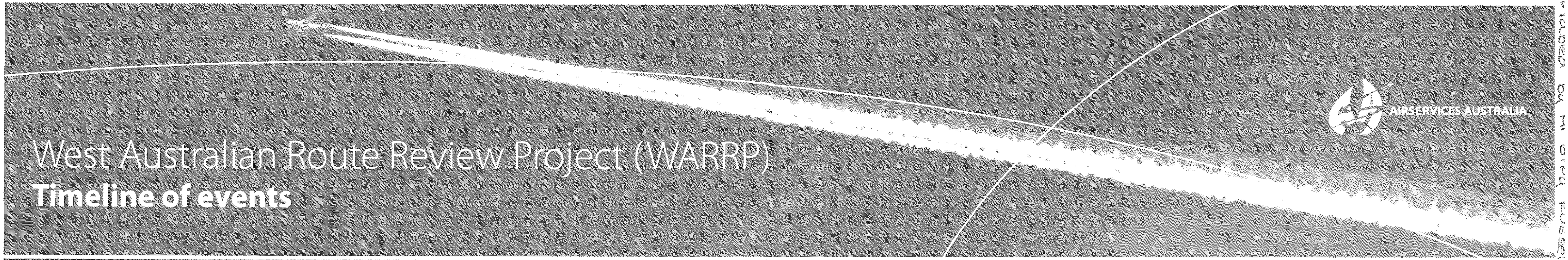


West Australian Route Review Project (WARRP)

Timeline of events

AIRSERVICES AUSTRALIA

2002

Perth Airport – total passengers: 5.122m
Perth Airport – total aircraft: 49,010

WHAT HAPPENED
Airservices departure and arrival review generates internal System Action Improvement Reports (items requiring corrective action by Airservices).

2003

Perth Airport – total passengers: 5.632
Perth Airport – total aircraft: 52,480

WHAT HAPPENED
June – Airservices reviews breakdowns of separation in WA.

July – CASA Audit 03-01 into Perth Airspace leads to six Requests for Corrective Action (regulatory requirement for Airservices to take action).

2004

Perth Airport – total passengers: 6.405m
Perth Airport – total aircraft: 54,876

WHAT HAPPENED
Airservices begins scoping the Perth Route Review Project (PRRP):

- **Stage 1:** Linking approach routes to Runway 03 instrument landing system (ILS)
- **Stage 2:** Changes to standard departure (SID) and approach (STAR) procedures.

2005

Perth Airport – total passengers: 6.899m
Perth Airport – total aircraft: 56,237

WHAT HAPPENED
Nov – PRRP Stage 2 begins.

2006

Perth Airport – total passengers: 7.569m
Perth Airport – total aircraft: 57,140

WHAT HAPPENED
April - CASA Audit 06-09 leads to three Observations and highlights changes to departure and approach procedures may be required.

July – Airservices expands PRRP into WARRP and begins two stage process:

- **Stage 1:** Terminal Operations Area route review (within 36nm/66 km of airport)
- **Stage 2:** Remote destinations route review (rest of WA).

CONSULTATION
July – Airservices emails all WARRP stakeholders to introduce project and invite to ANMCC presentation; Airservices WARRP website goes live; corporate meeting with Perth Airport.

Sept – WARRP route proposals 1 and 2 published on Airservices website – stakeholders advised via email.

Oct - Full presentation to ANMCC; presentation to City Of South Perth; route proposal 3 published on website.

Nov – Route 3A published, simulator trials commence, stakeholders advised by email.

Dec - Website update; stakeholders advised of delays to stage 1 as a result of simulator trials.

2007

Perth Airport – total passengers: 8.629m
Perth Airport – total aircraft: 62,476

WHAT HAPPENED
April – WARRP Stages 1 and 2 combined. Target implementation date: June 2008.

May – CASA audit 08-08 leads to four RCAs and six observations. Identifies need for better aircraft flow management and segregated departures. Changes incorporated into WARRP.

CONSULTATION
Feb - Airservices advises the project delayed from June 2007 to November 2007.

April - Website update; Airservices advises WARRP stages 1 & 2 will be combined and rescheduled for June 2008 due to complex modelling required.

May – ANMCC meeting about WARRP.

Oct - ANMCC meeting about WARRP.

Nov – ANMCC meeting about WARRP.

2008

Perth Airport – total passengers: 8.730m
Perth Airport – total aircraft: 73,210

WHAT HAPPENED
March – Airservices pre-implementation internal safety review identifies need for further changes. Project pushed back from June to November. CASA informed of delay to WARRP implementation.

19 November – Formal CASA approval of WARRP changes.

20 November – WARRP implementation.

CONSULTATION
Feb - ANMCC meeting about WARRP.

June – ANMCC meeting – Airservices did not attend.

Sept - Project update on website; new SID/STAR procedures and route data provided via email, ANMCC meeting – Airservices did not attend.

21 November – Media release issued "Largest air route restructure in 30 years implemented".

2009

Perth Airport – total passengers: 5.676m (as at July)
Perth Airport – total aircraft: 48,624 (as at July)

WHAT HAPPENED
Community concerns over flight path changes.

CONSULTATION
Ongoing liaison with ANMCC, Perth Airport and other stakeholders.

Meeting with Federal MPs.

Detailed presentation at ANMCC meeting in April.

Detailed community information posted on Airservices website.

KEY
- Perth Airport – total passengers
- Perth Airport – total aircraft

Source: Perth Airport

Regular communication with Perth Councils about WARRP since July 2006

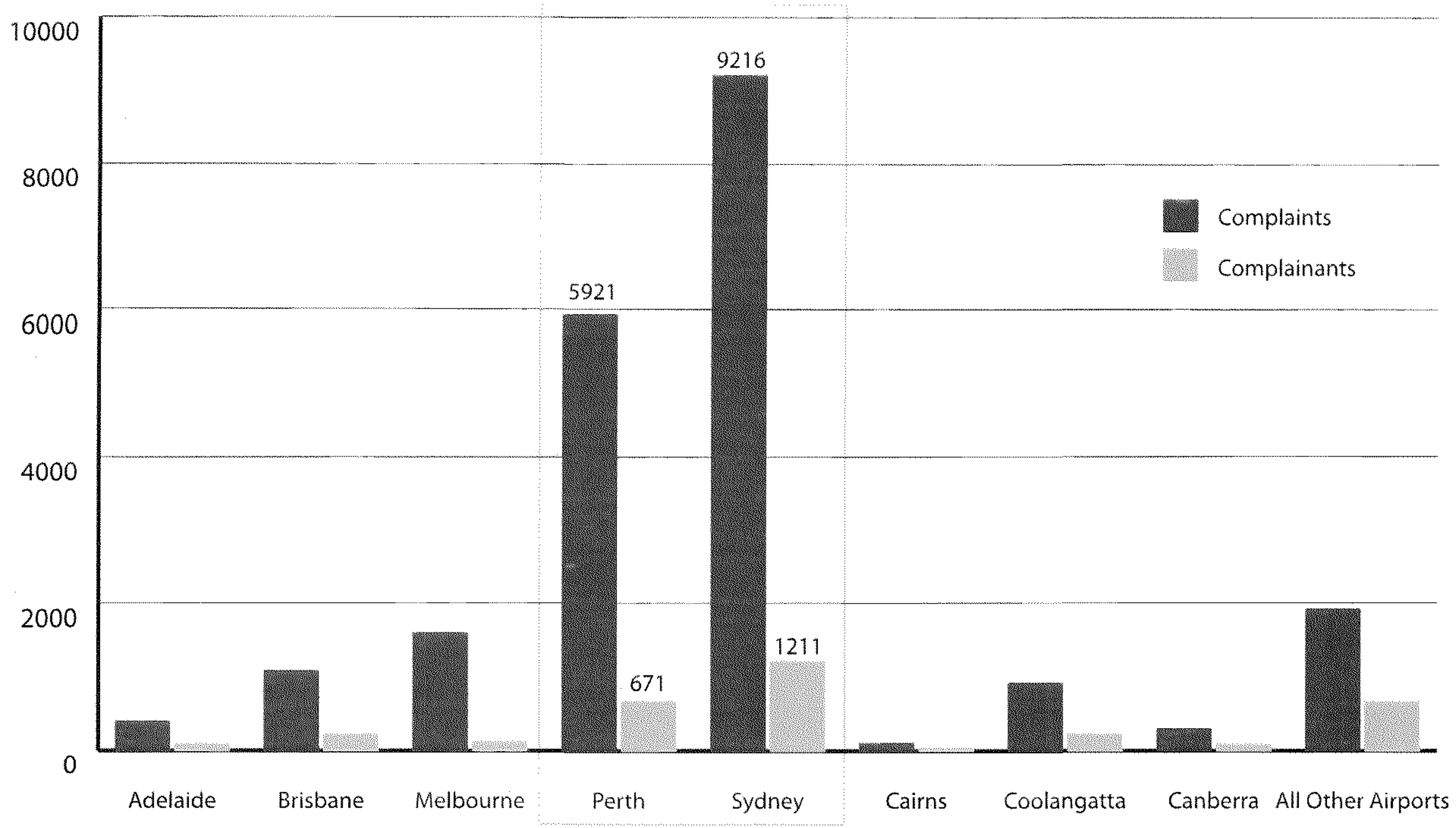
- City of Bayswater
- City of Belmont
- City of South Perth
- City of Canning
- City of Gosnells
- Shire of Kalamunda
- Shire of Mundaring

NEXT STEPS
- 'Rollback' is not an option due to unacceptable safety risk to public and industry
- Feedback and suggestions on improving consultation are welcome
- Working with airlines to manage aircraft altitudes at sensitive locations
- Initiatives including tailored arrivals and RNP approaches are in development and may reduce aircraft noise impacts

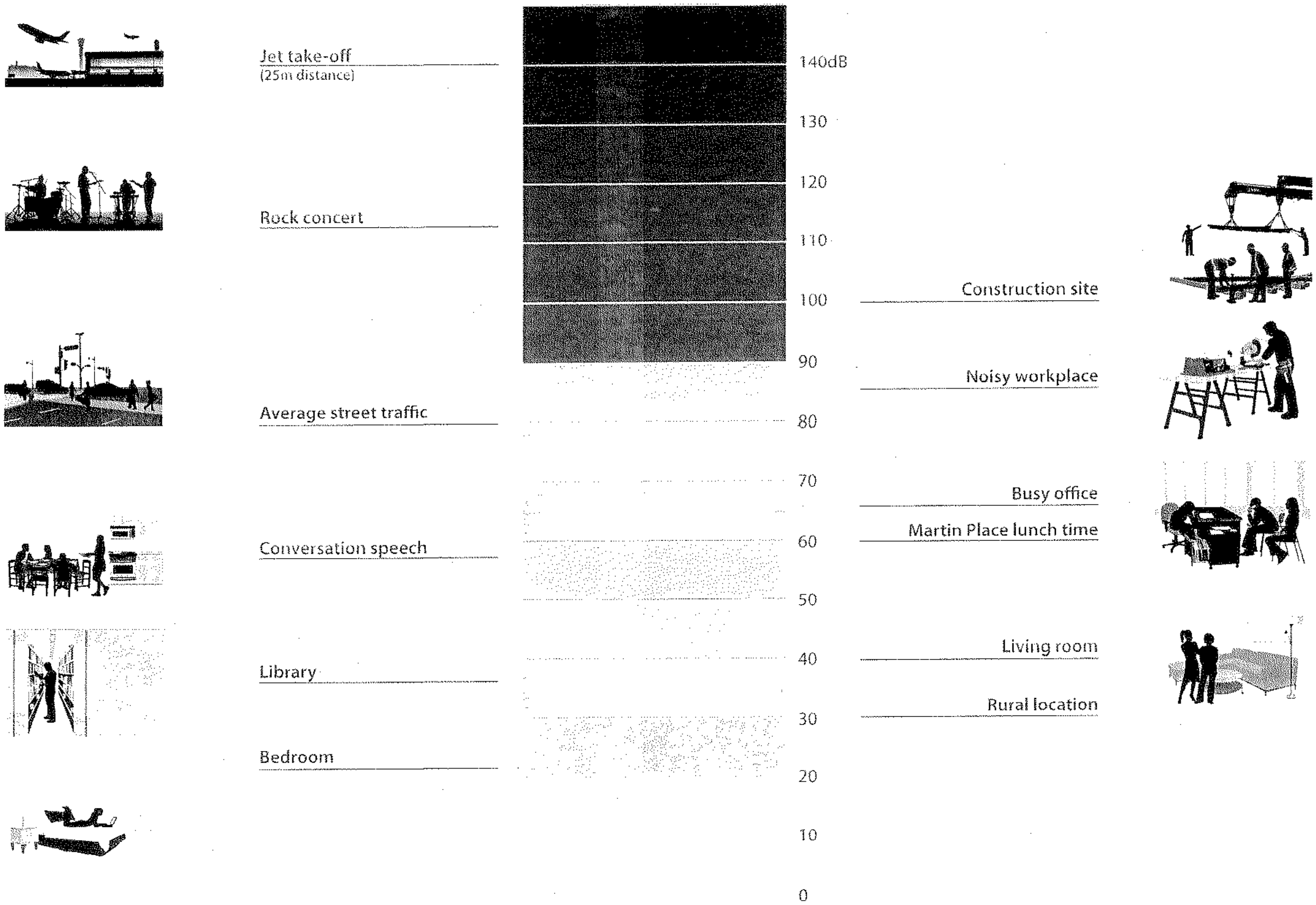
Provided by Mr Greg Russell, CEO AA, at aircraft noise meeting & delivered on 16 June 2010.

Complaints and complainants all airports

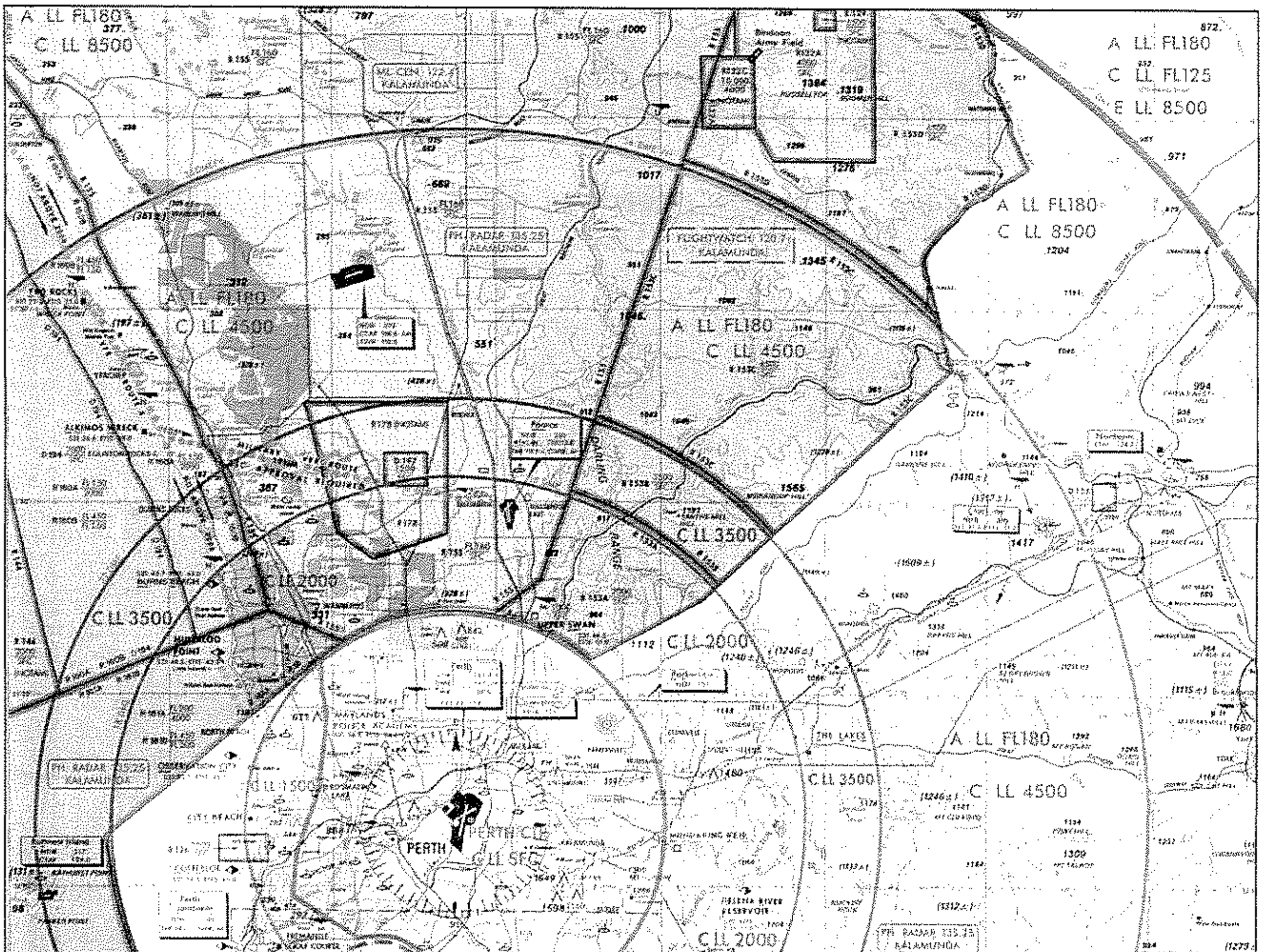
Australia 2009



Example noise levels



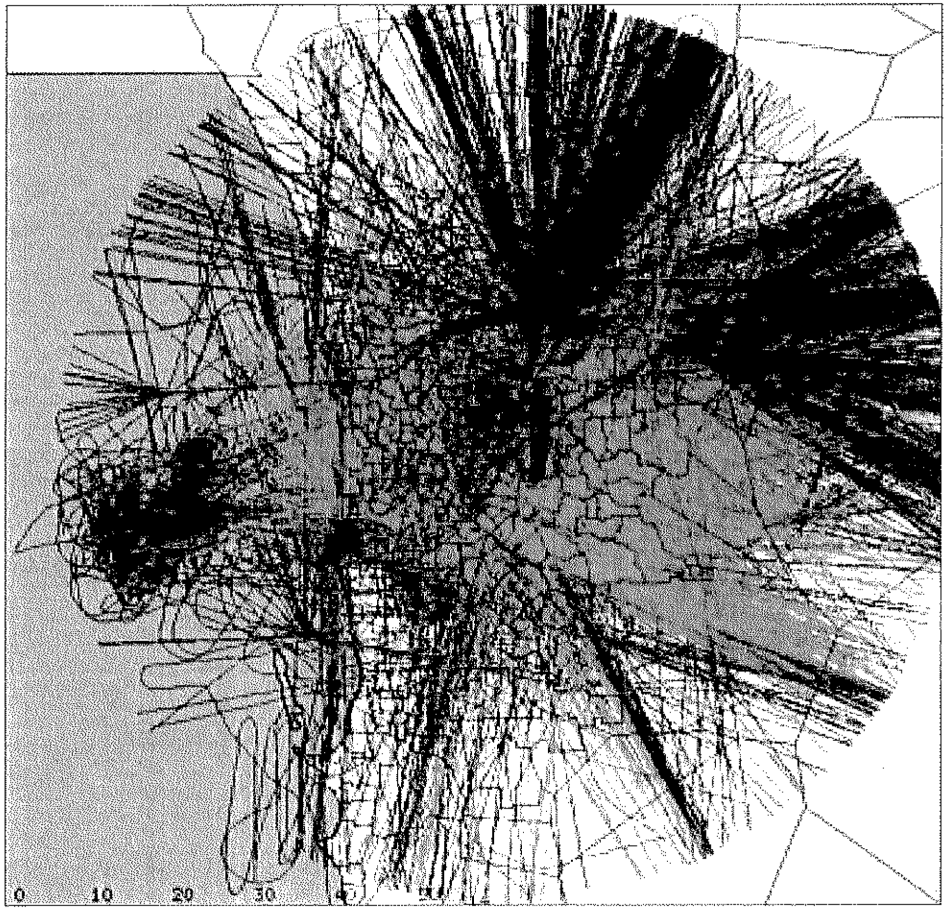
Perth airspace restricted areas



Areas marked in red are controlled by the military, with access by civilian aircraft either restricted or completely prohibited.

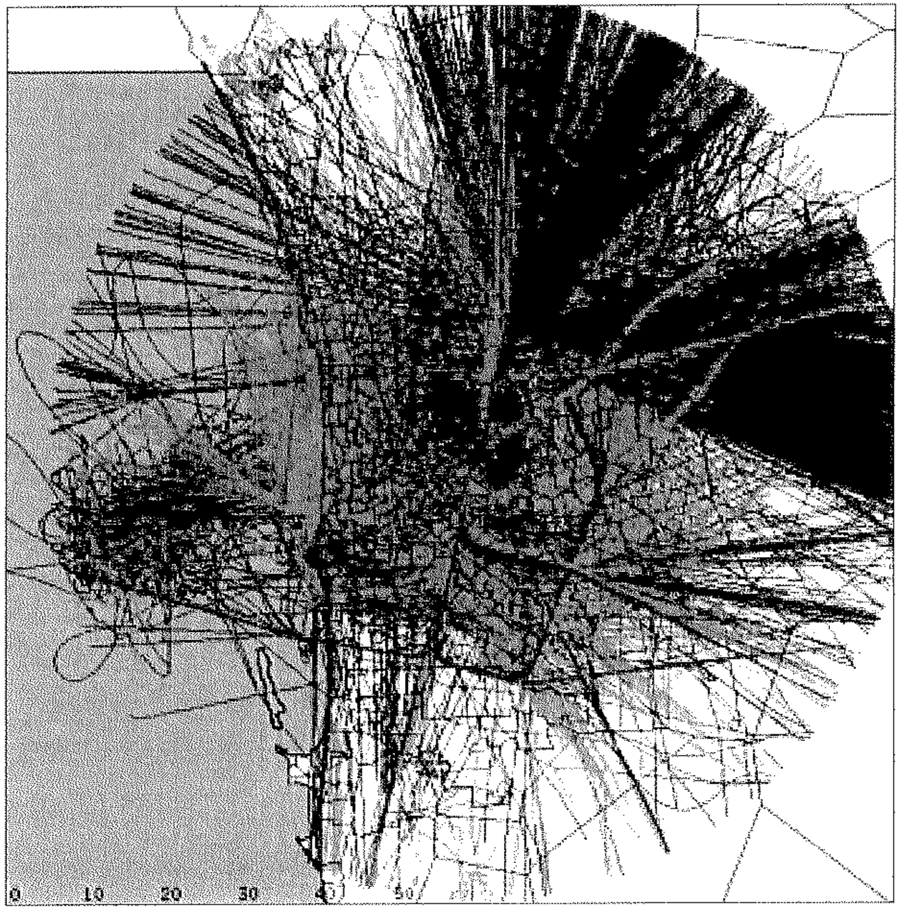
All arrivals and departures

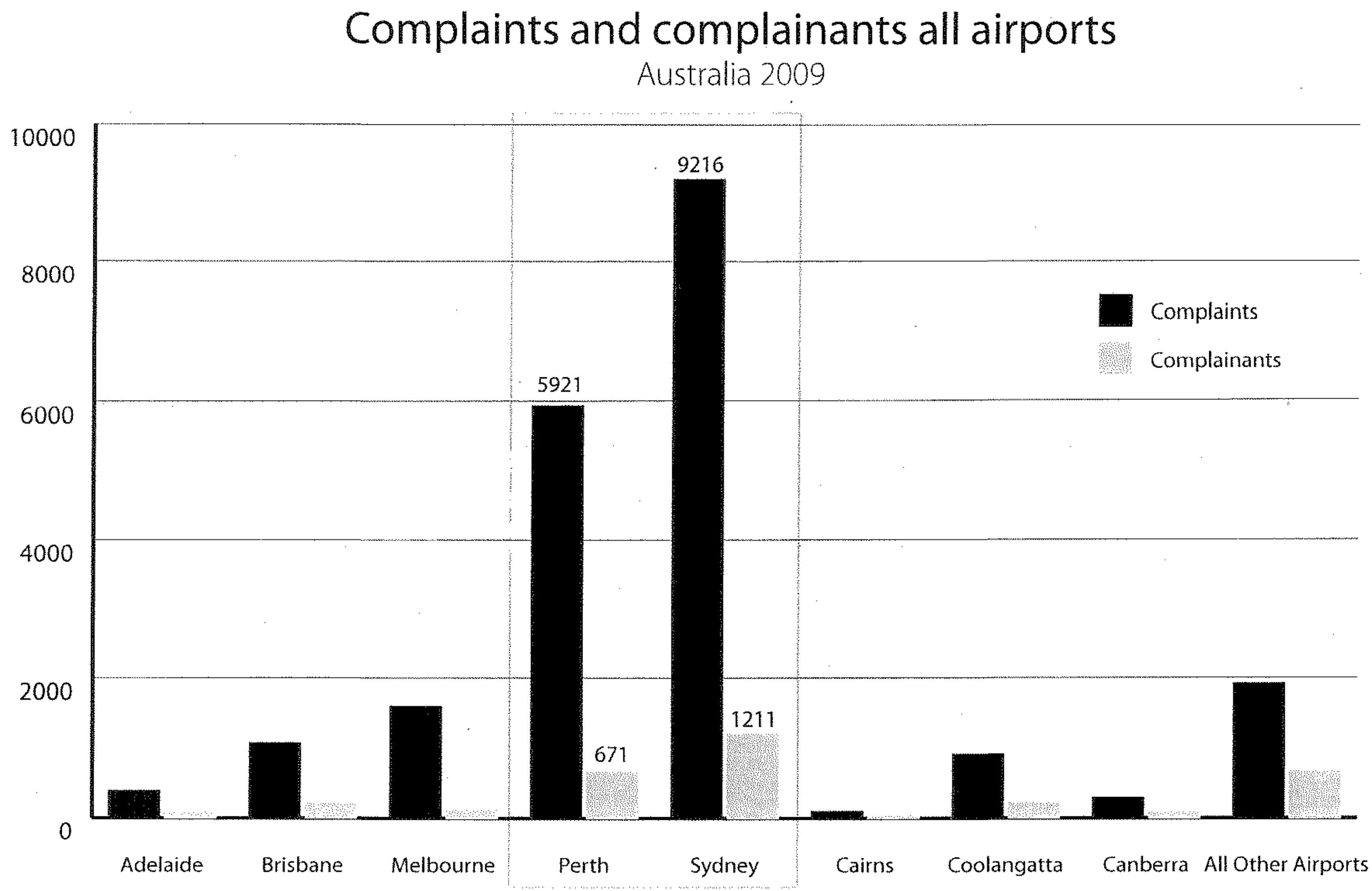
January 2007, 8725 flights



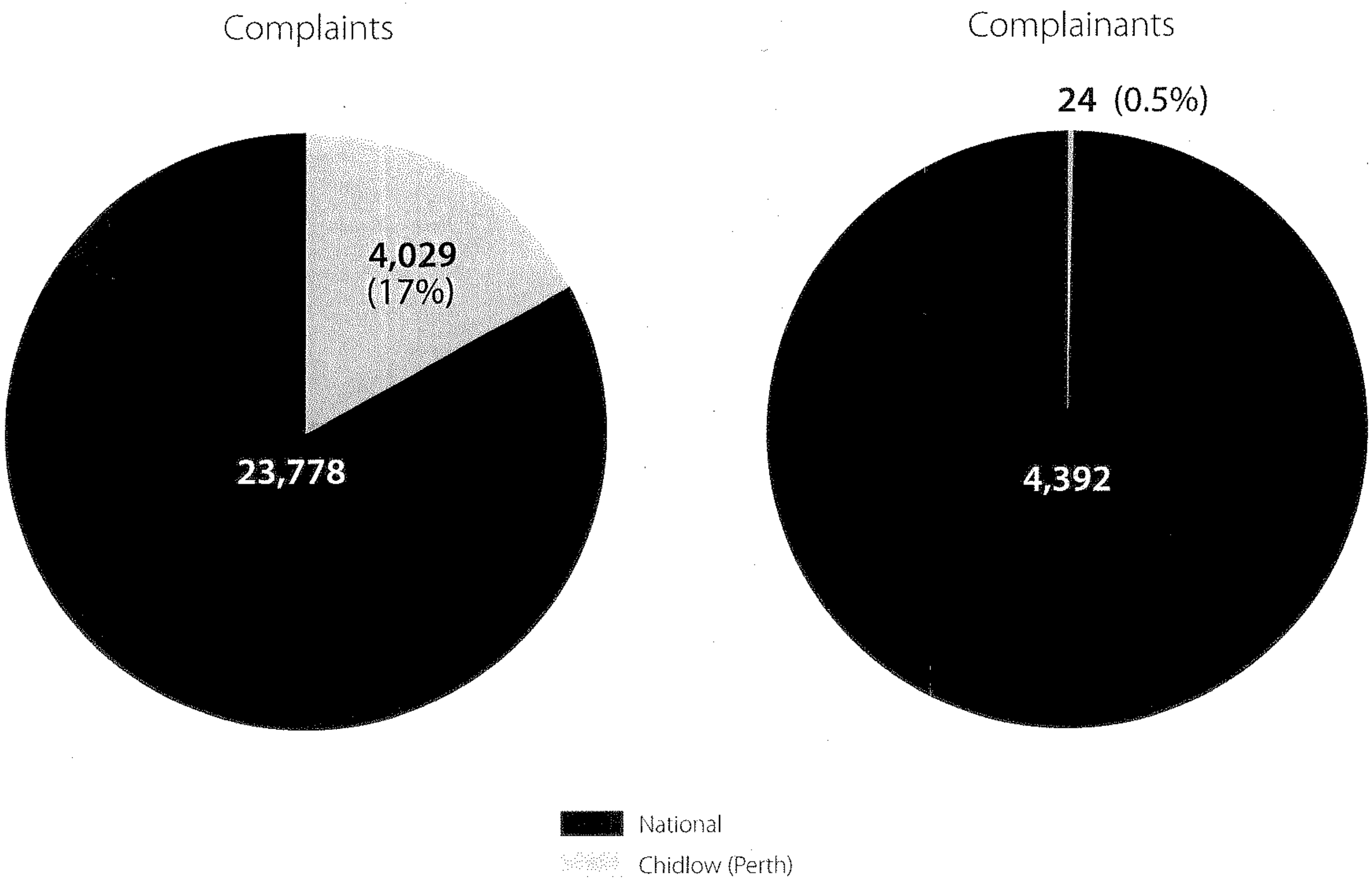
All arrivals and departures

January 2009, 10274 flights

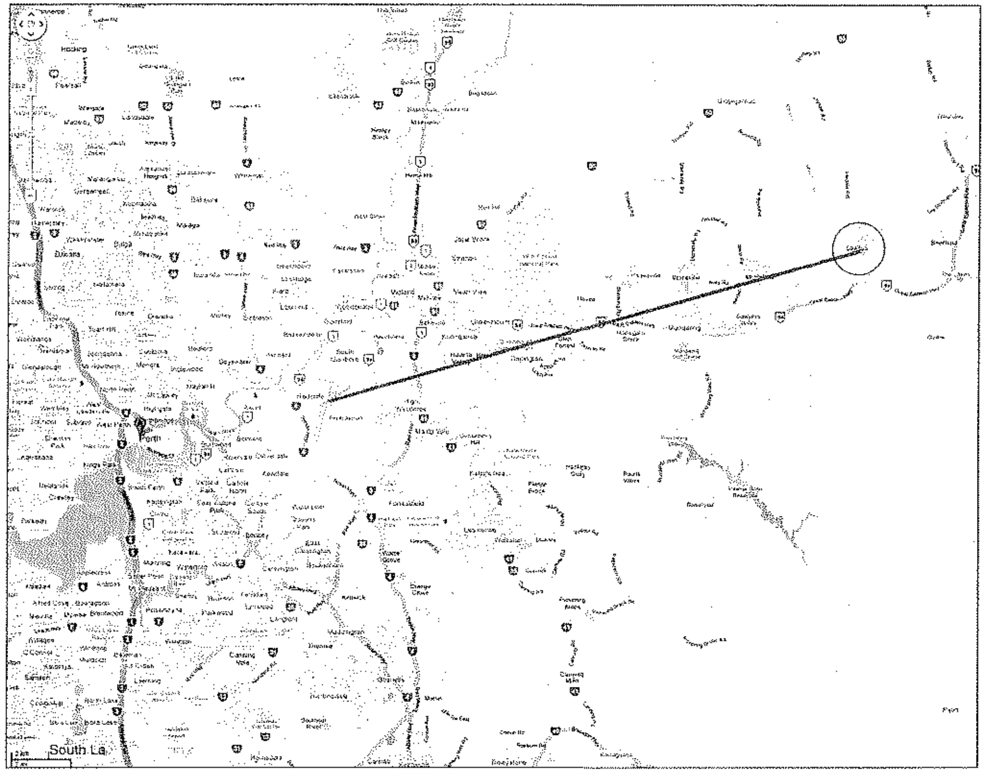



Complaints and complainants all airports
Australia 2009
10000
8000
6000
4000
2000
0
9216
5921
671
1211
Complaints
Complainants
Adelaide
Brisbane
Melbourne
Perth
Sydney
Cairns
Coolangatta
Canberra
All Other Airports

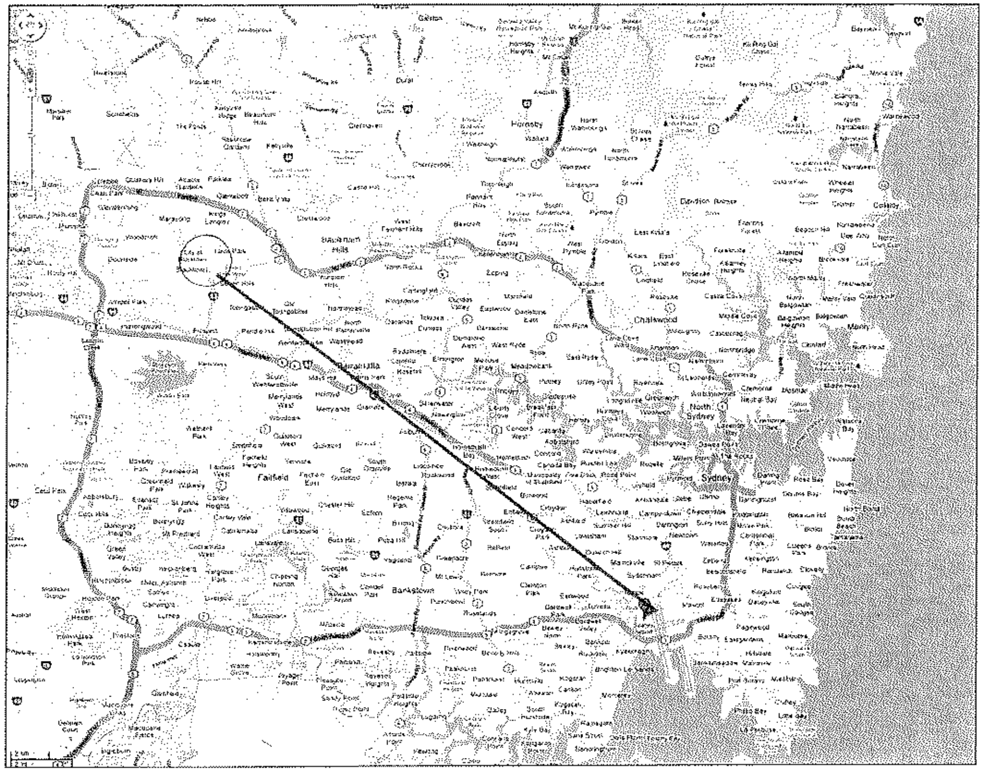
Complaints and complainants for Australia 2009 with Chidlow highlighted



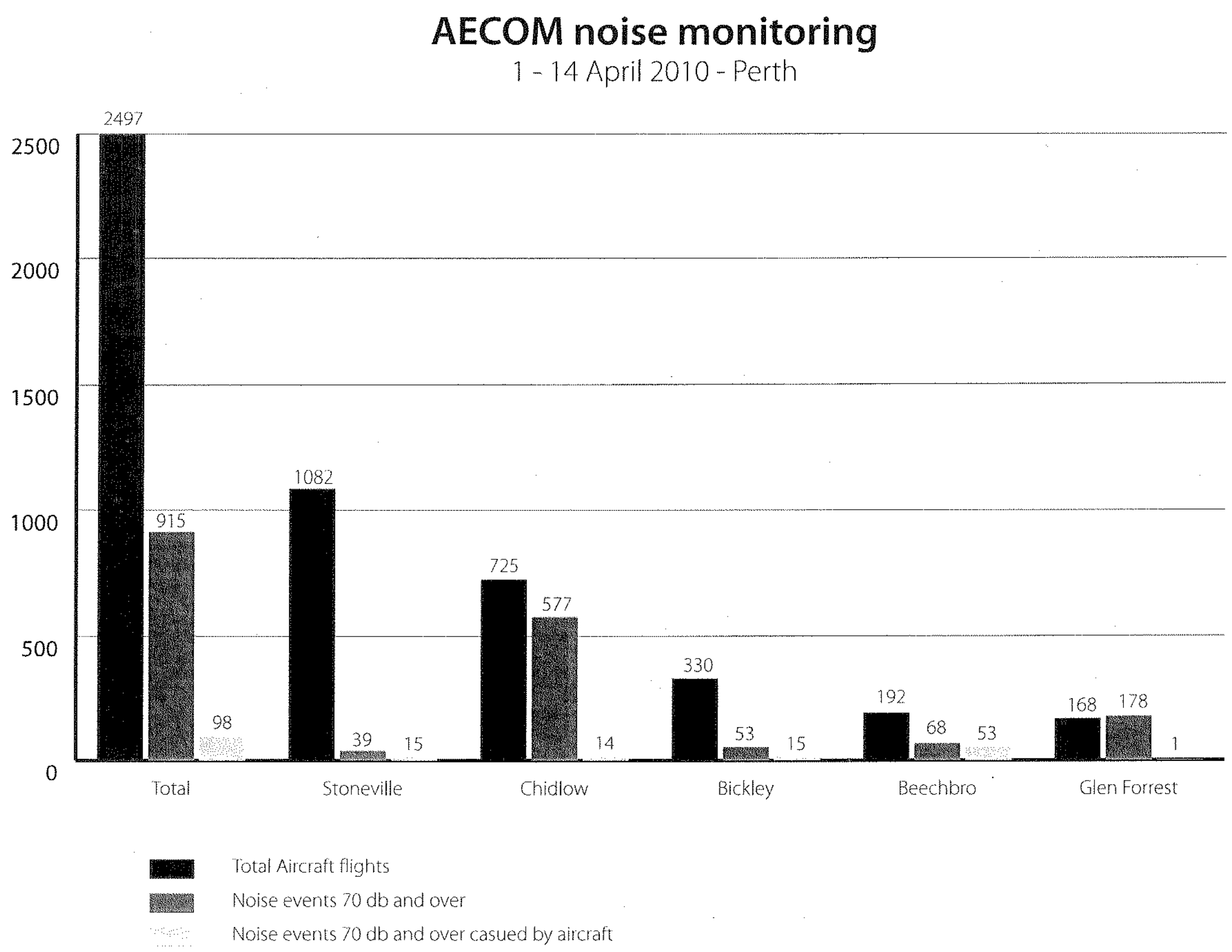
Comparative distances



Perth Airport - Chidlow
approx 30km

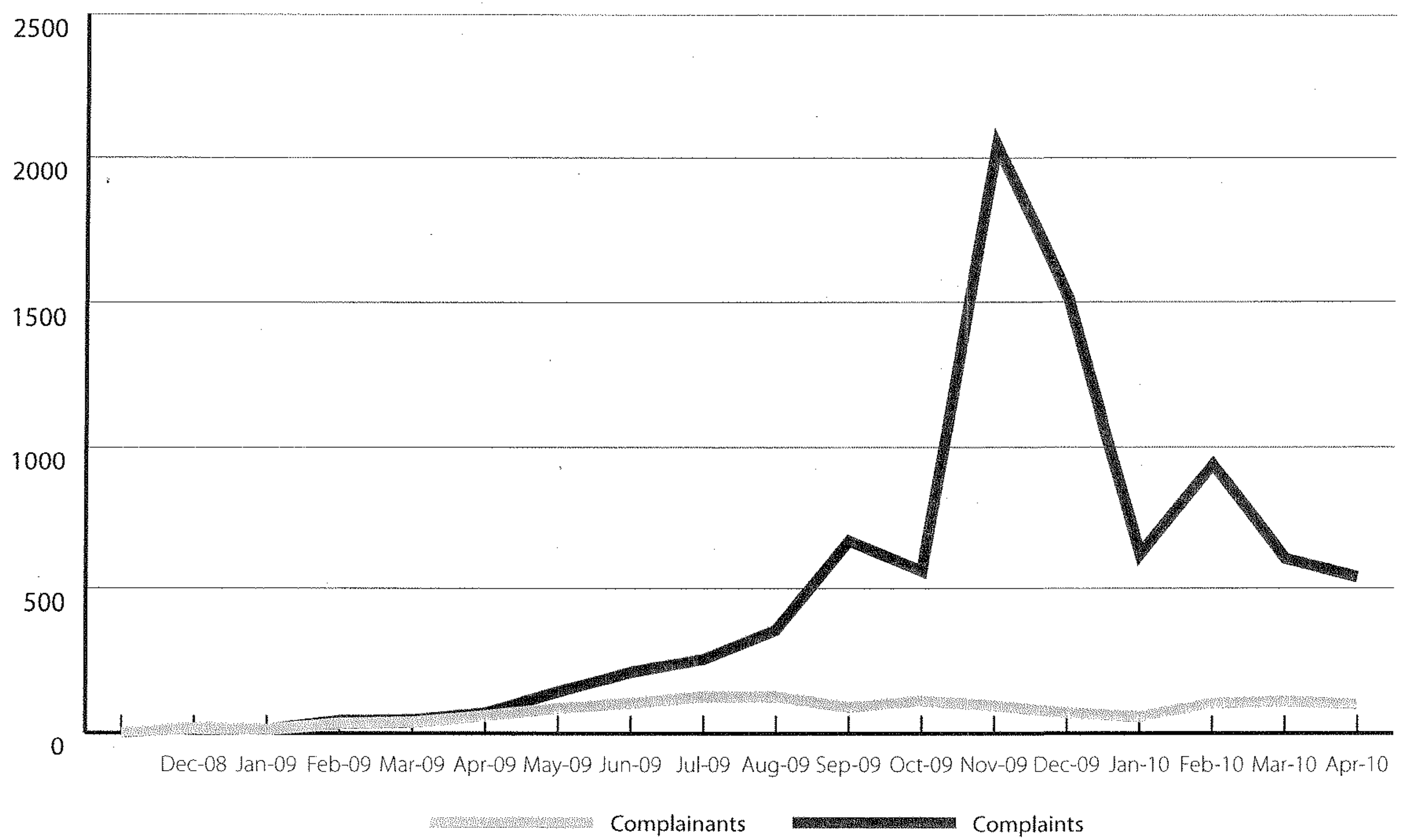


Sydney Airport - Blacktown
approx 30km


AECOM noise monitoring
1 - 14 April 2010 - Perth
2500
2000
1500
1000
500
0
2497
915
98
1082
39
15
725
577
14
330
53
15
192
68
53
168
178
1
Total
Stoneville
Chidlow
Bickley
Beechbro
Glen Forrest
Total Aircraft flights
Noise events 70 db and over
Noise events 70 db and over casued by aircraft

Aircraft Noise Complaints at Perth

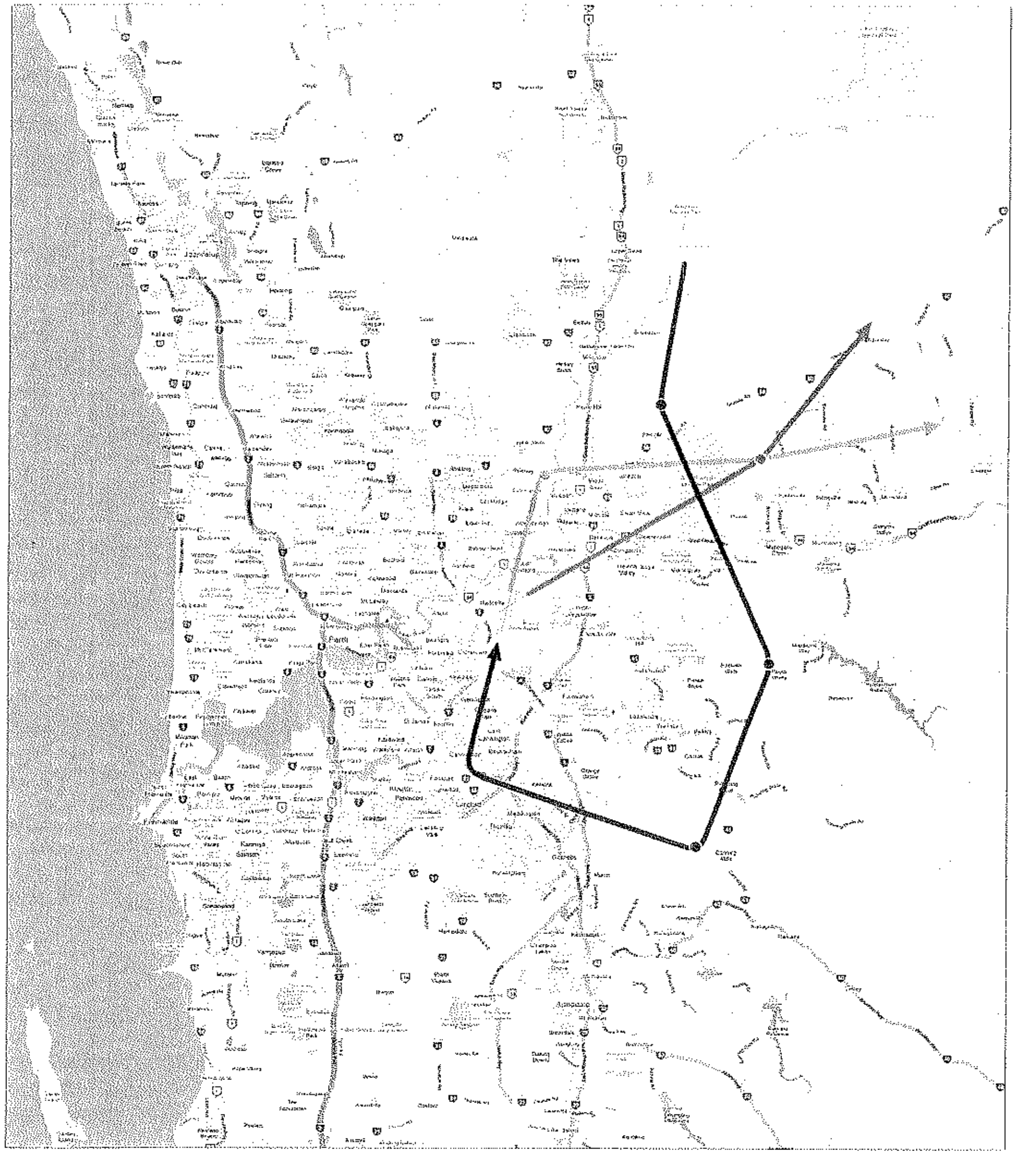
December 2008 to April 2010



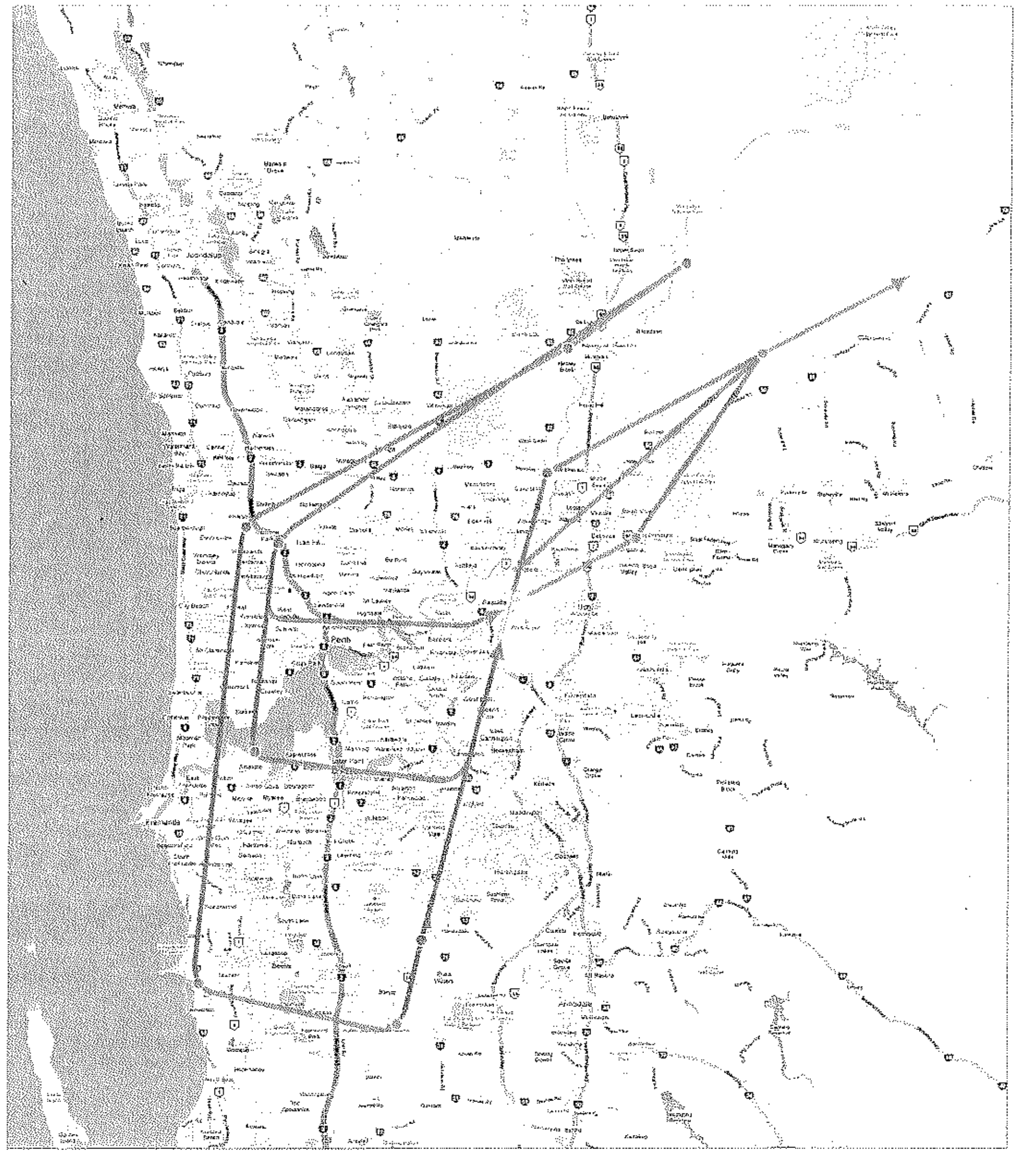
Perth total complaints = 8,098 - two-thirds were from 2 people

Chidlow complaints = 5,427 - 98% were from 2 people

Current flight paths



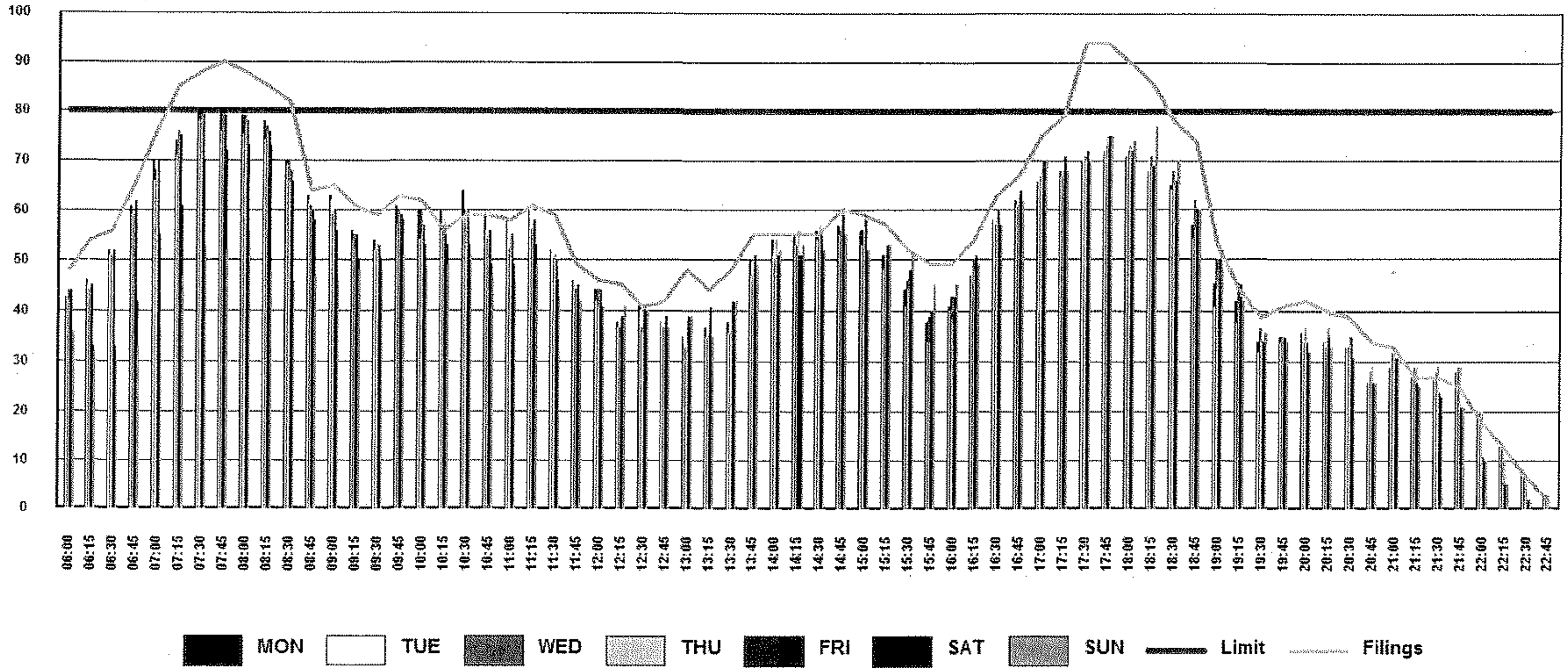
Anderson proposal



SYDNEY AIRPORT

Max.Runway Movements per Moving Hour

S10 April - October 2010 (August Sample Week)



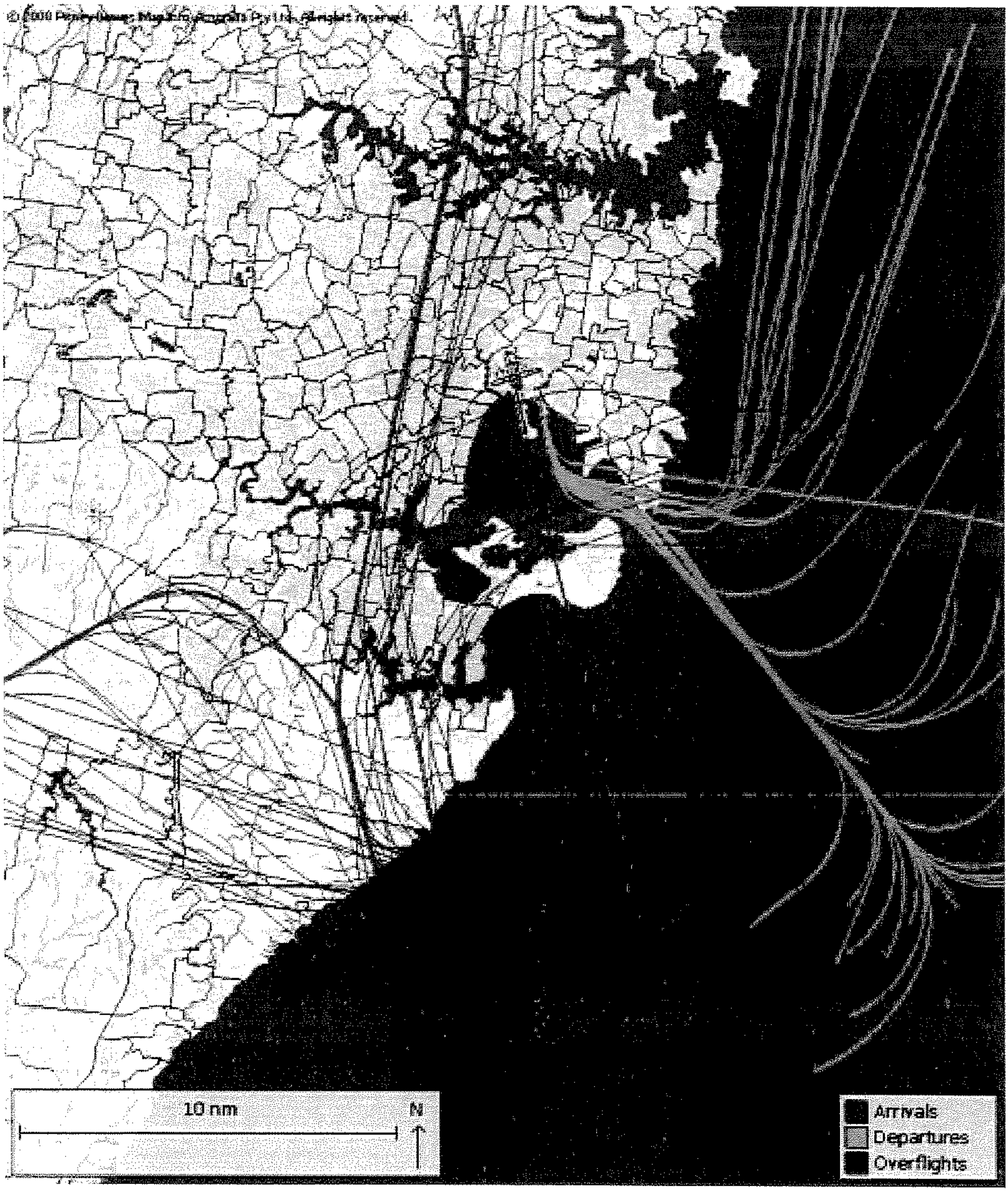
Excluding Protected services

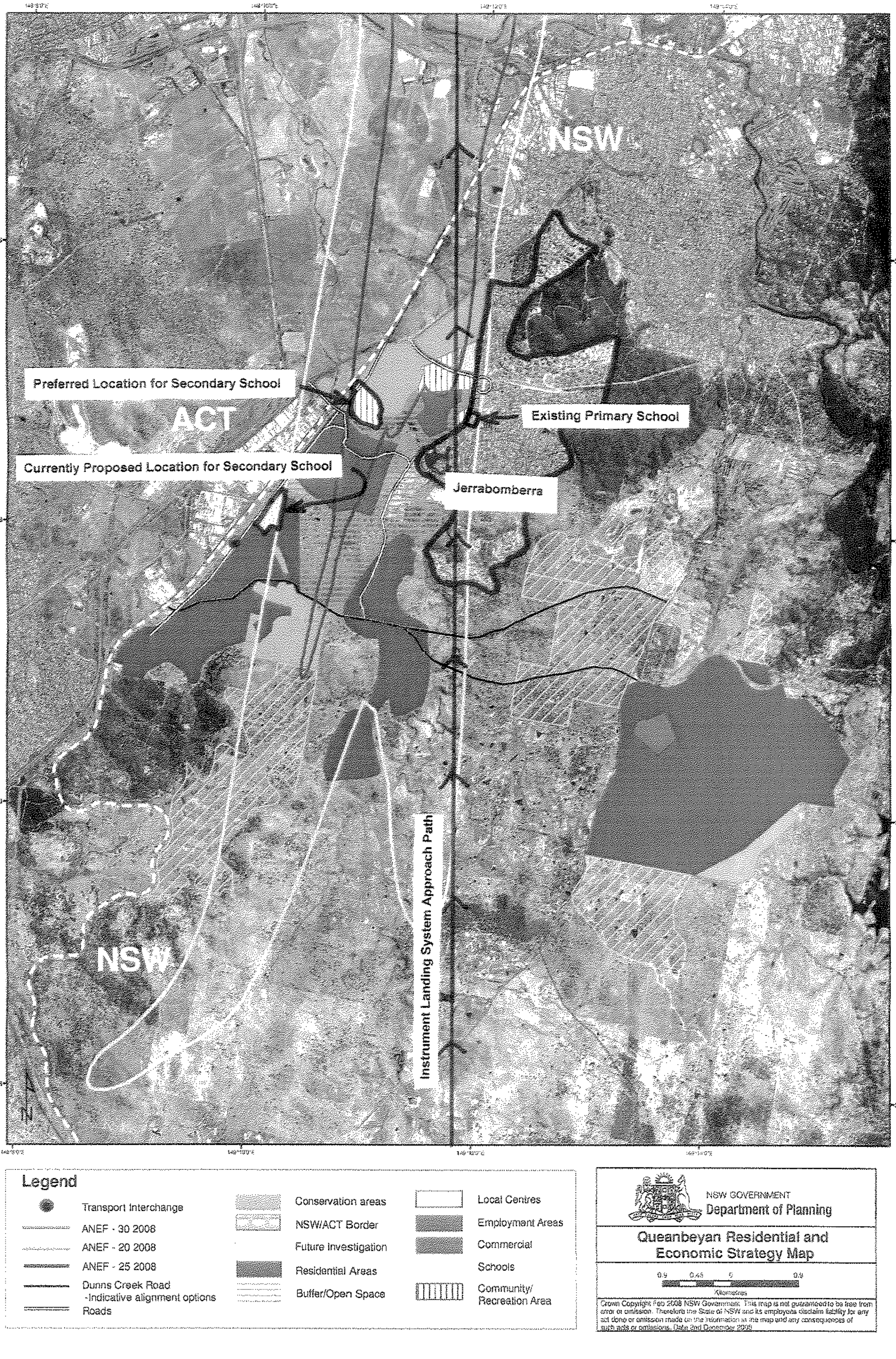
Updated: May 2010

ACA

SODPROPS

Sydney Airport




NSW
Preferred Location for Secondary School
ACT
Existing Primary School
Currently Proposed Location for Secondary School
Jerrabomberra
Instrument Landing System Approach Path
NSW
Legend
Transport Interchange
ANEF - 30 2008
ANEF - 20 2008
ANEF - 25 2008
Dunns Creek Road -Indicative alignment options
Roads
Conservation areas
NSW/ACT Border
Future Investigation
Residential Areas
Buffer/Open Space
Local Centres
Employment Areas
Commercial
Schools
Community/ Recreation Area
NSW GOVERNMENT
Department of Planning
Queanbeyan Residential and Economic Strategy Map
0.9 0.45 0 0.9
Kilometres
Crown Copyright Feb 2008 NSW Government. This map is not guaranteed to be free from error or omission. Therefore the State of NSW and its employees disclaim liability for any act done or omission made on the information in the map and any consequences of such acts or omissions. Date 2nd December 2008

Dear Mr Byron,

I was interviewed yesterday by Craig Allen of Stateline. In the course of the interview I was asked to respond to comments made by you on camera in your interview with Stateline on Tuesday 10 March 2009. The comments in question were to the effect that Curfew4Canberra (C4C) was a mouthpiece for the Village Building Company (VBC).

I have since asked Stateline for the opportunity to listen to a recording of what you actually said, and they have obliged. You state that the VBC was involved in the registration of C4C and were the Secretary of our organisation, and make a more generalised comment that VBC is behind a lot of the community efforts that resulted in the rejection of your 2008 Master Plan.

These comments are false and I believe are also defamatory. There is no relationship between C4C and VBC, and VBC had no involvement with our registration as an incorporated association. I am the inaugural Secretary of C4C and personally undertook the work required to register C4C with the ACT Registrar General in January 2008. I have no relationship, past or present, with VBC.

C4C is of the opinion that the only purpose of your comments is to discredit our organisation. This is the second time that we have asked you to cease making false assertions in public about a relationship between C4C and VBC. I refer to email correspondence in February 2008 between our former president Mr Geoff Willans and Mr Tom Snow of your company.

C4C will not abide these sorts of dirty tactics and makes the following demands:

- Please formally withdraw the comments you made to Stateline suggesting a relationship between C4C and VBC.
- Please apologise unconditionally to C4C.
- Please cease immediately from making any statements, whether oral or written, in all public forums that state or imply a relationship between VBC and C4C.

As the Stateline program is due to be broadcast on 20 March 2009, could you please respond to these demands forthwith. C4C undertakes not to take this matter any further if these demands are met. It is our strong preference to resolve this dispute privately.

I note that the current Green Paper of the National Aviation Policy encourages airports to develop better relationships with communities and engage in effective dialogue (page 196). Making defamatory comments to the press about a community organisation is the antithesis of this.

We hope for a much better working relationship in the future where you can engage with the substance of our concerns.

Yours sincerely,

Jenni Savigny
President
Curfew4Canberra

Table 5 Aircraft Movements

OPERATIONAL GROUP	TOTAL MOVEMENTS	AIRCRAFT TYPE	INM IDENTIFIER	ARRIVALS AND DEPARTURES		CIRCUITS	
				DAY	NIGHT	DAY	NIGHT
RPT – International Jet Services	25,106	Boeing 737-800	737800	906	544		
		Boeing 747-400	747400	807	3,203		
		Boeing 777-300	777300	2,212	3,316		
		Airbus A320	A320	1,268	192		
		Airbus A330	A33034	3,343	3,575		
		Airbus A340	A340	2,224	3,516		
RPT – Domestic Jet Services	155,906	Boeing 737-800	737800	34,182	19,924		
		Airbus A320	A320	17,704	10,596		
		Airbus A330	A33034	1,504	1,564		
		Embraer 170	EMB17U	22,329	12,423		
		Embraer 190	EMB19U	22,836	12,844		
RPT – Regional Non-Jet Services	68,828	Dash 8 300	DHC830	20,162	11,218		
		Dash 8 400	DHC840	20,162	11,218		
		Beechcraft 1900D	1900D	4,063	2,005		
Freight Operations	24,452	Boeing 747-400	747400	606	2,118		
		Boeing 757-200	757PW		12,708		
		MD-11	MD11PW		2,724		
		BAe 146	BAE146		3,024		
		Beechcraft 1900D	1900D		3,272		
Corporate Aviation	2,344	Beech 200	DHC6	1,081	183		
		Cessna 441	CNA441	516	88		
		Cessna 500	CNA500	343	57		
		Gulfstream IV	GIV	17	3		
		Lear 45	LEAR35	48	8		
General Aviation	1,892	Twin Engine	BECP58	819	145		
		Single Engine, Fixed Pitch	GASEPF	307	77		
		Single Engine, Variable Pitch	GASEPV	449	95		
Military Aircraft Operations – Including VIP Operations	2,776	Boeing 737-800	737800	760	140		
		Boeing B747-400	747400	214	24		
		Airbus A330	A33034	214	24		
		Challenger 601	CL601	566	566		
		Hercules C130	C130	114	114		
		Pilatus PC9	PILAT	20	20		
Training	816	Twin Engine	BECP58			61	75
		Single Engine, Fixed Pitch	GASEPF			367	41
		Single Engine, Variable Pitch	GASEPV			252	20
TOTAL FIXED WING	**282,120**			**159,776**	**121,528**	**680**	**136**
Helicopters	2,920	Sikorsky S-76	S76	1,144	316		
		AS350 Squirrel	AS350D	580	242	576	62
TOTAL MOVEMENTS	**285,040**			**161,500**	**122,086**	**1,256**	**198**

hearing on 10 June 2010.

REHBEIN AOS

DATE 28 May 2007

CONTACT KEVIN MOORE

CANBERRA INTERNATIONAL AIRPORT PRACTICAL ULTIMATE CAPACITY ANEF

For CAPITAL AIRPORT GROUP

REHBEIN AOS Airport Consulting

Document Control Page

Revision	Date	Description	Author	Signature	Verifier	Signature	Approver	Signature
0	25/1/07	Draft Report	RS		LS		RS	
1	29/1/07	Final	RS		LS		RS	
2	16/4/07	Final RevA	RS		LS		RS	
3	28/5/07	Final Rev B	RS		LS		RS	

REHBEIN AOS Airport Consulting

TABLE OF CONTENTS

1.0 INTRODUCTION

Rehbein AOS Airport Consulting (R-AOS) has been commissioned by Capital Airport Group to provide a Practical Ultimate Capacity ANEF for Canberra International Airport based on 282,120 annual fixed wing aircraft movements.

Practical Capacity has been determined in an earlier report, *Canberra International Airport: Ultimate Runway Capacity Analysis,* prepared by R-AOS in March 2005. A copy of this report is included as Annex 1.

The ANEF contour produced is a composite of three ANECs representing future possible operating scenarios. All three scenarios take into account the Canberra and Queanbeyan Noise Abatement Areas. Existing noise abatement procedures have been modelled for the two scenarios based on the existing runway operating mode which favours aircraft operations on runway 35.

The model takes account of GPS-based RNP approach/departure procedures which have recently been introduced for Qantas operations. These procedures are to be progressively adopted by Virgin Blue in 2007 and it is expected that the RAAF VIP Squadron and additional aircraft operators providing future services to Canberra will also utilise this technology.

A future RNP approach has been modelled for ultimate capacity operations to provide a 15° offset approach to runway 35 for long haul domestic/international aircraft. The current RNP approaches have shown this is feasible and Capital Airport Group expects the additional arrival track to be adopted as a further noise abatement measure. It will also reduce track miles – and associated fuel consumption and greenhouse emissions – for aircraft arrivals from the south or west (Adelaide, Perth, Southern or South-east Asia or the Middle East) or from the north after tracking around the Canberra Noise Abatement Area (Cairns, Darwin or Northern Asia).

A reverse operating mode has also been considered as this has been shown feasible once GPS-based precision approaches are possible from the north using GBAS technology which is currently being proven by Airservices Australia. A 3° offset precision approach has been agreed by the former Head of CASA's Airspace and Aerodrome Standards Branch as compliant with ICAO design requirements. The existing 17 RNP approach already greatly enhances procedures for arrivals from the north.

RNP departures are also modelled and it has been assumed that these will continue to be based on the existing standard instrument departures.

The predominant use of precision approaches and RNP approaches and departures will provide sufficient tracking accuracy to allow the use of single vector tracks in modelling except for general aviation and a portion of corporate aircraft movements.

The theoretical runway utilisation has been established for each runway direction by an analysis of meteorological data which considered wind speed and direction coupled with visibility/cloudbase criteria applicable to both non-precision and precision approaches. This report, *Canberra International Airport: Meteorological Analysis*, is included as Annex 2.

Observed differences in theoretical and practical usability of runway 35 suggest that ATC is not always able to adopt the runway direction most favoured by meteorological considerations. This has been taken into account by applying a lower percentage than indicated in the meteorological analysis in modelling the runway 17 operations. The practical, as opposed to theoretical runway utilisation, is derived in a further analysis of the meteorological report which is included as Annex 3.

In summary, the three scenarios from which the composite ANEF contour has been derived are:

- the currently preferred runway 35 operating mode and route/track structure (including RNP approaches/departures), with runway utilisation based on Airservices data;
- the preferred runway 35 operating mode with both the current RNP approaches/departures and the additional 15° offset RNP track for long haul domestic/international arrivals; and
- a preferred runway 17 operating mode with current RNP approaches/departures and a 3° offset precision approach, with runway utilisation derived from meteorological analysis.

The RNP departures in each scenario were modelled on SIDs currently in use at Canberra Airport.

All tracks were derived from published instrument approach/departure procedures and the Airservices NFPMS installed at Canberra Airport. Track dispersion apparent in the NFPMS track plots has been ignored except for general aviation and a portion of corporate aircraft movements.

The aircraft fleet mix, stage length and time of day of operations were derived from projections of future activity set out in the report *Canberra International Airport: Ultimate Runway Capacity Analysis*. These have been adopted by Capital Airport Group as the basis of their long term planning.

Noise exposure forecasts were derived by computer simulation using version 6.2a of the US FAA INM software. Contours have been computed incorporating the effects of terrain.

This report has been prepared for technical readers who are expected to understand the specialist acronyms and terminology used throughout.

2.0 INTEGRATED NOISE MODEL

The INM calculates noise impacts by applying standard or user defined aircraft flight profiles, performance data and noise curves to the specific runway configuration and flight tracks. The time of day at which operations take place is also factored into the noise computation. This allows for varying sensitivity in people's reaction to noise.

In interpreting the output of the model it should be noted that:

- aircraft movements are allocated as a day or night operation, defined as being the hours between 7.00 am to 7.00 pm and 7.00 pm to 7.00 am respectively;
- the number of approach and departure operations modelled equates directly to the actual number of approach and departure movements forecast;
- the INM requires that pilot training is modelled as a circuit which comprises the initial take-off and final landing, with touch and go (TGO) manoeuvres in between;
- each INM circuit and TGO represents two aircraft movements; and
- the ratio of INM circuits to TGO operations is assumed as 1:5 on the basis that a typical one hour flying training session allows "six circuits" to be flown.

The model has been constructed to produce the ANEF metric defined in AS2021-2000. The parameters for the metric have been set up in the INM as follows:

Table 1 INM Metric Parameters

Noise family	Perceived
Metric type	Exposure
Day multiplier	1.0
Night Multiplier	4.0

Source: AS 2021-2000

The accuracy and smoothness of the resulting contours are determined by the model's refinement and tolerance settings. The INM uses a subdivided grid method to calculate data for contours. Areas where noise changes substantially are divided into smaller grids, whereas areas where there is little change are left undivided. The refinement settings control the size of the smallest contouring grid. The tolerance setting controls the process of subdividing a contouring grid. If the tolerance is small, the INM is more sensitive to changes in the noise metric over an area and is more likely to divide a grid. For this study the refinement was set at 10 and the tolerance at 0.1 to give a high level of contouring accuracy.

The INM requires input of the "average annual day temperature" so that aircraft performance calculations and resulting noise exposure contours are as representative as possible. The value of 15.3°C used in this study was obtained from Bureau of Meteorology records, as the average of the mean annual 9am and 3pm temperatures.

The average headwind for operations on all runways was set to the INM default of 8 knots.

The ARP was chosen as the study datum. Its location and reference elevation are shown in Table 2.

Table 2 Airport Reference Point

AIRPORT CODE	COORDINATES		ELEVATION	AVERAGE TEMPERATURE
YSCB	Latitude	35°18'25"S	1888 feet	15.3°C
	Longitude	149°11'42"E		

ANEF values have been computed with reference to terrain elevations. In the INM study the ARP coordinates have been set to latitude 0.5°, longitude -0.5° to allow the terrain elevation model to be accurately imported.

3.0 CANBERRA INTERNATIONAL AIRPORT

Canberra International Airport accommodates civil and military operations. Civil operations currently include basic to advanced flight training, private and business traffic, freight, commercial and RPT services. Military activity includes operations and training for the RAAF VIP squadron based at Canberra Airport, ad hoc military transport and other training/maintenance operations and foreign VIP movements. The airport operates 24 hours a day.

Canberra International Airport has two runways, 17/35 and 12/30. Runway 17/35 is modelled in this study at its present length of 3283 metres. The runway 35 threshold location has been modelled with a displacement of 150 metres on advice from Capital Airport Group. The runway 35 threshold is currently displaced 600 metres as it was determined that the cost of relocating the current Category I ILS during recent runway extension works was excessive. The Jerrabomberra community also lobbied for retention of the current threshold. However, as part of a study into Category II and III ILS and GPS-based equivalent precision landing systems, it has been identified that the southerly movement of this threshold will have a significant benefit in terms of climb-out gradients available for missed approaches to the runway. This will add significantly to the safety of aircraft operations in low visibility at Canberra and provide increased runway utilisation by allowing a lower decision height to be specified for the approach procedure.

GPS-based (or GBAS) approaches are expected to be available well before the airport reaches its practical ultimate capacity. It is also noted that RNP approaches are now redirecting a substantial proportion of aircraft movements away from Jerrabomberra residents and these will minimise any impact of a southerly shift in the runway 35 threshold location.

The nominated displacement of 150 metres modelled in the ANEF is the minimum required to ensure appropriate obstacle clearances are maintained from traffic on Pialligo Avenue immediately south of the runway end.

Runway 12/30 has been modelled with a length of 2029 metres and includes an eastern extension of 350 metres. The runway 30 approach threshold has been maintained at its current location on advice from Capital Airport Group ie with a displacement of 423 metres from the 30 end.

Table 3 Runway End Details

RUNWAY	COORDINATES)		RUNWAY LENGTH (METRES)	THRESHOLD DISPLACEMENT (METRES)	RUNWAY ELEVATION (FEET)
12	Latitude Longitude	35°18'03"S 149°11'07"E	2029	0	1849
17	Latitude Longitude	35°17'26"S 149°11'40"E	3283	0	1874
30	Latitude Longitude	35°18'37"S 149°11'58"E	2029	423 (APPROACH)	1886
35	Latitude Longitude	35°19'13"S 149°11'40"E	3283	150 (APPROACH)	1870

The model also includes two helicopter landing sites located:

- in the general aviation precinct adjacent to taxiway C (HLS1); and
- east of runway 17/35 at the southern end of taxiway A (HLS2).

Table 4 HLS Location Details

DESIGNATION	COORDINATES)		ELEVATION (FEET)
HLS1	Latitude Longitude	35°18'12"S 149°11'20"E	1856
HLS2	Latitude Longitude	35°18'12"S 149°11'45"E	1872

4.0 AIRPORT ROUTE STRUCTURE

All tracks were derived from published instrument approach/departure procedures and the Airservices NFPMS installed at Canberra Airport. These tracks have been deemed appropriate by the Canberra ATC Tower Manager (Peter Romeis) and Canberra Approach Sector Manager, Melbourne Centre (Bill Phelan) of Airservices Australia.

4.1 FIXED WING ARRIVAL TRACKS

Current flight paths recorded by the Airservices NFPMS and depicted in published instrument approach procedures have been modelled. This includes RNP approaches recently introduced for Qantas B737 operations which are to be progressively adopted by Virgin Blue and other operators.

A future RNP approach has also been modelled for ultimate capacity operations to provide a 15° offset approach to runway 35 with a more generous radius of turn suited to heavy long haul domestic/international aircraft arriving predominantly from the north, north-west and the west. The current RNP approaches have shown this is feasible and, as noted above, this has also been agreed by Airservices Australia. Capital Airport Group expects the additional arrival track to be adopted as a further noise abatement measure once these operations are established.

A reverse operating mode has also been considered as this has been shown feasible once GPS-based precision approaches are possible from the north using GBAS technology which is currently being proven by Airservices Australia. A 3° offset precision approach with a 3.5° glidepath has been agreed by the former Head of CASA's Airspace and Aerodrome Standards Branch (Jim Shirley) as complying with ICAO design requirements. Already the existing runway 17 RNP approach greatly enhances procedures for arrival from the north.

The predominant use of GBAS and RNP approaches will provide sufficient tracking accuracy to allow the use of single vector tracks in modelling fixed wing arrivals. As a consequence the track dispersion apparent in previous NFPMS plots has been ignored.

The arrival tracks assigned to fixed wing aircraft in this study are shown in the first of seven drawings included at the end of this report.

4.2 FIXED WING DEPARTURE TRACKS

Current flight paths recorded by the Airservices NFPMS and depicted in published instrument departure procedures have been modelled. Future RNP departures based on these tracks have been assumed with tracking accuracy to allow modelling by single vector tracks.

The departure tracks assigned to fixed wing aircraft in this study are shown in the second of seven drawings included at the end of this report.

4.3 FIXED WING TRAINING TRACKS

Two types of training circuits for civil aircraft have been modelled. These have been based on training practices commonly adopted by commercial flight schools in Australia and on tracks recorded by the Airservices NFPMS.

These relate to the operational capabilities of the most common type of instructional aircraft, and are considered the best compromise between commercial operations, safe practices and air traffic requirements. They comprise:

- a basic training circuit, assigned to single engine low speed aircraft; and
- an advanced training circuit, assigned to a single engine high performance aircraft and twin engine aircraft.

The adopted tracks do not include any overflights of Pialligo, as flight training over this area has largely ceased because of noise abatement requirements.

The training tracks assigned to fixed wing aircraft operations in this study are shown in the third of seven drawings included at the end of this report.

4.4 HELICOPTER TRACKS

The helicopter arrival and departure movements included in this study are modelled parallel to the fixed wing arrival and departure tracks and are aligned with the 17/35 and 12/30 runways.

The helicopter arrival, departure and training tracks adopted in this study are shown in the third of seven drawings included at the end of this report.

5.0 AIRCRAFT TYPES

Twenty four fixed wing aircraft and two helicopter types have been used to provide a realistic model of future aircraft activity at Canberra International Airport. The aircraft have been separated into functional groupings and provide the best representation of the noise and operational characteristics of aircraft likely to operate in these groupings. The reasons for these aircraft selections are detailed in Section 6.

Aircraft types selected by Capital Airport Group and provided to R-AOS are based on current and known future fleet mixes for the nature of the operation involved.

5.1 RPT – INTERNATIONAL JET SERVICES

International jet services were modelled using four wide bodied jet aircraft for medium and long haul routes and two narrow body aircraft for Trans-Tasman and Pacific flights.

As the majority of destinations are expected to be within Asia, the dominant aircraft modelled in medium and long haul operations are the B777-300, A330 and A340 which have been acquired in large numbers by Asian-based carriers. All aircraft modelled are currently operating international routes from Australia:

- Boeing 737-800;
- Boeing 747-400;
- Boeing 777-300;
- Airbus A320;
- Airbus A330; and
- Airbus A340.

5.2 RPT – DOMESTIC JET SERVICES

RPT jet domestic services were modelled using the types of aircraft currently used in mainline domestic operations and aircraft forecast to be operating to Canberra International Airport in the long term. As the existing emphasis on peak period traffic and a dominant operating airline is likely to continue, widebody aircraft have also been modelled on domestic routes to cater for peak demands. Regional services will include Embraer aircraft which are yet to operate in Australia but are on firm order by Virgin Blue. The adopted aircraft are:

- Boeing 737-800;

- Airbus A320;
- Airbus A330;
- Embraer 170; and
- Embraer 190.

5.3 RPT – REGIONAL NON-JET SERVICES

RPT regional non jet services were modelled using the aircraft groups currently servicing Canberra and those that are forecast to be operating to Canberra International Airport into the long term. These aircraft are:

- a high capacity turbo prop represented by the Dash 8-400,
- a medium capacity turbo prop represented by the Dash 8-300, and
- a low capacity turbo prop represented by the Beechcraft 1900D.

5.4 FREIGHT OPERATIONS

Freight aircraft were selected based on the current Australian and international fleet of freighter aircraft. These are:

- Boeing 747-400;
- Boeing 757-200;
- McDonald Douglas MD-11;
- BAe 146; and
- Beechcraft 1900D.

5.5 CORPORATE AVIATION

Corporate Aviation is modelled using the most representative types of aircraft forecast to be operating to Canberra International Airport in the long term. These are:

- turbine engine aircraft Cessna 441;
- turbine engine aircraft Beech 200 Super King Air;
- jet engine aircraft Cessna 500 (Citation);

- jet engine aircraft Gulfstream IV (GIV); and
- jet engine aircraft Lear 45.

The Beech Super King Air activity includes flights operated by the RFDS (Air Ambulance).

5.6 GENERAL AVIATION

The Australian Civilian Aircraft Register lists about 200 types of general aviation piston-engined aircraft. For noise modelling purposes this number has been reduced to three INM based aircraft profiles:

- GASEPF (a low performance single engine aircraft with fixed pitch propeller such as a Cessna 172 and Piper Warrior);
- GASEPV (a high performance single engine aircraft with variable pitch propeller such as a Cessna 210, Beech Bonanza and Piper Lance); and
- BEC58P (a conventional twin engine aircraft modelled through a single profile representing a range of twins from the Piper Seminole to Cessna 421 and typified by the Beech Baron).

5.7 MILITARY AIRCRAFT OPERATIONS, INCLUDING VIP OPERATIONS

Military aircraft operations have been modelled using the following aircraft types:

- VIP squadron operations:
  - Boeing Business Jet represented by a Boeing 737-800 , and
  - Challenger 604 represented by a Challenger 601;
- foreign visiting aircraft:
  - Airbus A330; and
  - Boeing 747-400;
- transport aircraft operations – Hercules C130; and
- light aircraft operations – Pilatus PC9.

5.8 HELICOPTERS

Two helicopter profiles have been used in the modelling. These aircraft have been adopted as representative of both civil and military types:

- AS350 Squirrel - a representative single engine helicopter typically used in charter, air work and flying training; and
- Sikorsky S-76 - representing a typical twin engine turbine helicopter of the type which is used extensively in commercial operations, by the police air wing, emergency services and by the military.

5.9 TRAINING

The GASEPF, GASEPV, BEC58P and AS350 Squirrel have been selected to model fixed wing and helicopter training activity considered likely to be carried out at Canberra International Airport.

6.0 AIRCRAFT MOVEMENTS

The report, prepared by R-AOS forecasts an ultimate annual capacity of 282,120 fixed wing aircraft movements.

The *Canberra International Airport 2005 Approved Master Plan* projects a substantial growth in demand for international, domestic and regional RPT services and for both international and domestic freight. Based on the Master Plan forecasts and additional information supplied by Capital Airport Group, these movements have been distributed among aircraft types detailed in Section 5. This aircraft movement mix is shown in Tables 5 and 6.

The Master Plan envisages the progressive development of international services to New Zealand and the Pacific Islands, and destinations such as Bangkok, Denpasar (Bali), Singapore, Kuala Lumpur, Hong Kong, Tokyo, Seoul, Beijing, Dubai, Hawaii and Los Angeles. The recent extension of the runway to 3283 metres provides the opportunity to service these destinations.

As indicated in the *Canberra International Airport: Ultimate Runway Capacity Analysis* report the majority of international arrivals and departures are forecast as night movements in the INM as they will occur between 9pm and 7am. This is consistent with current arrival and departure times at non-curfew airports such as Brisbane and Melbourne and the expectation that Canberra International Airport will provide a logical alternative to Sydney Airport during its legislated curfew.

As the majority of destinations are likely to be within Asia the dominant aircraft modelled are the B777-300 and A330 which have been acquired in large numbers by Asian based carriers. The A340 have been modelled for longer range destinations such as Tokyo and Seoul while the B747 has been modelled for very long range operations to the Middle East and the west coast of the United States. B737-800 and A320 aircraft have been modelled for Trans-Tasman services and operations to the Pacific Islands.

Future domestic operations are forecast to include long haul destinations such as Darwin, Cairns and Townsville and an increased frequency of services to Perth. Direct services are also forecast to Alice Springs, the Sunshine Coast, Avalon, Hobart and Launceston. These have been modelled primarily as the B737-800 and A320 which are expected to dominate Australian domestic airline fleets. The continued peak hourly growth Sydney/Melbourne traffic will justify occasional operations by larger aircraft as well as frequent shuttle-type operations throughout the day.

Regional airline services are likely to be expanded to Canberra as a destination in its own right but also because Canberra has the potential to serve as a hub for NSW and Victorian regional passengers to transit to Sydney. Regional airline services are modelled by the Embraer 170 and 190 jets, Dash 8-300 and -400 series 50-75 seat turboprops and the Beechcraft 1900, a typical 19 seat turboprop.

Table 5 Aircraft Movements

OPERATIONAL GROUP	TOTAL MOVEMENTS	AIRCRAFT TYPE	INM IDENTIFIER	ARRIVALS AND DEPARTURES		CIRCUITS	
				DAY	NIGHT	DAY	NIGHT
RPT – International Jet Services	25,106	Boeing 737-800	737800	906	544		
		Boeing 747-400	747400	807	3,203		
		Boeing 777-300	777300	2,212	3,316		
		Airbus A320	A320	1,268	192		
		Airbus A330	A33034	3,343	3,575		
		Airbus A340	A340	2,224	3,516		
RPT – Domestic Jet Services	155,906	Boeing 737-800	737800	34,182	19,924		
		Airbus A320	A320	17,704	10,596		
		Airbus A330	A33034	1,504	1,564		
		Embraer 170	EMB17U	22,329	12,423		
		Embraer 190	EMB19U	22,836	12,844		
RPT – Regional Non-Jet Services	68,828	Dash 8 300	DHC830	20,162	11,218		
		Dash 8 400	DHC840	20,162	11,218		
		Beechcraft 1900D	1900D	4,063	2,005		
Freight Operations	24,452	Boeing 747-400	747400	606	2,118		
		Boeing 757-200	757PW		12,708		
		MD-11	MD11PW		2,724		
		BAe 146	BAE146		3,024		
		Beechcraft 1900D	1900D		3,272		
Corporate Aviation	2,344	Beech 200	DHC6	1,081	183		
		Cessna 441	CNA441	516	88		
		Cessna 500	CNA500	343	57		
		Gulfstream IV	GIV	17	3		
		Lear 45	LEAR35	48	8		
General Aviation	1,892	Twin Engine	BECP58	819	145		
		Single Engine, Fixed Pitch	GASEPF	307	77		
		Single Engine, Variable Pitch	GASEPV	449	95		
Military Aircraft Operations – Including VIP Operations	2,776	Boeing 737-800	737800	760	140		
		Boeing B747-400	747400	214	24		
		Airbus A330	A33034	214	24		
		Challenger 601	CL601	566	566		
		Hercules C130	C130	114	114		
		Pilatus PC9	PILAT	20	20		
Training	816	Twin Engine	BECP58			61	75
		Single Engine, Fixed Pitch	GASEPF			367	41
		Single Engine, Variable Pitch	GASEPV			252	20
TOTAL FIXED WING	**282,120**			**159,776**	**121,528**	**680**	**136**
Helicopters	2,920	Sikorsky S-76	S76	1,144	316		
		AS350 Squirrel	AS350D	580	242	576	62
TOTAL MOVEMENTS	**285,040**			**161,500**	**122,086**	**1,256**	**198**

Air freight movements are modelled on the Trans-Tasman freight hub scenario described in the *2005 Approved Master Plan.* This forecasts nightly short, medium and long haul Trans-Tasman freight operations by jet aircraft typified by the BAe 146 and B757, linking with long haul international freight arrival and departures by aircraft like the B747 and MD11. These aircraft are commonly used in similar freight operation scenarios throughout the world.

Canberra International Airport will continue as the base for the RAAF VIP squadron. Their operations have been modelled to include core activities by the BBJ and Challenger 601 aircraft, ad hoc military transport, and operations by aircraft typically utilised by visiting heads of state and foreign dignitaries as these movements are facilitated by the VIP Squadron. The latter include the B747 and A330.

Corporate aviation is represented by a range of turboprop and jet aircraft, general aviation by two single-engine and one twin-engine aircraft and helicopters by two types representative of both civil and military operations. As the airport nears its ultimate capacity corporate and general aviation movements will progressively decline as priority is given to RPT services and air freight activity. This is consistent with demonstrated trends at major international airports in Australia and worldwide.

Once the relative proportions of each activity were determined, movements were scaled to match the ultimate practical capacity of the airport.

Distribution of aircraft movements by time of day was determined by reference to the report, *Canberra International Airport: Ultimate Runway Capacity Analysis.* In all three scenarios 56.7% of movements were modelled by day (7am to 7pm) and 43.3% were modelled by night (7pm to 7am).

7.0 AIRCRAFT PROFILES

Standard INM profiles for approach and departure operations have been used for all fixed wing aircraft types except the Dash 8–400, the Embraer 170 and 190, and the Pilatus PC9.

As the Dash 8–400 series has only recently entered service and is not yet included in INM version 6.2a, a user defined aircraft has been modelled based on the Dash 8-300 operational characteristics with noise levels reduced by 3 dBA. This was adopted on advice from Leigh Kenna, then Manager of Environment Regulation, Airspace and Environment Regulatory Unit and Gavan Bennett, Acting Manager Environment Operations, Airservices Australia. The aircraft profile has been changed to reflect the increase in maximum take-off and landing weight, maximum landing distance and the static thrust value. All data was obtained from manufacturer's specifications.

The Embraer 170 and 190 have been modelled as a user defined aircraft (also on advice from Leigh Kenna and Gavan Bennett) based on the 737-800 operational characteristics with the noise levels reduced by 5 dBA and 4 dBA respectively. The aircraft profile has been modified to reflect the reduction in maximum take-off and landing weight, maximum landing distance and the static thrust values. All data was obtained from the manufacturer's specifications.

The departure profile Identifiers for both aircraft have also been modified to retain only those within the range achievable by the aircraft – stage lengths 1, 2 and 3.

A user defined light military turboprop has been included to model occasional visits by the RAAF Roulettes acrobatic team PC9 aircraft. Operational characteristics and noise levels for this aircraft have been sourced from previous INM studies of RAAF Base Pearce and Gingin Airfield prepared by R-AOS for the Department of Defence.

User defined profiles for fixed wing aircraft circuits have been modelled with:

- the fixed wing circuit profiles specified at 1100 feet AGL (which equates to 3000 feet altitude) to conform with current training practices at Canberra; and
- aircraft weight set at the standard Stage 1 departure weight in accordance with INM suggested practices.

User defined profiles have been set up for the two helicopters modelled. Helicopter circuits are also specified at 1100 feet AGL to conform with current training practices, with aircraft weight set at the maximum INM value.

Stage lengths for aircraft departures were determined and modelled in accordance with the destinations forecast in the *2005 Approved Master Plan*. These are summarised in Table 6. The aircraft stage length refers to the distance to the destination airport, plus an allowance for diversion to a nominated alternate - an average of 200 nautical miles (370 kilometres) is normally assumed – and a further 10 percent of this combined distance in accordance with statutory fuel reserve requirements. There is a direct relationship between distance to be travelled and fuel weight with higher fuel weights resulting in reduced rates of climb and lower aircraft departure profiles.

Table 6 Aircraft Origin/Destination and Take-off Stage Lengths

Operation	Aircraft Type	Origin/Destination	Distance	Take-off Stage Length	Arrivals and Departures	
					Day	Night
RPT International	B737-800	NZ/Pacific Islands	1800-2400nm	4	906	544
	B747-400	Los Angeles/Dubai	7200-7500nm	9	222	714
		Beijing	5600nm	8	222	714
		Bangkok/Tokyo/Seoul	4600-5500nm	7	363	1775
	B777-300	Hong Kong/Tokyo/Seoul	4500-5200nm	7	1738	2684
		Singapore/Kuala Lumpur/Bali	3900-4200nm	6	474	632
	A320	NZ/Pacific Islands	1800-2400nm	4	1268	192
	A330	Singapore/Kuala Lumpur/Bali	3900-4500nm	6	3343	3575
	A340	Tokyo, Seoul	4600-7200nm	7	2224	3516
RPT Domestic	B737-800	Sydney	360nm	1	3150	2285
		Melbourne/Brisbane/Adelaide	500-800nm	2	21509	12154
		Cairns/Alice Springs	1250-1450nm	3	3502	1902
		Perth/Darwin	2100nm	4	6021	3583
	320	Avalon/Adelaide/Gold Coast/ Sunshine Coast/Hobart	500-800nm	2	11338	6518
		Cairns/Townsville/Alice Springs	1250-1450nm	3	3007	1755
	A330	Perth/Darwin	2100nm	4	3359	2323
		Melbourne/Brisbane	500-800nm	2	752	782
		Perth/Darwin	2100nm	4	752	782
	Embraer 170	Melbourne/Brisbane/Adelaide	500-800nm	2	22329	12423
	Embraer 190	Melbourne/Brisbane/Adelaide	500-800nm	2	22836	12844
RPT Regional	Dash 8 - 300	Sydney/Regional NSW & Vic	360-500nm	1	20162	11218
	Dash 8 - 400	Sydney/Regional NSW & Vic	360-500nm	1	20162	11218
	Beech 1900D	Regional NSW & Vic	300-500nm	1	4063	2005
Freight Operations	B747-400	Bangkok/Tokyo/Beijing	4600-5500nm	7	606	2118
	B757-200	Melbourne/Brisbane/ /Hobart	500-800nm	2		6354
		Cairns/Townsville	1250-1450nm	3		3812
		NZ/Perth/Darwin	1500-2100nm	4		2542
	MD-11	Hong Kong/Singapore	3900-4500nm	6		2724
	BAe146	Sydney	390nm	1		484
		Melbourne/Adelaide	500-800nm	2		2540
	Beech 1900D	Regional NSW & Vic	300-500nm	1		3272

Standard INM stage lengths include the following ranges:

Stage length 1 – 0 to 500nm

Stage length 2 – 500 to 1000nm

Stage length 3 – 1000 to 1500nm

Stage length 4 – 1500 to 2500nm

Stage length 5 – 2500 to 3500nm

Stage length 6 – 3500 to 4500nm

Stage length 7 – 4500nm to 5500nm

Stage length 8 – 5500 to 6500nm

Stage length 9 – more than 6500nm.

Only larger RPT aircraft can be included in the model with stage lengths greater than 1. The B747-400 is the only long haul INM aircraft included with stage lengths 8 and 9.

Take-off weight and departure profile are also influenced by the quantity of air freight carried in the hold of RPT aircraft or by airline policy to uplift additional fuel to hedge against delays and allow a faster turnaround at the destination airport if required.

Departure profiles recorded by Airservices NFPMS at major airports suggest it may be prudent to model longer stage lengths in marginal cases. For this reason, Melbourne departures – 498nm based on statutory fuel requirements – are modelled as Stage 2 in this study.

It should be noted that Table 6 provides only a sample listing of possible origins and destinations for each aircraft stage length modelled and should not be considered exhaustive. As an example, Singapore and Kuala Lumpur are cited for A330 stage length 7 international operations, but this stage length may also include Bangkok, Hanoi, Hong Kong, Tokyo and Seoul.

8.0 DISTRIBUTION OF MOVEMENTS BY RUNWAY

The distribution of aircraft movements for each ANEC modelled was based on the 3 operating scenarios described in Sections 1 and 4 – two with runway 35 as the preferred and the reverse with runway 17 as the preferred operating mode. The percentage of each operation allocated to each runway direction is detailed in Tables 7 through to 14.

In the runway 35 preferred operating modes 81.75% of runway 17/35 traffic has been modelled in this direction. This is 0.5% greater than the utilisation observed in NFPMS reports for 2005, the last full year of data available on commencement of the ANEF study.

The runway utilisation modelled was derived from consideration of recent statistics of runway usage, the predicted average hourly availability of each runway direction, and the application of noise abatement procedures applicable between 8pm and 7am.

The *Canberra International Airport: Meteorological Analysis* (August 2003) included as Annex 2 established a theoretical runway utilisation for each runway direction by an analysis of meteorological data which considered wind speed and direction coupled with visibility/cloudbase criteria applicable to both non-precision and precision approaches. This report concluded erroneously that:

> *The accuracy of the meteorological analysis can be assessed by comparing the 2002 runway 35 utilisation of 80% with the theoretical average usability of 89% (Table 4.3). This indicates that in practice there are considerations other than weather which determine runway utilisation and that it is likely that this may as much as 10% lower than the usabilities estimated in this report.*

Annex 3 (December 2006) reviews the findings of the meteorological report by taking account of the published noise abatement procedures for Canberra Airport which require ATC and pilots to give preference to landings on runway 17 in the period between 8pm and 7am the following morning. This analysis concluded that the difference between theoretical and practical runway utilisation is more likely to be around 2.5% and that this could be attributed to the fact that ATC is not always able to adopt the direction most favoured by sudden changes in weather conditions.

On this basis, the Annex 3 analysis justifies the allocation of 82.1% of all movements to runway 17 in the 17 preferred operating mode. For convenience 81.75% of runway 17/35 traffic has been modelled in this direction – the same as for the runway 35 preferred modes.

The restricted use of runway 12/30 at night is due to voluntary noise abatement measures which are part of a written agreement between the airport and night freight operators.

Helicopter operations were similarly distributed as helicopters arrive/depart in parallel with the duty runway.

8.1 RUNWAY 35 PREFERRED OPERATING MODES

Table 7 Percentage of Runway Usage by Operation during the Day

RUNWAY	ARRIVAL	DEPARTURE	TRAINING	TOTAL
12	0.09	0.07	0.08	0.24
17	7.17	9.14	0.04	16.35
30	10.96	1.10	0.48	12.54
35	30.97	39.71	0.19	70.87
TOTAL	**49.19**	**50.02**	**0.79**	**100.00**

Table 8 Percentage of Runway Usage by Operation during the Night

RUNWAY	ARRIVAL	DEPARTURE	TRAINING	TOTAL
12	0.07	0.04	0.02	0.13
17	8.02	9.22	0.01	17.25
30	7.82	0.19	0.03	8.04
35	34.58	39.96	0.05	74.59
TOTAL	**50.49**	**49.41**	**0.11**	**100.00**

Table 9 Overall Percentage of Runway Utilisation during the Day and Night

RUNWAY	12	17	30	35
Utilisation - Day	0.24	16.35	12.54	70.87
Utilisation - Night	0.13	17.25	8.04	74.59

Table 10 Overall Percentage of Runway Utilisation

RUNWAY	12	17	30	35
Utilisation	0.18	16.80	10.29	72.73

8.2 RUNWAY 17 PREFERRED OPERATING MODE

Table 11 Percentage of Runway Usage by Operation during the Day

RUNWAY	ARRIVAL	DEPARTURE	TRAINING	TOTAL
12	0.09	0.07	0.08	0.24
17	31.05	39.68	0.17	70.90
30	10.98	1.10	0.33	12.41
35	7.16	9.26	0.04	16.46
TOTAL	**49.28**	**50.11**	**0.62**	**100.00**

Table 12 Percentage of Runway Usage by Operation during the Night

RUNWAY	ARRIVAL	DEPARTURE	TRAINING	TOTAL
12	0.07	0.04	0.02	0.13
17	34.63	39.95	0.04	74.62
30	7.82	0.19	0.02	8.03
35	7.98	9.24	0.01	17.23
TOTAL	**50.50**	**49.42**	**0.09**	**100.00**

Table 13 Overall Percentage of Runway Utilisation during the Day and Night

RUNWAY	12	17	30	35
Utilisation - Day	0.24	70.90	12.41	16.46
Utilisation - Night	0.13	74.62	8.03	17.23

Table 14 Overall Percentage of Runway Utilisation

RUNWAY	12	17	30	35
Utilisation	0.18	72.76	10.22	16.84

9.0 RUNWAY MOVEMENT TABLES

Aircraft have been allocated to specific arrival and departure tracks in accordance with established principles confirmed in discussions between Capital Airport Group, Canberra ATC Tower Manager (Peter Romeis) and Airservices Australia Canberra Approach Sector Manager, Melbourne Centre (Bill Phelan).

The track allocation principles applied to RPT and Freight operations are detailed in Tables 15, 16, 17 and 18. These constitute the majority of aircraft movements on runway 17/35. The application of these track allocation principles is demonstrated by reference to the sample listing of possible origins and destinations provided earlier in Table 6.

Table 15 RPT & Freight Aircraft Arrival Track Allocations - Runway 17

ARRIVAL	TRACK	ORIGIN
Runway 17	JET17A1	NZ, Pacific Islands, Ls Angeles, Beijing, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Sydney, Brisbane, Cairns, Alice Springs, Gold Coast, Sunshine Coast, Townsville and Regional NSW.
	JET17A2	Melbourne, Adelaide, Perth, Hobart, Avalon and Regional Victoria.
	JET17A3	Dubai, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Brisbane, Cairns, Alice Springs, Darwin, Gold Coast, Sunshine Coast, Townsville and Regional NSW.
	JET17A4	NZ, Pacific Islands, Los Angeles, Beijing, Tokyo, Seoul, Brisbane, Cairns, Townsville and Regional NSW.
	JET17A5	NZ and Sydney.
	RNP381	NZ, Pacific Islands, Los Angeles, Beijing, Tokyo, Seoul, Brisbane, Cairns, Townsville and Regional NSW.
	RNP347	Melbourne, Adelaide, Perth, Hobart, Avalon and Regional Victoria.
	RNP343	Melbourne, Adelaide, Perth, Hobart, Avalon and Regional Victoria.
	RNP331	Dubai, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Brisbane, Cairns, Alice Springs, Darwin, Gold Coast, Sunshine Coast, Townsville and Regional NSW.
	RNP305	NZ, Pacific Islands, Los Angeles, Beijing, Tokyo, Seoul, Brisbane, Cairns, Townsville and Regional NSW.
	RNP303	NZ and Sydney.

Table 16 RPT & Freight Aircraft Arrival Track Allocations – Runway 35

ARRIVAL	TRACK	ORIGIN
Runway 35	JET35A1	Melbourne, Avalon, Hobart and Regional Victoria.
	JET35A2	Melbourne, Avalon, Adelaide, Perth, Hobart and Regional Victoria.
	JET35A3	Los Angeles, Dubai, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Brisbane, Cairns, Alice Springs, Darwin, Gold Coast, Sunshine Coast and Regional NSW
	JET35A4	NZ and Sydney.
	JET35A7	Los Angeles, Dubai, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Melbourne, Avalon , Adelaide, Brisbane, Cairns, Alice Springs, Darwin, Gold Coast, Sunshine Coast, Perth, Hobart and Regional NSW/Victoria.
	RNP581	Los Angeles, Dubai, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Brisbane, Cairns, Alice Springs, Darwin, Gold Coast, Sunshine Coast and Regional NSW
	RNP595	Melbourne, Avalon, Adelaide, Perth, Hobart and Regional Victoria.
	RNP567	NZ and Sydney.

Table 17 RPT & Freight Aircraft Departure Track Allocations - Runway 17

DEPARTURE	TRACK	DESTINATION
Runway 17	JET17D1	Melbourne, Adelaide, Perth, Hobart, Avalon and Regional Victoria.
	JET17D2	NZ, Pacific Islands, Dubai, Los Angeles, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Sydney, Brisbane, Cairns, Townsville, Gold Coast, Sunshine Coast, Adelaide, Darwin, Alice Springs, Perth, and Regional NSW.
	JET17D3	NZ and Sydney
	TPROP17	Sydney and Regional NSW

Table 18 RPT & Freight Aircraft Departure Track Allocations - Runway 35

DEPARTURE	TRACK	DESTINATION
Runway 35	JET35D1	NZ, Pacific Islands, Los Angeles, Dubai, Beijing, Hong Kong, Tokyo, Seoul, Singapore, Kuala Lumpur, Bali, Sydney, Brisbane, Cairns, Alice Springs, Darwin, Gold Coast, Sunshine Coast, Townsville and Regional NSW.
	JET35D2	Melbourne, Adelaide, Perth, Hobart, Avalon and Regional Victoria.
	JET35D4	NZ, Pacific Islands, Los Angeles, Beijing, Tokyo, Seoul, Brisbane, Cairns, Townsville and Regional NSW.
	JET35D5	NZ and Sydney
	TPROP35	Melbourne and Regional Victoria

Details of aircraft movements by type, track and time of day for each of the modelled operating scenarios are set out in the following tables:

- the currently preferred runway 35 operating mode and route/track structure, including RNP approaches/departures – Tables 19 and 20;
- the preferred runway 35 operating mode with both the current RNP approaches/departures the additional 15° offset RNP track for long haul domestic/international arrivals – Tables 21 and 22; and
- a preferred runway 17 operating mode with current RNP approaches/departures and a 3° offset precision approach – Tables 23 and 24.

Runway utilisation for the runway 35 preferred scenarios was determined from Airservices NFPMS data for calendar year 2005 – the last full year results available on commencement of the INM study. Utilisation adopted in the runway 17 preferred was determined from the *Canberra International Airport Meteorological Analysis* after validating the calculated runway 35 usability against recorded 2005 NFPMS data, as detailed in Annex 3.

Table 19 *Existing Runway Mode – Aircraft by Operational Category and Track - Day*

	RWY	TRACK	B737	B747	B757	B777	A320	A330	A340	AS350	BAe146	B1900	B200	BEC58P	S-76	C130	CL601	CNA441	CNA500	DHC830	DHC840	EMB170	EMB190	GASEPF	GASEPV	GIV	LEAR45	MD11	PC9	TOTAL
ARRIVAL	12	GA1												0.0786										0.0543	0.0798					0.2127
		GA3																0.0281	0.0047					0.0005						0.0333
	HLS1	12HELO2								0.0987					0.0514															0.1501
	17	GAI											0.0272	0.0872				0.0793	0.0556					0.0371	0.0542		0.0092			0.3498
		JET17A1	0.4640	0.0955		0.4544	0.2936	0.1299	0.0169			0.2654	0.0092	0.0166		0.0088	0.0028	0.0008	0.0006	0.1416	0.0424	0.1143	0.1760							2.2328
		JET17A2	0.2782			0.1136	0.1957									0.0030	0.0073	0.0008	0.0006	0.2828	0.0707	0.6854	0.2346			0.0003				1.8730
		JET17A3	0.4640	0.0239			0.2446	0.6499	0.0847			0.0532	0.0030	0.0038		0.0073			0.0006	0.1416		0.3428	0.3519						0.0024	2.3737
		JET17A4	0.4640				0.0489	0.5200	0.0678			0.0532	0.0182	0.0168		0.0073	0.0189	0.0008		0.7071	0.1697		0.4106			0.0002			0.0030	2.5065
		JET17A5	0.1856				0.1957					0.1592	0.0030	0.0040		0.0029				0.1416										0.6920
		RNP381	1.8560				1.1741										0.0116				0.1697	0.4570	0.7038							4.3722
		RNP347	0.4640				0.2935										0.0073				0.0707	0.9140	0.2346			0.0003				1.9844
		RNP343	0.9280				0.4892										0.0218				0.2122	1.8281	0.7038			0.0011				4.1842
		RNP331	1.8560				0.9784															1.3710	1.4076							5.6130
		RNP305	1.8560				0.1957										0.0756				0.6790		1.6423			0.0008				4.4494
		RNP303	0.4640				0.7827																							1.2467
	HLS2	17HELO2								0.0400					0.0514															0.0914
	30	30A1										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.1633	0.2459	0.0024	0.0172			11.8601
		30A2										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6985
		30A3										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6985
		30A4										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6985
		GA1																												0.2631
	HLS1	30HELO2								0.6512					1.0308															1.6820
	35	GA1											0.1763	0.0445				0.1275	0.0920					0.0402	0.0258		0.0397			0.5460
		GA2												0.1446				0.1275	0.0896					0.1205	0.0775					0.5597
		JET35A1	0.4021	0.0518		0.2461	0.4240	0.5633	0.0735			0.6905	0.0342	0.1446		0.0381	0.0252	0.0177	0.0075	1.2259	0.3065	1.4853	2.0333			0.0007				7.7703
		JET35A2	0.8042				0.4240									0.0317	0.0126	0.0177	0.0075			1.4853				0.0009			0.0102	2.7941
		JET35A3	4.0212	0.2589		1.2305	2.3319	2.8164	0.3674			0.2302	0.0079	0.0389		0.0254			0.0075	0.6130	0.3065	1.9804	1.0166							15.2527
		JET35A4	2.8149	0.2072		0.9844	1.0599	2.2531	0.2939			1.3809	0.0447	0.1836		0.0317	0.0882	0.0638	0.0448	4.2907	0.6130		2.0333		0.1315	0.0007			0.0125	16.5328
		JET35A7																												0.0000
		RNP581	16.0850				9.3275														2.4518	7.9216	4.0665			0.0028				39.8552
		RNP595	4.8255				3.3918										0.1512					11.8823	8.1331			0.0037				28.3876
		RNP567	11.2595				4.2398										0.3528				2.4518		8.1331			0.0028				26.4398
DEPARTURE	12	GD1												0.0407										0.0181	0.0264					0.0852
		GD2												0.0827										0.0361	0.0535					0.1723
		GD5																0.0284	0.0047					0.0005						0.0336
	17	GD1											0.0362					0.0619	0.0565					0.0371	0.0542	0.0013	0.0092			0.2764
		JET17D1	3.6539				1.4562	1.0399	0.9730							0.0129	0.0770			0.5118	0.5118	3.4544	3.5191			0.0005			0.0022	15.1357
		JET17D2	4.5674	0.7166		0.5680	2.8153	0.1300														0.5757	0.5865							10.0365
		JET17D3	0.9135				0.5825	0.1300				0.3958				0.0164	0.0683		0.0006			1.7272	1.7596			0.0008			0.0028	5.5975
		TPROP17										0.3958	0.0252	0.0884				0.0008		4.6063	4.6063									9.7228
	30	GD1											1.1383	0.5170				0.2177	0.1434					0.1650	0.2459	0.0093	0.0172			2.4538
		GD2											0.0232	0.0106																0.0338
		GD3																0.0097	0.0064					0.0017						0.0178
		GD4																0.0145	0.0096					0.0017						0.0258
	HLS1	30HELO3								0.6493					1.7051															2.3544
	35	GD1											0.1038	0.1226				0.2581	0.1806					0.1607	0.1197	0.0059	0.0397			0.9911
		JET35D1	1.9792	2.7952		2.4611	1.6827									0.0558	0.0882	0.0072	0.0049	1.1089	1.1089	3.7422	3.8124			0.0023			0.0081	18.8571
		JET35D2	27.7086				15.1440	1.1266														11.2267	11.4372							66.6433
		JET35D4	9.8960	0.3106			4.2067	4.5062	4.2165							0.0711	0.5418	0.0072	0.0025	1.1089	1.1089	9.9793	10.1664			0.0034			0.0132	46.1387
		JET35D5										1.7153	0.1624	0.2605				0.0860	0.0594	17.7426	17.7426				0.1150					37.8838
		TPROP35										1.7153								2.2178	2.2178									6.1509
	HLS2	35HELO3								0.1476					0.2948															0.4424
TGO	12	G1L												0.0098											0.0224					0.0322
		G1R												0.0298											0.0672					0.0970
		G3L																						0.0326						0.0326
		G3R																						0.0982						0.0982
	HLS1	12HELO1A								0.0042																				0.0042
		12HELO1B								0.0974																				0.0974
	17	G1L												0.0072											0.0152					0.0224
		G1R												0.0214											0.0456					0.0670
		G3L																						0.0220						0.0220
		G3R																						0.0664						0.0664
	30	G1L												0.0348											0.0688					0.1036
		G1R												0.1044											0.2068					0.3112
		G3L																						0.1006						0.1006
		G3R																						0.3020						0.3020
	HLS1	30HELO1B								1.3380																				1.3380
	35	G1L																							0.0658					0.0968
		G1R																							0.1976					0.2904
		G3L												0.0310										0.0960						0.0960
		G3R												0.0928										0.2882						0.2882
	HLS2	35HELO1A								0.1378																				0.1378
TOTAL			98.2110	4.4597	0.0000	6.0581	51.9784	13.8653	6.0937	3.1642	0.0000	11.1312	2.9608	2.5761	3.1335	0.3124	1.5506	1.4147	0.9400	55.2378	55.2375	61.1730	62.5623	1.8479	1.9188	0.0474	0.1322	0.0000	0.0544	446.0612

Table 20 *Existing Runway Mode – Aircraft by Operational Category and Track – Night*

	RWY	TRACK	B737	B747	B757	B777	A320	A330	A340	AS350	BAe146	B1900	B200	BEC58P	S-76	C130	CL601	CNA441	CNA500	DHC830	DHC840	EMB170	EMB190	GASEPF	GASEPV	GIV	LEAR45	MD11	PC9	TOTAL
ARRIVAL	12	GA1												0.0178										0.0135	0.0170					0.0483
	12	GA3																0.0112	0.0008					0.0001						0.0121
	HLS1	12HELO2								0.0403					0.1261															0.1664
	17	GA1											0.0053	0.0162				0.0129	0.0091					0.0093	0.0115		0.0015			0.0658
	17	JET17A1	0.2610	1.3378	0.3915	0.6815	0.1652	0.1326	0.1304		0.0388	0.3366	0.0018	0.0031		0.0088	0.0028	0.0002	0.0002	0.0706	0.0212	0.0643	0.0990					0.5597		4.3072
	17	JET17A2	0.1565		0.1958	0.1704	0.1101				0.0777					0.0030	0.0073	0.0002	0.0002	0.1408	0.0353	0.3854	0.1320			0.0001				1.4147
	17	JET17A3	0.2610	0.3345	0.4570		0.1376	0.6631	0.6524		0.0466	0.0674	0.0006	0.0007		0.0073			0.0002	0.0706		0.1928	0.1980					0.1399	0.0024	3.2321
	17	JET17A4	0.2610		0.4570		0.0275	0.5305	0.5219		0.0466	0.0674	0.0036	0.0031		0.0073	0.0189	0.0002		0.3522	0.0844		0.2309						0.0026	2.6151
	17	JET17A5	0.1044		0.1306		0.1101				0.0233	0.2020	0.0006	0.0007		0.0029				0.0706										0.6452
	17	RNP381	1.0440		0.3917		0.6604				0.0854						0.0116				0.0846	0.2571	0.3959							2.9307
	17	RNP347	0.2610		0.0653		0.1651				0.0621						0.0073				0.0353	0.5141	0.1320			0.0001				1.2423
	17	RNP343	0.5220		0.1306		0.2752				0.1243						0.0218				0.1058	1.0283	0.3959			0.0002				2.6041
	17	RNP331	1.0440		0.4570		0.5504				0.1087											0.7712	0.7918							3.7231
	17	RNP305	1.0440		0.4570		0.1101				0.1087						0.0756				0.3385		0.9238			0.0001				3.0578
	17	RNP303	0.2610		0.1306		0.4403				0.0544																			0.8863
	HLS2	17HELO2								0.0151					0.1261															0.1412
	30	30A1										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0408	0.0522	0.0003				6.3365
	30	30A2										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0004		0.0003				6.2961
	30	30A3										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0004		0.0003				5.2961
	30	30A4										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0004		0.0003				6.2961
	30	GA1																									0.0028			0.0550
	HLS1	30HELO2								0.2806					0.6141															0.8947
	35	GA1											0.0339	0.0082				0.0207	0.0149					0.0100	0.0055		0.0065			0.0997
	35	GA2												0.0268				0.0207	0.0146					0.0301	0.0164					0.1086
	35	JET35A1	0.2262	0.7246	0.4243	0.3692	0.2385	0.5747	0.5654		0.1683	0.8751	0.0066	0.0266		0.0381	0.0252	0.0029	0.0012	0.6112	0.1528	0.8355	1.1437			0.0001		0.6064		7.6168
	35	JET35A2	0.4524		0.4243		0.2385				0.1663					0.0317	0.0126	0.0029	0.0012			0.8355				0.0002			0.0098	2.1774
	35	JET35A3	2.2619	3.6232	3.8775	1.8458	1.3117	2.8733	2.8270		0.3702	0.2917	0.0015	0.0072		0.0245			0.0012	0.3056	0.1528	1.1140	0.5719					1.2127		22.4746
	35	JET35A4	1.5834	2.8986	2.5459	1.4767	0.5962	2.2986	2.2616		0.3029	1.7502	0.0086	0.0340		0.0317	0.0882	0.0103	0.0073	2.1392	0.3056		1.1437		0.0279	0.0001		1.2127	0.0120	20.7354
	35	JET35A7																												0.0000
	35	RNP581	9.0478		3.6775		5.2467				0.8414										1.2224	4.4559	2.2874			0.0005				26.7796
	35	RNP595	2.7143		0.8486		1.9079				0.8078						0.1512					6.6836	4.5749			0.0006				17.6891
	35	RNP567	6.3335		2.5459		2.3849				0.7068						0.3528				1.2224		4.5749			0.0005				18.1217
DEPARTURE	12	GD1												0.0275										0.0045	0.0056					0.0376
	12	GD2												0.0557										0.0090	0.0114					0.0761
	12	GD5																0.0104	0.0008					0.0001						0.0113
	17	GD1											0.0064					0.0123	0.0096					0.0093	0.0115	0.0002	0.0015			0.0508
	17	JET17D1	2.1460	1.0750	0.8160		0.8370	1.0609	0.5013		0.4660					0.0129	0.0770			0.2942	0.2942	1.9012	1.9795			0.0001		0.6997	0.0024	11.0884
	17	JET17D2	2.6825		1.6320	0.8519	1.6182	0.1326			0.1864											0.3169	0.3299							8.8254
	17	JET17D3	0.5365		0.8160		0.3348	0.1326			0.1242	0.8037				0.0164	0.0683		0.0001			0.9506	0.9898			0.0001			0.0030	4.7761
	17	TPROP17										0.8037	0.0045	0.0171				0.0001		2.6477	2.6477									6.1208
	30	GD1											0.1805	0.0233				0.0354	0.0243					0.0412	0.0522	0.0023	0.0028			0.3620
	30	GD2											0.0037	0.0005																0.0046
	30	GD3																0.0016	0.0011					0.0004						0.0027
	30	GD4																0.0024	0.0016					0.0004						0.0044
	HLS1	30HELO3								0.2622																				0.2622
	35	GD1											0.0184	0.0237				0.0386	0.0306					0.0402	0.0254	0.0007	0.0065			0.1841
	35	JET35D1	1.1624	4.1928	2.1216	3.6916	0.9672				0.6732					0.0558	0.0882	0.0011	0.0008	0.6374	0.6374	2.0597	2.1445			0.0003			0.0088	18.4428
	35	JET35D2	16.2735		8.4865		8.7048	1.1494			2.1541											6.1790	6.4334							49.3307
	35	JET35D4	5.8119	0.4658	3.5360		2.4180	4.5972	2.1722		0.5384					0.0711	0.5418	0.0011	0.0004	0.6374	0.6374	5.4925	5.7166			0.0004		3.0317	0.0144	35.6863
	35	JET35D5										3.4825	0.0288	0.0503				0.0129	0.0101	10.1985	10.1985				0.0244					24.0060
	35	TPROP35										3.4825								1.2748	1.2748									6.0321
	HLS2	35HELO3								0.0688																				0.0688
TGO	12	G1L												0.0014											0.0002					0.0016
	12	G1R												0.0044											0.0004					0.0048
	12	G3L																						0.0002						0.0002
	12	G3R																						0.0008						0.0008
	HLS1	12HELO1A								0.0022																				0.0022
	HLS1	12HELO1B								0.0418																				0.0418
	17	G1L												0.0008											0.0024					0.0032
	17	G1R												0.0024											0.0074					0.0098
	17	G3L																						0.0050						0.0050
	17	G3R																						0.0148						0.0148
	30	G1L												0.0044											0.0004					0.0048
	30	G1R												0.0132											0.0016					0.0148
	30	G3L																						0.0012						0.0012
	30	G3R																						0.0034						0.0034
	HLS1	30HELO1A								0.0370																				0.0370
	HLS1	30HELO1B								0.0302																				0.0302
	35	G1L												0.0036											0.0108					0.0144
	35	G1R												0.0108											0.0324					0.0432
	35	G3L																						0.0216						0.0216
	35	G3R																						0.0648						0.0648
	HLS2	35HELO1A								0.0598																				0.0598
TOTAL			56.4522	14.6523	34.8162	9.0871	29.5564	14.1455	9.6322	0.8360	6.2846	14.4580	0.5020	0.4373	0.8663	0.3124	1.5506	0.2401	0.1559	30.7348	30.7351	34.0378	35.1915	0.3219	0.3166	0.0078	0.0216	7.4628	0.0554	334.8704

Table 21 *Offset Approach – Aircraft by Operational Category and Track – Day*

	RWY	TRACK	B737	B747	B757	B777	A320	A330	A340	AS350	BAe146	B1900	B200	BEC58P	S-76	C130	CL601	CNA441	CNA500	DHC830	DHC840	EMB170	EMB190	GASEPF	GASEPV	GIV	LEAR45	MD11	PC9	TOTAL
ARRIVAL	12	GA1												0.0786										0.0543	0.0798					0.2127
		GA3																0.0281	0.0047					0.0005						0.0333
	HLS1	12HELO2								0.0987					0.0514															0.1501
	17	GAI											0.0272	0.0872				0.0793	0.0556					0.0371	0.0542		0.0692			0.3498
		JET17A1	0.4640	0.0955		0.4544	0.2936	0.1299	0.0170			0.2654	0.0092	0.0167		0.0088	0.0028	0.0008	0.0006	0.1416	0.0424	0.1143	0.1760							2.2330
		JET17A2	0.2782			0.1136	0.1957									0.0030	0.0073	0.0008	0.0006	0.2828	0.0707	0.6854	0.2346			0.0003				1.8760
		JET17A3	0.4640	0.0239			0.2446	0.6499	0.0847			0.0532	0.0030	0.0039		0.0073			0.0006	0.1416		0.3428	0.3519						0.0024	2.3890
		JET17A4	0.4640				0.0489	0.5200	0.0678			0.0532	0.0182	0.0167		0.0073	0.0189	0.0008		0.7071	0.1697		0.4106			0.0002			0.0030	2.4912
		JET17A5	0.1856				0.1957					0.1592	0.0030	0.0039		0.0029				0.1416										0.6889
		RNP381	1.8560				1.1741										0.0116				0.1697	0.4570	0.7038							4.3722
		RNP347	0.4640				0.2935										0.0073				0.0707	0.9140	0.2346			0.0003				1.9844
		RNP343	0.9280				0.4892										0.0218				0.2122	1.8281	0.7038			0.0011				4.1842
		RNP331	1.8560				0.9784															1.3710	1.4076							5.6130
		RNP305	1.8560				0.1957										0.0756				0.6790		1.6423			0.0008				4.4494
		RNP303	0.4640				0.7827																							1.2467
	HLS2	17HELO2								0.0400					0.0514															0.0914
	30	30A1										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.1633	0.2459	0.0024	0.0172			11.8601
		30A2										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6985
		30A3										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6985
		30A4										1.0191	0.2870	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6985
		GA1																												0.2631
	HLS1	30HELO2								0.6512					1.0308															1.6820
	35	GA1											0.1763	0.0445				0.1275	0.0920					0.0402	0.0258		0.0397			0.5460
		GA2												0.1446				0.1275	0.0896					0.1205	0.0775					0.5597
		JET35A1										0.6805	0.0342	0.1446		0.0381		0.0177	0.0075	1.2259										2.1585
		JET35A2														0.0317		0.0177	0.0075										0.0102	0.0671
		JET35A3										0.2302	0.0079	0.0389		0.0254			0.0075	0.6130										0.9229
		JET35A4										1.3809	0.0447	0.1836		0.0317		0.0638	0.0448	4.2907					0.1315				0.0125	6.1842
		JET35A7	8.0425	0.5179		2.4610	4.2398	5.6328	0.7347								0.1260				1.2258	4.9510				0.0023				33.0170
		RNP581	16.0849				9.3275														2.4518	7.9216	5.0832			0.0028				39.8551
		RNP595	4.8255				3.3918										0.1512					11.8823	4.0665			0.0037				28.3876
		RNP567	11.2595				4.2398										0.3528				2.4520		8.1331			0.0028				26.4400
DEPARTURE	12	GD1												0.0407									8.1331	0.0181	0.0264					0.0852
		GD2												0.0827										0.0361	0.0535					0.1723
		GD5																0.0284	0.0047					0.0005						0.0336
	17	GD1											0.0362					0.0819	0.0565					0.0371	0.0542	0.0013	0.0092			0.7063
		JET17D1	3.6539				1.4562	1.0399	0.9730							0.0129	0.0770			0.5118	0.5118	3.4544	3.5191			0.0005			0.0022	14.7828
		JET17D2	1.8270	0.7166		0.5680	2.8153	0.1300														0.5757	0.5865							7.2191
		JET17D3	0.9135				0.5825	0.1300				0.3958				0.0164	0.0683		0.0006			1.7272	1.7598			0.0008			0.0028	5.5969
		TPROP17										0.3958	0.0252	0.0884				0.0008		4.6063	4.6063									9.7234
	30	GD1											1.1383	0.5170				0.2177	0.1434					0.1650	0.2459	0.0093	0.0172			2.4538
		GD2											0.0232	0.0106																0.0338
		GD3																0.0097	0.0064					0.0017						0.0178
		GD4																0.0145	0.0096					0.0017						0.0258
	HLS1	30HELO3								0.6493					1.7051															2.3544
	35	GD1											0.1038	0.1226				0.2581	0.1806					0.1607	0.1197	0.0059	0.0397			2.1009
		JET35D1	1.9792	2.7952		2.4611	1.6827									0.0558	0.0682	0.0072	0.0049	1.1089	1.1089	3.7422	3.8124			0.0023			0.0081	17.7482
		JET35D2	30.4492				15.1440	1.1266														11.2267	11.4372							69.3837
		JET35D4	9.8960	0.3106			4.2067	4.5062	4.2165							0.0711	0.5418	0.0072	0.0025	1.1089	1.1089	9.9793	10.1664			0.0034			0.0132	46.1387
		JET35D5										1.7153	0.1624	0.2605				0.0860	0.0594	17.7426	17.7426				0.1150					37.8838
		TPROP35										1.7153								2.2178	2.2178									6.1509
	HLS2	35HELO3								0.1476					0.2948															0.4424
TGO	12	G1L												0.0098											0.0224					0.0322
		G1R												0.0298											0.0672					0.0970
		G3L																						0.0326						0.0326
		G3R																						0.0982						0.0982
	HLS1	12HELO1A								0.0042																				0.0042
		12HELO1B								0.0974																				0.0974
	17	G1L												0.0072											0.0152					0.0224
		G1R												0.0214											0.0456					0.0670
		G3L																						0.0220						0.0220
		G3R																						0.0664						0.0664
	30	G1L												0.0348											0.0688					0.1036
		G1R												0.1044											0.2068					0.3112
		G3L																						0.1006						0.1006
		G3R																						0.3020						0.3020
	HLS1	30HELO1A																												0.0000
		30HELO1B								1.3380																				1.3380
	35	G1L												0.0310											0.0658					0.0968
		G1R												0.0928											0.1976					0.2904
		G3L																						0.0960						0.0960
		G3R																						0.2882						0.2882
	HLS2	35HELO1A								0.1378																				0.1378
TOTAL			98.2110	4.4597	0.0000	6.0581	51.9784	13.8653	6.0937	3.1642	0.0000	11.1312	2.9608	2.5761	3.1335	0.3124	1.5506	1.4147	0.9400	55.2378	55.2375	61.1730	62.5623	1.8479	1.9188	0.0474	0.1322	0.0000	0.0544	446.0612

Table 22 Offset Approach – Aircraft by Operational Category and Track – Night

	RWY	TRACK	B737	B747	B757	B777	A320	A330	A340	AS350	BAe146	B1900	B200	BEC58P	S-76	C130	CL601	CNA441	CNA500	DHC830	DHC840	EMB170	EMB190	GASEPF	GASEPV	GIV	LEAR45	MD11	PC9	TOTAL
ARRIVAL	12	GA1												0.0178										0.0135	0.0170					0.0483
		GA3																0.0112	0.0008					0.0001						0.0121
	HLS1	12HELO2								0.0403					0.1261															0.1664
	17	GAI											0.0053	0.0162				0.0129	0.0091					0.0093	0.0115		0.0015			0.0658
		JET17A1	0.2610	1.3378	0.3915	0.6815	0.1652	0.1326	0.1304		0.0388	0.3366	0.0018	0.0031		0.0088	0.0028	0.0002	0.0002	0.0706	0.0212	0.0643	0.0990					0.5597		4.3071
		JET17A2	0.1565		0.1958	0.1704	0.1101				0.0777					0.0030	0.0073	0.0002	0.0002	0.1408	0.0353	0.3854	0.1320			0.0001				1.4148
		JET17A3	0.2610	0.3345	0.4570		0.1376	0.6631	0.6524		0.0466	0.0674	0.0006	0.0007		0.0073			0.0002	0.0706		0.1928	0.1980					0.1399	0.0024	3.2321
		JET17A4	0.2610		0.4570		0.0275	0.5305	0.5219		0.0466	0.0674	0.0036	0.0031		0.0073	0.0189	0.0002		0.3522	0.0844		0.2309						0.0026	2.6151
		JET17A5	0.1044		0.1306		0.1101				0.0233	0.2020	0.0006	0.0007		0.0029				0.0706										0.6452
		RNP381	1.0440		0.3917		0.6604				0.0854						0.0116				0.0846	0.2571	0.3959							2.9307
		RNP347	0.2610		0.0653		0.1651				0.0621						0.0073				0.0353	0.5141	0.1320			0.0001				1.2423
		RNP343	0.5220		0.1306		0.2752				0.1243						0.0218				0.1058	1.0283	0.3959			0.0002				2.6041
		RNP331	1.0440		0.4570		0.5504				0.1087											0.7712	0.7918							3.7231
		RNP305	1.0440		0.4570		0.1101				0.1087						0.0756				0.3385		0.9238			0.0001				3.0578
		RNP303	0.2610		0.1306		0.4403				0.0544																			0.8863
	HLS2	17HELO2								0.0151					0.1261															0.1412
	30	30A1										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0408	0.0522	0.0003				6.3365
		30A2										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0004		0.0003				6.2961
		30A3										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0004		0.0003				6.2961
		30A4										0.5738	0.0493	0.0134				0.0105	0.0064	2.8210	2.8210			0.0004		0.0003				6.2961
		GA1																									0.0028			0.0550
	HLS1	30HELO2								0.2806					0.6141															0.8947
	35	GA1											0.0339	0.0082				0.0207	0.0149					0.0100	0.0055		0.0065			0.0997
		GA2												0.0268				0.0207	0.0146					0.0301	0.0164					0.1086
		JET35A1										0.8751	0.0066	0.0268		0.0381		0.0029	0.0012	0.6112										1.5619
		JET35A2														0.0317		0.0029	0.0012										0.0098	0.0456
		JET35A3										0.2917	0.0015	0.0072		0.0254			0.0012	0.3056										0.6326
		JET35A4										1.7502	0.0086	0.0340		0.0317		0.0103	0.0073	2.1392					0.0279				0.0120	4.0212
		JET35A7	4.5239	7.2464	7.0720	3.6917	2.3849	5.7466	5.6540		1.0097						0.1260				0.6112	2.7850				0.0004		3.0318		46.7429
		RNP581	9.0478		3.6775		5.2467				0.8414										1.2224	4.4559	2.8593			0.0005				26.7796
		RNP595	2.7143		0.8486		1.9079				0.8078						0.1512					6.6838	2.2874			0.0006				17.6891
		RNP567	6.3335		2.5459		2.3849				0.7068						0.3528				1.2224		4.5749			0.0005				18.1217
DEPARTURE	12	GD1												0.0275									4.5749	0.0045	0.0056					0.0376
		GD2												0.0557										0.0090	0.0114					0.0761
		GD5																0.0104	0.0008					0.0001						0.0113
	17	GD1											0.0064					0.0123	0.0096					0.0093	0.0115	0.0002	0.0015			0.3450
		JET17D1	2.1460		0.8160		0.6370	1.0609	0.5013		0.4660					0.0129	0.0770			0.2942	0.2942	1.9012	1.9795			0.0001		0.6997	0.0024	10.7942
		JET17D2	1.0730	1.0750	1.6320	0.8519	1.6182	0.1326			0.1864											0.3169	0.3299							7.2159
		JET17D3	0.5365		0.8160		0.3348	0.1326			0.1242	0.8037				0.0164	0.0683		0.0001			0.9506	0.9898			0.0001			0.0030	4.7760
		TPROP17										0.8037	0.0045	0.0171				0.0001	0.0243	2.6477	2.6477									6.1209
	30	GD1											0.1805	0.0233				0.0354						0.0412	0.0522	0.0023	0.0028			0.3620
		GD2											0.0037	0.0005																0.0042
		GD3																0.0016	0.0011					0.0004						0.0031
		GD4																0.0024	0.0016					0.0004						0.0044
	HLS1	30HELO3								0.2622																				0.2622
	35	GD1											0.0184	0.0237				0.0386	0.0306					0.0402	0.0254	0.0007	0.0065			0.8215
		JET35D1	1.1624	4.1928	2.1216	3.6916	0.9672				0.6732					0.0558	0.0862	0.0011	0.0008	0.6374	0.6374	2.0597	2.1445			0.0003			0.0088	17.8054
		JET35D2	17.8830		8.4865		8.7048	1.1494			2.1541											6.1790	6.4334							50.9902
		JET35D4	5.8119	0.4658	3.5360		2.4180	4.5972	2.1722		0.5384					0.0711	0.5418	0.0011	0.0004	0.6374	0.6374	5.4925	5.7186			0.0004		3.0317	0.0144	35.6853
		JET35D5										3.4825	0.0288	0.0503				0.0129	0.0101	10.1985	10.1985				0.0244					24.0060
		TPROP35										3.4825								1.2748	1.2748									6.0321
	HLS2	35HELO3								0.0668																				0.0668
TGO	12	G1L												0.0014											0.0002					0.0016
		G1R												0.0044											0.0004					0.0048
		G3L																						0.0002						0.0002
		G3R																						0.0008						0.0008
	HLS1	12HELO1A								0.0022																				0.0022
		12HELO1B								0.0418																				0.0418
	17	G1L												0.0008											0.0024					0.0032
		G1R												0.0024											0.0074					0.0098
		G3L																						0.0050						0.0050
		G3R																						0.0148						0.0148
	30	G1L												0.0044											0.0004					0.0048
		G1R												0.0132											0.0016					0.0148
		G3L																						0.0012						0.0012
		G3R																						0.0034						0.0034
	HLS1	30HELO1A								0.0370																				0.0370
		30HELO1B								0.0302																				0.0300
	35	G1L												0.0036											0.0108					0.0144
		G1R												0.0108											0.0324					0.0432
		G3L																						0.0216						0.0216
		G3R																						0.0648						0.0648
	HLS2	35HELO1A								0.0598																				0.0600
TOTAL			56.4522	14.6523	34.8162	9.0871	29.5564	14.1455	9.6322	0.8360	8.2846	14.4580	0.5020	0.4373	0.8563	0.3124	1.5506	0.2401	0.1559	30.7348	30.7351	34.0378	35.1915	0.3219	0.3166	0.0078	0.0216	7.4628	0.0554	334.8704

Table 23 Runway 17 Preferred – Aircraft by Operational Category and Track – Day

	RWY	TRACK	B737	B747	B757	B777	A320	A330	A340	AS350	BAe146	B1900	B200	BEC58P	S-76	C130	CL601	CNA441	CNA500	DHC830	DHC840	EMB170	EMB190	GASEPF	GASEPV	GIV	LEAR45	MD11	PC9	TOTAL
ARRIVAL	12	GA1												0.0785										0.0543	0.0799					0.2127
	12	GA3																0.0261	0.0047					0.0005						0.0333
	HLS1	12HELO2								0.0987					0.0514															0.1501
	17	GAI											0.1184	0.3783				0.3437	0.2414					0.1607	0.2348		0.0397			1.5170
	17	JET17A1	2.0106	0.4143		1.9689	1.2719	0.5633	0.0735			1.1508	0.0396	0.0722		0.0382	0.0126	0.0036	0.0026	0.6130	0.1839	0.4951	0.7625							9.6766
	17	JET17A2	1.2064			0.4922	0.8480									0.0127	0.0315		0.0026	1.2260	0.3065	2.9706	1.0166			0.0015				8.1278
	17	JET17A3	2.0106	0.1035			1.0599	2.8164	0.3674			0.2301	0.0132	0.0166		0.0316		0.0036	0.0026	0.6130		1.4853	1.5250						0.0102	10.3548
	17	JET17A4	2.0106				0.2120	2.2530	0.2938			0.2301	0.0790	0.0724		0.0316	0.0819	0.0036		3.0648	0.7355		1.7791			0.0008			0.0126	10.7950
	17	JET17A5	0.8042				0.8480					0.6906	0.0132	0.0168		0.0128				0.6130										2.9854
	17	RNP381	8.0425				5.0878										0.0504				0.7355	1.9804	3.0499							18.9465
	17	RNP347	2.0106				1.2719										0.0315				0.3065	3.9606	1.0166			0.0014				8.5993
	17	RNP343	4.0212				2.1199										0.0945				0.9194	7.9215	3.0499			0.0046				18.1310
	17	RNP331	8.0425				4.2398															5.9411	6.0999							24.3233
	17	RNP305	8.0425				0.8480										0.3276				2.9422		7.1164			0.0033				19.2800
	17	RNP303	2.0106				3.3918																							5.4024
	HLS2	17HELO2								0.0400					0.0514															0.0914
	30	30A1										1.0191	0.2869	0.0898				0.0598	0.0401	5.0993	5.0993			0.1633		0.0024				11.8600
	30	30A2										1.0191	0.2869	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6984
	30	30A3										1.0191	0.2869	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6984
	30	30A4										1.0191	0.2869	0.0898				0.0598	0.0401	5.0993	5.0993			0.0017		0.0024				11.6984
	30	GA1																							0.2458		0.0172			0.2630
	HLS1	30HELO2								0.6512					1.0308															1.6820
	35	GA1											0.0407	0.0103				0.0293	0.0211					0.0093	0.0060		0.0092			0.1259
	35	GA2												0.0334				0.0293	0.0206					0.0278	0.0179					0.1290
	35	JET35A1	0.0928	0.0120		0.0568	0.0978	0.1300	0.0170			0.1593	0.0079	0.0334		0.0088	0.0058	0.0041	0.0017	0.2826	0.0707	0.3428	0.4692			0.0002				1.7931
	35	JET35A2	0.1856				0.0978									0.0073	0.0029	0.0041	0.0017			0.3428				0.0002			0.0024	0.6448
	35	JET35A3	0.9280	0.0598		0.2840	0.5381	0.6499	0.0848			0.0531	0.0018	0.0090		0.0059			0.0017	0.1415	0.0707	0.4570	0.2346							3.5199
	35	JET35A4	0.6496	0.0477		0.2271	0.2446	0.5200	0.0677			0.3186	0.0103	0.0423		0.0073	0.0204	0.0146	0.0103	0.9902	0.1415		0.4692		0.0393	0.0002			0.0029	3.8148
	35	JET35A7																												0.0000
	35	RNP581	3.7119				2.1525														0.5658	1.8281	0.9384			0.0006				9.1973
	35	RNP595	1.1137				0.7828										0.0349					2.7420	1.8769			0.0009				6.5512
	35	RNP567	2.5983				0.9784										0.0813				0.5658		1.8769			0.0006				6.1013
DEPARTURE	12	GD1												0.0407										0.0181	0.0264					0.0852
	12	GD2												0.0827										0.0361	0.0535					0.1723
	12	GD5																0.0285	0.0047					0.0005						0.0337
	17	GD1											0.1570					0.3549	0.2449					0.1607	0.2348	0.0057	0.0397			1.1977
	17	JET17D1	15.8336				6.3100	4.5063	4.2165							0.0558	0.3339			2.2179	2.2179	14.9689	15.2495			0.0024			0.0094	65.9221
	17	JET17D2	19.7920	3.1058		2.4611	12.1994	0.5633														2.4948	2.5416							43.1580
	17	JET17D3	3.9584				2.5241	0.5632				1.7153				0.0711	0.2961		0.0025			7.4845	7.6248			0.0035			0.0122	24.2557
	17	TPROP17										1.7153	0.1091	0.3830				0.0036		19.9604	19.9604									42.1318
	30	GD1											1.1383	0.5171				0.2176	0.1434					0.1650	0.2459	0.0093	0.0172			2.4538
	30	GD2											0.0232	0.0107																0.0339
	30	GD3																0.0096	0.0064					0.0017						0.0177
	30	GD4																0.0144	0.0096					0.0017						0.0257
	HLS1	30HELO3								0.6493					1.7051															2.3544
	35	GD1											0.0240	0.0283				0.0596	0.0417					0.0371	0.0276	0.0013	0.0092			0.2288
	35	JET35D1	0.4567	0.6450		0.5680	0.3883									0.0129	0.0203	0.0017	0.0011	0.2559	0.2559	0.8636	0.8798			0.0005			0.0016	4.3513
	35	JET35D2	6.3944				3.4948	0.2600														2.5906	2.6393							15.3793
	35	JET35D4	2.2837	0.0716			0.9708	1.0399	0.9730							0.0164	0.1250	0.0017	0.0006	0.2559	0.2559	2.3029	2.3462			0.0008			0.0031	10.6475
	35	JET35D5										0.3958	0.0375	0.0600				0.0199	0.0137	4.0944	4.0944				0.0265					8.7422
	35	TPROP35										0.3958								0.5118	0.5118									1.4194
	HLS2	35HELO3								0.1476					0.2948															0.4424
TGO	12	G1L												0.0098											0.0224					0.0322
	12	G1R												0.0298											0.0672					0.0970
	12	G3L																						0.0326						0.0326
	12	G3R																						0.0982						0.0982
	HLS1	12HELO1A								0.0042																				0.0042
	HLS1	12HELO1B								0.0974																				0.0974
	17	G1L												0.0310											0.0658					0.0968
	17	G1R												0.0928											0.1976					0.2904
	17	G3L																						0.0960						0.0960
	17	G3R																						0.2882						0.2882
	30	G1L												0.0348											0.0688					0.1036
	30	G1R												0.1044											0.2068					0.3112
	30	G3L																						0.1006						0.1006
	30	G3R																						0.3020						0.3020
	HLS1	12HELO1A																												0.0000
	HLS1	12HELO1B								1.3380																				1.3380
	35	G1L												0.0072											0.0152					0.0224
	35	G1R												0.0214											0.0456					0.0670
	35	G3L																						0.0220						0.0220
	35	G3R																						0.0664						0.0664
	HLS2	35HELO1A								0.1378																				0.1378
TOTAL			98.2110	4.4597	0.0000	6.0581	51.9784	13.8653	6.0937	3.1642	0.0000	11.1312	2.9608	2.5761	3.1335	0.3124	1.5506	1.4147	0.9400	55.2378	55.2375	61.1730	62.5623	1.8479	1.9188	0.0474	0.1322	0.0000	0.0544	446.0612

Table 24 *Runway 17 Preferred – Aircraft by Operational Category and Track – Night*

	RWY	TRACK	B737	B747	B757	B777	A320	A330	A340	AS350	BAe146	B1900	B200	BEC58P	S-76	C130	CL601	CNA441	CNA500	DHC830	DHC840	EMB170	EMB190	GASEPF	GASEPV	GIV	LEAR45	MD11	PC9	TOTAL
ARRIVAL	12	GA1												0.0178										0.0134	0.0170					0.0482
		GA3																0.0112	0.0008					0.0001						0.0121
	HLS1	12HELO2								0.0403					0.1261															0.1664
	17	GAI											0.0226	0.0700				0.0558	0.0391					0.0402	0.0498		0.0065			0.2842
		JET17A1	1.1310	5.7972	1.6973	2.9533	0.7155	0.5747	0.5654		0.1683	1.4586	0.0076	0.0132		0.0382	0.0126	0.0006	0.0004	0.3056	0.0917	0.2785	0.4289					2.4255		18.5641
		JET17A2	0.6786		0.8486	0.7383	0.4770				0.3366					0.0127	0.0315	0.0006	0.0004	0.6112	0.1528	1.6710	0.5719			0.0002				6.1340
		JET17A3	1.1310	1.4493	1.9802		0.5962	2.8733	2.8270		0.2019	0.2918	0.0026	0.0032		0.0316			0.0004	0.3056		0.8355	0.8578					0.6064	0.0098	14.3829
		JET17A4	1.1310		1.9802		0.1192	2.2986	2.2816		0.2019	0.2918	0.0152	0.0134		0.0316	0.0819	0.0006		1.5278	0.3667		1.0008			0.0001			0.0120	10.9551
		JET17A5	0.4524		0.5658		0.4770				0.1010	0.8752	0.0026	0.0032		0.0128				0.3056										2.7930
		RNP381	4.5239		1.6973		2.8619				0.3702						0.0504				0.3667	1.1140	1.7156							12.7000
		RNP347	1.1309		0.2829		0.7155				0.2693						0.0315				0.1528	2.2278	0.5719			0.0002				5.3828
		RNP343	2.2619		0.5658		1.1924				0.5385						0.0945				0.4584	4.4559	1.7157			0.0008				11.2839
		RNP331	4.5239		1.9802		2.3849				0.4712											3.3419	3.4311							16.1332
		RNP305	4.5239		1.9802		0.4770				0.4712						0.3276				1.4669		4.0030			0.0006				13.2504
		RNP303	1.1310		0.5658		1.9079				0.2356																			3.8403
	HLS2	17HELO2								0.0151					0.1261															0.1412
	30	30A1										0.5738	0.0493	0.0134				0.0105	0.0065	2.8210	2.8210			0.0408		0.0003				6.3366
		30A2										0.5738	0.0493	0.0134				0.0105	0.0065	2.8210	2.8210			0.0004		0.0003				6.2962
		30A3										0.5738	0.0493	0.0134				0.0105	0.0065	2.8210	2.8210			0.0004		0.0003				6.2962
		30A4										0.5738	0.0493	0.0134				0.0105	0.0065	2.8210	2.8210			0.0004		0.0003				6.2962
		GA1																							0.0522		0.0028			0.0550
	HLS1	30HELO2								0.2806					0.6141															0.8947
	35	GA1											0.0078	0.0019				0.0048	0.0034					0.0023	0.0013		0.0016			0.0230
		GA2												0.0062				0.0048	0.0034					0.0070	0.0038					0.0252
		JET35A1	0.0522	0.1672	0.0979	0.0852	0.0550	0.1326	0.1305		0.0388	0.2019	0.0015	0.0062		0.0088	0.0058	0.0007	0.0003	0.1409	0.0352	0.1928	0.2639					0.1398		1.7573
		JET35A2	0.1044		0.0979		0.0550				0.0388					0.0073	0.0029	0.0007	0.0003			0.1928							0.0023	0.5024
		JET35A3	0.5220	0.8361	0.8486	0.4260	0.3027	0.6631	0.6524		0.0854	0.0673	0.0004	0.0017		0.0059			0.0003	0.0705	0.0352	0.2571	0.1320					0.2798		5.1865
		JET35A4	0.3654	0.6689	0.5875	0.3408	0.1376	0.5305	0.5218		0.0699	0.4038	0.0020	0.0078		0.0073	0.0204	0.0024	0.0017	0.4936	0.0705		0.2639		0.0064			0.2798	0.0027	4.7847
		JET35A7																												0.0000
		RNP581	2.0879		0.8486		1.2108				0.1942										0.2821	1.0283	0.5279			0.0002				6.1800
		RNP595	0.6264		0.1958		0.4404				0.1864						0.0349					1.5423	1.0557			0.0002				4.0821
		RNP567	1.4616		0.5875		0.5504				0.1631						0.0813				0.2821		1.0557			0.0002				4.1819
DEPARTURE	12	GD1												0.0275										0.0045	0.0056					0.0376
		GD2												0.0557										0.0090	0.0114					0.0761
		GD5																0.0105	0.0008					0.0001						0.0114
	17	GD1											0.0279					0.0532	0.0415					0.0402	0.0498	0.0007	0.0065			0.2198
		JET17D1	9.2991		3.5360		3.6270	4.5973	2.1722		2.0195					0.0558	0.3339			1.2748	1.2748	8.2387	8.5779			0.0003		3.0318	0.0102	48.0493
		JET17D2	11.6240	4.6585	7.0720	3.6816	7.0122	0.5747			0.8078											1.3731	1.4297							38.2436
		JET17D3	2.3249		3.5360		1.4508	0.5746			0.5384	3.4825				0.0711	0.2961		0.0004			4.1194	4.2889			0.0004			0.0130	20.6965
		TPROP17										3.4825	0.0194	0.0740				0.0005		11.4733	11.4733									26.5230
	30	GD1											0.1804	0.0233				0.0354	0.0243					0.0412	0.0522	0.0023	0.0028			0.3619
		GD2											0.0036	0.0005																0.0041
		GD3																0.0016	0.0011					0.0004						0.0031
		GD4																0.0024	0.0016					0.0004						0.0044
	HLS1	30HELO3								0.2622																				0.2622
	35	GD1											0.0043	0.0055				0.0089	0.0071					0.0093	0.0059	0.0002	0.0015			0.0427
		JET35D1	0.2682	0.9676	0.4896	0.8519	0.2232				0.1553					0.0129	0.0203	0.0002	0.0002	0.1471	0.1471	0.4753	0.4949			0.0001			0.0020	4.2559
		JET35D2	3.7554		1.9584		2.0088	0.2652			0.4971											1.4259	1.4846							11.3954
		JET35D4	1.3412	0.1075	0.8161		0.5580	1.0609	0.5013		0.1242					0.0164	0.1250	0.0002	0.0001	0.1471	0.1471	1.2675	1.3197			0.0001		0.6996	0.0034	8.2354
		JET35D5										0.8037	0.0067	0.0116				0.0030	0.0023	2.3535	2.3535				0.0056					5.5399
		TPROP35										0.8037								0.2942	0.2942									1.3921
	HLS2	35HELO3								0.0668																				0.0668
TGO	12	G1L												0.0014											0.0002					0.0016
		G1R												0.0044											0.0004					0.0048
		G3L																						0.0002						0.0002
		G3R																						0.0008						0.0008
	HLS1	12HELO1A								0.0022																				0.0022
		12HELO1B								0.0418																				0.0418
	17	G1L												0.0036											0.0108					0.0144
		G1R												0.0108											0.0324					0.0432
		G3L																						0.0216						0.0216
		G3R																						0.0648						0.0648
	30	G1L												0.0044											0.0004					0.0048
		G1R												0.0132											0.0016					0.0148
		G3L																						0.0012						0.0012
		G3R																						0.0034						0.0034
	HLS1	30HELO1A								0.0370																				0.0370
		30HELO1B								0.0302																				0.0302
	35	G1L												0.0008											0.0024					0.0032
		G1R												0.0024											0.0074					0.0098
		G3L																						0.0050						0.0050
		G3R																						0.0148						0.0148
	HLS2	35HELO1A								0.0598																				0.0598
TOTAL			56.4522	14.6523	34.8162	9.0871	29.5564	14.1455	9.6322	0.8360	8.2846	14.4580	0.5020	0.4373	0.8663	0.3124	1.5506	0.2401	0.1559	30.7348	30.7351	34.0378	35.1915	0.3219	0.3166	0.0078	0.0216	7.4628	0.0554	334.8704

10.0 PRACTICAL ULTIMATE CAPACITY ANEF

The ANEF contour is a composite produced by superimposing three ANECs representing three possible future operating scenarios:

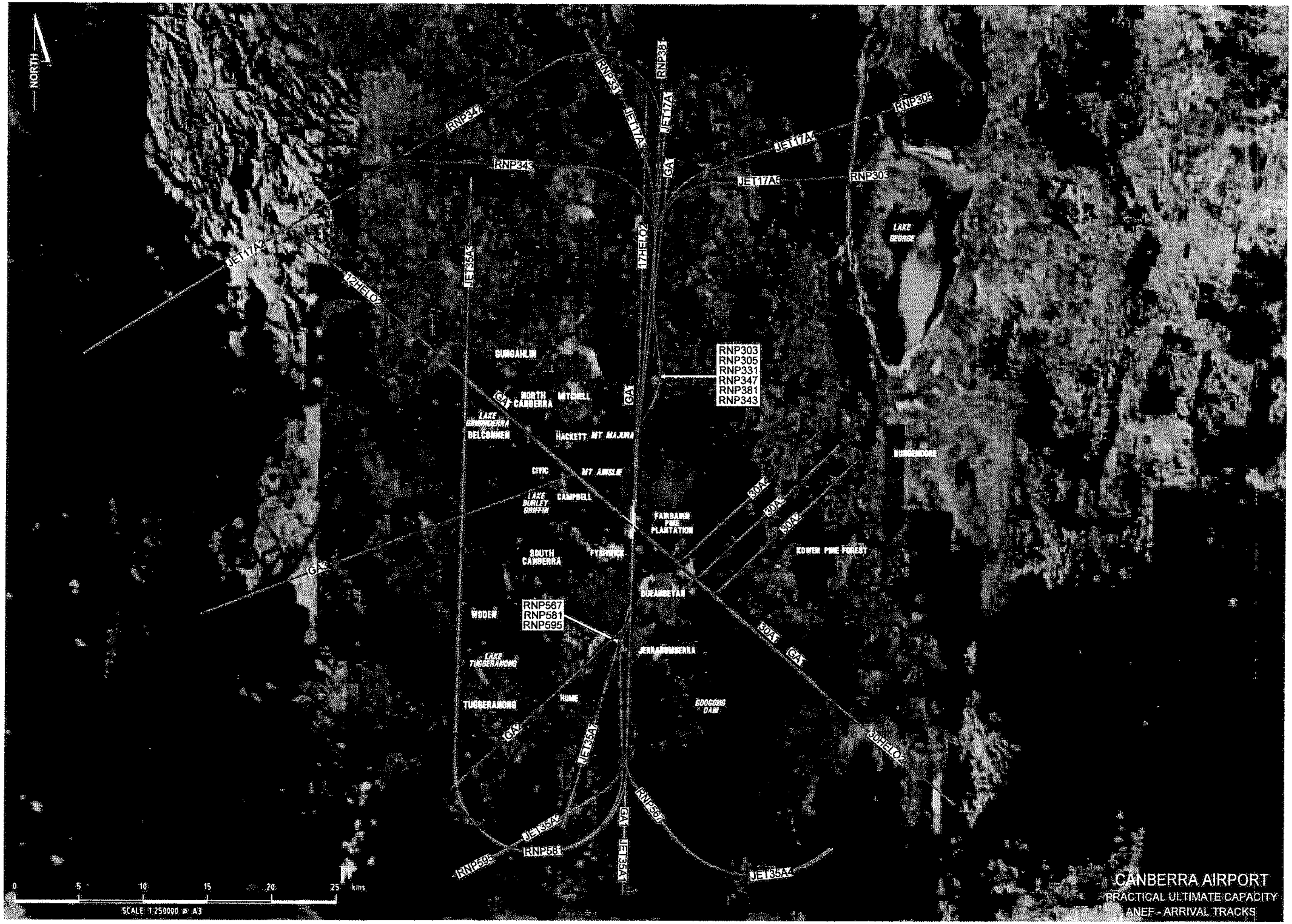
- the currently preferred runway 35 operating mode and route/track structure, including RNP tracks;
- the preferred runway 35 operating mode with the additional 15° offset RNP track for long haul domestic/international arrivals; and
- a preferred runway 17 operating mode with RNP tracks and a 3° off-set precision approach.

All three scenarios take account of the Canberra and Queanbeyan Noise Abatement Area.

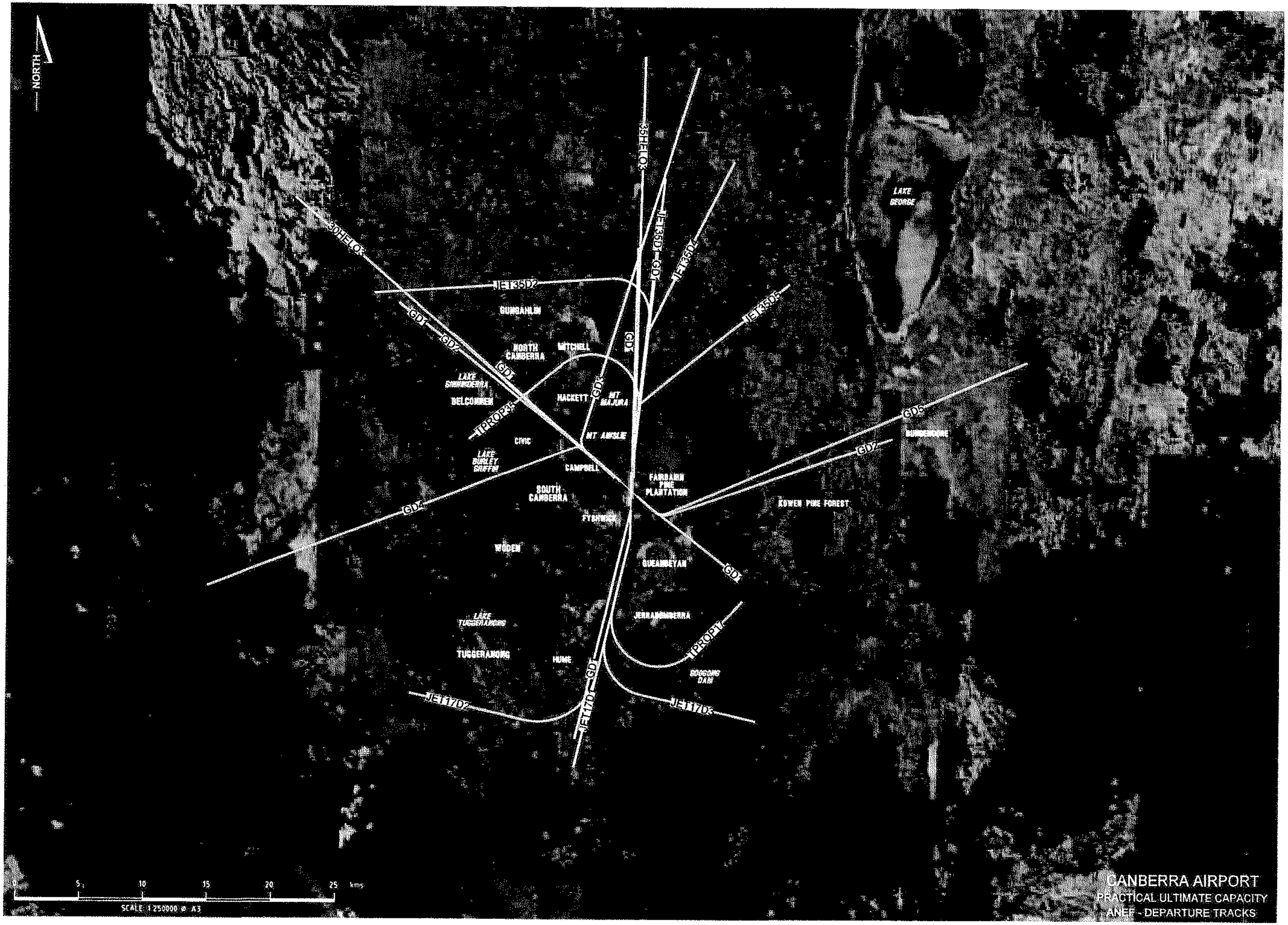
The resulting ANEC contour sets are shown in the fourth, fifth and sixth of seven drawings included at the end of this report.

The composite ANEF contour set which results from superimposing the ANECs for these three scenarios is shown tin the last of seven drawings included at the end of this report. Capital Airport Group is seeking formal endorsement of this contour set as the Practical Ultimate Capacity ANEF for Canberra International Airport.

DRAWINGS



NORTH
RNP347
RNP343
RNP331
JET17A3
JET17A
RNP38
GA
JET17A4
RNP30
JET17A5
RNP303
JET17A2
12HELO2
JET35A
17HELO2
LAKE GEORGE
GUNGAHLIN
RNP303
RNP305
RNP331
RNP347
RNP381
RNP343
GA
NORTH CANBERRA
MITCHELL
LAKE GINNINDERRA
BELCONNEN
HACKETT
MT MAJURA
BUNGENDORE
CIVIC
MT AINSLIE
30A
LAKE BURLEY GRIFFIN
CAMPBELL
FAIRBAIRN PINE PLANTATION
SOUTH CANBERRA
FYSHWICK
KOWEN PINE FOREST
QUEANBEYAN
WODEN
RNP567
RNP581
RNP595
JERRABOMBERRA
30A1
LAKE TUGGERANONG
TUGGERANONG
HUME
GOOGONG DAM
JET35A1
30HELO2
RNP567
JET35A2
RNP58
RNP595
JET35A4
0
5
10
15
20
25
kms
SCALE 1:250000 @ A3
CANBERRA AIRPORT
PRACTICAL ULTIMATE CAPACITY
ANEF - ARRIVAL TRACKS


NORTH
LAKE GEORGE
30HELO3
35HELO3
JET35D1
GD1
JET35D2
JET35D5
GD2
GD3
GD4
GD5
GD7
TPROP35
TPROP17
JET17D1
JET17D2
JET17D3
GUNGAHLIN
NORTH CANBERRA
MITCHELL
LAKE GINNINDERRA
BELCONNEN
HACKETT
MT MAJURA
MT AINSLIE
CIVIC
LAKE BURLEY GRIFFIN
CAMPBELL
FAIRBAIRN PINE PLANTATION
SOUTH CANBERRA
FYSHWICK
KOWEN PINE FOREST
BUNGENDORE
WODEN
QUEANBEYAN
JERRABOMBERRA
LAKE TUGGERANONG
TUGGERANONG
HUME
GOOGONG DAM
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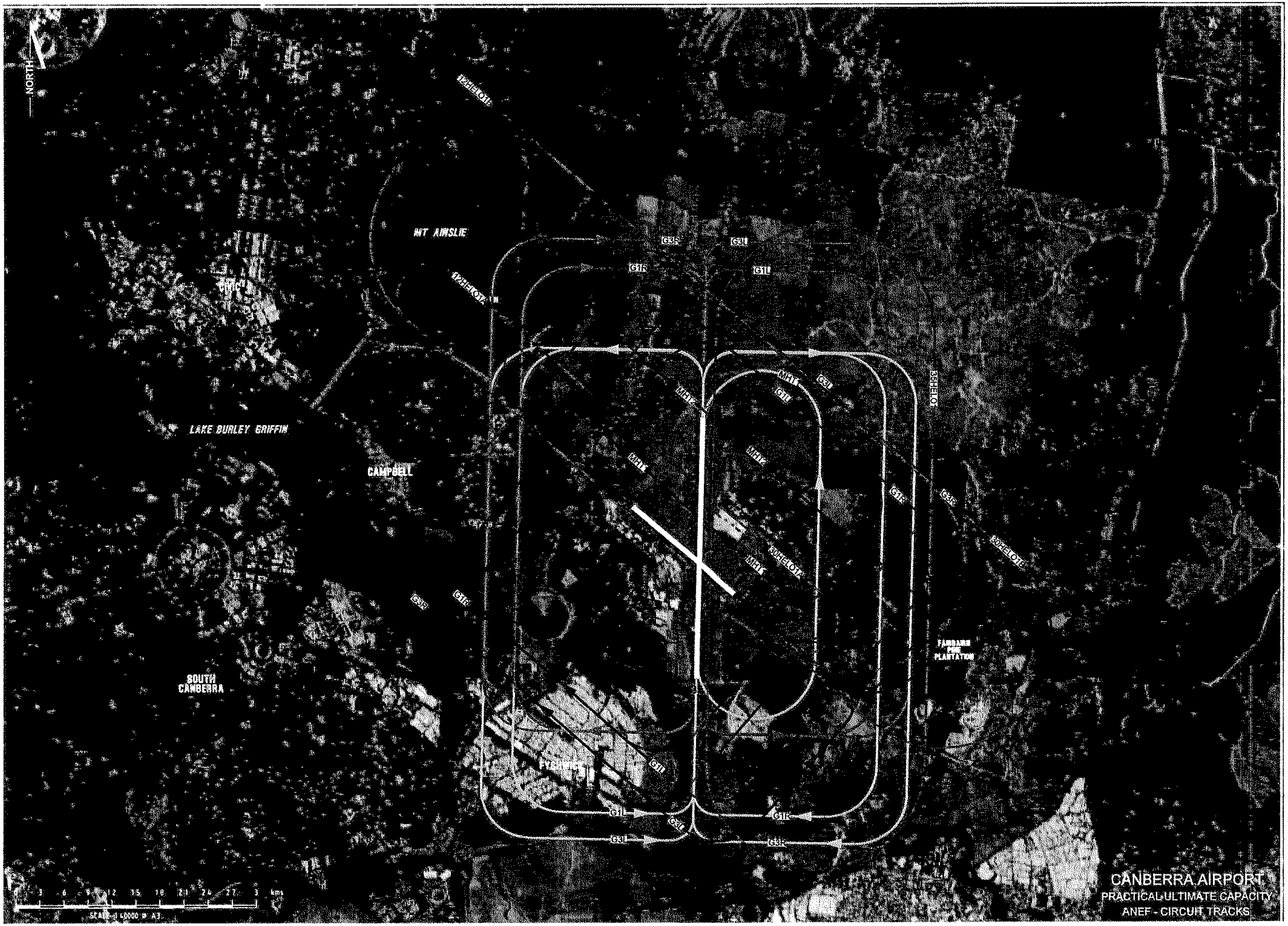
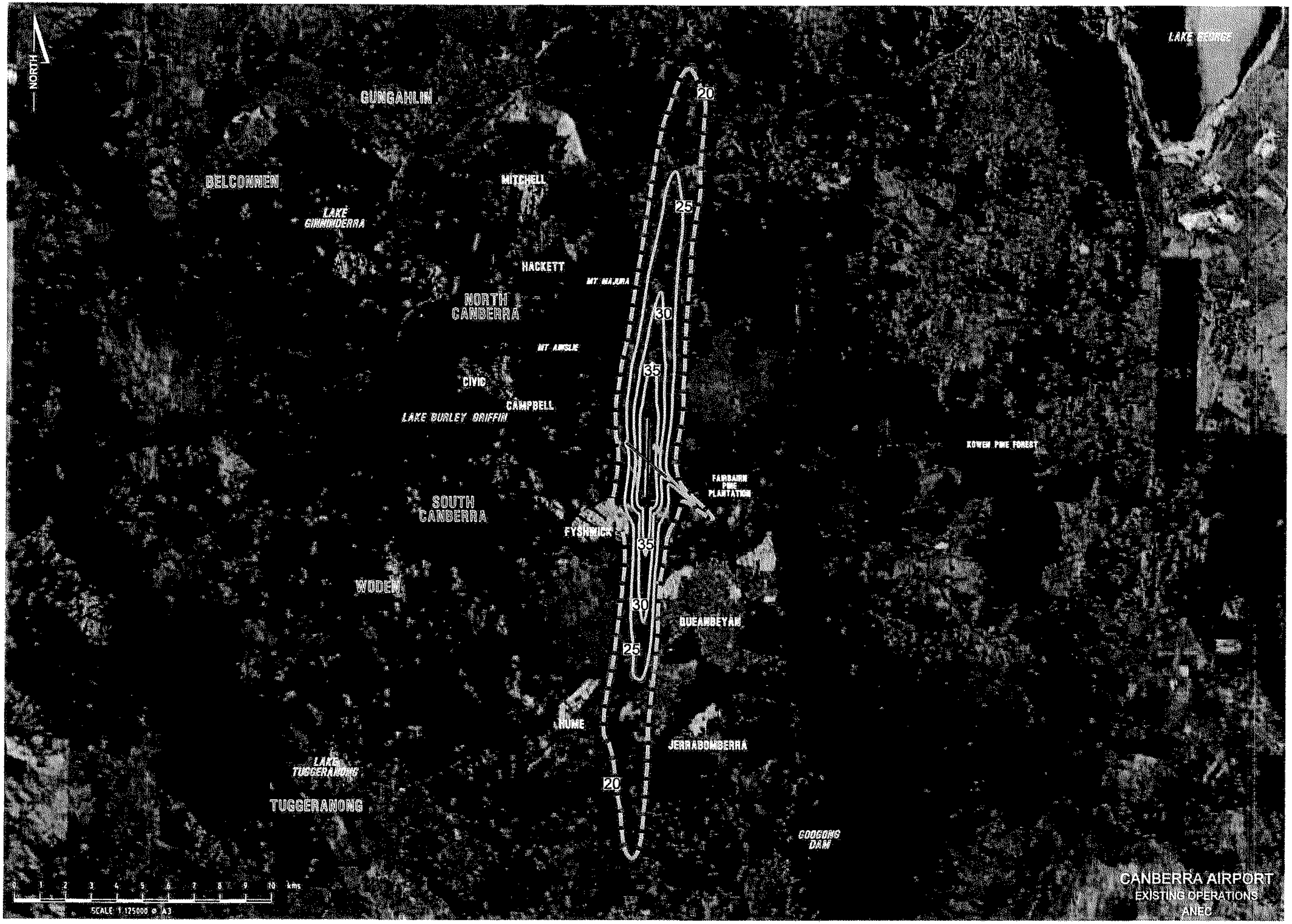
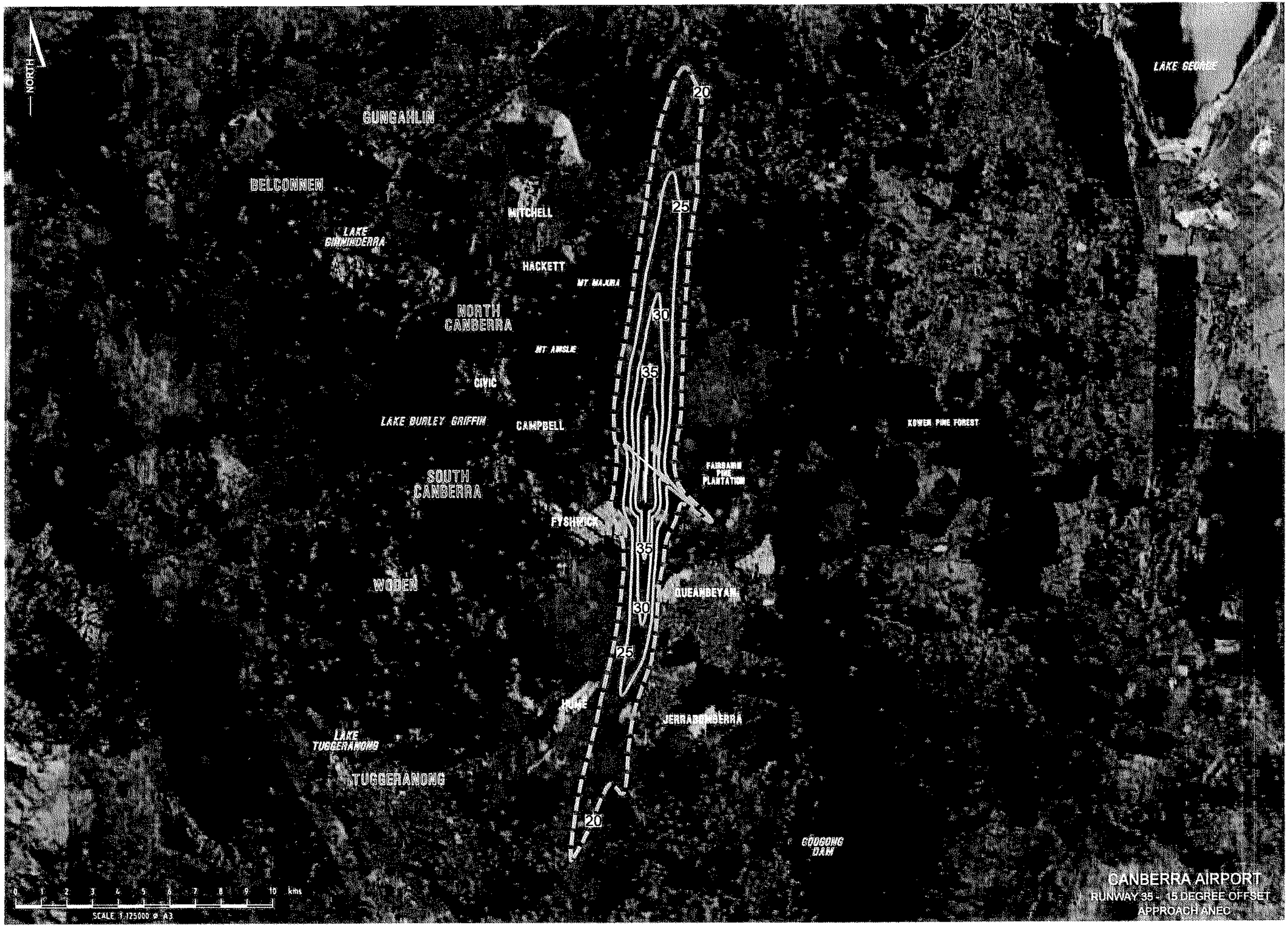
CANBERRA AIRPORT
PRACTICAL ULTIMATE CAPACITY
ANEF - DEPARTURE TRACKS

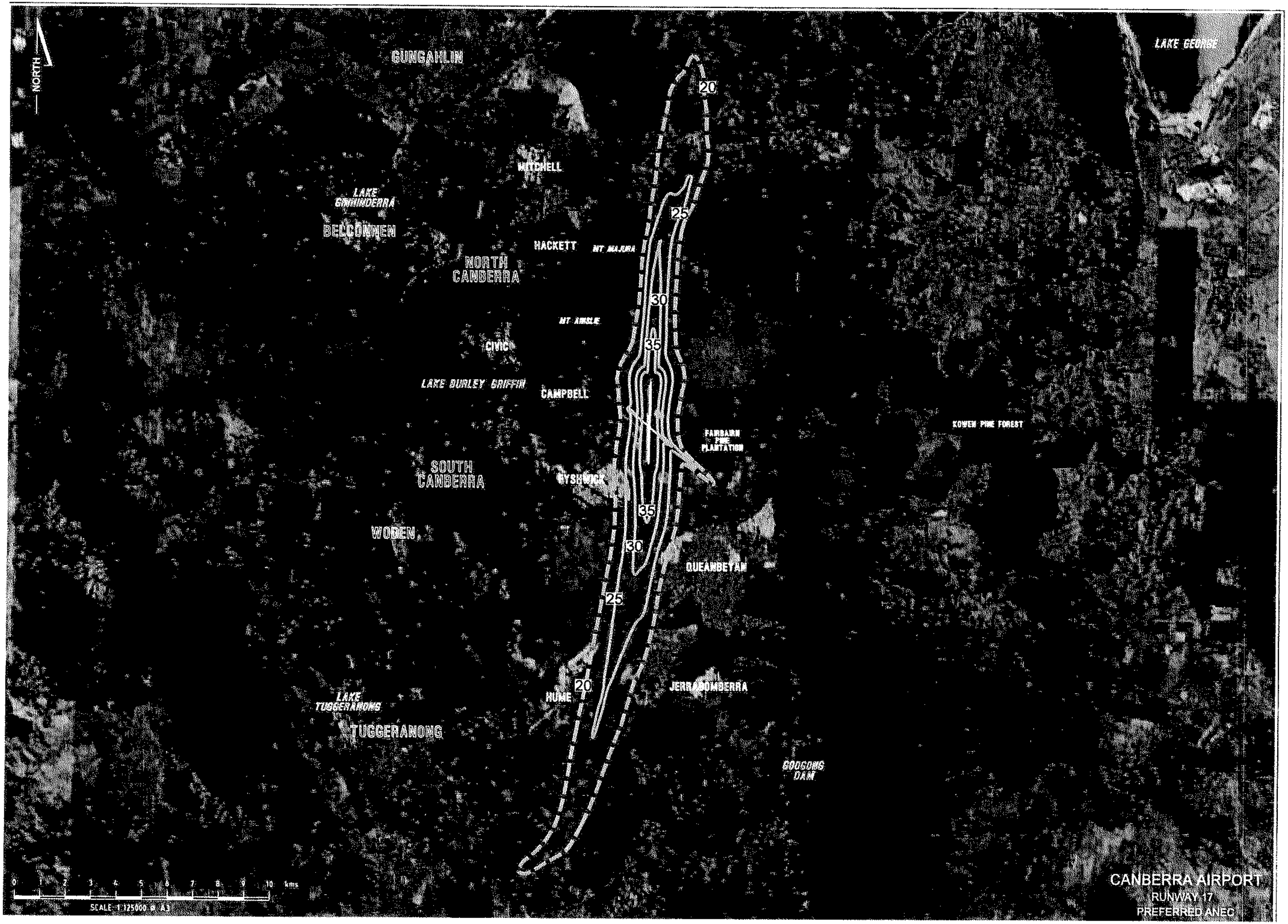


CANBERRA AIRPORT
PRACTICAL ULTIMATE CAPACITY
ANEF - CIRCUIT TRACKS

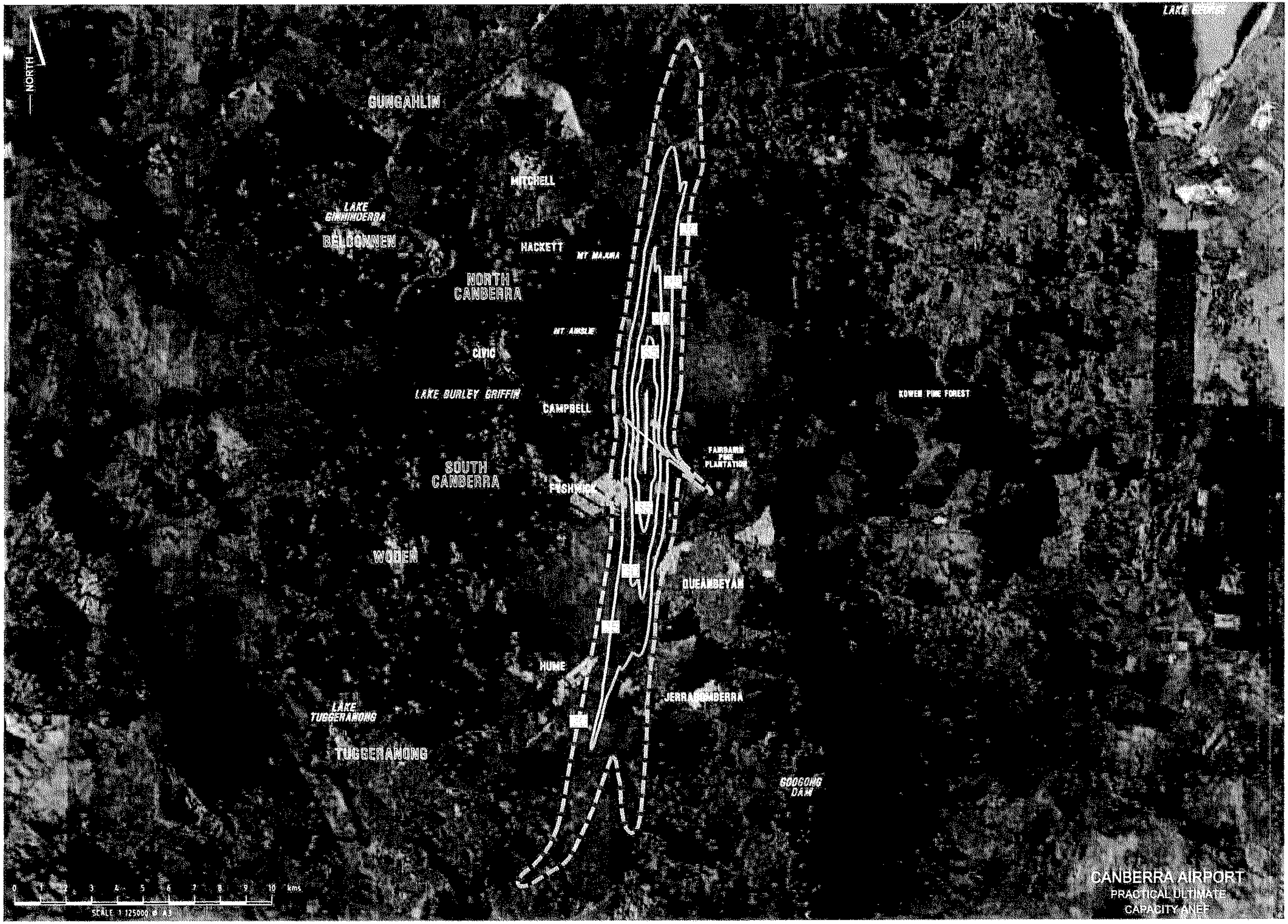


CANBERRA AIRPORT
EXISTING OPERATIONS
ANEC


NORTH
GUNGAHLIN
BELCONNEN
LAKE GINNINDERRA
MITCHELL
HACKETT
MT MAJURA
NORTH CANBERRA
MT AINSLIE
CIVIC
LAKE BURLEY GRIFFIN
CAMPBELL
SOUTH CANBERRA
FYSHWICK
FAIRBAIRN PINE PLANTATION
QUEANBEYAN
WODEN
HUME
JERRABOMBERRA
LAKE TUGGERANONG
TUGGERANONG
GOOGONG DAM
KOWEN PINE FOREST
LAKE GEORGE
20
25
30
35
35
30
25
20
0 1 2 3 4 5 6 7 8 9 10 kms
SCALE 1:125000 @ A3
CANBERRA AIRPORT
RUNWAY 35 - 15 DEGREE OFFSET
APPROACH ANEC



CANBERRA AIRPORT
RUNWAY 17
PREFERRED ANEC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CAMPBELL
SOUTH CANBERRA
FYSHWICK
FAIRBAIRN PINE PLANTATION
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CANBERRA AIRPORT
PRACTICAL ULTIMATE
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ANNEX 1

REHBEIN AOS
AIRPORT AND AVIATION CONSULTANTS
LEVEL 1
CAPITAL JET CHARTER BUILDING
DRAKE CRESCENT
CANBERRA AIRPORT ACT 2609

DATE 30 March, 2005
CONTACT DOUG ALLEY

CANBERRA INTERNATIONAL AIRPORT ULTIMATE RUNWAY CAPACITY ANALYSIS

For

CAPITAL AIRPORT GROUP

REHBEIN AOS Airport Consulting

Document Control Page

Revision	Date	Description	Author	Signature	Verifier	Signature	Approver	Signature
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2	16/09/05	Final	DPA		RV		RES	

REHBEIN AOS Airport Consulting

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EXECUTIVE SUMMARY

The Annual Ultimate Capacity for the runway system at Canberra International Airport is estimated to be 282,119 movements, with an aircraft mix ranging from light general aviation to large wide bodied passenger jet aircraft.

Operating data such as aircraft types and fleet mix were supplied by Capital Airport Group. Capital Airport Group also advised that the runway capacity should not be limited by airport infrastructure such as aprons, aircraft parking positions and terminal space as these can be easily extended to meet future demand.

The capacity modelling assumes the future runway and taxiway layouts as contained in the Canberra International Airport's Approved Major Development Plan of November 2004.

The Annual Ultimate Capacity was calculated using a weighted average for 7 different time periods in a day. These time periods were based on different operations and aircraft types.

The capacities for the individual time periods were calculated using an analytical method which accounts for the effects of aircraft approach speeds, the length of the common approach path and minimum aircraft separations as specified by air traffic regulations.

1.0 INTRODUCTION

Capital Airport Group (CAG) commissioned Rehbein AOS Airport Consulting (AOS) to provide an estimate of the Annual Ultimate Capacity (AUC) of the runway system at Canberra International Airport (CIA) for fixed wing aircraft operations. Due to differences in operational characteristics, helicopter operations were not considered as part of this study.

The AUC is defined in this report as the average number of aircraft movements the runway system can handle in the presence of a demand pattern supplied by CAG, while maintaining all the separation requirements imposed by the air traffic management system. The modelling has included aircraft types supplied by CAG.

The study calculated the AUC by separating an average day into 7 different time periods based on the type of operation (arrival/departure) and the aircraft traffic mix. An analytical method was used to estimate the capacity of the individual time periods and a weighted average, based on the duration of the time periods for an average day, was calculated. The average day capacity was used to calculate the AUC. The analytical model accounts for the effects of aircraft approach speeds, the length of the common approach path and the minimum aircraft separation for arrivals and departures as specified by air traffic regulations.

Operating data such as aircraft types and fleet mix were supplied by CAG. The calculations were based on future runway and taxiway layouts detailed in CIA's Approved Major Development Plan of November 2004.

2.0 AIRPORT INFRASTRUCTURE AND OPERATIONS

2.1 RUNWAY AND TAXIWAY CONFIGURATIONS

The capacity modelling was based on the future runway and taxiway layouts detailed in the Approved Major Development Plan. There are two intersecting sealed runways – 17/35 and 12/30. This study modelled runway 17/35 as sealed, 3,133m long and 45m wide, and runway 12/30 as sealed, 2029m long and 45m wide. The distances to the runway intersections from the runway thresholds are shown in Table 1.

Table 1
Distance from Runway Threshold to Runway Intersections

Runway 12	1080m
Runway 17	1800m
Runway 30	904m
Runway 35	1288m

The availability of suitable exit and entry taxiways affects the AUC. The Approved Major Development Plan proposes a full length taxiway parallel to the runway 17/35, removing the need for aircraft travelling to the passenger terminal and general aviation (GA) areas to use taxiway Alpha. The study has assumed that all taxiways will eventually be able to handle all aircraft types forecast to be operating at CIA in the long term. The location of the taxiways in relation to the runways 12/30 and 17/35 are shown in Tables 2 and 3 below.

Table 2
Distances from Runway Threshold to Taxiway Locations – Runway 12/30

Runway	Taxiway	Taxiway Distances (m) from Threshold
12	K	559
	H	599
	B	879
	G	1,039
	C5	1,679
	C6*	2,029
30	C5	350
	G	990
	B	1,150
	H	1,430
	K	1,470
	C1	2,029

*NOTE: The designation of this taxiway has been assumed. It is proposed to be located at the extended end of runway 30.

Table 3
Distances from Runway Threshold to Taxiway Locations – Runway 17/35

Runway	Taxiway	Taxiway Distances (m) from Threshold
17	F	603
	D	1,283
	G	1,803
	M	2,123
	N	2,683
	B	3,133
35	N	450
	M	1,010
	G	1,330
	D	1,850
	F	2,530
	B	3,133

2.2 AIRCRAFT PARKING APRONS

The regular public transport (RPT) apron currently provides 13 parking bays for use by aircraft ranging from medium sized turbo-prop aircraft such as the Dash 8 or Saab 340 to large commercial jets such as the Boeing 767-300.

A sealed GA apron is provided for all non-airline aircraft with a ramp weight of less than 14,000 kg. A grassed area is also provided for GA aircraft with a weight of up to 5,700 kg.

On advice from CIA, the capacity of the RPT and GA aprons have not been considered as a limitation on the AUC as this type of infrastructure would be expanded to meet future demand patterns.

2.3 PASSENGER TERMINAL

The CIA passenger throughput in 2003/04 was 2,303,582[1]. On advice from CIA, the terminal capacity has not been considered as a limitation on the AUC as this type of infrastructure would be expanded to meet future demand patterns.

2.4 RUNWAY OPERATING MODES

CIA operates with two intersecting runways whenever possible because this increases capacity and flexibility for air traffic management. Runway 35 has the highest use of all four runways because of the Instrument Landing System (ILS) and predominant wind directions. The principal operating mode is runway 35 in conjunction with runway 12/30. The secondary configuration is runway 17 in conjunction with runway 12/30. Runway 30 is the dominant runway direction used on runway 12/30.

2.5 PERCENTAGE OF TOUCH AND GO OPERATIONS

This study has not separately identified touch and go operations as this operation has little impact on the calculated AUC.

[1] AVSTATS

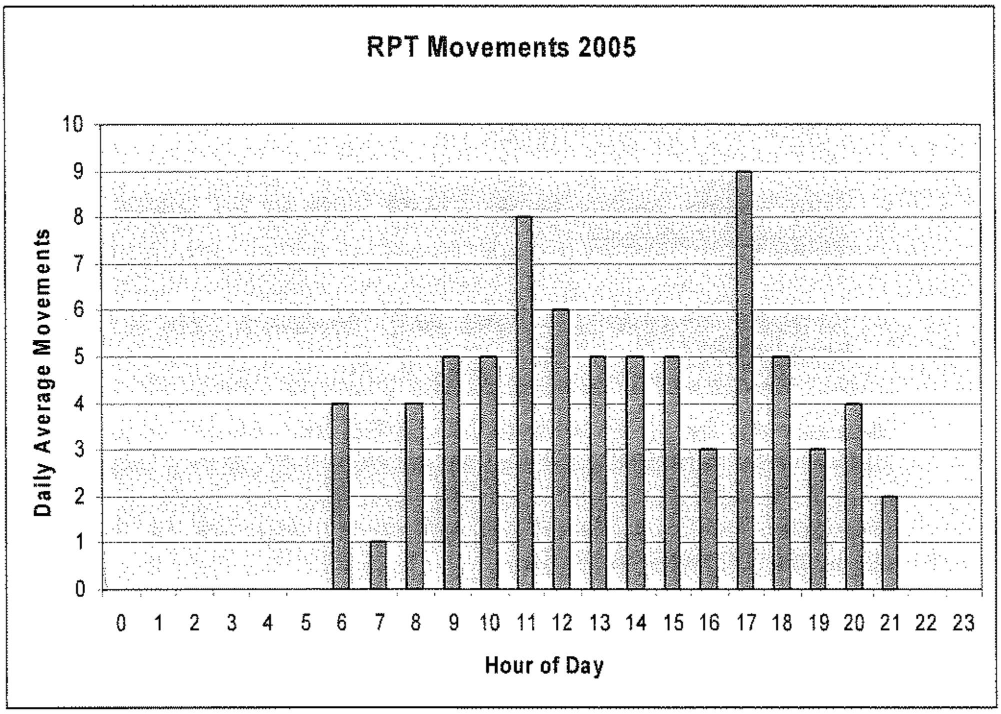
3.0 DEMAND

3.1 CURRENT

There were 38,373[2] RPT aircraft movements in the year 2003/04 at CIA.

The aircraft mix at CIA consisted primarily of medium weight jets (ie Boeing 737), medium weight regional turbo prop aircraft (Dash 8-300) and light GA aircraft. The airport capacity for aircraft movements is lower during periods when domestic jet aircraft are operating as the domestic jet operations require consideration of wake turbulence separation criteria when light aircraft operate at the same time. A distribution of the RPT movements on a typical day in 2005 is shown in Figure 1.

Figure 1 Busy Day RPT Movements 2005



This graph shows that although the RPT movements are distributed over a 16 hour period, there are 12 hours when RPT traffic peaks, albeit at some relatively low levels.

Although there is no time series to indicate the daily patterns or numbers of GA movements at CIA, an ANEI completed by AOS Airport Consulting for CAG in 2003 indicates that GA (including military aircraft) movements in 2002 totalled approximately 27,000 and were made up of a range of light aircraft including the:

- Cessna 172;
- Cessna 182;
- Piper Cherokee;

[2] AVSTATS

- Piper Chieftain; and
- Beech Baron.

3.2 FUTURE

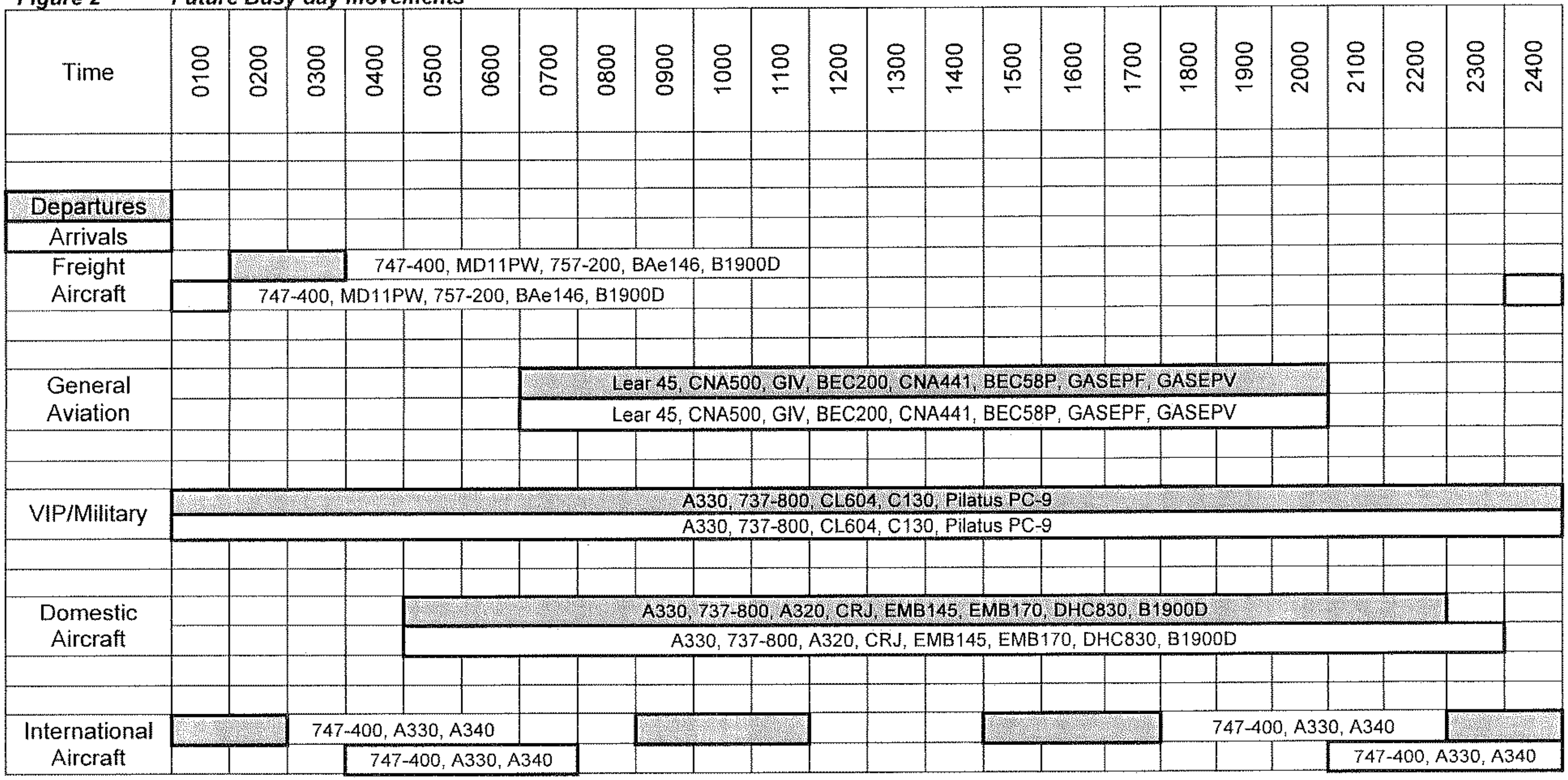
CAG has also advised AOS of the likely future demand profile for International, Domestic, Freight, Miliary and GA type operations and the aircraft types to be operating. This information is shown in Figure 2.

CAG have advised AOS that this level of GA traffic is likely to decline as it is anticipated that GA traffic will move to a separate GA airport within the Canberra region, leaving GA traffic levels similar to that of other major city airports. GA traffic at Sydney, Melbourne and Brisbane is consistent at around 5% of total traffic and therefore the levels of GA traffic included in this study will not exceed 5%. The GA traffic that would remain would consist mainly of:

- business GA (corporate jets);
- flight training (mainly by jet aircraft such as the current Singapore Flying College aircraft); and
- RFDS/Air Ambulance – turbo prop operations (with a base of 2-3 daily movements).

Between the hours of midnight and 0500, the aircraft movements have been capped at 20 movements an hour to provide a realistic long term demand profile. It should be noted however, that the date that this figure is reached for night movements is forecast to occur a number of years after the ultimate capacity for day time movements is reached.

Figure 2 Future Busy day movements



4.0 METHODOLOGY

An analytical method based on future operations, facilities and demand has been used to estimate the AUC. Although analytical models are relatively simple to apply, they have been shown to consistently produce results close to the capacities observed in practice.

Based on information supplied by CAG, this study has assumed aircraft types ranging from light GA aircraft through to wide bodied commercial jets will operate at CIA in the long term (see Table 7). At the AUC, CIA forecast that GA traffic levels will be similar to that of other major city airports i.e. around 5% of total traffic.

The estimates for AUC were calculated initially using the current utilisation of runways 17-35 and what an average operational day might look like in the future (see Figure 2). This average day was then split into 7 different time periods determined by the aircraft operation and type. The time periods are shown in Table 4:

Table 4
Average Day Time Periods

Time Period	Time of Day
1	0900 to 1200 and 1500 to 1800
2	1200 to 1500 and 1800 to 2100
3	0500 to 0700 and 2100 to 2300
4	0700 to 0900
5	2300 to 0100
6	0100 to 0200
7	0200 to 0500

Capacities were derived for each of the 7 time periods. A weighted average was calculated from these capacities based on the proportion of the day each time period lasted.

An allowance was then made for GA and RPT turboprop traffic that would operate on the cross runway 12-30. This brought the AUC of the airports runway system to 282,119 movements.

4.1 ANALYTICAL METHOD

4.1.1 Arrivals Only

Initially a model was developed to consider a runway used solely for arrivals. It calculates the average landing interval taking account of the effects of the following factors:

- length of the common (final segment) approach paths;
- aircraft speeds; and
- minimum aircraft separation distance for safe operations as specified by air traffic regulations.

This assumed error free approaches, ie the aircraft reaches the desired point on time and that the pilots are able to precisely maintain the required separation and speeds. It considered two situations – the first when the following aircraft has a speed equal to or greater than that of the leading aircraft and the second when the speed of the leading aircraft is greater than that of the following aircraft.

The appropriate separation for each pair of aircraft is established by categorising them by weight - heavy (D), large (C), and small. As different types of aircraft in the small category have quite different approach speeds, this group is divided into A and B.

Tables 5 and 6 show the weights and approach speeds for the various aircraft categories. Runway capacity is determined by the percentage of small, large and heavy aircraft that operate into the airport.

Table 5
Aircraft Fleet Mix Categories

Aircraft Fleet Mix Category	Maximum Takeoff Weight
A, B (small)	<7,000 kg
C (large)	7,000 – 136,000 kg
D (heavy)	>136,000 kg

Source: AIP ENR 1.4-13

Table 6
Aircraft Categories Approach Speeds

Aircraft Fleet Mix Category	Approach Speed (kts)
A (small)	90
B (small)	100
C (large)	150
D (heavy)	180

Source: AOS

The aircraft CAG forecast to be operating at CIA when it reaches ultimate capacity are shown by category in Table 7:

Table 7
Canberra Airport Fleet Mix Categories

Aircraft Fleet Mix Category	Aircraft
A (small)	GASEPF, GASEPV, Pilatus.
B (small)	Cessna 500, Beech 200, Cessna 441, BEC58P.
C (large)	DHC830, CRJ, EMB-145, EMB-170, 737-800, A320-200, BAe146, BBJ, C130, CL604, B1900D, Lear45, GIV.
D (heavy)	757-200, A330-300, A340-200, 747-400, MD11.

Source: AOS

The Australian Civilian Aircraft Register lists about 200 types of general aviation piston engined aircraft. For noise modelling purposes this number has been reduced to three Integrated Noise Model (INM) based aircraft profiles:

- a low performance single engine aircraft (GASEPF);
- a high performance single engine aircraft profile (GASEPV); and

- a conventional twin engine aircraft profile (BEC58P).

These profiles have been used in this study to cover the full range of light GA aircraft that CIA will cater for into the long term.

The mix of aircraft at an airport is an important factor in determining the runway system capacity. In general, airports with a more consistent aircraft mix (ie one or two dominant aircraft classes) will possess advantages in terms of runway capacity over airports with a non consistent aircraft mix. In addition, the airport with a consistent aircraft mix will also offer advantages in respect of air traffic management and simplifying the work of air traffic controllers who would have to make fewer adjustments for wake vortex separations and other aircraft characteristics.

At CIA for example, when medium weight jet aircraft are operating, wake turbulence separation criteria will need to be considered when light aircraft are operating at the same time.

At CIA because it has operating air traffic control (ATC) and services RPT operations, the separation requirements (in nautical miles) shown in Table 8 are applicable. In a sequence of arrivals, for example, the minimum separation requirement on final approach is 2.5 nautical miles. Depending on whether the leading or following aircraft is faster, the minimum separation requirement may apply at the beginning of the final approach path or at the runway threshold.

ATC may be required to apply a greater separation distance to ensure that a following small aircraft is not affected by wake turbulence created by a leading larger/heavier aircraft as it lands. The wake turbulence separation distance specified between a category D aircraft and a following A or B aircraft is 6 nautical miles

Table 8
Aircraft separation requirements (in nautical miles)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A (small)	2.5	2.5	2.5	2.5
B (small)	2.5	2.5	2.5	2.5
C (large)	5	5	2.5	2.5
D (heavy)	6	6	5	4

Source: AIP ENR 1.4-13.

Applying the representative speeds listed in Table 6 and assuming that the length of the common approach path is 5.3 nautical miles, which is the distance to the runway threshold from the final approach fix on a GPS instrument approach procedure the time separations shown in Table 9 can be calculated.

Table 9
Aircraft separation requirements (in ~~nautical miles~~) [seconds]

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A (small)	100	90	60	50
B (small)	100	90	60	50
C (large)	200	180	60	50
D (heavy)	240	216	120	80

Source: AOS

However, the layout of the proposed taxiway system needs to be considered. With the proposed taxiway system, category D aircraft approaching runway 35 will be required to exit the runway via the extended taxiway Bravo. The time required after touch down to perform this manoeuvre is estimated as 87 seconds. As Category D aircraft require 80 seconds in wake turbulence separation between arrivals, the critical time in terms of separation is therefore that required for Category D aircraft to vacate the runway after touching down.

Table 10 contains the estimated runway occupancy times for each aircraft category after touchdown.

Table 10
Aircraft time separations in an approach sequence to runway 35 (in seconds)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A	86	86	86	86
B	90	90	90	90
C	82	82	82	82
D	87	87	87	87

Source: AOS

Combining tables 9 and 10 gives the applicable aircraft separation requirements. The calculation performed in this instance is therefore either the time required for the leading aircraft to vacate the runway after touching down or the time taken for the following approaching aircraft to fly the appropriate wake turbulence separation, which ever is longer. These figures are contained in Table 11.

Table 11
Aircraft time separations in an approach sequence to runway 35 (in seconds)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A	100	90	86	86
B	100	90	90	90
C	200	180	82	82
D	240	216	100	87

Source: AOS

Similar time separations can be derived for runway 17 operations.

Table 12
Aircraft time separations in an approach sequence to runway 17 (in seconds)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	A	B	C	D
A	100	90	83	83
B	141	90	88	88
C	200	180	87	87
D	240	216	156	87

Source: AOS

4.1.2 Departures Only

The model is easily extended for a runway used entirely for departures. In this instance the departure runs of two successive aircraft must be separated (in seconds) by at least the times shown in Table 13. The times listed are an approximate and conservative indication of the time separations resulting from regulatory requirements allowing for wake turbulence.

Table 13
Aircraft separations in a departure sequence (in seconds)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	A	B	C	D
A	45	45	45	45
B	45	45	45	45
C	60	60	60	60
D	120	120	120	90

Source: Airport Systems Planning, Design and Management

4.1.3 Mixed Operations

Alternating arrivals and departures ie A-D-A-D-A-D-A requires pilots to "stretch" the separation distance applied on final approach to allow each departure to be inserted in the arrivals sequence.

As the lead approaching aircraft is vacating the runway, the following departing aircraft can line up and prepare for take off. As the departing aircraft starts its take-off run, the following arriving aircraft will need to be at a minimum of 2.5 nautical miles from touch down – a set distance that applies in this instance as no wake turbulence separation is applied when an aircraft is landing behind an aircraft taking off on the same runway. The current separation standard states that the departing aircraft must be airborne and there must be at least 1800m horizontal separation when the arriving aircraft is touching down and the departing aircraft is airborne. The separation criteria calculated in this study however, are based on the following aircraft touching down as the leading departing aircraft is passing the departure end of the runway. This study has increased the separation standard slightly to allow aircraft conducting a missed approach a bit more room to manoeuvre. Table 14 shows the separation distances applied for mixed operations.

Table 14
Aircraft separations for mixed operations (in nautical miles)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A	2.5	2.5	2.5	2.5
B	3.0	2.5	2.5	2.5
C	4.0	3.0	2.5	2.5
D	5.5	4.0	3.0	2.5

Source: AOS

The resulting separations between successive arriving aircraft on runway 17 are shown in Table 15.

Table 15
Aircraft time separations for mixed operations on runway 17 (in seconds)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A	183	183	183	183
B	170	152	152	152
C	183	159	147	147
D	181	156	138	130

Source: AOS

Similar separations can be derived for operations on runway 35.

Table 16
Aircraft time separations for mixed operations on runway 35 (in seconds)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A	186	186	186	186
B	198	180	180	180
C	178	154	142	142
D	181	156	138	130

Source: AOS

In practice it is generally unlikely that pilots will consistently achieve the separations shown in Tables 11 to 16. It would be reasonable to expect some deviation due to pilot reaction times to ATC instructions. Advice given to AOS suggests that pilot reaction times would add from 5 to 10 seconds to these separation times. This study will therefore apply a minimum 7 second buffer to the above times for each sequence of aircraft.

5.0 CAPACITY CALCULATION

Runway system capacity is determined by the percentage of small, large and heavy aircraft that operate into the airport. For each of the 7 time periods listed in Table 4, this study, based on information supplied by CAG, has applied a probability of occurrence for particular types of operation and aircraft categories. Tables 17 to 23 contain the probabilities derived for each of the 7 time periods.

Table 17
Time Period 1 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
GA	1%	Large	1%	Heavy	6.95%
		Small	99%	Large	92.04%
				Small	1.01%
VIP/MILITARY	1%	Heavy	9%		
		Large	89%		
		Small	2%		
DOMESTIC	93%	Heavy	2%		
		Large	98%		
INTERNATIONAL	5%	Heavy	100%		

Source: AOS

Table 18
Time Period 2 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
GA	1%	Large	1%	Heavy	2.05%
		Small	99%	Large	96.94%
				Small	1.01%
VIP/MILITARY	1%	Heavy	9%		
		Large	89%		
		Small	2		
DOMESTIC	98%	Heavy	2%		
		Large	98%		

Source: AOS

Table 19
Time Period 3 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
VIP/MILITARY	1%	Heavy	10%	Heavy	15.8%
		Large	89%	Large	84.19%
		Small	1%	Small	0.01%
DOMESTIC	85%	Heavy	2%		
		Large	98%		
INTERNATIONAL	14%	Heavy	100%		

Source: AOS

Table 20
Time Period 4 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
GA	2%	Large	1%	Heavy	4.94%
		Small	99%	Large	93.06%
				Small	2.00%
VIP/MILITARY	1%	Heavy	9%		
		Large	89%		
		Small	2%		
DOMESTIC	95%	Heavy	3%		
		Large	97%		
INTERNATIONAL	2%	Heavy	100%		

Source: AOS

Table 21
Time Period 5 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
VIP/MILITARY	1%	Heavy	10%	Heavy	59.65%
		Large	90%	Large	40.35%
				Small	0.00%
DOMESTIC	30%	Heavy	1%		
		Large	99%		
INTERNATIONAL	30%	Heavy	100%		
FREIGHT	39%	Heavy	75%		
		Large	25%		

Source: AOS

Table 22
Time Period 6 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
VIP/MILITARY	1%	Heavy	10%	Heavy	81.6%
		Large	90%	Large	18.40%
				Small	0.00%
INTERNATIONAL	29%	Heavy	100%		
FREIGHT	70%	Heavy	75%		
		Large	25%		

Source: AOS

Table 23
Time Period 7 Operational type and Aircraft Category Splits

Operation	% Split	A/C Category	% Split	Total	% Split
VIP/MILITARY	1%	Heavy	10%	Heavy	79.1%
		Large	90%	Large	20.9%
				Small	0.00%
INTERNATIONAL	19%	Heavy	100%		
FREIGHT	80%	Heavy	75%		
		Large	25%		

Source: AOS

5.1 ARRIVALS ONLY

The likelihood of any particular combination of leading and following aircraft can be determined by multiplying the probabilities of individual aircraft in each pair. The matrix of "pair probabilities" for an arrivals only sequence in time period 1, for example, can then be constructed as shown in Table 24.

Table 24
Time Period 1 Matrix of Pair Probabilities for an Arrival Sequence (Runway 35)

	FOLLOWING AIRCRAFT			
LEADING AIRCRAFT	**A**	**B**	**C**	**D**
A	0.0000	0.0000	0.0029	0.0002
B	0.0000	0.0000	0.0064	0.0005
C	0.0029	0.0064	0.8471	0.0640
D	0.0002	0.0005	0.0640	0.0048

Source: AOS

The average time separation over the threshold for an arriving sequence of aircraft is determined by multiplying the time separation for each pair of leading and following aircraft by the probability of that pair's occurrence.

Table 11 provides the aircraft separations for an arrivals sequence on runway 35. This indicates, for example, that a Category C aircraft following another Category C aircraft would have an expected separation time of 66 seconds. The probability of occurrence of this pairing shown in Table 24 is 0.8471. The weighted separation time which is the product of these two values is 55.91 seconds. The expected separation time of a Category B aircraft following a Category C aircraft is 180 seconds with a probability of occurrence of 0.0064. In this instance the weighted separation time is 1.15 seconds.

Multiplying the corresponding cell values in Tables 11 and 24 in this way and summing the resulting values provides the average expected separation time for the assumed combination of Category A, B, C, D aircraft of 70.38 seconds.

As noted earlier, a typical buffer of 7 seconds will be adopted to allow for pilots' reaction time to ATC instructions increasing the required minimum separations. As a result, the expected average separation is increased to 77.38 seconds.

This separation equates to an average of 46.52 arrivals per hour – comprised on average of 0.14 Category A, 0.33 Category B, 42.82 Category C and 3.23 Category D aircraft arrivals each hour.

Table 25 provides the average aircraft separations and hourly arrival capacities for runway 35 calculated using the method discussed above for all 7 time periods.

Table 25
Average Separation and Hourly Capacities for Arrivals Only Sequence (Runway 35)

Time Period	Average Separation (seconds)	Arrivals per Hour
1	77.38	46.52
2	74.90	48.06
3	80.19	44.90
4	77.56	46.41
5	90.81	39.65
6	90.35	39.85
7	90.60	39.74

Source: AOS

Table 26 shows how each time period is broken up over the aircraft categories.

Table 26
Aircraft Category Movements by Time Period – Arrivals Only Sequence (Runway 35)

Time Period	Category A	Category B	Category C	Category D	Total
1	0.14	0.33	42.82	3.23	46.52
2	0.15	0.34	46.59	0.99	48.06
3	0.00	0.00	37.80	7.09	44.90
4	0.23	0.70	43.19	2.29	46.41
5	0.00	0.00	16.00	23.65	39.65
6	0.00	0.00	7.33	32.51	39.85
7	0.00	0.00	8.30	31.43	39.74

Source: AOS

Based on the proportion of time in a 24 hour period each time period lasts, a weighted average for the 7 time periods of 44.92 arrivals an hour is calculated – comprising an average of 0.09 Category A, 0.22 Category B, 34.89 Category C and 9.72 Category D aircraft arrivals.

Table 12 provides the aircraft separations for an arrivals sequence on runway 17. The average aircraft separations and hourly capacities calculated for all 7 time periods are contained in Table 27.

Table 27
Average Separation and Hourly Capacities for Arrivals Only Sequence (Runway 17)

Time Period	Average Separation (seconds)	Arrivals per Hour
1	80.98	44.53
2	78.70	45.75
3	83.52	43.10
4	81.15	44.36
5	92.41	38.96
6	91.08	39.53
7	91.43	39.38

Source: AOS

Table 28 shows how each time period is broken up over the aircraft categories.

Table 28
Aircraft Category Movements by Time Period – Arrivals Only Sequence (Runway 17)

Time Period	Category A	Category B	Category C	Category D	Total
1	0.14	0.31	40.91	3.09	44.53
2	0.14	0.32	44.35	0.94	45.75
3	0.00	0.00	36.29	6.81	43.10
4	0.22	0.67	41.28	2.19	44.36
5	0.00	0.00	15.72	23.24	38.96
6	0.00	0.00	7.27	32.25	39.53
7	0.00	0.00	8.23	31.15	39.38

Source: AOS

The weighted average for the 7 time periods is 43.24 arrivals an hour – comprising an average of 0.09 Category A, 0.21 Category B, 33.41 Category C and 9.54 Category D aircraft arrivals.

Following an adjustment for runway utilisation (80% of operations on runway 35 and 20% on runway 17), the weighted hourly movement rate for an arrivals only sequence is 44.59 on runway 17/35 – comprising an average of 0.09 Category A, 0.22 Category B, 34.59 Category C and 9.69 Category D aircraft movements.

As stated previously, CAG have advised AOS that the level of GA traffic is likely to be consistent with other major city airports such as Sydney, Melbourne and Brisbane which is around 5% of total traffic. From the information supplied in tables 25 to 28 above, it is possible to estimate the amount of GA traffic modelled on runway 17/35. This will enable the balance of GA traffic which will operate on runway 12/30 to be calculated. Allowing for GA arrivals on runway 12/30 increases the arrival capacity to 46.05 arrivals an hour.

A final allowance must be made for the impact of RPT turboprop arrivals to runway 12/30. Experience at other airports with a cross runway indicate that a cross runway adds approximately 4 movements per hour to the capacity of the airport. The GA movements assigned to runway 12/30 would equate to 1.47 arrivals per hour. Therefore, the capacity figure for arrivals only would increase to 48.58 arrivals an hour – comprising an average of 0.10 Category A, 0.24 Category B, 38.56 Category C and 9.69 Category D aircraft.

5.2 DEPARTURES ONLY

Table 13 provides the aircraft separations for a departures only sequence. The average departure separations are calculated in the same manner as for the arrivals and are shown in Table 29. They are identical for both runways 17 and 35.

Table 29
Average Separation and Hourly Capacities for a Departure Only Sequence

Time Period	Average Separation (seconds)	Departures per Hour
1	70.87	50.80
2	68.07	52.89
3	75.73	47.54
4	69.59	51.73
5	92.12	39.08
6	95.98	37.51
7	95.69	37.62

Source: AOS

Table 30 shows how each time period is broken up over the aircraft categories.

Table 30
Aircraft Category Movements by Time Period – Departures Only Sequence

Time Period	Category A	Category B	Category C	Category D	Total
1	0.16	0.36	46.75	3.53	50.80
2	0.16	0.37	51.27	1.08	52.89
3	0.00	0.00	40.02	7.51	47.54
4	0.26	0.78	48.14	2.56	51.73
5	0.00	0.00	15.77	23.31	39.08
6	0.00	0.00	6.90	30.60	37.51
7	0.00	0.00	7.86	29.76	37.62

Source: AOS

Based on the proportion of the day each time period lasts, a weighted average for the 7 time periods of 47.66 departures an hour is calculated – comprising an average of 0.10 Category A, 0.24 Category B, 37.72 Category C and 9.59 Category D aircraft departures.

Allowing for GA departures on runway 12/30 will increase this total to 49.16 departures an hour – comprising an average of 0.11 Category A, 0.25 Category B, 39.21 Category C and 9.59 Category D aircraft departures.

5.3 MIXED OPERATIONS

Table 15 provides the aircraft separations for mixed operations on runway 17. The average aircraft separations and hourly capacities calculated for all 7 time periods are contained in Table 31.

Table 31
Average Separation and Hourly Capacities for Mixed Operations (Runway 17)

Time Period	Average Separation (seconds)	Movements per Hour
1	136.71	26.33
2	136.84	26.31
3	136.00	26.47
4	137.07	26.26
5	131.86	27.30
6	128.35	28.05
7	128.80	27.95

Source: AOS

Table 32 shows how each time period is broken up over the aircraft categories.

Table 32
Aircraft Category Movements by Time Period (Runway 17)

Time Period	Category A	Category B	Category C	Category D	Total
1	0.08	0.18	24.24	1.83	26.33
2	0.08	0.18	25.50	0.54	26.31
3	0.00	0.00	22.29	4.18	26.47
4	0.13	0.39	24.44	1.30	26.26
5	0.00	0.00	11.02	16.28	27.30
6	0.00	0.00	5.16	22.89	28.05
7	0.00	0.00	5.84	22.11	27.95

Source: AOS

Table 16 provides the aircraft separations for mixed operations on runway 35. The average aircraft separations and hourly capacities calculated for all 7 time periods are contained in Table 33.

Table 33
Average Separation and Hourly Capacities for Mixed Operations (Runway 35)

Time Period	Average Separation (seconds)	Movements per Hour
1	133.22	27.02
2	133.16	27.04
3	132.66	27.14
4	133.72	26.92
5	130.26	27.64
6	127.63	28.21
7	127.97	28.13

Source: AOS

Table 34 shows how each time period is broken up over the aircraft categories.

Table 34
Aircraft Category Movements by Time Period (Runway 35)

Time Period	Category A	Category B	Category C	Category D	Total
1	0.08	0.19	24.87	1.88	27.02
2	0.08	0.19	26.21	0.55	27.04
3	0.00	0.00	22.85	4.29	27.14
4	0.13	0.40	25.05	1.33	26.92
5	0.00	0.00	11.15	16.48	27.64
6	0.00	0.00	5.19	23.02	28.21
7	0.00	0.00	5.88	22.25	28.13

Source: AOS

Following an adjustment for runway utilisation, the weighted hourly movement rate for mixed operations is 27.16 on runway 17/35 – comprising an average of 0.05 Category A, 0.13 Category B, 20.42 Category C and 6.56 Category D aircraft movements.

Allowing for GA movements on runway 12/30 increases this figure to 28.08 movements per hour.

A final allowance must be made for the impact of RPT turboprop arrivals to runway 12/30. Experience at other airports with a cross runway indicate that a cross runway adds 4 movements per hour to the capacity of the airport. The GA movements assigned to runway 12/30 would equate to 0.91 movements per hour. Therefore, the capacity figure for mixed operations would increase to 31.16 movements per hour – comprising an average of 0.06 Category A, 0.15 Category B, 24.39 Category C and 6.56 Category D aircraft movements.

5.4 AVERAGE HOURLY MOVEMENTS RATE

In practice air traffic demand is a mixed mode operation which varies continuously between two extremes represented by an arrivals only sequence and a departure only sequence. The analytical model has provided estimations of hourly capacity of runway 17/35 for these extremes and a midpoint representing a mixed mode operation with alternating and equal numbers of arrivals and departures. The weighted average of these values provides an estimate of the hourly averaged movement rate for all possible operational scenarios. The individual capacities estimated above have been weighted as 15% arrivals only, 15% departures only and 70% mixed mode operations.

The averaged hourly movement rate for CIA is 36.47 movements – comprising up to 0.07 Category A, 0.18 Category B, 28.74 Category C and 7.48 Category D aircraft movements.

Higher movement rates will be observed at times but are not sustainable under conditions of continuous demand.

6.0 AIRPORT ANNUAL ULTIMATE CAPACITY

The averaged hourly movements' rate for CIA is 36.47 aircraft movements– comprising up to 0.07 Category A, 0.18 Category B, 28.74 Category C and 7.48 Category D aircraft movements. If capacity was to be maintained for 24 hours a day, this would equate to 875 movements a day or 319,477 movements a year.

However, CAG have advised AOS to lower the capacity of the airport between the hours of midnight and 0500 to 20 movements an hour to provide a realistic demand profile. These 20 movements will consist of 8 freight operations and 12 international operations. This means that from 0300 to 0400 the only movements will be 8 freight departures and from 0400 to 0500 the only movements will be 12 international arrivals (see figure 2).

Based on this information, the Annual Ultimate Capacity of CIA has been calculated as 282,119 aircraft movements.

ANNEX 2

AIRPORT CONSULTING

CANBERRA INTERNATIONAL AIRPORT

METEOROLOGICAL ANALYSIS

August 2003

CONTENTS

INTRODUCTION

1.1 THE COMMISSION

AOS Airport Consulting Pty Ltd (AOS) was engaged by Canberra International Airport Pty Ltd (CIA) to undertake a meteorological analysis of the usability of the present 17/35 runway. The investigation was intended to assess potential utilisation of runway 17 if nominated as the preferred runway with the present limitation of a non-precision VOR/DME instrument approach procedure and following the installation of an ILS.

1.2 RUNWAY USABILITY

Runway usability depends on site specific meteorology and refers to the percentage of time that a runway direction can be used for aircraft to land or take-off in specified meteorological conditions. These conditions determine the pilot's ability to control the aircraft both in normal and abnormal situations such as a critical engine failure during take-off.

1.3 DATA SOURCE

To acquire the necessary meteorological base data for this task, AOS engaged Mirrabooka Consulting Pty Ltd to undertake and report on Canberra International Airport's specific meteorological conditions. Mirrabooka produced data sets for nominated conditions using The Air Pollution Model (TAPM) developed by the CSIRO and Bureau of Meteorology (BOM) data.

2 METHODOLOGY

2.1 TAPM

TAPM is a sophisticated model that provides a record of hourly average wind speed and direction for a nominated location based on actual synoptic records and databases of local topography. It can generate meteorological data for a given set of parameters on an hourly basis for any period ranging from hours to years. At this point in time TAPM is able to generate meteorological conditions for any site in Australasia and South–east Asia for any period between 1997 and 2002. In this instance AOS requested site specific data for the full six years.

TAPM is a three dimensional prognostic model that solves the equations governing the behaviour of the atmosphere to predict meteorological fields at local and regional scales. To solve these atmospheric equations, TAPM makes use of the BOM's Limited Area Prediction System database to explain the associated synoptic conditions. TAPM is then able to output data for every hour of the period modelled to meet any given parameter or set of parameters such as:

- hourly averaged wind speed,
- wind direction,
- temperature,
- humidity,
- hour of the day,
- evaporative heat flux, and
- rainfall rate.

The parameters nominated for this analysis were:

- cloud base,
- visibility,
- wind speed,
- wind direction, and

- rainfall limits.

2.2 BOM DATA

The BOM data is manually recorded observations produced at varying frequencies over a shorter period and therefore provides less data than TAPM.

However, the BOM data includes cloud base and visibility data which is not produced by TAPM. Therefore the data needed to undertake the present analysis is a combination of TAPM and BOM data. Hence the analysis has been based on 25,606 TAPM data points for which there are corresponding BOM data points and not the full set of 43,824 TAPM data points available. This provides a statistically reliable data set.

The results of the TAPM modelling with the inclusion of BOM data are included at Attachment A.

2.3 AOS ANALYSIS

AOS analysed the TAPM and BOM data in relation to the nominated parameters. The data was collated to provide a realistic view of weather conditions at Canberra Airport which affect runway usability.

2.3.1 Dry/wet runways

The six years of data was initially collated for each hour of the day to determine the number of hours the runway was dry or wet. The criteria used to determine if the runway was dry were:

- there had been 0mm of rain in the current hour, and
- there had been less than 5mm of rain in the previous hour.

2.3.2 Operating modes

The data was further analysed in relation to specific operating modes which depend on cloud base and visibility. The modes in question relate solely to the 17/35 runway system. The following criteria were examined:

RUNWAY 17	CLOUD BASE	VISIBILITY
VOR/DME	>1500 feet	> 5000 metres
ILS	>200 feet	> 800 metres

RUNWAY 35	CLOUD BASE	VISIBILITY
VOR/DME	> 660 feet	> 2700 metres
ILS	> 330 feet	> 1200 metres

The wind speed and direction data provided by TAPM also allowed consideration of a tailwind component of 0, 5 and 10 knots for aircraft using a dry runway. While up to 10 knots of tailwind is structurally acceptable for an aircraft, 5 knots is routinely accepted by ATC and pilots and has been included in the analysis. Since pilots are not expected to take-off with a tailwind in wet conditions, only zero knot tailwinds were considered in the analysis of operations wet conditions.

2.3.3 Computations

The four tables below set out the results of the analysis for each operating mode.

For each hour of the day, summing the records when the runway is dry and when the runway is wet provided the total number of records included in the data set for that hour.

For each operating mode it was possible to determine the number of records that matched the operating mode criteria for use in dry conditions and in wet conditions for each hour of the day. These individual figures were summed to provide a total number of records that matched the criteria for each hour of the day for that operating mode.

It was then possible by dividing the records for each operating mode by the total number of records in the data set to determine a percentage runway usability for that hour of the day. The daily, hourly average for the mode was then calculated.

Table 2.1 Usability of runway 17 for VOR/DME criteria

				RWY 17 VOR (DRY)	RWY 17 VOR (WET)	RWY 17 VOR (ALL)	
	BOM DATA			SCENARIO 3C	SCENARIO 3A		
TIME	NO. RECORDS WHEN RWY DRY	NO. RECORDS WHEN RWY WET	TOTAL RECORDS	NO. RECORDS MATCHING VOR CRITERIA	NO. RECORDS MATCHING VOR CRITERIA	TOTAL RECORDS MATCHING VOR CRITERIA	RWY 17 VOR USABILITY (%)
0000-0100	240	32	272	205	9	214	78.68
0100-0200	239	23	262	198	6	204	77.86
0200-0300	544	59	603	399	10	409	67.83
0300-0400	595	60	655	420	9	429	65.50
0400-0500	626	64	690	433	9	442	64.06
0500-0600	1100	91	1191	695	10	705	59.19
0600-0700	1292	98	1390	808	7	815	58.63
0700-0800	1317	90	1407	869	5	874	62.12
0800-0900	1307	113	1420	930	14	944	66.48
0900-1000	1365	86	1451	1021	10	1031	71.05
1000-1100	1368	107	1475	1059	20	1079	73.15
1100-1200	1407	92	1499	1092	6	1098	73.25
1200-1300	1395	98	1493	1076	14	1090	73.01
1300-1400	1401	88	1489	1128	13	1141	76.63
1400-1500	1377	103	1480	1135	15	1150	77.70
1500-1600	1372	102	1474	1163	15	1178	79.92
1600-1700	1336	113	1449	1174	12	1186	81.85
1700-1800	1212	113	1325	1085	15	1100	83.02
1800-1900	943	103	1046	857	15	872	83.37
1900-2000	865	93	958	779	11	790	82.46
2000-2100	828	75	903	715	8	723	80.07
2100-2200	796	87	883	664	13	677	76.67
2200-2300	452	74	526	386	19	405	77.00
2300-2400	216	49	265	193	11	204	76.98
TOTALS	23593	2013	25606	18484	276	18760	
AVERAGE							73.26

Source: AOS, 2003

Table 2.2 Usability of runway 17 for ILS criteria

				RWY 17 ILS (DRY)	RWY 17 ILS (WET)	RWY 17 ILS (ALL)	
	BOM DATA			SCENARIO 6C	SCENARIO 6A		
TIME	NO. RECORDS WHEN RWY DRY	NO. RECORDS WHEN RWY WET	TOTAL RECORDS	NO. RECORDS MATCHING ILS CRITERIA	NO. RECORDS MATCHING ILS CRITERIA	TOTAL RECORDS MATCHING ILS CRITERIA	RWY 17 ILS USABILITY (%)
0000-0100	240	32	272	228	10	238	87.50
0100-0200	239	23	262	225	7	232	88.55
0200-0300	544	59	603	507	19	526	87.23
0300-0400	595	60	655	556	17	573	87.48
0400-0500	626	64	690	575	22	597	86.52
0500-0600	1100	91	1191	966	26	992	83.29
0600-0700	1292	98	1390	1152	26	1178	84.75
0700-0800	1317	90	1407	1198	23	1221	86.78
0800-0900	1307	113	1420	1212	29	1241	87.39
0900-1000	1365	86	1451	1229	21	1250	86.15
1000-1100	1368	107	1475	1178	36	1214	82.31
1100-1200	1407	92	1499	1177	24	1201	80.12
1200-1300	1395	98	1493	1130	30	1160	77.70
1300-1400	1401	88	1489	1160	24	1184	79.52
1400-1500	1377	103	1480	1167	33	1200	81.08
1500-1600	1372	102	1474	1194	30	1224	83.04
1600-1700	1336	113	1449	1208	27	1235	85.23
1700-1800	1212	113	1325	1127	35	1162	87.70
1800-1900	943	103	1046	896	30	926	88.53
1900-2000	865	93	958	826	23	849	88.62
2000-2100	828	75	903	784	20	804	89.04
2100-2200	796	87	883	744	26	770	87.20
2200-2300	452	74	526	429	28	457	86.88
2300-2400	216	49	265	208	13	221	83.40
TOTALS	23593	2013	25606	21076	579	21655	
AVERAGE							84.57

Source: AOS, 2003

Table 2.3 Usability of runway 35 for VOR/DME criteria

				RWY 35 VOR (DRY)	RWY 35 VOR (WET)	RWY 35 VOR (ALL)	
	BOM DATA			SCENARIO 9C	SCENARIO 9A		
TIME	NO. RECORDS WHEN RWY DRY	NO. RECORDS WHEN RWY WET	TOTAL RECORDS	NO. RECORDS MATCHING VOR CRITERIA	NO. RECORDS MATCHING VOR CRITERIA	TOTAL RECORDS MATCHING VOR CRITERIA	RWY 35 VOR USABILITY (%)
0000-0100	240	32	272	222	21	243	89.34
0100-0200	239	23	262	216	16	232	88.55
0200-0300	544	59	603	469	36	505	83.75
0300-0400	595	60	655	501	38	539	82.29
0400-0500	626	64	690	523	33	556	80.58
0500-0600	1100	91	1191	842	44	886	74.39
0600-0700	1292	98	1390	986	44	1030	74.10
0700-0800	1317	90	1407	1023	41	1064	75.62
0800-0900	1307	113	1420	1056	51	1107	77.96
0900-1000	1365	86	1451	1153	47	1200	82.70
1000-1100	1368	107	1475	1211	54	1265	85.76
1100-1200	1407	92	1499	1269	55	1324	88.33
1200-1300	1395	98	1493	1269	53	1322	88.55
1300-1400	1401	88	1489	1276	48	1324	88.92
1400-1500	1377	103	1480	1250	51	1301	87.91
1500-1600	1372	102	1474	1244	49	1293	87.72
1600-1700	1336	113	1449	1211	65	1276	88.06
1700-1800	1212	113	1325	1138	55	1193	90.04
1800-1900	943	103	1046	899	56	955	91.30
1900-2000	865	93	958	832	55	887	92.59
2000-2100	828	75	903	798	45	843	93.36
2100-2200	796	87	883	758	49	807	91.39
2200-2300	452	74	526	428	43	471	89.54
2300-2400	216	49	265	202	33	235	88.68
TOTALS	23593	2013	25606	20776	1082	21858	
AVERAGE							85.36

Source: AOS, 2003

Table 2.4 Usability of runway 35 for ILS criteria

				RWY 35 ILS (DRY)	RWY 35 ILS (WET)	RWY 35 ILS (ALL)	
	BOM DATA			SCENARIO 7C	SCENARIO 7A		
TIME	NO. RECORDS WHEN RWY DRY	NO. RECORDS WHEN RWY WET	TOTAL RECORDS	NO. RECORDS MATCHING ILS CRITERIA	NO. RECORDS MATCHING ILS CRITERIA	TOTAL RECORDS MATCHING ILS CRITERIA	RWY 35 ILS USABILITY (%)
0000-0100	240	32	272	223	21	244	89.71
0100-0200	239	23	262	219	16	235	89.69
0200-0300	544	59	603	480	37	517	85.74
0300-0400	595	60	655	523	40	563	85.95
0400-0500	626	64	690	543	38	581	84.20
0500-0600	1100	91	1191	896	58	954	80.10
0600-0700	1292	98	1390	1070	56	1126	81.01
0700-0800	1317	90	1407	1107	60	1167	82.94
0800-0900	1307	113	1420	1122	70	1192	83.94
0900-1000	1365	86	1451	1202	64	1266	87.25
1000-1100	1368	107	1475	1235	69	1304	88.41
1100-1200	1407	92	1499	1288	66	1354	90.33
1200-1300	1395	98	1493	1275	66	1341	89.82
1300-1400	1401	88	1489	1279	61	1340	89.99
1400-1500	1377	103	1480	1255	68	1323	89.39
1500-1600	1372	102	1474	1248	70	1318	89.42
1600-1700	1336	113	1449	1218	84	1302	89.86
1700-1800	1212	113	1325	1145	76	1221	92.15
1800-1900	943	103	1046	905	70	975	93.21
1900-2000	865	93	958	840	68	908	94.78
2000-2100	828	75	903	807	54	861	95.35
2100-2200	796	87	883	768	60	828	93.77
2200-2300	452	74	526	435	46	481	91.44
2300-2400	216	49	265	204	34	238	89.81
TOTALS	23593	2013	25606	21287	1352	22639	
AVERAGE							88.41

Source: AOS, 2003

3 RESULTS

The results shown in the tables suggest that under current operating conditions (no ILS on runway 17) the runway has an average daily usability of 73.26%. However, if an ILS system is installed on this runway it will result in an average daily usability of 84.57%. This is an increase of 11.31%.

The results for runway 35 show that under VOR minima the usability is 85.36% and 88.41% under ILS minima.

4 APPLICATION OF USABILITIES TO PRESENT AND FUTURE MOVEMENTS

4.1 2002 ANEI MOVEMENTS

To assess the impact of a revised runway utilisation this report has compared the result with the data collected for the 2002 ANEI. The runway utilisation based on the 2002 aircraft movement data supplied by Airservices Australia is shown in the table below.

Table 4.1 Runway utilisation

RUNWAY	UTILISATION (%)
12	8.8
17	12.9
30	25.4
35	52.9

Source: Airservices Australia, 2003 and AOS, 2003

Total movements for 2002 were in the order of 85,800, with approximately 66% of aircraft activity on runway 17/35. This equates to 56,648 annual movements. Of these 26,500 (45%) represent movements of RPT or large VIP aircraft on runway 35 and 5,700 (10%) represent movements on runway 17.

As RPT and large VIP aircraft currently account for the majority (55%) of activity on runway 17/35 and this proportion is likely to increase in the future, it is appropriate for analysis of revised runway usability to be confined to this category of aircraft.

Runway 35 is the predominant operating direction at present for RPT aircraft with 80% of the total movements. A break up of arrival and departures by RPT aircraft in 2002 is shown in the following table.

Table 4.2 Arrival and departures of RPT aircraft in 2002

RUNWAY	DEPARTURES	ARRIVALS	TOTAL
17	2,160	3,540	5,700
35	16,500	10,000	26,500
TOTAL	**18,660**	**13,540**	**32,200**

Source: Airservices Australia, 2003 and AOS, 2003

The apparent imbalance between arrivals and departures results from the use of runway 30 for landings by RPT turboprop aircraft.

The maximum runway 17/35 usability for different operating modes determined by the metrological analysis described in subsection 2.3.2 is shown in the following table. This table shows the average usability for a 24 hour and for the normal RPT operating hours (6.00 am to 10.00 pm). The individual hourly usabilities range between 59% and 95% for 24 hours and the 6.00 am to 10.00 pm periods.

Table 4.3 Average usability for 24 hour and for the normal RPT operating hours

RUNWAY	24 HOURS		6.00 AM TO 10.00 PM	
	VOR	ILS	VOR	ILS
17	73	85	74	84
35	85	88	86	89

Source: AOS, 2003

Based on the assumption that the take off direction is determined by the landing minima the table shows that:

- there is relatively little difference between runway usability over a 24 hour period compared to the16 hour period with-in which most RPT activity normally occurs;
- for the current predominant 35 direction the availability of the existing precision ILS provides only an additional 3% usability above that provided by a non precision VOR/DME approach;
- the usability of runway 17 although less that 35 is considerably greater than its use in 2002 would suggest; and

- the provision of an ILS on runway 17 would increase usability by 8 to 10% above that currently provided by the VOR/DME approach.

Although runway 35 is the current preferred runway, primarily for historic reasons such as airport operating modes and airline route structure, metrological conditions would allow a significant proportion of the activity on runway 35 to be moved onto runway 17.

The table below provides a comparison of the maximum impact of increased runway usability for the RPT movements on runway 17/35 in 2002. The table includes calculations based on the average usability and the individual hourly usabilities for the 16 hour period when RPT operations occurred in 2002. The latter calculation was based on hourly movements obtained from the March 2003 RPT schedule. This schedule resulted in slightly more (2%) movements being calculated on 17/35 than occurred in 2002. As a consequence to match the 2002 total this figure was adjusted down while maintaining the 17/35 ratio.

It shows that with revised and more flexible operating modes

- significantly more movements can be placed on runway 17 than is currently taking place;
- the provision of an ILS on runway 17 would increase the number of movements possible on runway 17 number by up to 13%; and
- for runway 17/35 the use of the average hourly utilisation provides a good approximation for the more accurate analysis using individual hourly usabilities.

Table 4.4 Impact of ILS on runway 17 for 2002 RPT movements

RUNWAY	2002 ANEI WITH 20% / 80% 17/35 SPLIT	BASED ON AVERAGE HOURLY USABILITY		BASED ON INDIVIDUAL HOURLY USABILITIES	
		WITH EXSITING VOR ON RUNWAY 17	WITH PROPOSED ILS ON RUNWAY 17	WITH EXSITING VOR ON RUNWAY 17	WITH PROPOSED ILS ON RUNWAY 17
17	5,700	23,800	27,000	24,230	27,300
35	26,500	8,400	5,200	7,970	4,900

Source: AOS, 2003

4.2 2024/25 FORECAST MOVEMENTS

Applying the usabilities derived from the metrology analysis to the 2024/25 forecast supplied by CIA, results in the number movements shown in the following table. The first column shows the likely runaway split of the 2002 20%/80% distribution is maintained. The table indicates that the impact of an ILS on runway 17 will be more pronounced as total movements increase.

Table 4.5 Impact of ILS on runway 17 for 2024/25 RPT movements

RUNWAY	WITH CURRENT 20% / 80% 17/35 SPLIT	BASED ON AVERAGE HOURLY USABILITY		BASED ON INDIVIDUAL HOURLY USABILITIES	
		WITH EXSITING VOR ON RUNWAY 17	WITH PROPOSED ILS ON RUNWAY 17	WITH EXSITING VOR ON RUNWAY 17	WITH PROPOSED ILS ON RUNWAY 17
17	13,500	50,000	56,700	50,800	57,300
35	54,000	17,500	10,800	16,700	10,200

Source: AOS, 2003

4.3 ACCURACY

The accuracy of the meteorological analysis can assessed by comparing the 2002 runway 35 utilisation of 80% with the theoretical average usability of 89% (Table 4.3). This indicates that in practice there are considerations other than weather which determine runway utilisation and that it is likely that this may as much as 10% lower than the usabilities estimated in this report.

A change to a runway 17 preferred operation may also cause a variance from the theoretical value because of such factors as:

- delays in the change over because ATC have to maintain 35 operations beyond the desirable time to allow all the remaining aircraft on the 35 approach to land, and
- wake turbulence caused by aircraft taking off on 17 increasing the time gap before aircraft can land on 30, thereby potentially reducing the usability of runway 30 during peak times.

4.4 SUMMARY

In summary the analysis of meteorological conditions shows that there can be significantly more operations on runway 17 than is currently the case and that this increase can occur without the installation of a precision ILS. An ILS on runway 17 would provide for an increase of approximately 13% above this figure, significantly in the period from 4.00am to 10.00am when the airport is most likely to be affected by winter fog.

Estimates of the number of movements able to be transferred to runway 17 however need to be modified due to the impact of non metrological factors.

ATTACHMENT A

MIRRABOOKA CONSULTING

BASE DATA

Scenario Description

Scenario 1

Results_scen1a.txt relative use of runway 17 for a wet runway (i.e. >5mm rain in current hour or > 10mm in previous hour), nil tailwind

Results_scen1b.txt relative use of runway 35 for a wet runway (i.e. >5mm rain in current hour or > 10mm in previous hour), nil tailwind

Results_scen1c.txt relative use of runway 17 for a wet runway (i.e. >0mm rain in current hour or > 5mm in previous hour) , nil tailwind

Results_scen1d.txt relative use of runway 35 for a wet runway (i.e. >0mm rain in current hour or > 5mm in previous hour) , nil tailwind

Rainfall limits for a wet/dry runway of 0 mm in the current hour and 5 mm in the previous hour gave better results for the wet runway usages, so I used those criteria for the following analyses of wet and dry runway usages.

Scenario 2

Results_scen2a.txt relative use of runway 17 for a dry runway, nil tailwind

Results_scen2b.txt relative use of runway 35 for a dry runway, nil tailwind

Results_scen2c.txt relative use of runway 17 for a dry runway, tailwind 5 knots

Results_scen2d.txt relative use of runway 35 for a dry runway, tailwind 5 knots

Results_scen2e.txt relative use of runway 17 for a dry runway, tailwind 10 knots

Results_scen2f.txt relative use of runway 35 for a dry runway, tailwind 10 knots

Scenario 3

Results_scen3a.txt relative use of runway 17 for a wet runway, nil tailwind, cloud base >1500ft, visibility >5000m

Results_scen3b.txt relative use of runway 17 for a dry runway, nil tailwind, cloud base >1500ft, visibility >5000m

Results_scen3c.txt relative use of runway 17 for a dry runway, 5 knot tailwind, cloud base >1500ft, visibility >5000m

Results_scen3d.txt relative use of runway 17 for a dry runway, 10 knot tailwind, cloud base >1500ft, visibility >5000m

Scenario 4

Results_scen4a.txt relative use of runway 17 (nil tailwind), while runway 12 is also useable (5 knot tailwind, 20 knot crosswind), both wet runway

Results_scen4b.txt relative use of runway 17 (nil tailwind), while runway 12 is also useable (5 knot tailwind, 20 knot crosswind), both dry runway

Results_scen4c.txt relative use of runway 17 (5 knot tailwind), while runway 12 is also useable (5 knot tailwind, 20 knot crosswind), both dry runway

Results_scen4d.txt relative use of runway 17 (10 knot tailwind), while runway 12 is also useable (5 knot tailwind, 20 knot crosswind), both dry runway

Scenario 5

Results_scen5a.txt	relative use of runway 35 (nil tailwind), while runway 30 is also useable (5 knot tailwind, 20 knot crosswind, cloud base >900ft, visibility >5000m), both wet runway
Results_scen5b.txt	relative use of runway 35 (nil tailwind), while runway 30 is also useable (5 knot tailwind, 20 knot crosswind, cloud base >900ft, visibility >5000m), both dry runway
Results_scen5c.txt	relative use of runway 35 (5 knot tailwind), while runway 30 is also useable (5 knot tailwind, 20 knot crosswind, cloud base >900ft, visibility >5000m), both dry runway
Results_scen5d.txt	relative use of runway 35 (10 knot tailwind), while runway 30 is also useable (5 knot tailwind, 20 knot crosswind, cloud base >900ft, visibility >5000m), both dry runway

Scenario 6

Results_scen6a.txt	relative use of runway 17 for a wet runway, nil tailwind, cloud base >200ft, visibility >800m
Results_scen6b.txt	relative use of runway 17 for a dry runway, nil tailwind, cloud base >200ft, visibility >800m
Results_scen6c.txt	relative use of runway 17 for a dry runway, 5 knot tailwind, cloud base >200ft, visibility >800m
Results_scen6d.txt	relative use of runway 17 for a dry runway, 10 knot tailwind, cloud base >200ft, visibility >800m

Scenario 7

Results_scen7a.txt	relative use of runway 35 for a wet runway, nil tailwind, cloud base >330ft, visibility >1200m
Results_scen7b.txt	relative use of runway 35 for a dry runway, nil tailwind, cloud base >330ft, visibility >1200m
Results_scen7c.txt	relative use of runway 35 for a dry runway, 5 knot tailwind, cloud base >330ft, visibility >1200m
Results_scen7d.txt	relative use of runway 35 for a dry runway, 10 knot tailwind, cloud base >3300ft, visibility >1200m

Scenario 8

Results_scen8a.txt	relative use of runway 35 for a wet runway, nil tailwind, cloud base >200ft, visibility >800m
Results_scen8b.txt	relative use of runway 35 for a dry runway, nil tailwind, cloud base >200ft, visibility >800m
Results_scen8c.txt	relative use of runway 35 for a dry runway, 5 knot tailwind, cloud base >200ft, visibility >800m
Results_scen8d.txt	relative use of runway 35 for a dry runway, 10 knot tailwind, cloud base >200ft, visibility >800m

Scenario 9

Results_scen9a.txt relative use of runway 35 for a wet runway, nil tailwind, cloud base >660ft, visibility >2700m

Results_scen9b.txt relative use of runway 35 for a dry runway, nil tailwind, cloud base >660ft, visibility >2700m

Results_scen9c.txt relative use of runway 35 for a dry runway, 5 knot tailwind, cloud base >660ft, visibility >2700m

Results_scen9d.txt relative use of runway 35 for a dry runway, 10 knot tailwind, cloud base >660ft, visibility >2700m

Scenario 10

Results_scen10a.txt runways 17/35, wet runway, nil tailwind, number of hours which were double counted in scenarios 1c and 1d (i.e. number of hours for which there were calm conditions, or wind at 90° to runway)

Results_scen10b.txt runways 17/35, wet runway, nil tailwind, number of hours which were double counted in scenarios 1c and 1d (i.e. number of hours for which there were calm conditions)

Scenario 11

Results_scen11a.txt runways 17/35, dry runway, nil tailwind, number of hours which were double counted in scenarios 2a-2f (i.e. number of hours for which there were calm conditions, or wind at 90° to runway)

Results_scen11b.txt runways 17/35, dry runway, nil tailwind, number of hours which were double counted in scenarios 2a-2f (i.e. number of hours for which there were calm conditions)

Scenario 12

Results_scen12a.txt runways 17/35, wet runway, nil tailwind, cloud base >200ft, visibility >800m, number of hours which were double counted in scenarios 6a and 8a (i.e. number of hours for which there were calm conditions, or wind at 90° to runway)

Results_scen12b.txt runways 17/35, wet runway, nil tailwind, cloud base >200ft, visibility >800m, number of hours which were double counted in scenarios 6a and 8a (i.e. number of hours for which there were calm conditions)

Scenario 13

Results_scen13a.txt runways 17/35, dry runway, nil tailwind, cloud base >200ft, visibility >800m, number of hours which were double counted in scenarios 6b-d and 8b-d (i.e. number of hours for which there were calm conditions, or wind at 90° to runway)

Results_scen13b.txt runways 17/35, dry runway, nil tailwind, cloud base >200ft, visibility >800m, number of hours which were double counted in scenarios 6b-d and 8b-d (i.e. number of hours for which there were calm conditions)

Scenario 14

Results_scen14a.txt time for which cloud/visibility criteria are met for a wet runway, cloud height 1500 ft, visibility 5000 m

Results_scen14b.txt time for which cloud/visibility criteria are met for a wet runway, cloud height 900 ft, visibility 5000 m

Results_scen14c.txt time for which cloud/visibility criteria are met for a wet runway, cloud height 200 ft, visibility 800 m

Results_scen14d.txt time for which cloud/visibility criteria are met for a wet runway, cloud height 330 ft, visibility 1200 m

Results_scen14e.txt time for which cloud/visibility criteria are met for a wet runway, cloud height 660 ft, visibility 2700 m

Scenario 15

Results_scen15a.txt time for which cloud/visibility criteria are met for a dry runway, cloud height 1500 ft, visibility 5000 m

Results_scen15b.txt time for which cloud/visibility criteria are met for a dry runway, cloud height 900 ft, visibility 5000 m

Results_scen15c.txt time for which cloud/visibility criteria are met for a dry runway, cloud height 200 ft, visibility 800 m

Results_scen15d.txt time for which cloud/visibility criteria are met for a dry runway, cloud height 330 ft, visibility 1200 m

Results_scen15e.txt time for which cloud/visibility criteria are met for a dry runway, cloud height 660 ft, visibility 2700 m

RESULTS SCENARIO 1A

RUNWAY 17, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 17

RUNWAY DIRECTION 180.419998

RAINFALL LIMIT IN CURRENT HOUR 5.

RAINFALL LIMIT IN PREVIOUS HOUR 10.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824

NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS

NO. OF HOURS RUNWAY IS WET = 126

NO. OF USEABLE HOURS = 38

USEABLE FOR 30.16% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	2	0	0.00
0100-0200	2	0	0.00
0200-0300	3	1	33.33
0300-0400	4	1	25.00
0400-0500	5	2	40.00
0500-0600	5	1	20.00
0600-0700	7	1	14.29
0700-0800	7	3	42.86
0800-0900	1	0	0.00
0900-1000	3	1	33.33
1000-1100	3	0	0.00
1100-1200	3	2	66.67
1200-1300	3	2	66.67
1300-1400	2	2	100.00
1400-1500	2	0	0.00
1500-1600	3	1	33.33
1600-1700	6	2	33.33
1700-1800	6	1	16.67
1800-1900	9	2	22.22
1900-2000	5	1	20.00
2000-2100	2	0	0.00
2100-2200	8	0	0.00
2200-2300	21	9	42.86
2300-2400	14	6	42.86
TOTAL	126	38	30.16

RESULTS SCENARIO 1B

RUNWAY 35, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 5.
RAINFALL LIMIT IN PREVIOUS HOUR 10.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 126
NO. OF USEABLE HOURS = 88
USEABLE FOR 69.84% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	2	2	100.00
0100-0200	2	2	100.00
0200-0300	3	2	66.67
0300-0400	4	3	75.00
0400-0500	5	3	60.00
0500-0600	5	4	80.00
0600-0700	7	6	85.71
0700-0800	7	4	57.14
0800-0900	1	1	100.00
0900-1000	3	2	66.67
1000-1100	3	3	100.00
1100-1200	3	1	33.33
1200-1300	3	1	33.33
1300-1400	2	0	0.00
1400-1500	2	2	100.00
1500-1600	3	2	66.67
1600-1700	6	4	66.67
1700-1800	6	5	83.33
1800-1900	9	7	77.78
1900-2000	5	4	80.00
2000-2100	2	2	100.00
2100-2200	8	8	100.00
2200-2300	21	12	57.14
2300-2400	14	8	57.14
TOTAL	126	88	69.84

RESULTS SCENARIO 1C

RUNWAY 17, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2542
NO. OF USEABLE HOURS = 763
USEABLE FOR 30.02% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	107	39	36.45
0100-0200	79	26	32.91
0200-0300	94	27	28.72
0300-0400	96	28	29.17
0400-0500	103	32	31.07
0500-0600	101	29	28.71
0600-0700	101	27	26.73
0700-0800	96	26	27.08
0800-0900	122	33	27.05
0900-1000	88	21	23.86
1000-1100	111	38	34.23
1100-1200	94	26	27.66
1200-1300	99	30	30.30
1300-1400	89	24	26.97
1400-1500	104	33	31.73
1500-1600	102	30	29.41
1600-1700	115	28	24.35
1700-1800	121	37	30.58
1800-1900	133	40	30.08
1900-2000	117	31	26.50
2000-2100	96	29	30.21
2100-2200	111	37	33.33
2200-2300	140	55	39.29
2300-2400	123	37	30.08
TOTAL	2542	763	30.02

RESULTS SCENARIO 1D

RUNWAY 35, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2542
NO. OF USEABLE HOURS = 1783
USEABLE FOR 70.14% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	107	68	63.55
0100-0200	79	53	67.09
0200-0300	94	67	71.28
0300-0400	96	69	71.88
0400-0500	103	71	68.93
0500-0600	101	73	72.28
0600-0700	101	74	73.27
0700-0800	96	70	72.92
0800-0900	122	89	72.95
0900-1000	88	68	77.27
1000-1100	111	74	66.67
1100-1200	94	68	72.34
1200-1300	99	69	69.70
1300-1400	89	65	73.03
1400-1500	104	71	68.27
1500-1600	102	72	70.59
1600-1700	115	87	75.65
1700-1800	121	84	69.42
1800-1900	133	93	69.92
1900-2000	117	86	73.50
2000-2100	96	67	69.79
2100-2200	111	74	66.67
2200-2300	140	85	60.71
2300-2400	123	86	69.92
TOTAL	2542	1783	70.14

RESULTS SCENARIO 2A

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 0 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 14146
USEABLE FOR 35.57% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	794	48.36
0100-0200	1673	804	48.06
0200-0300	1660	778	46.87
0300-0400	1661	770	46.36
0400-0500	1659	751	45.27
0500-0600	1657	726	43.81
0600-0700	1663	692	41.61
0700-0800	1673	604	36.10
0800-0900	1647	509	30.90
0900-1000	1674	465	27.78
1000-1100	1649	396	24.01
1100-1200	1669	386	23.13
1200-1300	1665	398	23.90
1300-1400	1668	428	25.66
1400-1500	1657	439	26.49
1500-1600	1664	483	29.03
1600-1700	1655	494	29.85
1700-1800	1651	479	29.01
1800-1900	1639	477	29.10
1900-2000	1657	547	33.01
2000-2100	1672	619	37.02
2100-2200	1655	673	40.66
2200-2300	1625	684	42.09
2300-2400	1635	750	45.87
TOTAL	39770	14146	35.57

RESULTS SCENARIO 2B

RUNWAY 35, DRY CONDITIONS, TAILWIND LIMIT 0 KNOTS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 25709
USEABLE FOR 64.64% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	855	52.07
0100-0200	1673	875	52.30
0200-0300	1660	890	53.61
0300-0400	1661	897	54.00
0400-0500	1659	916	55.21
0500-0600	1657	934	56.37
0600-0700	1663	977	58.75
0700-0800	1673	1080	64.55
0800-0900	1647	1148	69.70
0900-1000	1674	1216	72.64
1000-1100	1649	1253	75.99
1100-1200	1669	1284	76.93
1200-1300	1665	1268	76.16
1300-1400	1668	1240	74.34
1400-1500	1657	1221	73.69
1500-1600	1664	1181	70.97
1600-1700	1655	1161	70.15
1700-1800	1651	1172	70.99
1800-1900	1639	1163	70.96
1900-2000	1657	1110	66.99
2000-2100	1672	1054	63.04
2100-2200	1655	984	59.46
2200-2300	1625	943	58.03
2300-2400	1635	887	54.25
TOTAL	39770	25709	64.64

RESULTS SCENARIO 2C

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 5 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 37120
USEABLE FOR 93.34% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	1614	98.29
0100-0200	1673	1652	98.74
0200-0300	1660	1643	98.98
0300-0400	1661	1650	99.34
0400-0500	1659	1645	99.16
0500-0600	1657	1647	99.40
0600-0700	1663	1654	99.46
0700-0800	1673	1654	98.86
0800-0900	1647	1602	97.27
0900-1000	1674	1550	92.59
1000-1100	1649	1435	87.02
1100-1200	1669	1393	83.46
1200-1300	1665	1350	81.08
1300-1400	1668	1377	82.55
1400-1500	1657	1398	84.37
1500-1600	1664	1442	86.66
1600-1700	1655	1485	89.73
1700-1800	1651	1528	92.55
1800-1900	1639	1547	94.39
1900-2000	1657	1568	94.63
2000-2100	1672	1578	94.38
2100-2200	1655	1551	93.72
2200-2300	1625	1558	95.88
2300-2400	1635	1599	97.80
TOTAL	39770	37120	93.34

RESULTS SCENARIO 2D

RUNWAY 35, DRY CONDITIONS, TAILWIND LIMIT 5 KNOTS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 38169
USEABLE FOR 95.97% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	1610	98.05
0100-0200	1673	1637	97.85
0200-0300	1660	1626	97.95
0300-0400	1661	1625	97.83
0400-0500	1659	1623	97.83
0500-0600	1657	1626	98.13
0600-0700	1663	1628	97.90
0700-0800	1673	1621	96.89
0800-0900	1647	1570	95.32
0900-1000	1674	1569	93.73
1000-1100	1649	1536	93:15
1100-1200	1669	1548	92.75
1200-1300	1665	1543	92.67
1300-1400	1668	1542	92.45
1400-1500	1657	1530	92.34
1500-1600	1664	1535	92.25
1600-1700	1655	1534	92.69
1700-1800	1651	1573	95.28
1800-1900	1639	1590	97.01
1900-2000	1657	1624	98.01
2000-2100	1672	1650	98.68
2100-2200	1655	1629	98.43
2200-2300	1625	1598	98.34
2300-2400	1635	1602	97.98
TOTAL	39770	38169	95.97

RESULTS SCENARIO 2E

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 10 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 39689
USEABLE FOR 99.80% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	1641	99.94
0100-0200	1673	1672	99.94
0200-0300	1660	1659	99.94
0300-0400	1661	1661	100.00
0400-0500	1659	1659	100.00
0500-0600	1657	1656	99.94
0600-0700	1663	1663	100.00
0700-0800	1673	1672	99.94
0800-0900	1647	1646	99.94
0900-1000	1674	1670	99.76
1000-1100	1649	1642	99.58
1100-1200	1669	1657	99.28
1200-1300	1665	1652	99.22
1300-1400	1668	1656	99.28
1400-1500	1657	1649	99.52
1500-1600	1664	1658	99.64
1600-1700	1655	1650	99.70
1700-1800	1651	1649	99.88
1800-1900	1639	1637	99.88
1900-2000	1657	1656	99.94
2000-2100	1672	1672	100.00
2100-2200	1655	1654	99.94
2200-2300	1625	1624	99.94
2300-2400	1635	1634	99.94
TOTAL	39770	39689	99.80

RESULTS SCENARIO 2F

RUNWAY 35, DRY CONDITIONS, TAILWIND LIMIT 10 KNOTS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 39571
USEABLE FOR 99.50% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	1640	99.88
0100-0200	1673	1671	99.88
0200-0300	1660	1658	99.88
0300-0400	1661	1658	99.82
0400-0500	1659	1657	99.88
0500-0600	1657	1655	99.88
0600-0700	1663	1660	99.82
0700-0800	1673	1668	99.70
0800-0900	1647	1636	99.33
0900-1000	1674	1659	99.10
1000-1100	1649	1631	98.91
1100-1200	1669	1647	98.68
1200-1300	1665	1644	98.74
1300-1400	1668	1645	98.62
1400-1500	1657	1636	98.73
1500-1600	1664	1648	99.04
1600-1700	1655	1642	99.21
1700-1800	1651	1646	99.70
1800-1900	1639	1637	99.88
1900-2000	1657	1654	99.82
2000-2100	1672	1671	99.94
2100-2200	1655	1652	99.82
2200-2300	1625	1623	99.88
2300-2400	1635	1633	99.88
TOTAL	39770	39571	99.50

RESULTS SCENARIO 3A

RUNWAY 17, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 276
USEABLE FOR 13.71% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	9	28.13
0100-0200	23	6	26.09
0200-0300	59	10	16.95
0300-0400	60	9	15.00
0400-0500	64	9	14.06
0500-0600	91	10	10.99
0600-0700	98	7	7.14
0700-0800	90	5	5.56
0800-0900	113	14	12.39
0900-1000	86	10	11.63
1000-1100	107	20	18.69
1100-1200	92	6	6.52
1200-1300	98	14	14.29
1300-1400	88	13	14.77
1400-1500	103	15	14.56
1500-1600	102	15	14.71
1600-1700	113	12	10.62
1700-1800	113	15	13.27
1800-1900	103	15	14.56
1900-2000	93	11	11.83
2000-2100	75	8	10.67
2100-2200	87	13	14.94
2200-2300	74	19	25.68
2300-2400	49	11	22.45
TOTAL	2013	276	13.71

RESULTS SCENARIO 3B

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 0 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 23593
NO. OF USEABLE HOURS = 7472
USEABLE FOR 31.67% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	110	45.83
0100-0200	239	113	47.28
0200-0300	544	234	43.01
0300-0400	595	248	41.68
0400-0500	626	252	40.26
0500-0600	1100	387	35.18
0600-0700	1292	432	33.44
0700-0800	1317	401	30.45
0800-0900	1307	368	28.16
0900-1000	1365	365	26.74
1000-1100	1368	334	24.42
1100-1200	1407	341	24.24
1200-1300	1395	346	24.80
1300-1400	1401	380	27.12
1400-1500	1377	385	27.96
1500-1600	1372	426	31.05
1600-1700	1336	432	32.34
1700-1800	1212	384	31.68
1800-1900	943	305	32.34
1900-2000	865	307	35.49
2000-2100	828	314	37.92
2100-2200	796	312	39.20
2200-2300	452	195	43.14
2300-2400	216	101	46.76
TOTAL	23593	7472	31.67

RESULTS SCENARIO 3C

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 5 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 23593
NO. OF USEABLE HOURS = 18484
USEABLE FOR 78.35% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	205	85.42
0100-0200	239	198	82.85
0200-0300	544	399	73.35
0300-0400	595	420	70.59
0400-0500	626	433	69.17
0500-0600	1100	695	63.18
0600-0700	1292	808	62.54
0700-0800	1317	869	65.98
0800-0900	1307	930	71.16
0900-1000	1365	1021	74.80
1000-1100	1368	1059	77.41
1100-1200	1407	1092	77.61
1200-1300	1395	1076	77.13
1300-1400	1401	1128	80.51
1400-1500	1377	1135	82.43
1500-1600	1372	1163	84.77
1600-1700	1336	1174	87.87
1700-1800	1212	1085	89.52
1800-1900	943	857	90.88
1900-2000	865	779	90.06
2000-2100	828	715	86.35
2100-2200	796	664	83.42
2200-2300	452	386	85.40
2300-2400	216	193	89.35
TOTAL	23593	18484	78.35

RESULTS SCENARIO 3D

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 10 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 23593
NO. OF USEABLE HOURS = 20237
USEABLE FOR 85.78% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	211	87.92
0100-0200	239	203	84.94
0200-0300	544	406	74.63
0300-0400	595	423	71.09
0400-0500	626	438	69.97
0500-0600	1100	700	63.64
0600-0700	1292	816	63.16
0700-0800	1317	883	67.05
0800-0900	1307	964	73.76
0900-1000	1365	1112	81.47
1000-1100	1368	1221	89.25
1100-1200	1407	1299	92.32
1200-1300	1395	1319	94.55
1300-1400	1401	1350	96.36
1400-1500	1377	1334	96.88
1500-1600	1372	1330	96.94
1600-1700	1336	1293	96.78
1700-1800	1212	1164	96.04
1800-1900	943	899	95.33
1900-2000	865	812	93.87
2000-2100	828	753	90.94
2100-2200	796	706	88.69
2200-2300	452	403	89.16
2300-2400	216	198	91.67
TOTAL	23593	20237	85.78

RESULTS SCENARIO 4A

RUNWAYS 17 & 12, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 1
RUNWAY DIRECTION 130.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2542
NO. OF USEABLE HOURS = 742
USEABLE FOR 29.19% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	107	38	35.51
0100-0200	79	25	31.65
0200-0300	94	27	28.72
0300-0400	96	28	29.17
0400-0500	103	32	31.07
0500-0600	101	29	28.71
0600-0700	101	27	26.73
0700-0800	96	26	27.08
0800-0900	122	32	26.23
0900-1000	88	21	23.86
1000-1100	111	34	30.63
1100-1200	94	26	27.66
1200-1300	99	29	29.29
1300-1400	89	22	24.72
1400-1500	104	29	27.88
1500-1600	102	29	28.43
1600-1700	115	26	22.61
1700-1800	121	37	30.58
1800-1900	133	40	30.08
1900-2000	117	28	23.93
2000-2100	96	29	30.21
2100-2200	111	37	33.33
2200-2300	140	55	39.29
2300-2400	123	36	29.27
TOTAL	2542	742	29.19

RESULTS SCENARIO 4B

RUNWAYS 17 (TAILWIND LIMIT 0 KNOTS) & 12, DRY CONDITIONS

<u>CRITERIA</u>
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 12
RUNWAY DIRECTION 130.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

<u>RESULTS</u>
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 13466
USEABLE FOR 33.86% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	792	48.23
0100-0200	1673	802	47.94
0200-0300	1660	775	46.69
0300-0400	1661	767	46.18
0400-0500	1659	749	45.15
0500-0600	1657	725	43.75
0600-0700	1663	690	41.49
0700-0800	1673	601	35.92
0800-0900	1647	499	30.30
0900-1000	1674	442	26.40
1000-1100	1649	365	22.13
1100-1200	1669	342	20.49
1200-1300	1665	344	20.66
1300-1400	1668	353	21.16
1400-1500	1657	348	21.00
1500-1600	1664	377	22.66
1600-1700	1655	399	24.11
1700-1800	1651	408	24.71
1800-1900	1639	446	27.21
1900-2000	1657	538	32.47
2000-2100	1672	614	36.72
2100-2200	1655	667	40.30
2200-2300	1625	677	41.66
2300-2400	1635	746	45.63
TOTAL	39770	13466	33.86

RESULTS SCENARIO 4C

RUNWAYS 17 (TAILWIND LIMIT 5 KNOTS) & 12, DRY CONDITIONS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 12
RUNWAY DIRECTION 130.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 31222
USEABLE FOR 78.51% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	1564	95.25
0100-0200	1673	1592	95.16
0200-0300	1660	1579	95.12
0300-0400	1661	1588	95.61
0400-0500	1659	1580	95.24
0500-0600	1657	1583	95.53
0600-0700	1663	1585	95.31
0700-0800	1673	1549	92.59
0800-0900	1647	1422	86.34
0900-1000	1674	1223	73.06
1000-1100	1649	1019	61.80
1100-1200	1669	908	54.40
1200-1300	1665	833	50.03
1300-1400	1668	824	49.40
1400-1500	1657	826	49.85
1500-1600	1664	865	51.98
1600-1700	1655	948	57.28
1700-1800	1651	1093	66.20
1800-1900	1639	1248	76.14
1900-2000	1657	1406	84.85
2000-2100	1672	1483	88.70
2100-2200	1655	1475	89.12
2200-2300	1625	1489	91.63
2300-2400	1635	1540	94.19
TOTAL	39770	31222	78.51

RESULTS SCENARIO 4D

RUNWAYS 17 (TAILWIND LIMIT 10 KNOTS) & 12, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 12
RUNWAY DIRECTION 130.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 32029
USEABLE FOR 80.54% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	1576	95.98
0100-0200	1673	1596	95.40
0200-0300	1660	1580	95.18
0300-0400	1661	1588	95.61
0400-0500	1659	1584	95.48
0500-0600	1657	1584	95.59
0600-0700	1663	1587	95.43
0700-0800	1673	1553	92.83
0800-0900	1647	1431	86.89
0900-1000	1674	1249	74.61
1000-1100	1649	1067	64.71
1100-1200	1669	962	57.64
1200-1300	1665	901	54.11
1300-1400	1668	876	52.52
1400-1500	1657	874	52.75
1500-1600	1664	913	54.87
1600-1700	1655	996	60.18
1700-1800	1651	1135	68.75
1800-1900	1639	1296	79.07
1900-2000	1657	1464	88.35
2000-2100	1672	1555	93.00
2100-2200	1655	1560	94.26
2200-2300	1625	1540	94.77
2300-2400	1635	1562	95.54
TOTAL	39770	32029	80.54

RESULTS SCENARIO 5A

RUNWAYS 35 & 30, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 30
RUNWAY DIRECTION 310.420013
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 824
USEABLE FOR 40.93% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	19	59.38
0100-0200	23	15	65.22
0200-0300	59	29	49.15
0300-0400	60	30	50.00
0400-0500	64	28	43.75
0500-0600	91	38	41.76
0600-0700	98	29	29.59
0700-0800	90	22	24.44
0800-0900	113	33	29.20
0900-1000	86	37	43.02
1000-1100	107	38	35.51
1100-1200	92	43	46.74
1200-1300	98	41	41.84
1300-1400	88	32	36.36
1400-1500	103	37	35.92
1500-1600	102	36	35.29
1600-1700	113	47	41.59
1700-1800	113	43	38.05
1800-1900	103	42	40.78
1900-2000	93	41	44.09
2000-2100	75	36	48.00
2100-2200	87	40	45.98
2200-2300	74	36	48.65
2300-2400	49	32	65.31
TOTAL	2013	824	40.93

RESULTS SCENARIO 5B

RUNWAYS 35 (TAILWIND LIMIT 0 KNOTS)& 30, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 30
RUNWAY DIRECTION 310.420013
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 23593
NO. OF USEABLE HOURS = 13494
USEABLE FOR 57.19% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	110	45.83
0100-0200	239	99	41.42
0200-0300	544	206	37.87
0300-0400	595	215	36.13
0400-0500	626	225	35.94
0500-0600	1100	386	35.09
0600-0700	1292	467	36.15
0700-0800	1317	573	43.51
0800-0900	1307	696	53.25
0900-1000	1365	835	61.17
1000-1100	1368	949	69.37
1100-1200	1407	1006	71.50
1200-1300	1395	1008	72.26
1300-1400	1401	983	70.16
1400-1500	1377	955	69.35
1500-1600	1372	899	65.52
1600-1700	1336	846	63.32
1700-1800	1212	770	63.53
1800-1900	943	585	62.04
1900-2000	865	497	57.46
2000-2100	828	443	53.50
2100-2200	796	415	52.14
2200-2300	452	222	49.12
2300-2400	216	104	48.15
TOTAL	23593	13494	57.19

RESULTS SCENARIO 5C

RUNWAYS 35 (TAILWIND LIMIT 5 KNOTS)& 30, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 30
RUNWAY DIRECTION 310.420013
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 23593
NO. OF USEABLE HOURS = 18866
USEABLE FOR 79.96% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	217	90.42
0100-0200	239	212	88.70
0200-0300	544	441	81.07
0300-0400	595	467	78.49
0400-0500	626	484	77.32
0500-0600	1100	780	70.91
0600-0700	1292	914	70.74
0700-0800	1317	934	70.92
0800-0900	1307	964	73.76
0900-1000	1365	1058	77.51
1000-1100	1368	1117	81.65
1100-1200	1407	1173	83.37
1200-1300	1395	1180	84.59
1300-1400	1401	1178	84.08
1400-1500	1377	1145	83.15
1500-1600	1372	1115	81.27
1600-1700	1336	1063	79.57
1700-1800	1212	1010	83.33
1800-1900	943	779	82.61
1900-2000	865	702	81.16
2000-2100	828	672	81.16
2100-2200	796	666	83.67
2200-2300	452	400	88.50
2300-2400	216	195	90.28
TOTAL	23593	18866	79.96

RESULTS SCENARIO 5D

RUNWAYS 35 (TAILWIND LIMIT 10 KNOTS)& 30, DRY CONDITIONS

<u>CRITERIA</u>
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

DATA FOR RUNWAY 30
RUNWAY DIRECTION 310.420013
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

<u>RESULTS</u>
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 23593
NO. OF USEABLE HOURS = 19358
USEABLE FOR 82.05% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	222	92.50
0100-0200	239	216	90.38
0200-0300	544	447	82.17
0300-0400	595	473	79.50
0400-0500	626	489	78.12
0500-0600	1100	790	71.82
0600-0700	1292	927	71.75
0700-0800	1317	954	72.44
0800-0900	1307	991	75.82
0900-1000	1365	1086	79.56
1000-1100	1368	1154	84.36
1100-1200	1407	1210	86.00
1200-1300	1395	1220	87.46
1300-1400	1401	1217	86.87
1400-1500	1377	1185	86.06
1500-1600	1372	1160	84.55
1600-1700	1336	1111	83.16
1700-1800	1212	1035	85.40
1800-1900	943	795	84.31
1900-2000	865	712	82.31
2000-2100	828	682	82.37
2100-2200	796	676	84.92
2200-2300	452	405	89.60
2300-2400	216	201	93.06
TOTAL	23593	19358	82.05

RESULTS SCENARIO 6A

RUNWAYS 17, WET CONDITIONS

<u>CRITERIA</u>
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

<u>RESULTS</u>
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 579
USEABLE FOR 28.76% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	10	31.25
0100-0200	23	7	30.43
0200-0300	59	19	32.20
0300-0400	60	17	28.33
0400-0500	64	22	34.38
0500-0600	91	26	28.57
0600-0700	98	26	26.53
0700-0800	90	23	25.56
0800-0900	113	29	25.66
0900-1000	86	21	24.42
1000-1100	107	36	33.64
1100-1200	92	24	26.09
1200-1300	98	30	30.61
1300-1400	88	24	27.27
1400-1500	103	33	32.04
1500-1600	102	30	29.41
1600-1700	113	27	23.89
1700-1800	113	35	30.97
1800-1900	103	30	29.13
1900-2000	93	23	24.73
2000-2100	75	20	26.67
2100-2200	87	26	29.89
2200-2300	74	28	37.84
2300-2400	49	13	26.53
TOTAL	2013	579	28.76

RESULTS SCENARIO 6B

RUNWAYS 17, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 8268
USEABLE FOR 35.04% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	120	50.00
0100-0200	239	126	52.72
0200-0300	544	279	51.29
0300-0400	595	300	50.42
0400-0500	626	305	48.72
0500-0600	1100	482	43.82
0600-0700	1292	554	42.88
0700-0800	1317	506	38.42
0800-0900	1307	430	32.90
0900-1000	1365	404	29.60
1000-1100	1368	359	26.24
1100-1200	1407	357	25.37
1200-1300	1395	357	25.59
1300-1400	1401	392	27.98
1400-1500	1377	395	28.69
1500-1600	1372	436	31.78
1600-1700	1336	443	33.16
1700-1800	1212	394	32.51
1800-1900	943	316	33.51
1900-2000	865	320	36.99
2000-2100	828	336	40.58
2100-2200	796	341	42.84
2200-2300	452	210	46.46
2300-2400	216	106	49.07
TOTAL	23593	8268	35.04

RESULTS SCENARIO 6C

RUNWAYS 17, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 21076
USEABLE FOR 89.33% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	228	95.00
0100-0200	239	225	94.14
0200-0300	544	507	93.20
0300-0400	595	556	93.45
0400-0500	626	575	91.85
0500-0600	1100	966	87.82
0600-0700	1292	1152	89.16
0700-0800	1317	1198	90.96
0800-0900	1307	1212	92.73
0900-1000	1365	1229	90.04
1000-1100	1368	1178	86.11
1100-1200	1407	1177	83.65
1200-1300	1395	1130	81.00
1300-1400	1401	1160	82.80
1400-1500	1377	1167	84.75
1500-1600	1372	1194	87.03
1600-1700	1336	1208	90.42
1700-1800	1212	1127	92.99
1800-1900	943	896	95.02
1900-2000	865	826	95.49
2000-2100	828	784	94.69
2100-2200	796	744	93.47
2200-2300	452	429	94.91
2300-2400	216	208	96.30
TOTAL	23593	21076	89.33

RESULTS SCENARIO 6D

RUNWAYS 17, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 22934
USEABLE FOR 97.21% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	234	97.50
0100-0200	239	230	96.23
0200-0300	544	514	94.49
0300-0400	595	560	94.12
0400-0500	626	580	92.65
0500-0600	1100	972	88.36
0600-0700	1292	1160	89.78
0700-0800	1317	1215	92.26
0800-0900	1307	1251	95.72
0900-1000	1365	1328	97.29
1000-1100	1368	1346	98.39
1100-1200	1407	1393	99.00
1200-1300	1395	1386	99.35
1300-1400	1401	1394	99.50
1400-1500	1377	1372	99.64
1500-1600	1372	1368	99.71
1600-1700	1336	1333	99.78
1700-1800	1212	1211	99.92
1800-1900	943	942	99.89
1900-2000	865	864	99.88
2000-2100	828	827	99.88
2100-2200	796	793	99.62
2200-2300	452	448	99.12
2300-2400	216	213	98.61
TOTAL	23593	22934	97.21

RESULTS SCENARIO 7A

RUNWAYS 35, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 1352
USEABLE FOR 67.16% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	21	65.63
0100-0200	23	16	69.57
0200-0300	59	37	62.71
0300-0400	60	40	66.67
0400-0500	64	38	59.38
0500-0600	91	58	63.74
0600-0700	98	56	57.14
0700-0800	90	60	66.67
0800-0900	113	70	61.95
0900-1000	86	64	74.42
1000-1100	107	69	64.49
1100-1200	92	66	71.74
1200-1300	98	66	67.35
1300-1400	88	61	69.32
1400-1500	103	68	66.02
1500-1600	102	70	68.63
1600-1700	113	84	74.34
1700-1800	113	76	67.26
1800-1900	103	70	67.96
1900-2000	93	68	73.12
2000-2100	75	54	72.00
2100-2200	87	60	68.97
2200-2300	74	46	62.16
2300-2400	49	34	69.39
TOTAL	2013	1352	67.16

RESULTS SCENARIO 7B

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 14532
USEABLE FOR 61.59% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	113	47.08
0100-0200	239	103	43.10
0200-0300	544	228	41.91
0300-0400	595	248	41.68
0400-0500	626	264	42.17
0500-0600	1100	462	42.00
0600-0700	1292	580	44.89
0700-0800	1317	683	51.86
0800-0900	1307	781	59.76
0900-1000	1365	908	66.52
1000-1100	1368	986	72.08
1100-1200	1407	1047	74.41
1200-1300	1395	1036	74.27
1300-1400	1401	1008	71.95
1400-1500	1377	985	71.53
1500-1600	1372	936	68.22
1600-1700	1336	893	66.84
1700-1800	1212	817	67.41
1800-1900	943	627	66.49
1900-2000	865	544	62.89
2000-2100	828	491	59.30
2100-2200	796	449	56.41
2200-2300	452	236	52.21
2300-2400	216	107	49.54
TOTAL	23593	14532	61.59

RESULTS SCENARIO 7C

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 21287
USEABLE FOR 90.23% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	223	92.92
0100-0200	239	219	91.63
0200-0300	544	480	88.24
0300-0400	595	523	87.90
0400-0500	626	543	86.74
0500-0600	1100	896	81.45
0600-0700	1292	1070	82.82
0700-0800	1317	1107	84.05
0800-0900	1307	1122	85.85
0900-1000	1365	1202	88.06
1000-1100	1368	1235	90.28
1100-1200	1407	1288	91.54
1200-1300	1395	1275	91.40
1300-1400	1401	1279	91.29
1400-1500	1377	1255	91.14
1500-1600	1372	1248	90.96
1600-1700	1336	1218	91.17
1700-1800	1212	1145	94.47
1800-1900	943	905	95.97
1900-2000	865	840	97.11
2000-2100	828	807	97.46
2100-2200	796	768	96.48
2200-2300	452	435	96.24
2300-2400	216	204	94.44
TOTAL	23593	21287	90.23

RESULTS SCENARIO 7D

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 22487
USEABLE FOR 95.31% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	232	96.67
0100-0200	239	227	94.98
0200-0300	544	499	91.73
0300-0400	595	544	91.43
0400-0500	626	561	89.62
0500-0600	1100	922	83.82
0600-0700	1292	1101	85.22
0700-0800	1317	1154	87.62
0800-0900	1307	1187	90.82
0900-1000	1365	1288	94.36
1000-1100	1368	1325	96.86
1100-1200	1407	1381	98.15
1200-1300	1395	1371	98.28
1300-1400	1401	1377	98.29
1400-1500	1377	1356	98.47
1500-1600	1372	1356	98.83
1600-1700	1336	1323	99.03
1700-1800	1212	1207	99.59
1800-1900	943	941	99.79
1900-2000	865	863	99.77
2000-2100	828	825	99.64
2100-2200	796	788	98.99
2200-2300	452	446	98.67
2300-2400	216	213	98.61
TOTAL	23593	22487	95.31

RESULTS SCENARIO 8A

RUNWAYS 35, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 1411
USEABLE FOR 70.09% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	21	65.63
0100-0200	23	16	69.57
0200-0300	59	39	66.10
0300-0400	60	43	71.67
0400-0500	64	41	64.06
0500-0600	91	64	70.33
0600-0700	98	65	66.33
0700-0800	90	66	73.33
0800-0900	113	76	67.26
0900-1000	86	66	76.74
1000-1100	107	71	66.36
1100-1200	92	68	73.91
1200-1300	98	68	69.39
1300-1400	88	64	72.73
1400-1500	103	70	67.96
1500-1600	102	72	70.59
1600-1700	113	85	75.22
1700-1800	113	78	69.03
1800-1900	103	72	69.90
1900-2000	93	70	75.27
2000-2100	75	55	73.33
2100-2200	87	61	70.11
2200-2300	74	46	62.16
2300-2400	49	34	69.39
TOTAL	2013	1411	70.09

RESULTS SCENARIO 8B

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 14761
USEABLE FOR 62.57% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	114	47.50
0100-0200	239	105	43.93
0200-0300	544	240	44.12
0300-0400	595	262	44.03
0400-0500	626	276	44.09
0500-0600	1100	492	44.73
0600-0700	1292	609	47.14
0700-0800	1317	719	54.59
0800-0900	1307	828	63.35
0900-1000	1365	932	68.28
1000-1100	1368	993	72.59
1100-1200	1407	1049	74.56
1200-1300	1395	1039	74.48
1300-1400	1401	1009	72.02
1400-1500	1377	985	71.53
1500-1600	1372	936	68.22
1600-1700	1336	893	66.84
1700-1800	1212	818	67.49
1800-1900	943	628	66.60
1900-2000	865	545	63.01
2000-2100	828	492	59.42
2100-2200	796	452	56.78
2200-2300	452	238	52.65
2300-2400	216	107	49.54
TOTAL	23593	14761	62.57

RESULTS SCENARIO 8C

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 21606
USEABLE FOR 91.58% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	225	93.75
0100-0200	239	222	92.89
0200-0300	544	496	91.18
0300-0400	595	538	90.42
0400-0500	626	560	89.46
0500-0600	1100	944	85.82
0600-0700	1292	1125	87.07
0700-0800	1317	1164	88.38
0800-0900	1307	1176	89.98
0900-1000	1365	1230	90.11
1000-1100	1368	1243	90.86
1100-1200	1407	1290	91.68
1200-1300	1395	1278	91.61
1300-1400	1401	1280	91.36
1400-1500	1377	1255	91.14
1500-1600	1372	1248	90.96
1600-1700	1336	1218	91.17
1700-1800	1212	1146	94.55
1800-1900	943	906	96.08
1900-2000	865	841	97.23
2000-2100	828	809	97.71
2100-2200	796	771	96.86
2200-2300	452	437	96.68
2300-2400	216	204	94.44
TOTAL	23593	21606	91.58

RESULTS SCENARIO 8D

RUNWAYS 35, DRY CONDITIONS

<u>CRITERIA</u>
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

<u>RESULTS</u>
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 22810
USEABLE FOR 96.68% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	234	97.50
0100-0200	239	230	96.23
0200-0300	544	515	94.67
0300-0400	595	559	93.95
0400-0500	626	579	92.49
0500-0600	1100	971	88.27
0600-0700	1292	1157	89.55
0700-0800	1317	1211	91.95
0800-0900	1307	1241	94.95
0900-1000	1365	1316	96.41
1000-1100	1368	1334	97.51
1100-1200	1407	1383	98.29
1200-1300	1395	1374	98.49
1300-1400	1401	1378	98.36
1400-1500	1377	1356	98.47
1500-1600	1372	1356	98.83
1600-1700	1336	1323	99.03
1700-1800	1212	1208	99.67
1800-1900	943	942	99.89
1900-2000	865	864	99.88
2000-2100	828	827	99.88
2100-2200	796	791	99.37
2200-2300	452	448	99.12
2300-2400	216	213	98.61
TOTAL	23593	22810	96.68

RESULTS SCENARIO 9A

RUNWAYS 35, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 1082
USEABLE FOR 53.75% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	21	65.63
0100-0200	23	16	69.57
0200-0300	59	36	61.02
0300-0400	60	38	63.33
0400-0500	64	33	51.56
0500-0600	91	44	48.35
0600-0700	98	44	44.90
0700-0800	90	41	45.56
0800-0900	113	51	45.13
0900-1000	86	47	54.65
1000-1100	107	54	50.47
1100-1200	92	55	59.78
1200-1300	98	53	54.08
1300-1400	88	48	54.55
1400-1500	103	51	49.51
1500-1600	102	49	48.04
1600-1700	113	65	57.52
1700-1800	113	55	48.67
1800-1900	103	56	54.37
1900-2000	93	55	59.14
2000-2100	75	45	60.00
2100-2200	87	49	56.32
2200-2300	74	43	58.11
2300-2400	49	33	67.35
TOTAL	2013	1082	53.75

RESULTS SCENARIO 9B

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 14123
USEABLE FOR 59.86% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	112	46.67
0100-0200	239	100	41.84
0200-0300	544	221	40.63
0300-0400	595	235	39.50
0400-0500	626	250	39.94
0500-0600	1100	424	38.55
0600-0700	1292	511	39.55
0700-0800	1317	612	46.47
0800-0900	1307	728	55.70
0900-1000	1365	867	63.52
1000-1100	1368	966	70.61
1100-1200	1407	1029	73.13
1200-1300	1395	1031	73.91
1300-1400	1401	1007	71.88
1400-1500	1377	981	71.24
1500-1600	1372	933	68.00
1600-1700	1336	888	66.47
1700-1800	1212	811	66.91
1800-1900	943	622	65.96
1900-2000	865	537	62.08
2000-2100	828	482	58.21
2100-2200	796	441	55.40
2200-2300	452	230	50.88
2300-2400	216	105	48.61
TOTAL	23593	14123	59.86

RESULTS SCENARIO 9C

RUNWAYS 35, DRY CONDITIONS

CRITERIA
DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 20776
USEABLE FOR 88.06% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	222	92.50
0100-0200	239	216	90.38
0200-0300	544	469	86.21
0300-0400	595	501	84.20
0400-0500	626	523	83.55
0500-0600	1100	842	76.55
0600-0700	1292	986	76.32
0700-0800	1317	1023	77.68
0800-0900	1307	1056	80.80
0900-1000	1365	1153	84.47
1000-1100	1368	1211	88.52
1100-1200	1407	1269	90.19
1200-1300	1395	1269	90.97
1300-1400	1401	1276	91.08
1400-1500	1377	1250	90.78
1500-1600	1372	1244	90.67
1600-1700	1336	1211	90.64
1700-1800	1212	1138	93.89
1800-1900	943	899	95.33
1900-2000	865	832	96.18
2000-2100	828	798	96.38
2100-2200	796	758	95.23
2200-2300	452	428	94.69
2300-2400	216	202	93.52
TOTAL	23593	20776	88.06

RESULTS SCENARIO 9D

RUNWAYS 35, DRY CONDITIONS

CRITERIA

DATA FOR RUNWAY 35
RUNWAY DIRECTION 0.419999987
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 21969
USEABLE FOR 93.12% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	231	96.25
0100-0200	239	224	93.72
0200-0300	544	488	89.71
0300-0400	595	521	87.56
0400-0500	626	540	86.26
0500-0600	1100	868	78.91
0600-0700	1292	1017	78.72
0700-0800	1317	1070	81.25
0800-0900	1307	1120	85.69
0900-1000	1365	1239	90.77
1000-1100	1368	1300	95.03
1100-1200	1407	1360	96.66
1200-1300	1395	1365	97.85
1300-1400	1401	1374	98.07
1400-1500	1377	1350	98.04
1500-1600	1372	1352	98.54
1600-1700	1336	1316	98.50
1700-1800	1212	1200	99.01
1800-1900	943	935	99.15
1900-2000	865	855	98.84
2000-2100	828	816	98.55
2100-2200	796	778	97.74
2200-2300	452	439	97.12
2300-2400	216	211	97.69
TOTAL	23593	21969	93.12

RESULTS SCENARIO 10A

RUNWAY 17, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2542
NO. OF USEABLE HOURS = 4
USEABLE FOR 0.16% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	107	0	0.00
0100-0200	79	0	0.00
0200-0300	94	0	0.00
0300-0400	96	1	1.04
0400-0500	103	0	0.00
0500-0600	101	1	0.99
0600-0700	101	0	0.00
0700-0800	96	0	0.00
0800-0900	122	0	0.00
0900-1000	88	1	1.14
1000-1100	111	1	0.90
1100-1200	94	0	0.00
1200-1300	99	0	0.00
1300-1400	89	0	0.00
1400-1500	104	0	0.00
1500-1600	102	0	0.00
1600-1700	115	0	0.00
1700-1800	121	0	0.00
1800-1900	133	0	0.00
1900-2000	117	0	0.00
2000-2100	96	0	0.00
2100-2200	111	0	0.00
2200-2300	140	0	0.00
2300-2400	123	0	0.00
TOTAL	2542	4	0.16

RESULTS SCENARIO 10B

RUNWAY 17, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2542
NO. OF USEABLE HOURS = 4
USEABLE FOR 0.16% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	107	0	0.00
0100-0200	79	0	0.00
0200-0300	94	0	0.00
0300-0400	96	1	1.04
0400-0500	103	0	0.00
0500-0600	101	1	0.99
0600-0700	101	0	0.00
0700-0800	96	0	0.00
0800-0900	122	0	0.00
0900-1000	88	1	1.14
1000-1100	111	1	0.90
1100-1200	94	0	0.00
1200-1300	99	0	0.00
1300-1400	89	0	0.00
1400-1500	104	0	0.00
1500-1600	102	0	0.00
1600-1700	115	0	0.00
1700-1800	121	0	0.00
1800-1900	133	0	0.00
1900-2000	117	0	0.00
2000-2100	96	0	0.00
2100-2200	111	0	0.00
2200-2300	140	0	0.00
2300-2400	123	0	0.00
TOTAL	2542	4	0.16

RESULTS SCENARIO 11A

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 0 KNOTS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 85
USEABLE FOR 0.21% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	7	0.43
0100-0200	1673	6	0.36
0200-0300	1660	8	0.48
0300-0400	1661	6	0.36
0400-0500	1659	8	0.48
0500-0600	1657	3	0.18
0600-0700	1663	6	0.36
0700-0800	1673	11	0.66
0800-0900	1647	10	0.61
0900-1000	1674	7	0.42
1000-1100	1649	0	0.00
1100-1200	1669	1	0.06
1200-1300	1665	1	0.06
1300-1400	1668	0	0.00
1400-1500	1657	3	0.18
1500-1600	1664	0	0.00
1600-1700	1655	0	0.00
1700-1800	1651	0	0.00
1800-1900	1639	1	0.06
1900-2000	1657	0	0.00
2000-2100	1672	1	0.06
2100-2200	1655	2	0.12
2200-2300	1625	2	0.12
2300-2400	1635	2	0.12
TOTAL	39770	85	0.21

RESULTS SCENARIO 11B

RUNWAY 17, DRY CONDITIONS, TAILWIND LIMIT 0 KNOTS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 42312

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS DRY = 39770
NO. OF USEABLE HOURS = 81
USEABLE FOR 0.20% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS DRY	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	1642	7	0.43
0100-0200	1673	6	0.36
0200-0300	1660	8	0.48
0300-0400	1661	6	0.36
0400-0500	1659	7	0.42
0500-0600	1657	2	0.12
0600-0700	1663	5	0.30
0700-0800	1673	10	0.60
0800-0900	1647	10	0.61
0900-1000	1674	7	0.42
1000-1100	1649	0	0.00
1100-1200	1669	1	0.06
1200-1300	1665	1	0.06
1300-1400	1668	0	0.00
1400-1500	1657	3	0.18
1500-1600	1664	0	0.00
1600-1700	1655	0	0.00
1700-1800	1651	0	0.00
1800-1900	1639	1	0.06
1900-2000	1657	0	0.00
2000-2100	1672	1	0.06
2100-2200	1655	2	0.12
2200-2300	1625	2	0.12
2300-2400	1635	2	0.12
TOTAL	39770	81	0.20

RESULTS SCENARIO 12A

RUNWAYS 17, WET CONDITIONS

<u>CRITERIA</u>
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

<u>RESULTS</u>
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 3
USEABLE FOR 0.15% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	0	0.00
0100-0200	23	0	0.00
0200-0300	59	0	0.00
0300-0400	60	1	1.67
0400-0500	64	0	0.00
0500-0600	91	0	0.00
0600-0700	98	0	0.00
0700-0800	90	0	0.00
0800-0900	113	0	0.00
0900-1000	86	1	1.16
1000-1100	107	1	0.93
1100-1200	92	0	0.00
1200-1300	98	0	0.00
1300-1400	88	0	0.00
1400-1500	103	0	0.00
1500-1600	102	0	0.00
1600-1700	113	0	0.00
1700-1800	113	0	0.00
1800-1900	103	0	0.00
1900-2000	93	0	0.00
2000-2100	75	0	0.00
2100-2200	87	0	0.00
2200-2300	74	0	0.00
2300-2400	49	0	0.00
TOTAL	2013	3	0.15

RESULTS SCENARIO 12B

RUNWAYS 17, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF USEABLE HOURS = 3
USEABLE FOR 0.15% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	32	0	0.00
0100-0200	23	0	0.00
0200-0300	59	0	0.00
0300-0400	60	1	1.67
0400-0500	64	0	0.00
0500-0600	91	0	0.00
0600-0700	98	0	0.00
0700-0800	90	0	0.00
0800-0900	113	0	0.00
0900-1000	86	1	1.16
1000-1100	107	1	0.93
1100-1200	92	0	0.00
1200-1300	98	0	0.00
1300-1400	88	0	0.00
1400-1500	103	0	0.00
1500-1600	102	0	0.00
1600-1700	113	0	0.00
1700-1800	113	0	0.00
1800-1900	103	0	0.00
1900-2000	93	0	0.00
2000-2100	75	0	0.00
2100-2200	87	0	0.00
2200-2300	74	0	0.00
2300-2400	49	0	0.00
TOTAL	2013	3	0.15

RESULTS SCENARIO 13A

RUNWAYS 17, WET CONDITIONS

CRITERIA
DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 39
USEABLE FOR 0.17% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	0	0.00
0100-0200	239	1	0.42
0200-0300	544	4	0.74
0300-0400	595	2	0.34
0400-0500	626	1	0.16
0500-0600	1100	1	0.09
0600-0700	1292	3	0.23
0700-0800	1317	9	0.68
0800-0900	1307	6	0.46
0900-1000	1365	5	0.37
1000-1100	1368	0	0.00
1100-1200	1407	1	0.07
1200-1300	1395	1	0.07
1300-1400	1401	0	0.00
1400-1500	1377	3	0.22
1500-1600	1372	0	0.00
1600-1700	1336	0	0.00
1700-1800	1212	0	0.00
1800-1900	943	1	0.11
1900-2000	865	0	0.00
2000-2100	828	1	0.12
2100-2200	796	0	0.00
2200-2300	452	0	0.00
2300-2400	216	0	0.00
TOTAL	23593	39	0.17

RESULTS SCENARIO 13B

RUNWAYS 17, WET CONDITIONS

CRITERIA

DATA FOR RUNWAY 17
RUNWAY DIRECTION 180.419998
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.

RESULTS

TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF USEABLE HOURS = 38
USEABLE FOR 0.16% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF USEABLE HOURS	% USEABILITY
0000-0100	240	0	0.00
0100-0200	239	1	0.42
0200-0300	544	4	0.74
0300-0400	595	2	0.34
0400-0500	626	1	0.16
0500-0600	1100	1	0.09
0600-0700	1292	2	0.15
0700-0800	1317	9	0.68
0800-0900	1307	6	0.46
0900-1000	1365	5	0.37
1000-1100	1368	0	0.00
1100-1200	1407	1	0.07
1200-1300	1395	1	0.07
1300-1400	1401	0	0.00
1400-1500	1377	3	0.22
1500-1600	1372	0	0.00
1600-1700	1336	0	0.00
1700-1800	1212	0	0.00
1800-1900	943	1	0.11
1900-2000	865	0	0.00
2000-2100	828	1	0.12
2100-2200	796	0	0.00
2200-2300	452	0	0.00
2300-2400	216	0	0.00
TOTAL	23593	38	0.16

RESULTS SCENARIO 14A

CANBERRA AIRPORT, WET CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 1500.
VISIBILITY (m) 5000.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 848
CRITERIA MET FOR 42.13% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	32	25	78.13
0100-0200	23	17	73.91
0200-0300	59	33	55.93
0300-0400	60	34	56.67
0400-0500	64	27	42.19
0500-0600	91	30	32.97
0600-0700	98	19	19.39
0700-0800	90	16	17.78
0800-0900	113	34	30.09
0900-1000	86	38	44.19
1000-1100	107	47	43.93
1100-1200	92	36	39.13
1200-1300	98	45	45.92
1300-1400	88	38	43.18
1400-1500	103	42	40.78
1500-1600	102	38	37.25
1600-1700	113	47	41.59
1700-1800	113	45	39.82
1800-1900	103	46	44.66
1900-2000	93	36	38.71
2000-2100	75	29	38.67
2100-2200	87	37	42.53
2200-2300	74	49	66.22
2300-2400	49	40	81.63
TOTAL	2013	848	42.13

RESULTS SCENARIO 14B

CANBERRA AIRPORT, WET CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 900.
VISIBILITY (m) 5000.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 1249
CRITERIA MET FOR 62.05% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	32	28	87.50
0100-0200	23	22	95.65
0200-0300	59	43	72.88
0300-0400	60	44	73.33
0400-0500	64	43	67.19
0500-0600	91	54	59.34
0600-0700	98	46	46.94
0700-0800	90	35	38.89
0800-0900	113	53	46.90
0900-1000	86	49	56.98
1000-1100	107	64	59.81
1100-1200	92	57	61.96
1200-1300	98	64	65.31
1300-1400	88	52	59.09
1400-1500	103	64	62.14
1500-1600	102	56	54.90
1600-1700	113	67	59.29
1700-1800	113	71	62.83
1800-1900	103	66	64.08
1900-2000	93	60	64.52
2000-2100	75	50	66.67
2100-2200	87	59	67.82
2200-2300	74	58	78.38
2300-2400	49	44	89.80
TOTAL	2013	1249	62.05

RESULTS SCENARIO 14C

CANBERRA AIRPORT, WET CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 200.
VISIBILITY (m) 800.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 1987
CRITERIA MET FOR 98.71% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	32	31	96.88
0100-0200	23	23	100.00
0200-0300	59	58	98.31
0300-0400	60	59	98.33
0400-0500	64	63	98.44
0500-0600	91	90	98.90
0600-0700	98	91	92.86
0700-0800	90	89	98.89
0800-0900	113	105	92.92
0900-1000	86	86	100.00
1000-1100	107	106	99.07
1100-1200	92	92	100.00
1200-1300	98	98	100.00
1300-1400	88	88	100.00
1400-1500	103	103	100.00
1500-1600	102	102	100.00
1600-1700	113	112	99.12
1700-1800	113	113	100.00
1800-1900	103	102	99.03
1900-2000	93	93	100.00
2000-2100	75	75	100.00
2100-2200	87	87	100.00
2200-2300	74	74	100.00
2300-2400	49	47	95.92
TOTAL	2013	1987	98.71

RESULTS SCENARIO 14D

CANBERRA AIRPORT, WET CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 330.
VISIBILITY (m) 1200.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 1908
CRITERIA MET FOR 94.78% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	32	31	96.88
0100-0200	23	23	100.00
0200-0300	59	56	94.92
0300-0400	60	56	93.33
0400-0500	64	60	93.75
0500-0600	91	83	91.21
0600-0700	98	80	81.63
0700-0800	90	80	88.89
0800-0900	113	94	83.19
0900-1000	86	82	95.35
1000-1100	107	103	96.26
1100-1200	92	88	95.65
1200-1300	98	95	96.94
1300-1400	88	85	96.59
1400-1500	103	101	98.06
1500-1600	102	100	98.04
1600-1700	113	110	97.35
1700-1800	113	110	97.35
1800-1900	103	100	97.09
1900-2000	93	91	97.85
2000-2100	75	74	98.67
2100-2200	87	86	98.85
2200-2300	74	73	98.65
2300-2400	49	47	95.92
TOTAL	2013	1908	94.78

RESULTS SCENARIO 14E

CANBERRA AIRPORT, WET CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 660.
VISIBILITY (m) 2700.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 2013
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 1591
CRITERIA MET FOR 79.04% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	32	30	93.75
0100-0200	23	23	100.00
0200-0300	59	53	89.83
0300-0400	60	53	88.33
0400-0500	64	53	82.81
0500-0600	91	63	69.23
0600-0700	98	64	65.31
0700-0800	90	58	64.44
0800-0900	113	73	64.60
0900-1000	86	62	72.09
1000-1100	107	86	80.37
1100-1200	92	73	79.35
1200-1300	98	80	81.63
1300-1400	88	71	80.68
1400-1500	103	82	79.61
1500-1600	102	76	74.51
1600-1700	113	89	78.76
1700-1800	113	87	76.99
1800-1900	103	84	81.55
1900-2000	93	77	82.80
2000-2100	75	64	85.33
2100-2200	87	74	85.06
2200-2300	74	70	94.59
2300-2400	49	46	93.88
TOTAL	2013	1591	79.04

RESULTS SCENARIO 15A

CANBERRA AIRPORT, DRY CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 1500.
VISIBILITY (m) 5000.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 20291
CRITERIA MET FOR 86.00% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	240	211	87.92
0100-0200	239	203	84.94
0200-0300	544	407	74.82
0300-0400	595	423	71.09
0400-0500	626	438	69.97
0500-0600	1100	701	63.73
0600-0700	1292	816	63.16
0700-0800	1317	884	67.12
0800-0900	1307	965	73.83
0900-1000	1365	1115	81.68
1000-1100	1368	1227	89.69
1100-1200	1407	1309	93.03
1200-1300	1395	1328	95.20
1300-1400	1401	1357	96.86
1400-1500	1377	1339	97.24
1500-1600	1372	1334	97.23
1600-1700	1336	1296	97.01
1700-1800	1212	1165	96.12
1800-1900	943	900	95.44
1900-2000	865	813	93.99
2000-2100	828	753	90.94
2100-2200	796	706	88.69
2200-2300	452	403	89.16
2300-2400	216	198	91.67
TOTAL	23593	20291	86.00

RESULTS SCENARIO 15B

CANBERRA AIRPORT, DRY CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 900.
VISIBILITY (m) 5000.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 21683
CRITERIA MET FOR 91.90% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	240	229	95.42
0100-0200	239	223	93.31
0200-0300	544	469	86.21
0300-0400	595	497	83.53
0400-0500	626	511	81.63
0500-0600	1100	818	74.36
0600-0700	1292	963	74.54
0700-0800	1317	1022	77.60
0800-0900	1307	1097	83.93
0900-1000	1365	1219	89.30
1000-1100	1368	1305	95.39
1100-1200	1407	1367	97.16
1200-1300	1395	1373	98.42
1300-1400	1401	1387	99.00
1400-1500	1377	1364	99.06
1500-1600	1372	1361	99.20
1600-1700	1336	1320	98.80
1700-1800	1212	1191	98.27
1800-1900	943	928	98.41
1900-2000	865	844	97.57
2000-2100	828	797	96.26
2100-2200	796	757	95.10
2200-2300	452	431	95.35
2300-2400	216	210	97.22
TOTAL	23593	21683	91.90

RESULTS SCENARIO 15C

CANBERRA AIRPORT, DRY CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 200.
VISIBILITY (m) 800.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 22990
CRITERIA MET FOR 97.44% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	240	234	97.50
0100-0200	239	230	96.23
0200-0300	544	515	94.67
0300-0400	595	560	94.12
0400-0500	626	580	92.65
0500-0600	1100	973	88.45
0600-0700	1292	1160	89.78
0700-0800	1317	1216	92.33
0800-0900	1307	1252	95.79
0900-1000	1365	1331	97.51
1000-1100	1368	1352	98.83
1100-1200	1407	1405	99.86
1200-1300	1395	1395	100.00
1300-1400	1401	1401	100.00
1400-1500	1377	1377	100.00
1500-1600	1372	1372	100.00
1600-1700	1336	1336	100.00
1700-1800	1212	1212	100.00
1800-1900	943	943	100.00
1900-2000	865	865	100.00
2000-2100	828	827	99.88
2100-2200	796	793	99.62
2200-2300	452	448	99.12
2300-2400	216	213	98.61
TOTAL	23593	22990	97.44

RESULTS SCENARIO 15D

CANBERRA AIRPORT, DRY CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 330.
VISIBILITY (m) 1200.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 22667
CRITERIA MET FOR 96.08% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	240	232	96.67
0100-0200	239	227	94.98
0200-0300	544	499	91.73
0300-0400	595	545	91.60
0400-0500	626	562	89.78
0500-0600	1100	924	84.00
0600-0700	1292	1104	85.45
0700-0800	1317	1159	88.00
0800-0900	1307	1198	91.66
0900-1000	1365	1303	95.46
1000-1100	1368	1343	98.17
1100-1200	1407	1403	99.72
1200-1300	1395	1392	99.78
1300-1400	1401	1400	99.93
1400-1500	1377	1377	100.00
1500-1600	1372	1372	100.00
1600-1700	1336	1336	100.00
1700-1800	1212	1211	99.92
1800-1900	943	942	99.89
1900-2000	865	864	99.88
2000-2100	828	825	99.64
2100-2200	796	790	99.25
2200-2300	452	446	98.67
2300-2400	216	213	98.61
TOTAL	23593	22667	96.08

RESULTS SCENARIO 15E

CANBERRA AIRPORT, DRY CONDITIONS

CRITERIA
RAINFALL LIMIT IN CURRENT HOUR 0.
RAINFALL LIMIT IN PREVIOUS HOUR 5.
CLOUD BASE LIMIT (m) 660.
VISIBILITY (m) 2700.

RESULTS
TOTAL NO. OF HOURS IN MODELLING PERIOD = 43824
NO. OF HOURS FOR WHICH BOM DATA IS AVAILABLE = 25606

GLOBAL ANALYSIS
NO. OF HOURS RUNWAY IS WET = 23593
NO. OF HOURS FOR WHICH CLOUD/VIS CRITERIA ARE MET = 22149
CRITERIA MET FOR 93.88% OF THE TIME

HOURLY ANALYSIS

TIME	NO. OF HOURS RUNWAY IS WET	NO. OF HOURS CRITERIA ARE MET	%
0000-0100	240	231	96.25
0100-0200	239	224	93.72
0200-0300	544	488	89.71
0300-0400	595	522	87.73
0400-0500	626	541	86.42
0500-0600	1100	870	79.09
0600-0700	1292	1020	78.95
0700-0800	1317	1075	81.62
0800-0900	1307	1131	86.53
0900-1000	1365	1254	91.87
1000-1100	1368	1318	96.35
1100-1200	1407	1382	98.22
1200-1300	1395	1386	99.35
1300-1400	1401	1397	99.71
1400-1500	1377	1371	99.56
1500-1600	1372	1368	99.71
1600-1700	1336	1329	99.48
1700-1800	1212	1204	99.34
1800-1900	943	936	99.26
1900-2000	865	856	98.96
2000-2100	828	816	98.55
2100-2200	796	780	97.99
2200-2300	452	439	97.12
2300-2400	216	211	97.69
TOTAL	23593	22149	93.88

ANNEX 3

RUNWAY 17/35 USABILITY ANALYSIS

This analysis compares the theoretical utilisation of runway 35 determined from meteorological analysis with actual 2005 calendar year data derived from the Airservices Australia NFPMS reports for Canberra Airport.

The purpose of the analysis was to review broad conclusions reached in the *Canberra International Airport Meteorological Analysis* which did not take account of noise abatement procedures applicable between 8pm and 7am and their impact on runway selection.

The 2005 NFPMS reports indicated that in terms of runway 17/35 the 17 direction was utilised for 18.75% of aircraft movements and the 35 direction for 81.25%.

For runway 35 this compares with a theoretical 88.4% utilisation based on detailed meteorological analysis and cast some doubt on the accuracy/validity of that analysis.

On the other hand the meteorological analysis simply considered the availability of runway 35 and did not take account of weather conditions – nil, or light and variable winds – in which runway 17 might equally be used, or of noise abatement procedures which require ATC and pilots to give preference to landings on runway 17 in the period between 8pm and 7am the following morning.

The NFPMS reports indicate that approximately 16% of all aircraft movements fall within this period. Operations in this period are biased slightly towards arrivals – with a number of overnighting RPT aircraft not departing until after 7am. In this analysis 9% of daily movements are assumed to arrive between 8pm and 7am compared with 7% of departures.

The meteorological analysis suggests that the average usability of runway 17 with VOR/DME visibility and cloudbase minima – this being the only instrument approach available to runway 17 in 2005 – is 71.1%. This suggests that of the 9% of daily arrivals scheduled in this period 6.4% should have used runway 17 and 2.6% should have used runway 35.

In this same period runway 35 is preferred for departures. Similar consideration of the meteorological analysis suggests that of the 7% of daily departures scheduled in this period 0.8% use runway 17 while 6.2% use runway 35.

Combining these figures suggests that of the 16% of daily movements which occur in this period 7.2% use runway 17 and 8.8% use runway 35.

In the period 7am to 8pm the current noise abatement procedures nominate runway 35 as the preferred direction for both landing and take-off. The meteorological analysis suggests that in this period the average usability of runway 35 with its Category I ILS is 89.3%. Since 84% of all aircraft movements fall within this period this means that only 9% all traffic use runway 17 while 75% use runway 35 during this period.

Aggregating all arrivals/departures within the periods 8pm to 7am and 7am to 8pm this suggests that runway 17 should be utilised by 16.2% (7.2% + 9%) and runway 35 by 83.8% (8.8% + 75%) of all traffic.

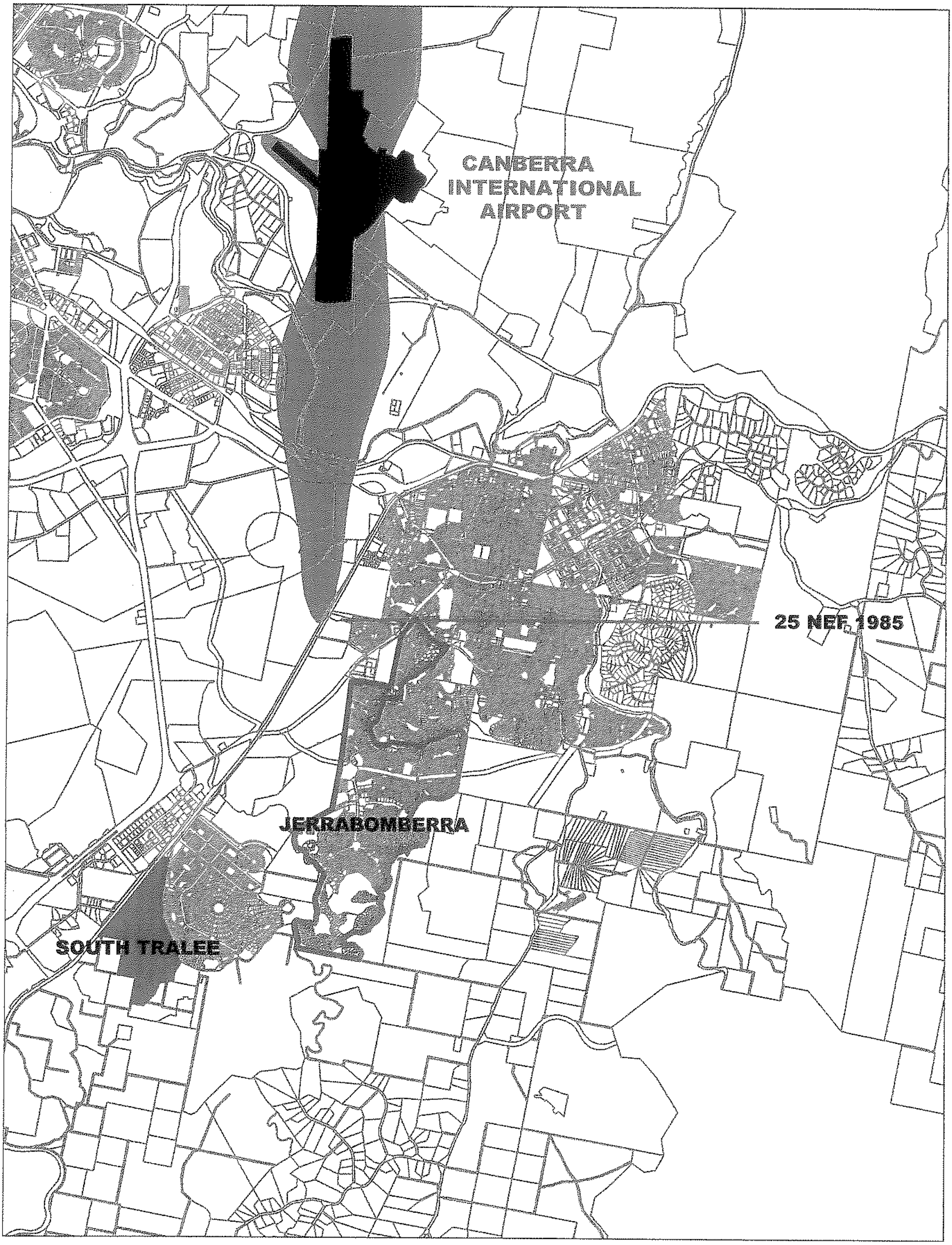
The latter compares closely with the actual utilisation of 81.25% reported in 2005. The minor difference of 2.5% is more readily explained by the fact that ATC is not always able to adopt the runway direction most favoured by sudden changes in weather conditions. This is much more realistic than the 10% discrepancy observed in the original report, which did not take account of noise abatement procedures.

The meteorological analysis suggests that for runway 17 preferred operations with a Category I ILS - as agreed by CASA - the overall usability will be 84.6%. Allowing a similar 2.5% margin for ATC delays in responding to changes in weather conditions it would be reasonable to model 82.1% of all runway 17/35 traffic in the 17 direction.

For ease of computation in the Ultimate Practical Capacity ANEF study a value of 81.75% is recommended, the reciprocal of the utilisation adopted for the runway 35 preferred scenarios.

A

Canberra Airports expanding contours - 1985



B

Canberra Airports expanding contours - 1997

Canberra Airports expanding contours - 2000

D

Canberra Airports expanding contours - 2002

E

INTEROFFICE MEMORANDUM

Sensitivity: COMPANY CONFIDENTIAL

Date: 1/11/2000 10:37:39
From: Adrian But
BUT_A
Dept: Envir. Serv. Branch, OSG
Tel No: x 4412

To: Leigh Kenna (KENNA_L)
CC: KENNETH OWEN (OWEN_KJ)

Subject: Canberra 2050 ANEF #2

Leigh,

Attached are my comments on the 2050 ANEF for Canberra International Airport submitted by AOS.

I have some reservations in respect to the inclusion of some of the fleet such as B777, A340 and MD11PW. Who are they trying to convince. The choice seems to be selective to try and expand the contours to satisfy CAG ulterior desire to force Queanbeyan Council to develop elsewhere. Still, it is a 2050 (Dreamtime) forecast.

Adrian

F

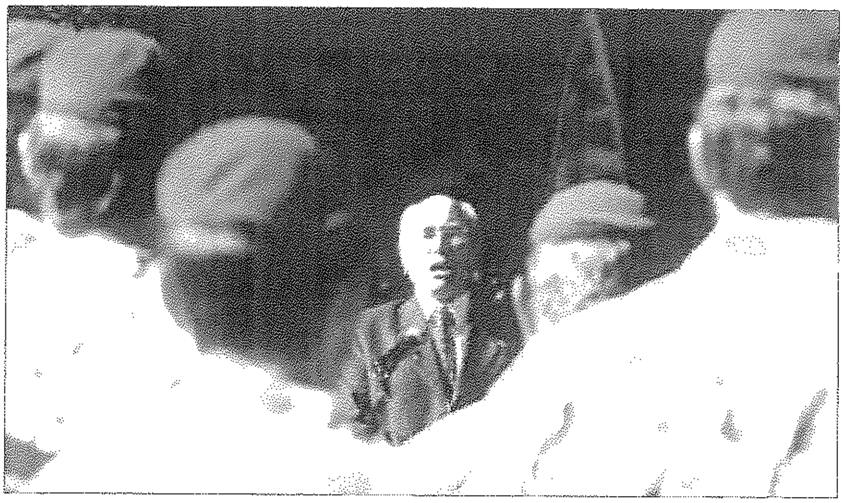
Canberra Airports expanding contours - 2007

Table 5 Aircraft Movements

OPERATIONAL GROUP	TOTAL MOVEMENTS	AIRCRAFT TYPE	INM IDENTIFIER	ARRIVALS AND DEPARTURES DAY	ARRIVALS AND DEPARTURES NIGHT	CIRCUITS DAY	CIRCUITS NIGHT
RPT – International Jet Services	25,106	Boeing 737-800	737800	906	544		
		Boeing 747-400	747400	807	3,203		
		Boeing 777-300	777300	2,212	3,316		
		Airbus A320	A320	1,268	192		
		Airbus A330	A33034	3,343	3,575		
		Airbus A340	A340	2,224	3,516		
RPT – Domestic Jet Services	155,906	Boeing 737-800	737800	34,182	19,924		
		Airbus A320	A320	17,704	10,596		
		Airbus A330	A33034	1,504	1,564		
		Embraer 170	EMB17U	22,329	12,423		
		Embraer 190	EMB19U	22,836	12,844		
RPT – Regional Non-Jet Services	68,828	Dash 8 300	DHC830	20,162	11,218		
		Dash 8 400	DHC840	20,162	11,218		
		Beechcraft 1900D	1900D	4,063	2,005		
Freight Operations	24,452	Boeing 747-400	747400	606	2,118		
		Boeing 757-200	757PW		12,708		
		MD-11	MD11PW		2,724		
		BAe 146	BAE146		3,024		
		Beechcraft 1900D	1900D		3,272		
Corporate Aviation	2,344	Beech 200	DHC6	1,081	183		
		Cessna 441	CNA441	516	88		
		Cessna 500	CNA500	343	57		
		Gulfstream IV	GIV	17	3		
		Lear 45	LEAR35	48	8		
General Aviation	1,892	Twin Engine	BECP58	819	145		
		Single Engine, Fixed Pitch	GASEPF	307	77		
		Single Engine, Variable Pitch	GASEPV	449	95		
Military Aircraft Operations – Including VIP Operations	2,776	Boeing 737-800	737800	760	140		
		Boeing B747-400	747400	214	24		
		Airbus A330	A33034	214	24		
		Challenger 601	CL601	566	566		
		Hercules C130	C130	114	114		
		Pilatus PC9	PILAT	20	20		
Training	816	Twin Engine	BECP58			61	75
		Single Engine, Fixed Pitch	GASEPF			367	41
		Single Engine, Variable Pitch	GASEPV			252	20
TOTAL FIXED WING	**282,120**			**159,776**	**121,528**	**680**	**136**
Helicopters	2,920	Sikorsky S-76	S76	1,144	316		
		AS350 Squirrel	AS350D	580	242	576	62
TOTAL MOVEMENTS	**285,040**			**161,500**	**122,086**	**1,256**	**198**

H

Bearded troops head to Afghanistan



STAY SAFE: Prime Minister John Howard farewells soldiers at Holsworthy barracks, telling them the Taliban resurgence made their mission more dangerous. Picture: AAP

Australian army commandos headed for southern Afghanistan were farewelled yesterday by Prime Minister John Howard and Opposition Leader Kevin Rudd.

The mostly Sydney-based soldiers from the 4th Battalion, The Royal Australian Regiment (Commando), will boost Australia's troop deployment in Afghanistan to about 1000.

Mr Howard wished the troops a successful mission and safe return, saying the deployment was made all the more dangerous by the resurgence of the Taliban.

"It is a very important mission," Mr Howard told the soldiers, many of them sporting new beards, at Sydney's Holsworthy barracks.

"If terrorism wins in Afghanistan, that would be bad for our part of the world as well as bad for the people of that country."

Mr Rudd told the soldiers that Labor supported their deployment to Afghanistan.

His party, however, does oppose Australia's involvement in the war in Iraq.

Mr Rudd said the army's great achievement was defending democracy in Australia and overseas when the call came.

"One of the great things about what you do is to defend the lifeblood of our democracy, which makes [political] disagreement possible."

The commandos will deploy as part of a 300-strong Special Operations Task Group into Oruzgan province in southern Afghanistan.

The task group will be made up of elements of the Special Air Service Regiment, the 4th Battalion The Royal Australian Regiment (Commando), the Incident Response Regiment and logistics support.

Defence Minister Brendan Nelson said military operations of this nature were dangerous.

"The highly trained soldiers within the Special Operations Task Group are likely to face some significant challenges in the conduct of their duties," he said in a statement.

– AAP

Fears over Pakistan, Saudi 'meltdown'

By David McLennan
Defence Reporter

A meltdown in Pakistan or Saudi Arabia could make the West's troubles in Iraq and Afghanistan look easy, according to America's former commander in the region.

General John Abizaid, who addressed an Australian Defence College and the Royal United Services Institute of Australia seminar yesterday, retired in May after four years commanding United States Central Command, which covers much of the Middle East.

He said the world's biggest strategic concerns might well be Pakistan and Saudi Arabia.

"Those two countries are struggling mightily with the security implications that they have to deal with, with regard to their external security problems, internal security problems and in the case of Pakistan the fact that they happen to be a nuclear armed country," he said.

He thought the countries were more resilient against the extremist threat than a couple of years ago, but "a meltdown in the security apparatus of those two countries could have implications for us that make the current situation look easy".

CAUTION: General John Abizaid warned of potential strategic concerns in other countries.

General Abizaid said winning in Iraq required "a lot of patience and a lot of courage".

He believed that only 20 per cent of the problem was military, saying military power at best bought time for the hard work of nation building.

"The key point is governance and military activity and diplomatic action have to move together in a positive way, and that is a very, very difficult thing to do, although I am confident that over time it can be done," he said.

Responding to an Iraqi colonel who asked him why "after four years and we have all these troops in Iraq, why we can't see any significant development in the military and security issue?", General Abizaid said the country presented a complicated problem that would be resolved slowly.

"It is a problem that requires the application of military force, but it also requires, as you probably know better than anybody, the clear need to get the angry young men, not just in the Sunni triangle, but throughout Iraq, off the streets."

The Iraqi Government had to put aside sectarian differences and give its armed forces the tools they needed to deal with the security problems, and the nations around Iraq had to have a vested interest in addressing its problems.

Coalition forces were yet to lose a single battle at the platoon level after five years in Iraq, but what was needed was better intelligence sharing so diplomatic, economic and political power could also be brought to bear in the right places.

Al-Qaeda's websites gave clear ideological directions for the movement, and helped with training, recruiting and funding "in an almost unfettered way".

"There is a debate about whether we need to control or observe that battle space. I say we have to do both," he said.

The coalition had to do better at winning the information battle, which al-Qaeda saw as its main stepping stone to winning the overall campaign.

G-G urges focus on climate

The Governor-General, Major-General Michael Jeffery, has urged governments to focus not only on terrorism as a threat to global security but also poverty and climate change.

He also wants the United Nations to take a more proactive role in addressing the causes of global insecurity rather than only reacting after a disaster.

"While military power remains the ultimate means of preserving natural sovereignty and protecting our national interests, to effectively combat terrorism, and other non-state-based threats, requires a whole-of-government response and, very frequently, close cooperation between governments," he said.

"Importantly, at some point, and hopefully sooner rather than later, the United Nations must establish ways and means of pre-empting genocide, civil war and mass starvation rather than responding after the tragedy has already occurred. Perhaps it needs a new set of rules and a more responsive structure. And I know this gets debated time and time again but something has to happen."

General Jeffery made the speech while welcoming members of the Royal United Services Institute of Australia to Government House on Monday night. The institute is continuing a seminar in Canberra today on the future of the Australian Defence Force and trends in international security over the next 20 years. The Governor-General is also a member of the institute.

"Today we view terrorism as one of our greatest security threats, a pandemic, I believe, will exist for a considerable time," he said.

"Yet, in so doing, we must also consider the impact of other factors on global security including poverty, climate change and resource challenges such as energy and water availability, ownership and distribution."

As to the future challenges facing the ADF, the Governor-General said it was "now generally accepted that the likelihood, and therefore the extreme consequences, of war between the major powers has been greatly reduced".

– Megan Doherty

INSIDE TODAY'S CANBERRA TIMES

PROPERTY 72 pages | EMPLOYMENT 1047 jobs | VEHICLES 571 cars

LOTTERIES

$2 Jackpot Lotto draw 8890: First, $100,000, No 145725, Chittaway Point; second, $10,000, No 80806, Wentworthville; third, $5000, No 39134, Warrawong. Consolation prizes of $1000 each, Nos 145724, 145726. The jackpot prize of $4,550,000 was not won.
Tatts 2: 90, 6. Division 1 dividend: $2,000
Tatts Keno: 1, 2, 3, 6, 12, 17, 22, 23, 25, 28, 31, 40, 45, 56, 57, 59, 64, 72, 77, 80. Jackpot for next draw is $1,073,600
Powerball draw 586: 41, 45, 8, 24, 18. Powerball: 29. Dividends: Div 1, $0; Div 2, $76,798.05; Div 3, $7,168.30; Div 4, $116.20; Div 5, $60.30; Div 6, $22.80; Div 7, $22.80.
Total prize pool: $3,570,769.70

STOP THE DROP

Mandatory Stage 3 water restrictions currently apply in the ACT.

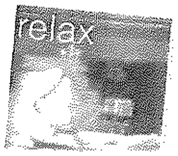
Water consumption and dam storage

Our target average daily consumption for winter under Stage 3 is 97ML a day.
Our average daily consumption for the last week has been 96ML a day, which is on target.

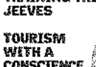
August 3	41.5	84
August 4	41.6	99
August 5	41.6	99
August 6	41.7	100
August 7	41.7	94
August 8	41.7	101
August 9	41.8	98

Rainfall to date for August at Canberra Airport has been 1mm*, the expected average for August is 47.1mm*.
*Bureau of Meteorology

IN TOMORROW'S Canberra Times



RELAX MAGAZINE
■ **SUPER BUTLERS: TRAINING THE NEW JEEVES**



■ **TOURISM WITH A CONSCIENCE**

■ **GOING DEFIANTLY GREY**

SPORT
■ **RAIDERS AIM TO RESTORE RESPECT AGAINST BULLDOGS**

Hughes to watch over world security

By Brad Watts
Police Reporter

Decorated Canberra policeman Andy Hughes has feathered his cap with another prestigious accolade – winning the United Nations' most senior policing post.

Mr Hughes, a widely respected policing veteran, has been appointed director of UN Policing in the Department of Peace Operations.

He ended his three-month interim role as the ACT chief police officer yesterday.

In a high-achieving, internationally focused career that spans 30 years, Mr Hughes has held a number of key positions, including Police Commissioner of Fiji in 2003.

He was recently awarded an Australian Police Medal in the Queen's Birthday Honour's list.

However, his latest appointment is the highest position ever held by a sworn Australian police officer.

The news sparked a flood of tributes from across Australia.

Mr Hughes said yesterday it was the first time Australia had secured a senior police position at the UN.

"I will be responsible for coordinating the UN police component and for peacekeeping around the world."

Mr Hughes, who has a bachelor of science in policing and a passion for AFL, said he would add a uniquely Australian flair to the two-year position, which he will fill early next month.

He described the job as a "growing role".

He would be responsible for thousands of officers posted in troublespots across the globe, including the Dafur region in Sudan, in conjunction with the African Union.

Foreign Minister Alexander Downer warmly welcomed Mr Hughes's appointment yesterday.

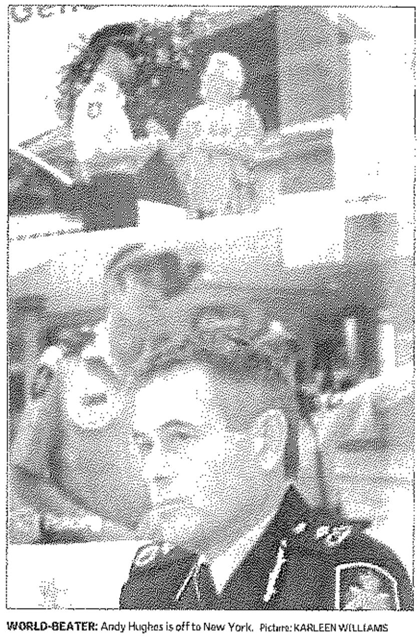
"As the UN's most senior police officer, Mr Hughes will be responsible for coordinating police involvement in UN peace efforts, including establishing doctrine, procedures and standards.

"As a leader within the UN's law and justice sector, he will also direct police involvement in UN capacity building projects in fragile states."

Mr Downer said the appointment was a reflection of Australia's strong and long-standing contribution to UN and regional peacekeeping operations.

Australian Federal Police Commissioner Mick Keelty said the appointment indicated Mr Hughes's stature in the law enforcement community.

"Andy is a very experienced police officer and I'm very happy for him," he said.



WORLD-BEATER: Andy Hughes is off to New York. Picture: KARLEEN WILLIAMS

He highlighted Mr Hughes's 3½-year tenure as commissioner of the Fijian Police Force, saying it had shown his commitment to principled law enforcement.

ACT Police Minister Simon Corbell paid tribute to Mr Hughes's outstanding role in the territory to fill the top policing position.

"Andy Hughes stepped in at a difficult time for ACT Policing and I have been delighted with his professionalism and leadership during his time in the role of [chief police officer]," he said.

ACT Opposition Leader Bill Stefaniak also congratulated Mr Hughes on his appointment.

"I always suspected he would get this job," he said.

"It's a tribute to the quality of the man.

"He's done a great job, he'll do Australia proud."

GOING PLACES

Andy Hughes
■ Born in Elizabeth in Adelaide's northern suburbs
■ AFP veteran of 30 years
■ 50 years old, married with four sons
■ Will travel to New York with his wife for UN role
■ AFL fan, dedicated musician

Career highlights
■ Appointed adviser of UN Policing, 2007
■ Won Australian Police Medal in 2007 Queen's Birthday Honour's list
■ Interim ACT chief police officer, 2007
■ Appointed Fiji police commissioner, 2003
■ ACT deputy chief police officer, 2001-03
■ Several overseas postings with the AFP

Deputy to fill in as ACT's top cop

By Brad Watts

Canberra will have its third police chief in four months after the departure of highly respected officer Andy Hughes yesterday.

The ACT's deputy police officer, Commander Shane Connelly, has temporarily stepped up to fill the top job, pending an imminent announcement about a permanent replacement by the ACT Government.

Mr Hughes has filled the position for the past three months after the death of Audrey Fagan in April.

The Australian Federal Police and the ACT Government have been tight-lipped about a permanent replacement after AFP Commissioner Mick Keelty delivered a list of candidates to Police Minister Simon Corbell earlier this month.

THE BOSS: Shane Connelly has a new temporary role.

The AFP has not confirmed the number of candidates put forward for the position, but it's understood to be only a handful.

A decision about the timing of the announcement has also been kept under wraps.

Mr Hughes would not comment on the issue on his last day in the top job.

"It's not for me to say – to look at the field of candidates I understand it's a strong field," he said.

All he could say was that the territory could "look forward to some strong leadership".

"It [the decision] will be made soon as it's with the minister now."

Mr Hughes, who has worked in Fiji and Britain, also compared the ACT police force to the world's best.

"It's clean, it's strong, it's proud and it's professional," he said.

Commander Connelly said he was looking forward to taking up the top job and thanked Mr Hughes for his services to the territory.

"The timing of him coming in was very important to us," he said.

Mr Keelty said the AFP was still consulting with the ACT Government to fill the position of chief officer.

"An announcement will be made on Assistant Commissioner Hughes's replacement when a decision is taken by the AFP and the ACT Government," Mr Keelty said.

Mr Corbell's office would not comment on the timing of an announcement.

ACT Opposition Leader Bill Stefaniak said he had not heard who would be named as replacement but backed Commander Connelly for the top job.

Man pleads not guilty

By Victor Violante
Court Reporter

A Perth man who was extradited to Canberra last month to face a charge of grooming a child on the internet for sex has pleaded not guilty.

Keith Shepheard, 48, of the Perth suburb of Kelmscott, is one of two men who allegedly tried to lure a teenager into a threesome through an internet chatroom, and by sending him pornographic images from their mobile phones.

Shepheard and his co-accused, New Zealand-born Brendan Russell Sinclair, 39, of Millers Point, Sydney, were refused bail in the ACT Magistrates Court last month.

It is alleged Shepheard used a mobile phone to send pornographic images to the boy. A police report tendered to the court showed police would allege Shepheard sent scores of text messages and sexually explicit pictures from April 1 to July 23.

A labourer at a Perth Bunnings store, Shepheard was evicted from his house when he was arrested.

His eviction was part of the reason Magistrate John Burns refused bail. Police also allege Sinclair sent 57 text messages and 37 pictures.

On June 14 police assumed the teenager's online personality in the internet chatroom. Sinclair was arrested as he allegedly prepared to visit the boy in Canberra.

Shepheard's matter was adjourned until next month, while Sinclair will appear in court this month.

Vic couple die in Tahiti crash

From Page 1

Divers were expected to inspect the wreckage today.

The first rescue workers on the scene found debris and floating bodies. "The bodies were coming up slowly, one after the other," one rescuer said, adding "it seems that the cabin disintegrated upon impact as all the passengers are still buckled in."

The bodies of the victims were moved to a makeshift morgue in a nearby village where identification was under way.

Officials had been in touch with the families and Australia's consul in Noumea was travelling to Tahiti, the Foreign Affairs Department spokesman said. Australian authorities would assist next of kin if they wanted to travel to Papeete.

French President Nicolas Sarkozy said he was "profoundly saddened" by the accident and offered his sympathy to the families of the victims.

K1

Presentation by The Village Building Co to the
Rural and Regional Affairs and Transport References Committee
on the
Inquiry into the effectiveness of Airservices Australia's management of aircraft noise

My name is Ken Ineson and I am the General Manager, Special Projects and Feasibilities with The Village Building Co. I would like to thank the Senate Committee for the opportunity to give evidence at this Hearing.

The Village Building Co is the proponent of a proposed residential development known as Tralee in the municipality of Queanbeyan between 10 to 12 kms to the south of Canberra Airport.

Prior to purchasing a share in the Tralee property in May 2002, The Village Building Co undertook a thorough due diligence process. Of most significance was the 1998 ACT and Sub-Region Planning Strategy which was a formal agreement between the Commonwealth Government, ACT and NSW Governments and surrounding Local Governments. The Strategy followed eight years of extensive studies and consultation including consideration of Aircraft noise. The Strategy's stated aim was to provide certainty for Governments, the community and industry alike. It endorsed Tralee and its surrounds as the only future residential area in the south of the region for the next 25 years. The development also complies with the NSW Sydney/Canberra Corridor Strategy, the Queanbeyan Residential and Economic Strategy prepared by Queanbeyan Council and endorsed by the NSW government, and the Australian Standard for Aircraft Noise, AS 2021-2000.

Queanbeyan City Council commenced processing our application for the residential rezoning of South Tralee in July 2002.

The rezoning has been vigorously opposed by the Capital Airport Group which has initiated a series of strategies intended to defeat the rezoning despite its compliance with all relevant planning strategies and the ANEF system. Of relevance to the Terms of Reference of this Inquiry is the manipulation by the Capital Airport Group of the ANEF system. The Capital Airport Group has exploited a ~~weakness~~ flaws in Airservices Australia's processes for endorsing ANEFs and a similar ~~weakness~~ flaw in the approval process for Airport Master Plans.

The ~~weakness~~ flaw was exposed in legal action initiated by The Village Building Co. Acting on the advice of Senior Counsel, The Village Building Co in the Federal Court of Australia, challenged the failure of Airservices to test the validity of the assumptions upon which the Canberra Airport ANEF is based. The Federal court found that the regulations under the Airservices Act were "*silent on the manner of endorsement of ANEFs to be employed by Airservices*". The court therefore found that Airservices had not acted illegally in its processes for endorsing ANEFs even though it had not been subjected the assumptions underlying the ANEF to any scrutiny whatsoever.

Without a process spelled out in regulations, Airservices has been free to invent the concept of "*endorsement for technically accuracy*". In evidence to this Inquiry, Airservices has acknowledged that it does not check the feasibility of the assumptions which underpin the ANEF contours.

In late 2008 the Department of Infrastructure, Transport, Regional Development and Local Government prepared the regulations that the Federal Court had identified to be lacking. Unfortunately all that the regulations did was formalise the process of "endorsement for technical accuracy" with no review of the Airport's assumptions on which an ANEF is based.

On page 91 of the proof Hansard for the Hearing on 28th May, Mr Russell of Airservices advised that the traffic volume and aircraft types used by an airport operator as the basis of an ANEF are not assessed by Airservices but are assessed in a master plan by the Department of Infrastructure, Transport, Regional Development and Local Government.

Mr Russell neglected to advise this committee that the projections of traffic volumes and aircraft types in a master plan relate to the statutory 20 year planning period and may be different to the projections used in an ANEF. In the case of the Canberra Airport Master Plan, the projections approved by the Department in the Master Plan are very significantly less than the projections upon which the ANEF is based. The assumptions behind the ANEFs for Canberra Airport were not checked by Airservices and there is no evidence in the Master Plan that they were checked by the Department. Mr Doherty confirmed this morning that the assumptions behind the ANEF are not checked by the Department

I wish to now turn to the manner in which Canberra Airport has exploited these legislative weaknesses, by manipulating the ANEF contours to the south of the airport for the express purpose of defeating the Tralee rezoning process.

Since the privatisation of the airport in 1998 the Capital Airport Group has dramatically extended the noise contours to the south. I will demonstrate this by reference to a series of contour maps that I would like to table.

Document "A" is a plan of the 25 ANEF contour from 1985.

Document "B" is a plan of the 25 ANEF contour endorsed in 1997. It was the ANEF in existence at the time The Capital Airport Group purchased the lease for Canberra Airport in 1998.

Document "C" shows the 25 ANEF contour prepared by The Capital Airport Group in 2000. You can see the in red, the proposed residential part of Tralee that the Village Building Co purchased in 2002, well clear of the 25 ANEF contour. You will notice that the ANEF has shrunk slightly due to the phasing out of noisier aircraft.

Document "D" shows the 25 ANEF contour "Endorsed for Technical Accuracy" by Airservices in 2002. The Capital Airport Group called this an "Ultimate Capacity Year 2050 ANEF". It was based on air traffic volumes exceeding Sydney Airport which The Capital Airport Group claimed would be achieved by 2050. It required a flight every one minute and 48 seconds 24 hours per day, every day of the year. Advice from four independent air traffic experts including The Ambidji Group indicates that this level of traffic is absolutely unachievable.

Document "E" is an Interoffice Memorandum from Mr Adrian But, the Manager Environment Operations of Airservices Australia. In relation to the assumptions made by The Capital Airport Group for the 2002 ANEF, Mr But advised his colleagues *"I have some reservations in respect to the inclusion of some of the fleet such as B777, A340, and MD11PW. Who are they trying to convince. The choice seems to be selective to try and expand the contours to satisfy CAG* (Capital Airport Group) *ulterior desire to force Queanbeyan Council to develop elsewhere. Still it is a 2050 (Dreamtime) Forecast."*

The invention of the concept of *"endorsement for technical accuracy"* allowed Airservices to endorse this ANEF without having regard to the concerns expressed by AirServices own technical expert and others about the projections upon which the ANEF was based.

Document "F" shows the 25 ANEF contour "Endorsed for Technical Accuracy" by Airservices in 2007. The Capital Airport Group called this the "Practical Ultimate Capacity ANEF". It assumes noisier aircraft that are already being phased out will be in operation well beyond 2050. This ANEF is the combination of three mutually exclusive ultimate capacity operating scenarios. If this analysis was done under one operating scenario, the current ANEF would be unachievable as it would require well in excess of 1 ½ times the theoretical maximum achievable number of flights for the runway.

Document "G" is an extract from the technical report and calculation of the "Practical Ultimate Capacity ANEF" prepared by Rehbein AOS in 2007. The report states that the air traffic forecasts were supplied by the Capital Airport Group. The forecasts were not checked by Rehbien AOS or Airservices. They are fictional and unachievable.

The Capital Airport Group's forecasts are tabulated on Page 14. In this table you can see a very large number of freight operations virtually all at night, totalling 23,846 per annum or 65 per night. This is at odds with the statement made to this Inquiry by Mr Rod Gilmour of Sydney Airport that virtually all air freight is carried in the bellies of passenger planes. Mr Chan added that there are only 2 or 3 dedicated freight flights per day at Sydney.

You can also see in this table a large number of Boeing 747's, virtually all at night. There are a total of 5,342 night-time Boeing 747's per annum. Currently virtually no Boeing 747s use Canberra Airport. Advice from The Ambidji Group and other experts is that the number of Boeing 747's using Canberra Airport is never likely to exceed a few per year.

The dramatic growth of the ANEF contours for Canberra Airport contrasts starkly with the evidence given to this Inquiry by Mr Rod Gilmour when he advised that the ANEF contour for Sydney Airport is shrinking. The ANEF for Sydney is based on larger and quieter aircraft already coming into service, whereas the ANEF for Canberra is based on noisier aircraft already being phased out.

You will see in document "F" that the proposed residential area at Tralee remains outside the 25 ANEF contour. Virtually all of it is also outside the 20 ANEF contour. The development fully complies with the ANEF system even under the exaggerated projections of the Capital Airport Group. Despite this, the development is still vigorously opposed by The Capital Airport Group.

Both Airservices Australia and Department of Infrastructure, Transport, Regional Development and Local Government have supported The Capital Airport Group by publicly opposing the development of Tralee and claiming that it will result in noise sharing, even though it complies with Commonwealth government policy, and the National Standard adopted by all levels of government. Wilkinson Murray, the acoustics consultant who prepared the ANEF for Sydney airport advises that the risk of noise sharing resulting from the development of Tralee is virtually nil.

Airservices and the Department have not opposed numerous other recent developments in areas with far more aircraft noise than Tralee around all major airports. When we questioned Mr Mrdak and Mr Doherty of the Department why they have not opposed other developments with more noise than Tralee, we were advised that nobody had brought these developments to their attention. In other words, at the behest of Canberra Airport, this particular development and this company have been singled out for differential treatment by Airservices and the Department contrary to national and state legislation and policy. This is a failure of government to act without fear or favour.

To assist this committee to understand the level of aircraft noise at Tralee, Wilkinson Murray advises that in 2050 Tralee will have less aircraft noise than experienced today in Double Bay in Sydney and less noise than very large existing and recently approved developments around all major airports, including curfew free airports.

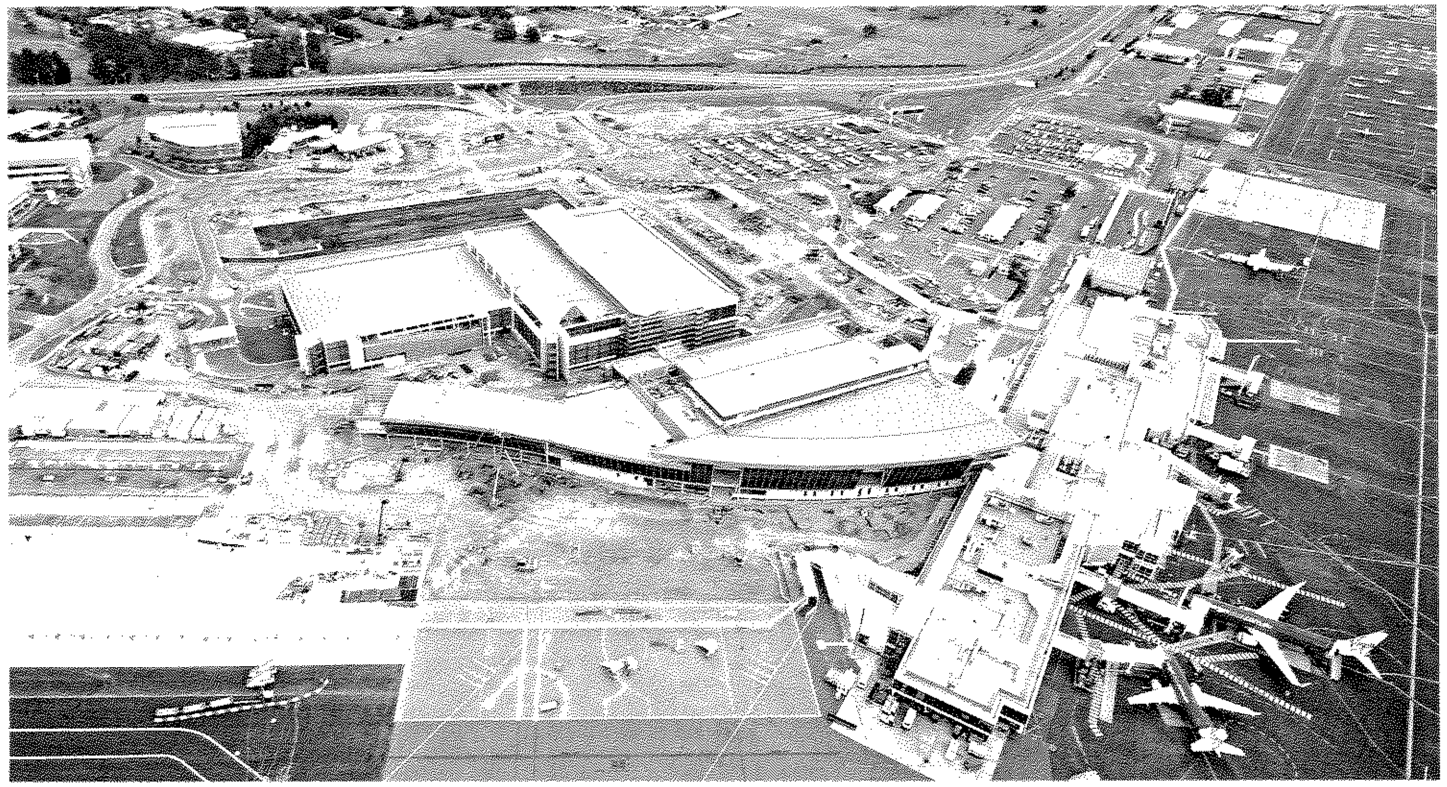
The National Aviation Policy White paper states that the Government will *"improve the technical processes and independence associated with the assessment and scrutiny of ANEFs"*. Evidence given to this Inquiry by many parties including Airservices indicates an unwillingness within the aviation bureaucracy to comply with this goal of the White Paper. The proposed Aircraft Noise Ombudsman should have the power to review the processes of the Department and Airservices in relation to Airport Master Plans and ANEFs as well as noise complaints.

Before I conclude, I would like to comment briefly on complaints about aircraft noise. Records of complaints that we have obtained under Freedom of information indicate that during 2002 and 2003 there were only two or three complaints per month from Jerrabomberra which is the suburb most affected by noise from Canberra Airport. During the consultation process in 2007 for the Canberra Airport Practical Ultimate Capacity ANEF, the Capital Airport Group promised to turn Canberra Airport into a 24 hour freight hub with Boeing 747's flying all through the night. Canberra Airport undertook a misleading scare campaign in the media, promising noise sharing over all over Canberra and Queanbeyan if our proposed development at Tralee proceeded. The airport placed half page advertisements in Canberra and Queanbeyan newspapers and undertook a radio advertising campaign. Documents "H" and "I" are examples of the advertising. This caused in a big increase in the number of complaints, even though the volume of air traffic has only increased marginally during this period.

The claims made by Canberra Airport in these advertisements are false. As I mentioned earlier, expert acoustics consultants, Wilkinson Murray have advised that the chance of noise sharing being introduced as a result of the residential development of Tralee is virtually nil. Hundreds of thousands of people live in far more noisy areas around every major airport in the country. If noise sharing is an issue for Tralee it would have already been introduced at every other major airport in the country.

In conclusion, The Village Building Co makes the following recommendations to this Inquiry:

1. The regulation governing the approval of ANEFs should be amended to include an independent review of the reasonableness of the assumptions behind an ANEF.
2. The process for endorsing ANEFs should be incorporated into the process for approving Airport Master Plans.
3. The planning period of a master plan should be adopted in the preparation of an ANEF.
4. The process for the review of master plans including ANEFs should be open and transparent.
5. The proposed Aircraft Noise Ombudsman should have the power to review the processes of the Department and Airservices in relation to Airport Master Plans and ANEFs as well as noise complaints and should report direct to Parliament.
6. Government policy frameworks on aircraft noise and land use planning should be uniformly applied and individual developments should not be singled out for inconsistent treatment.



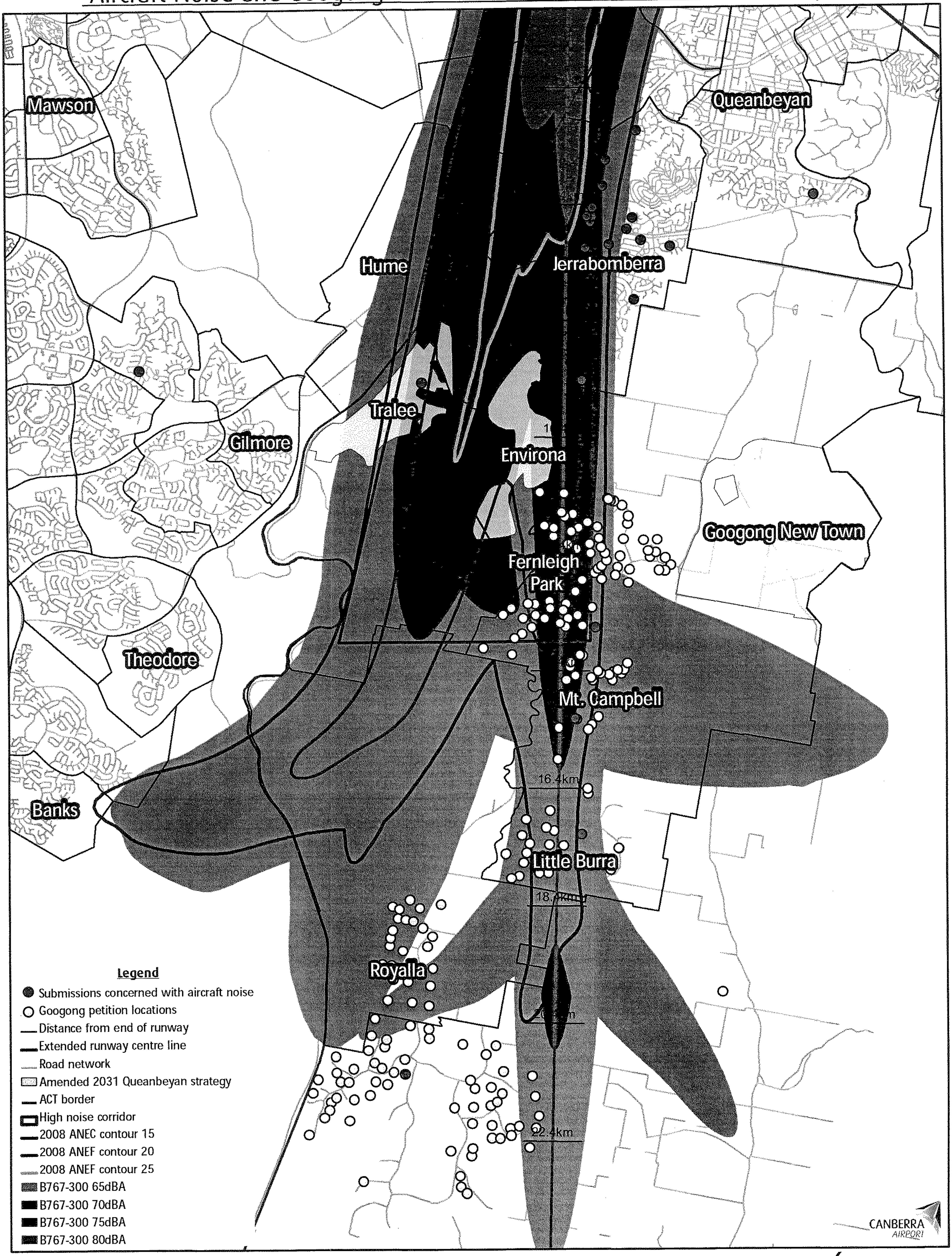
CANBERRA AIRPORT | AiR Volution TRANSFORMING CANBERRA'S AIRPORT

Canberra Airport Terminal - opening September 2010

#11 - Tabled by Canberra Airport at aircraft noise hearing in Canberra on 10 June 2010

17/12/2009

2009 Preliminary Draft Master Plan - Submission Concerned with Aircraft Noise and Googong Petition Locations South of Canberra Airport



#12 - Tabled by Canberra Airport at aircraft noise hearing in Canberra on 10 June 2010

16/07/2009