Australian Government
Department of Transport and Regional Services

GOING BEYOND NOISE CONTOURS

Local Approaches to Land Use Planning Around Smaller Australian Airports

DISCUSSION PAPER

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This discussion paper has been prepared by the Aviation Environment Policy Section of the Department's Aviation Operations Branch.

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Foreword

In recent times there have been increasing calls for a review of land use planning practices around regional and general aviation (GA) airports in Australia. In essence, submissions have been made to the Department which express the view that the current land use planning regime, which is based on a noise contouring system (the ANEF system), is not providing smaller airports with effective protection from being built out. Experience has shown that urban encroachment on airports can lead to aircraft noise problems which in turn can result in community pressures to restrict airport operations.

This paper has been prepared to stimulate discussion on ways in which current land use planning approaches could possibly be modified in order to achieve more effective land use and/or aircraft noise management outcomes around regional airports and GA airports surrounded by or close to urban areas.

The ANEF system is a 'one size fits all' approach to land use planning. The ANEF noise dose criterion for 'acceptable' land use is the same whether the land is in the vicinity of a major international jet airport or a small regional non-jet aerodrome. The system makes no allowance for local conditions, for example an airport on a greenfield site is treated the same as one which has already been 'built out'. Furthermore, for the smaller airports the threshold ANEF contour for restricting development in most cases does not extend much beyond the airport boundary. This means that noise sensitive buildings such as houses are permitted to be built in areas that have high levels of aircraft overflight activity.

The Department held a round of preliminary consultations in the first part of 2002 with a number of airports, aviation authorities, State planning, transport and environment agencies and Environment Australia to gain a broad appreciation of the issues. These organisations, and local government, are the prime target audience for this paper.

The paper is simply designed to initiate discussion and, as such, the arguments have been couched at the conceptual level. The paper intentionally does not put forward recommendations for specific new land use planning standards or criteria. It is proposed that more detailed examination will be made into the feasibility of implementing possible new approaches should any concepts receive widespread support.

Comments are being sought on the concepts raised in the paper and readers are encouraged to submit views and ideas to the Department on ways in which the shortcomings in the current approaches to land use planning around smaller airports may be addressed.

Encapsulation

The Department has received a number of submissions expressing the view that the current approaches to land use planning for smaller Australian airports - regional and urban general aviation airports - need to be revised.

Key Views Expressed in Submissions

- The current land use planning approaches are not adequately protecting smaller airports from urban encroachment (**Chapters 1 & 2**).
- There is a need for greater flexibility to allow communities to develop local solutions (**Chapter 1**).
- Cognizance needs to be given to flight paths as well as noise contours (**Chapter 4**).
- Land use planning strategies need to be supplemented by noise disclosure programmes (**Chapters 5 & 6**).
- There is a need for more holistic planning approaches. The current system relies on examining Development Applications on a 'micro' case-by-case basis - the 'macro' significance of airports as important transport nodes is lost (**Chapters 5, 6 & 7**).

Incompatible Encroachment not Prevented

For many airports, even land under very busy flight paths can be considered as ‘acceptable’ for residential and other noise sensitive uses when assessed using the Australian Noise Exposure Forecast (ANEF) system. This has resulted in new housing encroaching very close to airports and residential areas being subjected to high numbers of overflights.

At general aviation airports the training circuits are generally situated well outside the outer Australian Noise Exposure Forecast (ANEF) contour which is used to determine land use ‘acceptability’ for housing.

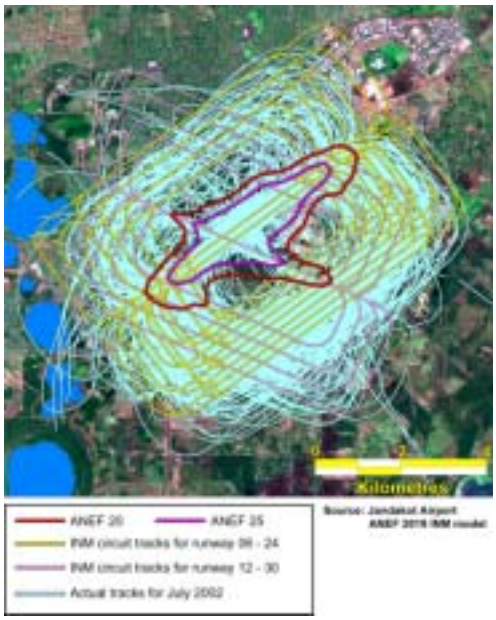

Figure 1.1 – Section 1.1

At regional airports future potential uses of the airport may be constrained if planning is based solely on ANEF contours. Even at a busy regional airport with extended ANEF contours, the contours do not generally extend far to the sides of the runways. Dense urban encroachment on one side of an airport, for example, means that the airport could not offer a potential new flying school training circuits over unoccupied land to that side of the airport.

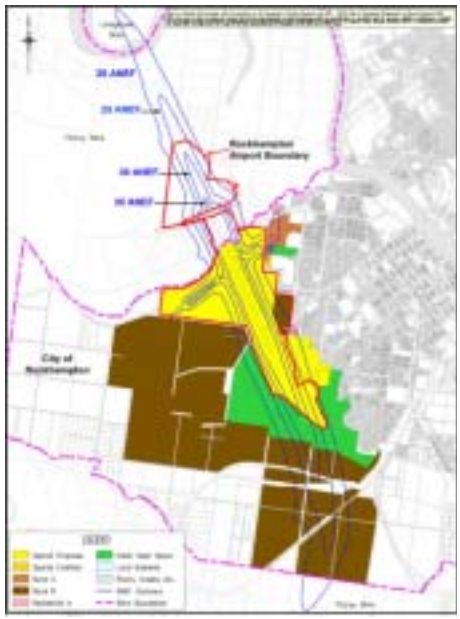

Figure 1.3 – Section 1.2

Establishing Different 'Acceptability' Noise Contours

One approach to the problem could be to increase the size of buffers around airports by setting the noise 'acceptability' criteria at lower ANEF values or by using another noise descriptor (for example one based on the number of noise events rather than on accumulated noise energy like the ANEF). To all intents and purposes, this could be considered a re-calibration of the current system.

Figure 3.1 – Section 3.2

Moving Toward Flight Path Based Criteria

Under the current approach noise sensitive land uses (e.g. a school) can be built under a busy flight path, without any acknowledgment of the presence of aircraft noise, even if it is only just outside the 20 ANEF. This can result in alternative sites, away from flight paths, not being examined. Strong arguments are being made that, at the very least, land use planning decisions should take into account both noise contours and the location of flight paths.

The concept of airports developing some form of flight path corridors or zones over unoccupied land, which are protected from noise sensitive development, is receiving increasing attention.

Flight path zones can be defined by specific reference to the location of flight paths or simply by establishing distance buffers which encompass the areas under current or possible future flight paths.

Figure 4.1 – Section 4.1

Assisting the Noise Sensitive Individual – Noise Disclosure

At many airports, irrespective of land use planning regimes, there is housing directly under busy flight paths (particularly urban GA airports). A noise sensitive person would be greatly assisted, and be less likely to be placed in an undesirable situation, if they were advised of the location of the flight paths, and had information on the activity levels on the flight paths, before they make a decision about buying a house. Similar arguments apply to proposals to construct new dwellings in the vicinity of flight paths.

Holistic Planning Approaches for Airports

Current approaches to land use planning are based on each Development Application being considered in isolation against the location of ANEF contours. This approach does not facilitate local conditions being taken into account. For example, this 'one size fits all' system treats a greenfield site no different from a totally urbanised site.

Adopting a more holistic approach would enable local circumstances to be taken into account in planning decisions. This approach would be consistent with the ICAO 'Balanced Approach' which is based on an 'airport by airport' approach to managing aircraft noise.

Land use planning is just one of a number of 'passive' tools for managing aircraft noise and considering it in combination with these other tools has significant potential benefits.

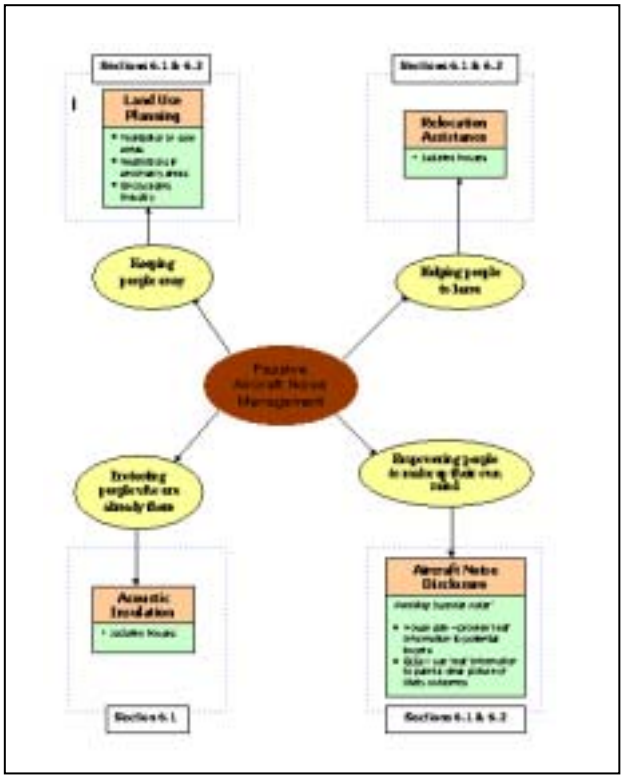

Figure 5.2 – Section 5.3
Passive aircraft noise management

Airport Environs Planning Zone

A more holistic approach could be implemented by proclaiming some form of airport special use zone, or 'airport environs planning zone' around an airport. This would allow other important planning factors, such as Obstacle Limitation Surfaces and runway safety zones, to be considered in tandem with aircraft noise criteria when planning decisions are made.

This type of approach could be adopted under current State planning legislation. It could be implemented through a graduated approach based on, for example, a core and a secondary area where different criteria apply

Airport Environs Overflight Plan

The airport environs planning zone could be taken further by adopting an approach based on integrating land use planning with operational controls. For example, establishing agreed flight path corridors and then undertaking that noise sensitive land uses will be not be built on the land under those corridors.

Developing these approaches under the auspices of a dedicated 'plan' would allow a community to consider what future it envisages for its airport (eg transport hub or aviation-related economic centre such as a major flying school) and would provide a mechanism for all interested parties to actively take part in the development of an airport's 'vision' for the future.

Airport Environs Overflight Plan

Concept

- A community-based approach which encapsulates the visions and aspirations for the airport and protects the long term viability of the airport through combining land use planning and airport operational controls.
- Akin to an 'airport environs planning zone' and 'operating plan' rolled into one.
- Be given formal status or authority through appropriate legislative instruments.

Developing the Plan - A Consultative Process

- Establish a consultative forum for developing and reviewing the Plan.

Extract from Figure 7.1 – Section 7.1

Example Airport - Mildura Airport

Mildura Airport is a fast growing regional airport that is interested in protecting itself from urban encroachment.

Currently it uses an obstacle limitation surface, rather than ANEF contours, to delineate its planning buffer. This provides a much greater size of buffer than would otherwise be the case.

Figure 8.2 – Mildura Airport

Next Steps

Subject to the comments on this paper it is proposed that any concepts which have broad support will be developed under the auspices of the Transport and Local Government Planning Ministers' Councils. The goal will be to develop nationally endorsed guidelines to underpin the adoption of any new approaches.

It is envisaged that the national guidelines will simply constitute an umbrella framework that facilitates local solutions and does not impose uniform 'one size fits all' approaches.

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PART 2 FINDING THE ANSWER

Part 1

DEFINING

THE

PROBLEM

CHAPTER 1 Introduction

1.1 The core issue

Small airports are valuable community assets, particularly for regional centres. It is widely recognised that it is undesirable to compromise the long-term viability of these airports by allowing noise sensitive land uses to encroach to airport boundaries. However, under the current system used for land use planning around airports in Australia - the Australian Noise Exposure Forecast (ANEF) system – such encroachment is commonly treated as being 'acceptable'.

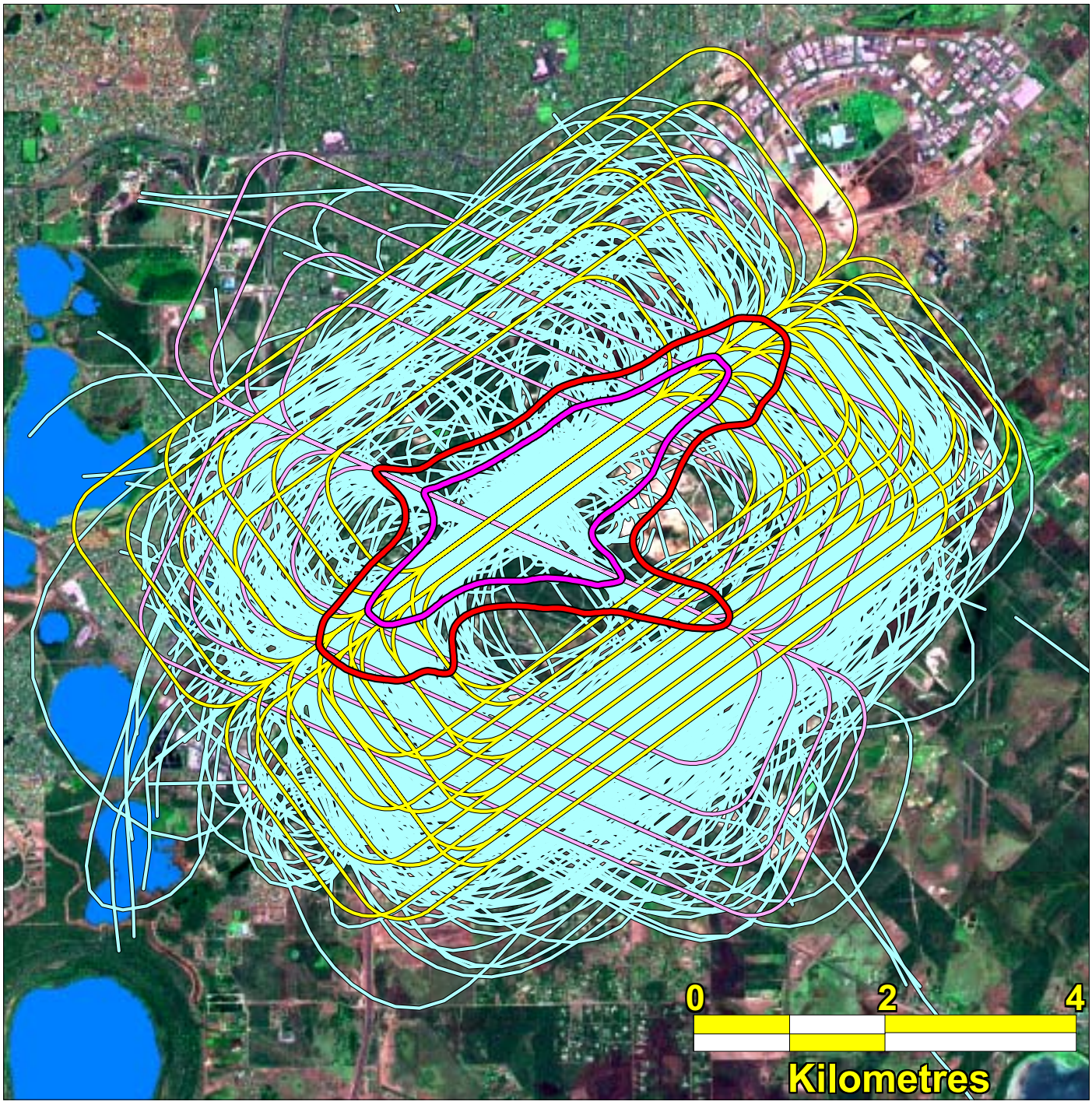
The ANEF system was established in the early 1980s to provide guidance to land use planners on the types of developments that are likely to be compatible with future aircraft noise exposure levels around an airport **[Ref 1]**. In essence this system defines residential development on land that is within what is termed the 25 ANEF contour as 'unacceptable', and recommends the incorporation of noise mitigation measures in residences which are constructed on land which lies between the 20 and 25 ANEF contours. The system treats land lying outside the 20 ANEF as being 'acceptable' for any land use with respect to aircraft noise exposure.

For many regional airports and urban GA airports, the 25 ANEF contour, even for relatively long-term horizon forecasts, barely goes off or does not extend very far from the airport. This is mainly because the bulk of operations at these airports are by smaller, non-jet aircraft, and even a large number of overflights by these aircraft make only a small contribution to the total ANEF level. In particular, the contours tend not to pick up aircraft in training circuits. This is illustrated in **Figure 1.1** which shows the training circuits in the vicinity of Jandakot Airport, a very busy training airport, superimposed on a map showing the 20 and 25 ANEF contours.

Clearly the ANEF system's lack of sensitivity to increasing numbers of aircraft movements has significant long-term implications for small airports if they wish to stop noise sensitive encroachment.

This paper focuses on two broad categories of airports:

(i) **regional airports** - airports located within rural or regional areas of comparatively low population density where there is a high potential for residential or other noise sensitive development to encroach upon the airport. These airports often provide scheduled regular public transport (RPT) services for the regions and are often seen as a potential centre of local economic activity. In addition they are commonly used as bases for circuit training. The key aircraft noise issue for these airports is how to take steps to establish a noise buffer which provides long term protection from encroachment by noise sensitive land uses. Residents living in the vicinity of these airports may be more sensitive to aircraft noise then their urban counterparts due to lower background noise levels and also due to expectations of a 'quiet' rural lifestyle.



ANEF 20
ANEF 25
INM circuit tracks for runway 06 - 24
INM circuit tracks for runway 12 - 30
Actual tracks for July 2002

Source: Jandakot Airport
ANEF 2019 INM model

Figure 1.1 : The 20 and 25 ANEF contour for Jandakot Airport for the year 2019 superimposed onto (i) actual circuit tracks for July 2002 and (ii) the circuit tracks from the INM model for the ANEF.

(ii) **urban GA airports** - general aviation airports located in metropolitan areas such as Jandakot (Perth), Bankstown (Sydney), Parafield (Adelaide) and Moorabbin (Melbourne). These airports have to a large extent (but not totally) been built out and the key issue is finding ways to manage aircraft noise generated by repetitive overflight of urban areas by aircraft in training circuits.

1.2 Protection of regional aviation centres

There are approximately 70 airports in Australia which fall into the category of regional Regular Public Transport (RPT) airports with between 10,000 and 400,000 passengers a year. The location of these airports is shown in **Figure 1.2**.

Regional airports are vital to the sustainability and growth of local and state economies and play an integral role in nationwide transportation in Australia. They act as gateways for rural and regional centres through the provision of passenger and freight services, as well as providing and stimulating employment and investment opportunities for local communities. Moreover, many of these airports play a key emergency services role. Without these regional aerodromes, fast and reliable access to products and services would be severely limited for regional and remote communities.

In addition to the role as a regular transport link, it is not uncommon for regional communities to have aspirations for their airport to become a centre for aviation activity and to view the airport as a potential key economic driver. Tamworth Airport, for example, has attracted the establishment of a major flying training school, the Australasian Pacific Aeronautical College.

Given the importance of regional airports, it is widely considered prudent that these airports be protected from incompatible land uses that could impose operational constraints or inhibit future expansion. The protection of regional airports would be in line with the coalition government's Stronger Regions, A Stronger Australia policy which promotes the strengthening of economic and social opportunities for regional communities and encourages the development of self-reliant regions where local communities play a lead role in determining their own development **[Ref 2]**.

As mentioned earlier, many airports have expressed the view that the current ANEF system does not provide adequate protection of regional airport environs from residential encroachment because the threshold 25 ANEF contour often lies very close to the airport boundary. There is a fear that the absence of effective measures to prevent residential development from closing in on an airport may result in aircraft noise pressures which either restrict operations or limit the possibilities for expansion.

The potential for constraints arising under the present planning system can be seen by reference to **Figure 1.3** which shows the noise contours for Rockhampton Airport – a very active regional airport. It can be seen that there are quite extensive areas to the north and south of the Airport on the main runway alignment which are within the noise contours and which are therefore protected from noise sensitive development. However, the contours do not offer protection from urban encroachment to the side of the Airport. It can be seen from the Figure that there are existing large urban areas to the east of the Airport and therefore a potential new flying school could not be offered training circuits over unoccupied land to that side of the Airport.

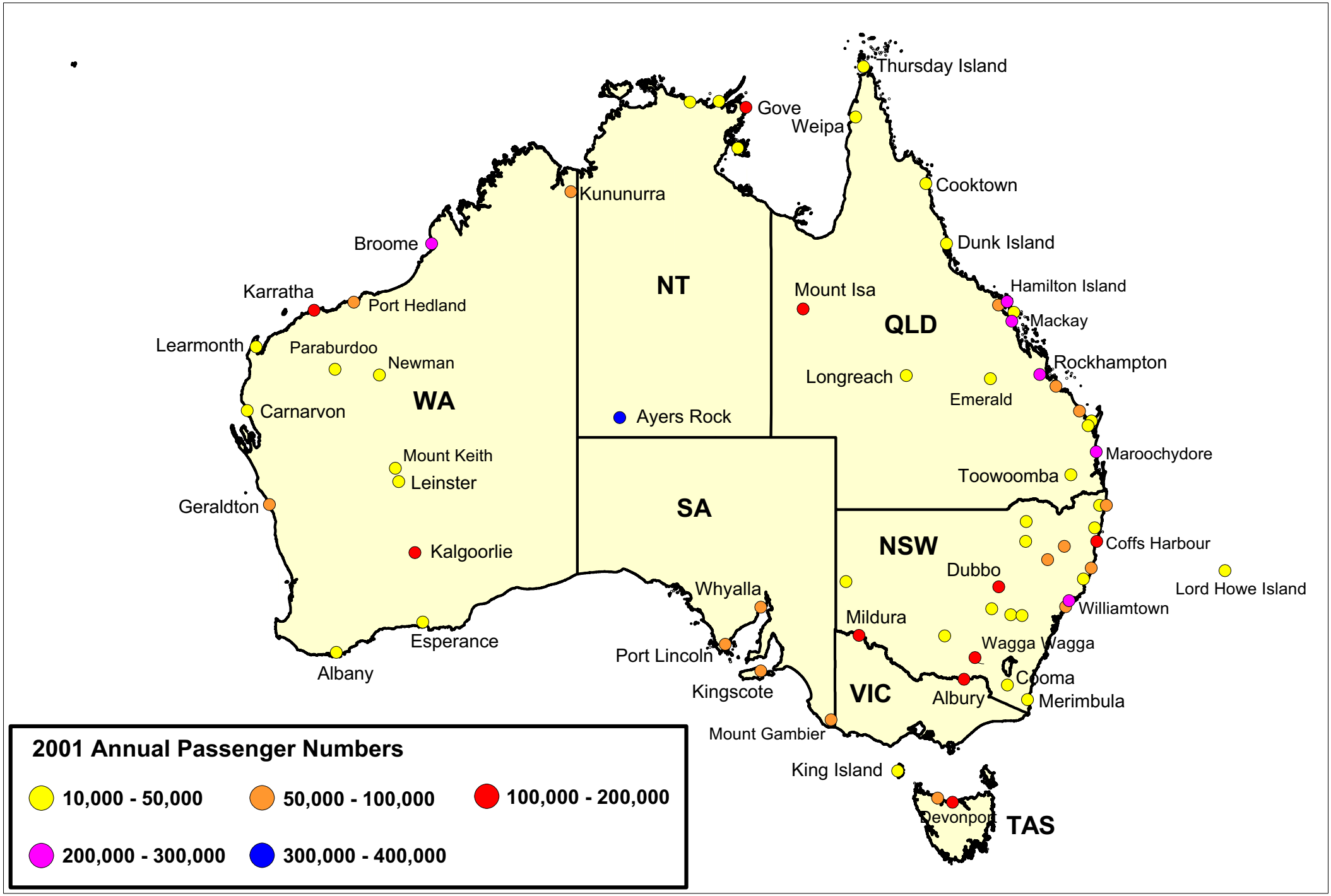


Figure 1.2 : RPT airports in Australia with annual passenger numbers between 10,000 to 400,000 in 2001.

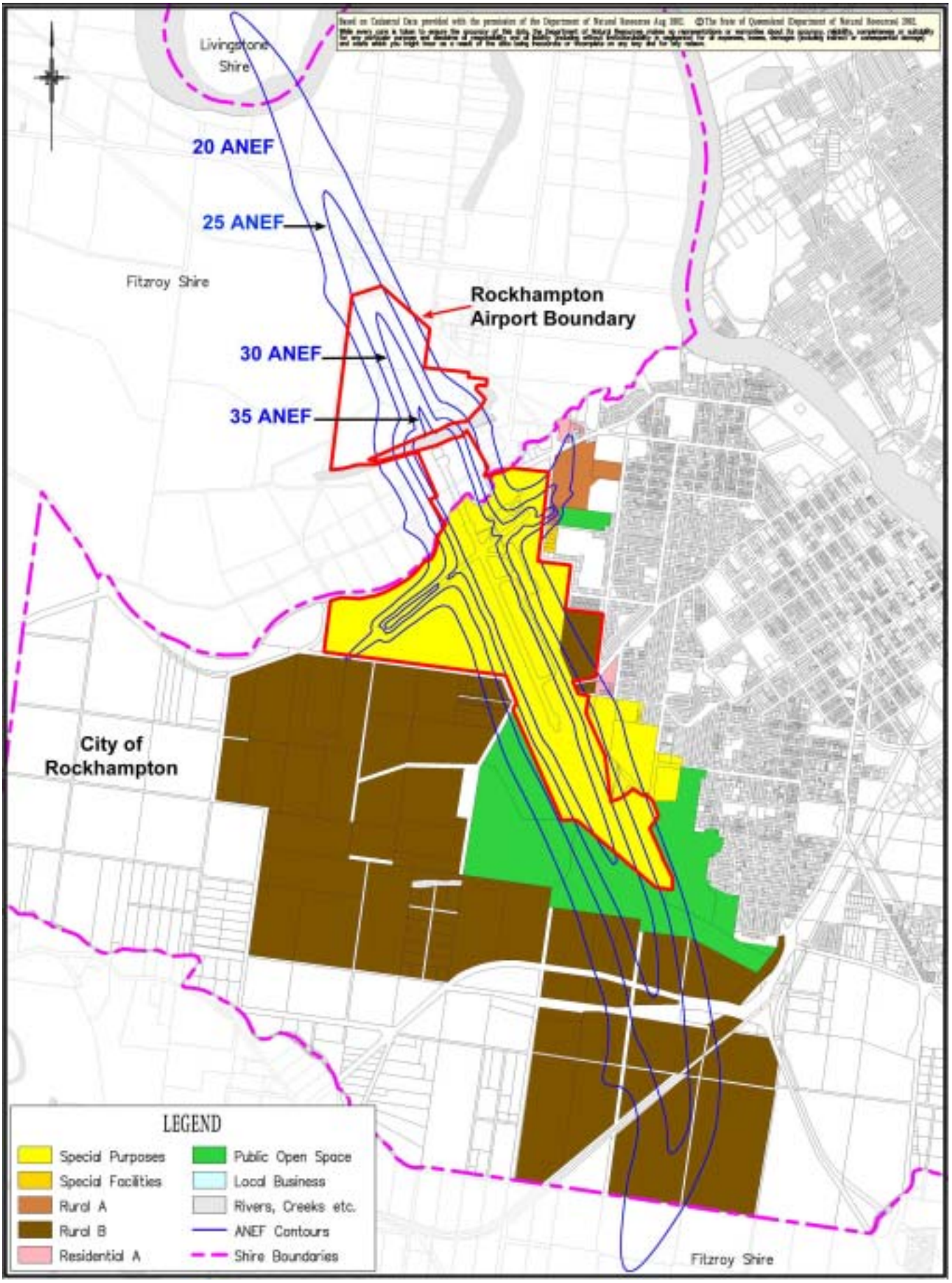


Figure 1.3 : The ANEF contours for Rockhampton Airport for the year 2010.
It can be seen that the airport boundary (red line) extends over two jurisdictions (City of Rockhampton and Fitzroy Shire), while the 20 ANEF contour encompasses areas in three jurisdictions (City of Rockhampton, Fitzroy Shire and Livingstone Shire).

Regional airports are generally owned and operated by local councils. Some of these councils have been active in developing additional land use controls which augment the current ANEF system – this is discussed briefly in **Chapter 2**.

1.3 Training circuits

Figure 1.1 shows the 20 and 25 ANEF contours for the year 2019 for Jandakot Airport overlaid onto actual circuit tracks for the month July 2002 and the modelled circuit tracks which were used to compute the ANEF. It can be seen that, even at this airport with very high numbers of circuit movements (possibly close to ultimate capacity), the circuit flight paths lie predominantly outside the 20 ANEF contour. Therefore current planning advice based on the ANEF does not protect areas under the flight training circuits from noise-sensitive development. Aircraft training circuits lie predominantly outside the 20 ANEF contour because although these operations can result in large numbers of overflights, they only generate single event sound pressure levels of between about 60 to 65 dB(A) for an observer on the ground. This type of noise exposure pattern results in relatively low ANEF values since the ANEF metric is much more heavily influenced by the loudness of aircraft noise events than by the number of aircraft overflights.

Circuit training is the predominant source of aircraft noise complaints at urban GA airports. The noise from flight training activity can be particularly annoying because of its highly repetitive nature over long periods of time. Moreover, a significant amount of the training occurs at noise sensitive times such as summer evenings and on weekends when residents tend to spend more time at home or outdoors. Interference or disruption to outdoor activity is the major reason for complaint. Aircraft noise has been a particularly contentious issue at Jandakot Airport (see **Chapter 2**).

CHAPTER 2 Existing Situation

2.1 Current land use planning regime

Australian Standard 2021 - 2000 *Acoustics - Aircraft noise Intrusion - Building siting and construction* (AS2021) **[Ref 1]** provides guidance on the acceptability of specified land uses in the vicinity of aerodromes based on ANEF zones. The Standard's land use compatibility advice, which is briefly summarised in **Section 1.1**, has been incorporated into the planning legislation of a number of States and is widely used by planning authorities as the basis for land use planning decisions around airports.

In 1982 the National Acoustic Laboratories (NAL) published a report on a major socio-acoustic study it had carried out to assess the impact of aircraft noise on residential communities **[Ref 3]**. The findings of the study led to the adoption of the ANEF system and the establishment of the land use compatibility advice which is contained in AS2021.

A very important point in the context of this paper is that the NAL study examined the reaction to aircraft noise of residents around main RPT airports at Sydney, Melbourne, Perth and Adelaide and the Air Force Base at Richmond (NSW). It did not consider the response to aircraft noise at any general aviation or regional airports where the nature of aircraft noise exposure differs markedly from their major RPT counterparts in terms of the types of aircraft and the frequency of overflights. Therefore it could be argued that applying the ANEF system across all airports, irrespective of type, takes the system beyond the parameters set by the NAL study.

2.2 Examples of current or recent issues

2.2.1 Regional airports

As indicated earlier, the key issue for most regional airports that are experiencing, or foresee, aircraft noise pressures, is the establishment of land use planning controls which restrict urban encroachment. Airports see this as the best way to ensure their long-term viability and it keeps the door open for major expansion of the airport if the economic opportunity presents itself.

Geraldton

Geraldton Airport (WA) is an example of where a regional airport has taken the initiative to try and protect the airport from urban encroachment. Greenough Council, which owns the airport, is now involved in consultation with its local community about the establishment of a 2km buffer zone around the airport which would strictly control further residential development. Although traffic at the airport is currently relatively low, the Council is proposing to put in place planning controls before residential encroachment occurs and before demands on the airport increase.

The idea of establishing a buffer was initiated in 1998 in an effort to avoid aircraft noise pressures similar to those that were then being experienced at Jandakot Airport. Public meetings have been held on the buffer proposal and it is clear from the published reports that a number of ratepayers have concerns with the proposal **[Ref 4]**.

Busselton

While long term planning has been identified as the key issue for regional airports, some of these airports already have to deal with active aircraft noise issues. For example, when the new Busselton Airport was being developed in the 1990s, the Western Australia Environmental Protection Authority (EPA) imposed strict noise controls on the Airport in response to community submissions made during the formal Environmental Impact Assessment process for the project. The local council, which owns the airport, considers the constraints to be too restrictive and impractical and is now initiating a consultation process with its community in an effort to have these controls reviewed.

In addition to this issue Busselton Airport is also receiving complaints from local residents regarding repetitive pilot training. In response to the noise issues, Busselton Shire has indicated that Guidelines for managing pilot training are being considered and a Noise Management Plan is to be prepared for the Airport **[Ref 5]**. The Shire of Busselton has advised that a proposal to base land use planning controls on N65 noise contours (contours showing the number of aircraft noise events louder than 65 dB(A)) has been developed for the airport.

2.2.2 Urban GA airports

As mentioned in **Section 1.3**, training circuits are the main source of complaints at the metropolitan GA airports. This is due to the highly repetitive nature of the training and the time it occurs which is often at noise sensitive times like summer evenings and during weekends when residents are at home or pursuing recreational activities outdoors.

The circuit tracks also lie predominantly outside the 20 ANEF contour and therefore under the current land use planning regime these areas are not protected from residential or other noise sensitive development. This can be seen by reference to **Figure 1.1.**

Jandakot

Community opposition to circuit training at Jandakot Airport has resulted in several studies being conducted to investigate community reaction to aircraft noise **[Refs 6, 7, 8]**. These studies have proposed a lower ANEF value, such as 15 **[Ref 6]** or even 10 **[Ref 7]** ANEF, be used as a threshold for residential zoning. However, these proposals would appear to be no longer applicable since housing has encroached within these contours in recent years.

A review of flight paths and operational procedures at Jandakot Airport in 1999 **[Ref 9]** recommended that the ANEF system be reviewed and that clear planning arrangements by local and state planning authorities be set in place to protect the airport and its environs from incompatible development. This recommendation only related to reviewing the use of the ANEF as a planning tool and was not proposing that the ANEF be used as a tool for restricting airport operations.

Camden

At Camden Airport, a very active GA airport on the western fringe of Sydney, urban pressures are leading to houses being constructed increasingly close to the airport and its flight paths. **Figure 2.1** indicates the location of an area where approval has been granted within the past two years for a rural-residential development with 27 lots. It can be seen that the area in question is situated more or less directly under the final approach to the Airport's most active runway – the closest point in this area is approximately 400 metres from the runway end. However, the Department has been advised that, when approving this subdivision, Camden Council complied with the requirements of the ANEF system.

Approximate location of housing subdivision

Figure 2.1: Camden Airport and surrounds

Part 2

FINDING

THE

ANSWER

PART 2 Finding the Answer

Overview

Clearly there are a number of strategies that could be adopted in response to the submissions that have been put to the Department. These range from retaining noise contour based land use planning approaches, through declaring buffer zones using different (non-noise based) criteria, to adopting much more 'whole of airport' approaches.

ANEF noise contours have been used to underpin land use planning controls around Australian airports for the past two decades. Over this time the conventional wisdom has been that using computer generated noise contours is the only 'proper' way to plan for aircraft noise and that any approach which is not based on formal rigorous aircraft noise dose/response studies is somehow substandard. The incorporation of the ANEF system into State Planning legislation (eg through reference to Australian Standard AS 2021) and Federal legislation (eg in the Airports Act 1996), has de facto, locked the system in place and despite its perceived shortcomings, land use planners have considered themselves to be very constrained in adopting, or even examining, different approaches.

Despite the above, examples of airports which have declared a buffer that goes beyond ANEF contours are now emerging (eg Mildura, Ceduna). Clearly there are a number of options for defining a buffer that is not based on noise contours. The declaration of buffers based on a distance are a common land use planning tool which may have applicability to small airports. Increasing interest is being shown in planning based on flight path corridors, or at least in requiring flight paths to be taken into account when planning decisions are made.

In recent times significant advances have been made in the way aircraft noise can be described and reported. This has opened up many possibilities for ensuring that there is full aircraft noise disclosure. For example, a 'real' picture of aircraft noise can be given to the occupants and potential purchasers of houses located near flight paths. Aircraft noise disclosure can be used to underpin strategies designed to attract noise tolerant people to live near flight paths.

Increasing interest is being shown in adopting more holistic approaches to managing aircraft noise at smaller airports. Concepts which involve the development and adoption of plans which integrate land use planning and airport operating regimes are attracting attention.

The above options are discussed in the next five chapters. A mind map which summarises the options is at **Figure P2.1**.

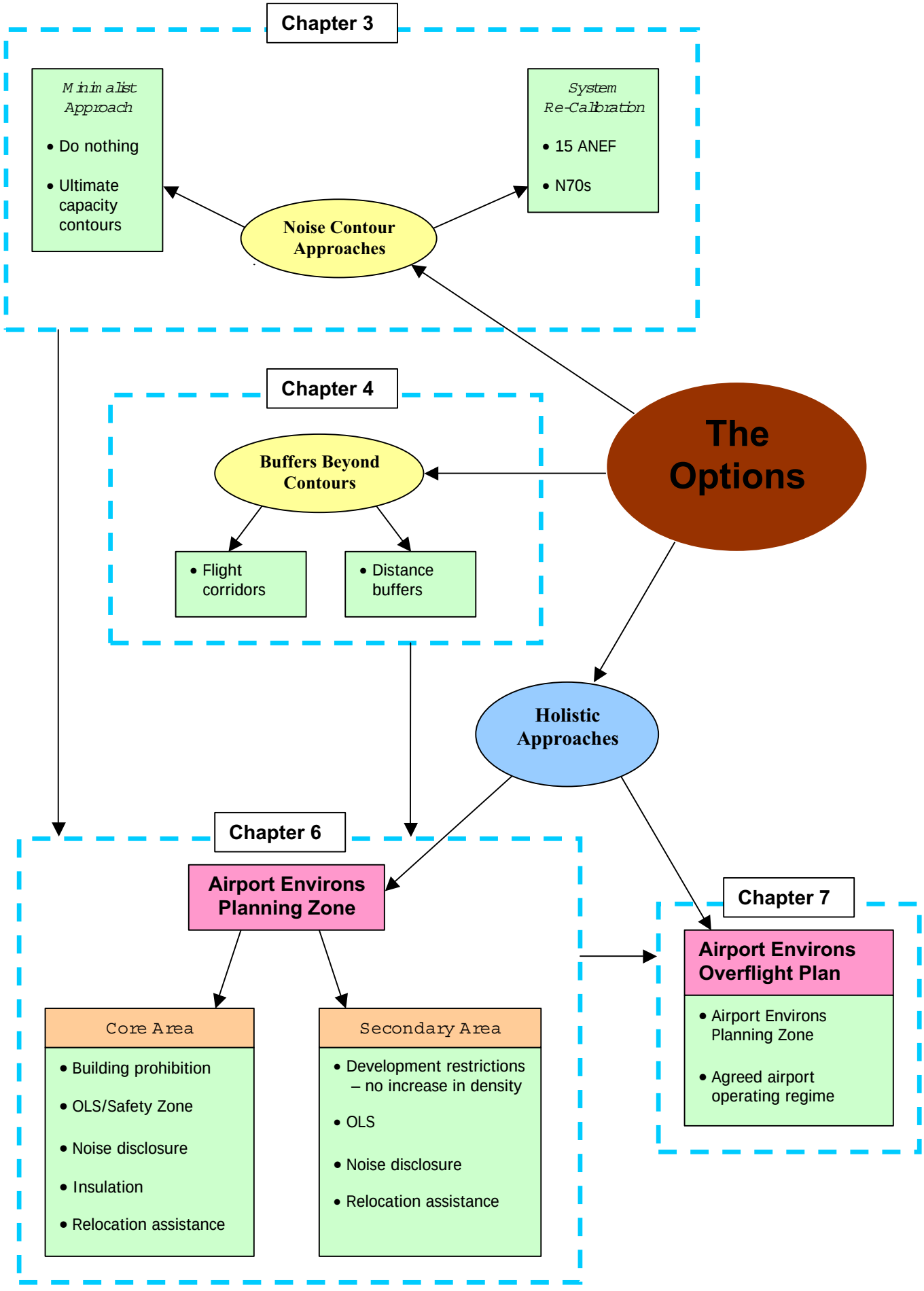


Figure P2.1: Mind map of the Options

Differentiating between airport types

In examining the options it is important to recognise, as indicated in Part 1, that different types of airport have different types of problems and issues. In addition, the constraints on adopting options will vary widely from airport to airport.

Regional airports are fundamentally transport nodes. In general, regional communities consider their local airport as a lifeline to wider Australia and recognise that it is vital for the local economy. Hence regional communities are likely to be keen on protecting their airport from any incompatible land uses which may impose operational constraints.

A key consideration with land use planning around rural and regional airports, which very often differentiates them from urban GA airports, is the availability of alternative land for noise sensitive development. Unlike the urban situation there is often likely to be alternative land available for noise sensitive development in the vicinity of a regional centre but which is away from the airport.

At urban GA airports the focus of activity tends to be on pilot training and specialist aeronautical activities rather than on transport per se. A resident living in the vicinity of a major metropolitan GA airport is likely therefore to view the airport in a somewhat different light to the way a resident of a regional centre might view their airport. Given that a GA airport is not a transport hub, for many local residents there is no apparent reason why, for example, highly repetitive training activity has to be carried out over their home. The perception that the training activity is unnecessary, or is being carried out at the wrong location, is likely to exacerbate any negative attitudes toward the noise.

Irrespective of the above, the differentiation between airport types is not always clear cut. Pilot training and GA activities do take place at many regional airports and these airports would undoubtedly welcome the additional economic benefits arising from, for example, the establishment of a major flying school on their premises.

CHAPTER 3 Noise Contour Based Approaches

If a noise contouring approach to land use planning is to be retained, there would appear to be two broad potential strategies for extending the areas bounded by the contours

- Apply the existing provisions of the ANEF system more aggressively through the use of much longer term or ultimate capacity contours.
- Re-calibrate the current system to establish noise criteria that produce contours which more closely match community aspirations and expectations.

3.1 Ultimate capacity ANEF contours

The simplest approach to enlarging the area captured by an airport's noise contours is probably to develop ultimate capacity ANEF contours since this can be done within the current system

There is precedent for this in that the land use planning regimes around several of the larger airports in Australia are now based on ultimate capacity ANEF contours. These contours are generally modelled on a notional 50 year horizon and often include what might be mutually exclusive development options (eg a number of options for potential new runways) in order to ensure that the key airport development options remain open.

However, the concept of 'ultimate capacity' does not necessarily translate well to a smaller, particularly regional, airport. Adopting an approach based on 'legitimate aspirations' (ie a realistic long term forecast), rather than the maximum number of operations that could theoretically take place at the airport site, is probably more appropriate.

Advantages

- Future zones which will or may be impacted by aircraft noise can be protected from noise sensitive developments before they are built out.
- Noise contours need only be developed once for the maximum throughput of the airport (however, they will still need on-going refinement – movements at an airport can decrease as well as increase).
- This approach can be adopted within the current ANEF system.

Disadvantages

- Land may be unnecessarily sterilised from optimal use for many years, especially if the maximum capacity of the airport is never reached.
- Present calculations of an ultimate capacity contour are based on current knowledge (e.g. aircraft types, air traffic control technology, etc.). It is difficult to forecast far into the future with great certainty.

- ANEF contours (even ultimate capacity contours) do not normally capture training circuits. Therefore they will not protect areas potentially under the circuits from urban encroachment.
- Planning approaches based on noise contours can often send the wrong message to land use planners, developers and property buyers – contours can generate the perception that there is no aircraft noise outside the outer contour.

3.2 Re-calibrating the system – selecting different noise criteria

3.2.1 Lowering the ANEF contour value for unrestricted development

As indicated earlier, the majority of complaints at GA airports arise from highly repetitive overflights of houses under training circuits. It was also pointed out by reference to **Figure 1.1** that these houses are generally well outside an airport's 20 ANEF contour.

One possibility of extending land use controls to more accurately capture areas under training circuits would be to reduce the threshold for non-compatible development to a lower ANEF value such as the 15 ANEF contour. As mentioned previously, studies on the impact of aircraft noise at Jandakot Airport have recommended the use of a lower ANEF value such as the 15 **[Ref 6]** or 10 **[Ref 7]** contour for limiting residential zoning. As shown in **Figure 3.1**, the 15 ANEF contour for Jandakot Airport for the year 2019 captures most of the areas under the main training circuit.

This approach would be consistent with the approach adopted in California where a lower noise threshold is recommended for GA airports (see **Figure 8.3**). It would also not be inconsistent with the NAL study, which underpins the ANEF system, as this did not examine the noise dose/response relationship around small non-jet airports.

Advantages

- There would be a closer fit between areas where housing is restricted and where the majority of complaints arise (i.e. areas under the training circuits).
- It would involve a relatively minor 're-calibration' of the current system rather than the adoption of a totally new system.

Disadvantages

- It would be a 'quick fix' solution and simply represent a 'tweaking' of the system; it would not overcome the more fundamental problems with the current approach (e.g. could further enshrine a 'one size fits all' approach; retains a system which is difficult to understand, etc).
- Planning approaches based on noise contours can often send the wrong message to land use planners, developers and property buyers – contours can generate the perception that there is no aircraft noise outside the outer contour.

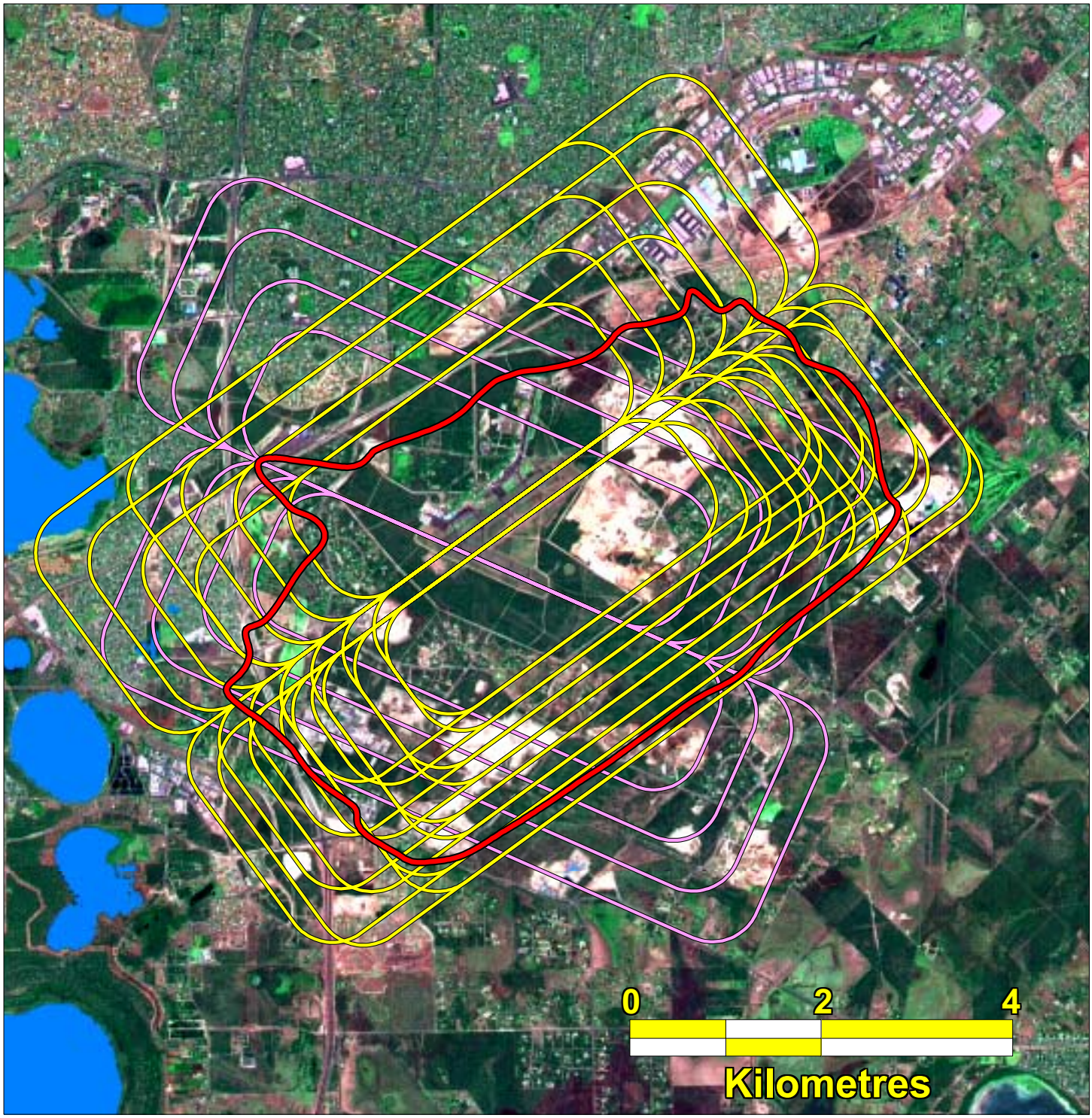


Figure 3.1 : The 15 ANEF contour superimposed onto circuit tracks from the INM model for Jandakot Airport for the year 2019.

3.2.2 Use of noise metrics based on number of aircraft noise events

Over recent years there has been increasing evidence that the number of noise events is a key determinant of the extent to which a person may be annoyed by aircraft noise.

When the ANEF was being developed more than 20 years ago, the NAL study found that, even though at that time there were relatively few aircraft overflights compared to today, a number of events based noise metric, the N70, '…could provide useful information…'**[Ref 10]**. Two major public inquiries in recent years have found that logarithmic contours (eg the ANEF) do not give sufficient weight to the number of aircraft noise events **[Refs 11 & 12]**. These findings are supported by examination of complaints about aircraft noise from residents living around GA and other airports – the issue of concern is primarily the very high number of overflights per day. Therefore there would appear to be strong arguments for suggesting that noise metrics based on number of noise events could be of value in land use planning decisions. In particular, these metrics could be useful when considering the issue of land use planning to cater for training circuits at smaller airports.

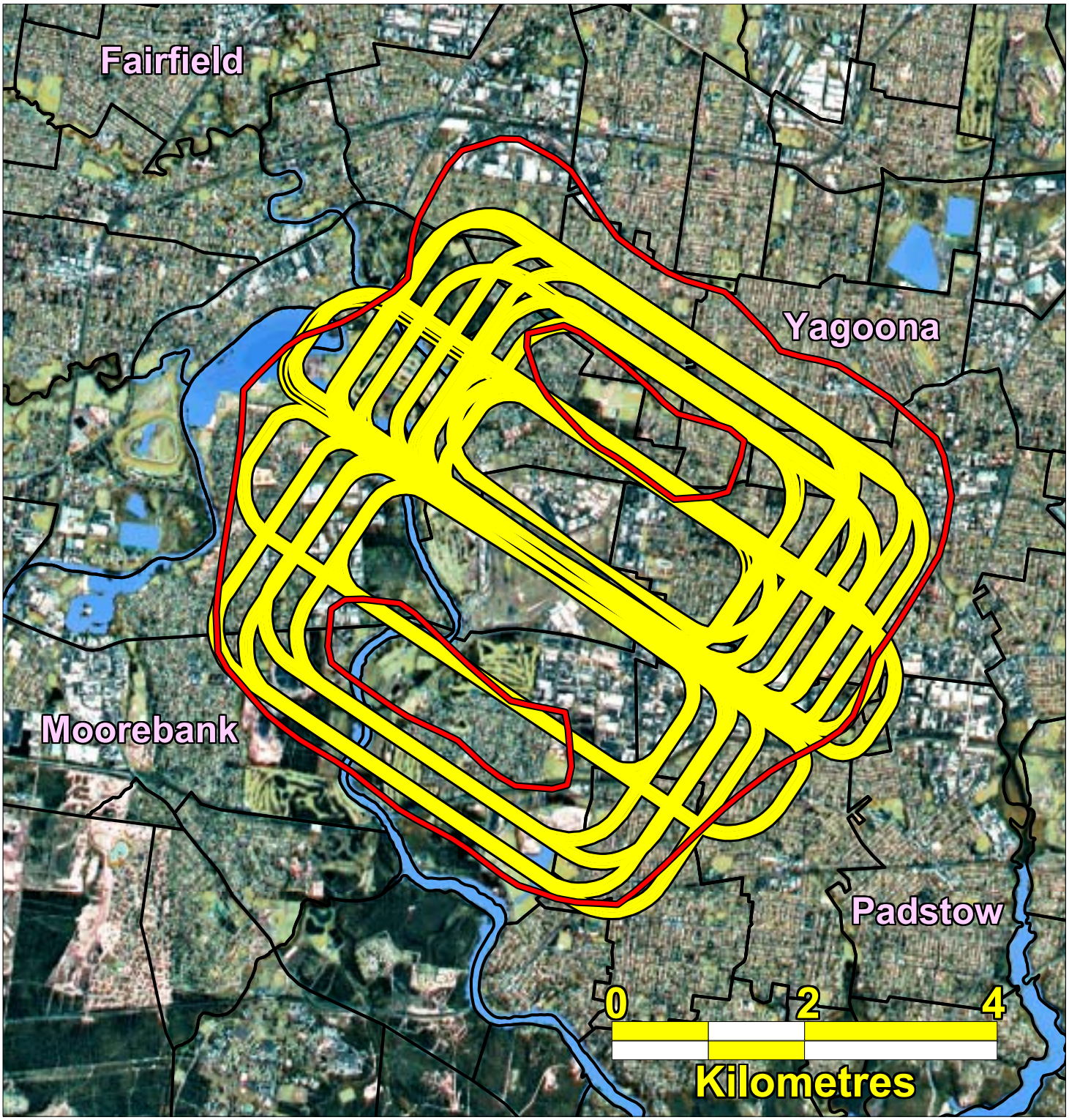
These number of events based metrics, commonly called the N70 in Australia, have recently been introduced as a tool for providing aircraft noise information around major jet airports. These report the number of noise events louder than 70 dB(A) over a specified time period. A sound pressure level of 70 dB(A) is considered to be a useful 'trigger level' since an external noise of this magnitude equates to approximately 60 dB(A) inside a house with open windows. 60 dB(A) is the sound pressure level at which noise events may become intrusive to speech and hence may interfere with activities like telephone conversations and watching the TV. This is commonly called the Speech Interference Level (SIL).

While 70 dB(A) is commonly used as the reporting level for major jet airports, for GA airports where the number of noise events per day is often very significantly higher than for a person living around an RPT airport, lower noise level metrics such as the N60 (the number of events louder than 60 dB(A)) are likely to be more indicative of the noise regime. This is because the small aircraft involved in performing training circuits normally generate outdoor sound pressure levels at houses which are around 60 dB(A).

As an example, **Figure 3.2** shows an N60 contour map for Bankstown Airport. It can be seen that the contour with 100 or more noise events louder than 60 dB(A) per day effectively envelopes the area under the training circuits.

Advantages

- There would be a closer fit between areas where housing is restricted and where the majority of complaints arise (i.e. areas under the training circuits).
- It would describe the noise using a descriptor that matches the issue over which concerns are most often expressed – the number of noise events.
- There would be less likelihood of someone being misled if the planning noise contour were to be used as 'aircraft noise information' (compared to using an ANEF).



Source: Bankstown 1997 - 1998 ANEI Data

Figure 3.2 : N60 contour of 100 or more aircraft noise events superimposed onto circuit tracks from the INM model for the ANEI of Bankstown Airport for the financial year 1997-1998.

- Land use planners and the decision makers would be in a much more informed position about the likely noise exposure patterns.
- Number above metrics can be easily calibrated to suit local needs (ie informed debate can be held about the number of events to be used for a 'cut-off' if such a figure is considered necessary – this type of process is now taking place at some US airports **Ref 13**).

Disadvantages

- The contours could give the impression that 60 dB(A) is a 'loud' noise event (the issue for most people disturbed by noise from training circuits is generally the high number, and time of day, of the events not the loudness of the individual events).
- Planning approaches based on noise contours can often send the wrong message to land use planners, developers and property buyers – contours can generate the perception that there is no aircraft noise outside the outer contour.

3.3 Comments

Retaining a noise contouring approach has some attractions. Principally it would mean little or no divergence from current practice. It would retain a system which some see as scientifically rigorous and which leads to planning decisions based on what some would argue are 'objective' rather than 'subjective' criteria. There is a view that this approach also results in outcomes that are more consistent and more legally defensible.

On the other hand retaining a noise contouring approach is unlikely to address those factors which submissions to the Department would suggest are seen as the problems with the current system. The current noise contouring based approach to land use planning produces 'black and white' answers – on one side of the line a building is permitted, on the other it is not. The criteria for determining this line are not transparent and are derived from a computer model which for most people is a 'black box'. The criteria take no account of local circumstances and the 'yes/no' criteria, if the system is strictly followed, apply equally to an urban area adjacent to a big city airport and to the rural area around a small 'greenfield' regional airport.

It could be argued that the current noise contouring system effectively takes land use planning decisions out of the hands of the planners and elected representatives and places them in the hands of the 'experts' who carry out the computer modelling.

CHAPTER 4 Establishing Buffers Beyond the Noise Contours

The logical response to a situation where an airport and/or a community considers that a noise contouring approach results in buffers which give inadequate protection from urban encroachment is to develop larger buffers using other criteria. At several airports recent interest has been shown in using the location of flight paths, rather than noise contours, to determine land use planning areas. At certain categories of airports around the world it is not uncommon to simply use a buffer based on distance from the airport to delineate airport influence/planning zones. For example, military airports in the United States establish such zones **[Ref 14]**.

4.1 Controls based on flight paths

4.1.1 Areas under training circuits

An alternative to using noise contours to 'capture' the circuit flight paths is to directly use the location of the flight paths to define a planning zone. The broad area covered by the circuits is usually reasonably well defined and contained – this can be seen from **Figure 4.1**. However, defining the edge of the 'circuit zone' would not be clear-cut if something less than a nominal 100% capture of the flight paths were being sought.

Advantages

- Avoids the mysteries and uncertainties of computer generated noise contours.
- Gives direct protection from the nuisance (houses would not be overflown), rather than indirect protection (the daily noise dose is less than some specified level).

Disadvantages

- Is likely to generate an expectation that every aircraft will fly only over the 'circuit zone'.
- Has the potential to lock the airport into flight paths that may not suit future operations.
- The flight path zone may be quite wide and it could 'lock up' or sub-optimally use large areas of potentially valuable land. That is, it could lead to over protection by restricting development in areas that are overflown infrequently.

4.1.2 Protecting flightpath corridors

For some regional and GA airports complaints are not only generated by the very high numbers of overflights from aircraft in training circuits, but also from the high number of noise events for residents living under the airport's main entry and departure flight paths.

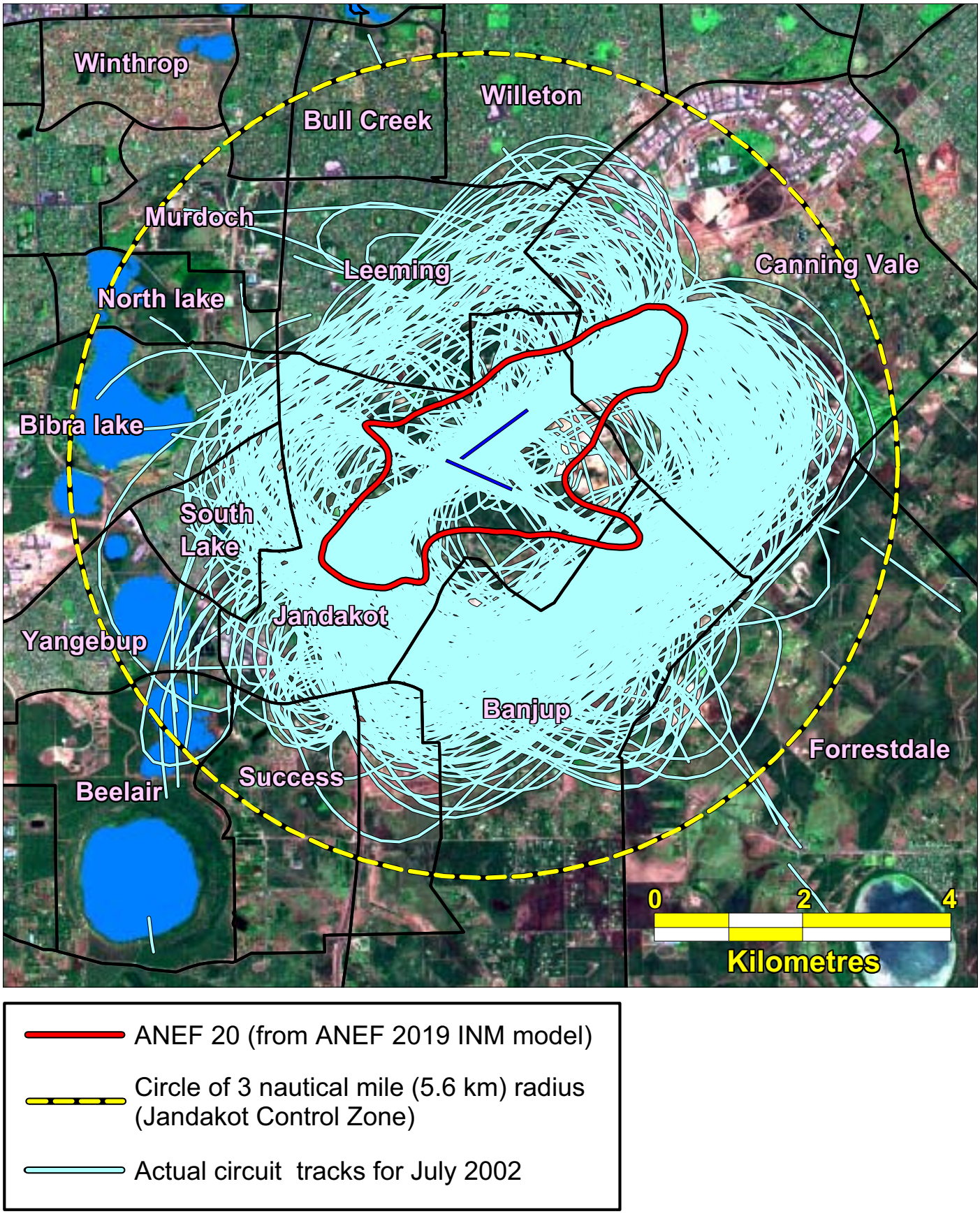


Figure 4.1 : A circle of radius 3 nautical miles (5.6 km) centred at Jandakot Airport and encompassing the 20 ANEF contour for the year 2019 and the actual circuit tracks for July 2002. The area covered by the circle also defines the Jandakot Control Zone.

As with the circuits, the areas under these flight path corridors are not normally within the 25 or 20 ANEF contour and therefore have no protection from noise sensitive development. However, there would apparently be no legal impediment to flight path corridors being defined in a planning scheme and restrictions being placed on land uses in those areas.

Advantages

- A transparent approach which, compared to noise contours, can be easily understood by planners, decision-makers and the community.
- Allows flexibility and community debate on the definition of the boundaries of the 'flight path zone' – empowers the community as opposed to deferring to a system where the definition of the line is effectively outside local control (i.e. computer generated line).
- Boundaries can be set with more certainty than with a 'pure' noise contouring approach (e.g. can follow agreed cadastral boundaries or surveyed lines).

Disadvantages

- Has the potential to lock the airport into flight paths that may not suit future operations.
- Will only be appropriate at airports which have well defined or dedicated inbound and outbound flight paths (i.e. will probably only work for concentrated flight paths).

4.2 Distance based buffers

A simple alternative to defining flight path zones or flight path corridors would be to use distance from an airport as the means of defining a buffer zone to implement local planning controls in the vicinity of the airport. The buffer zone could be chosen to encompass the areas impacted by training circuits and to extend to natural boundaries such as major roads. A circle with a radius of 3 nautical miles (~ 5.6 km) from an airport would include all or most of the regions overflown by pilots performing circuits. This is illustrated in **Figure 4.1** for Jandakot Airport – this area now contains a significant number of houses.

The boundaries of a flight path corridor relating to the main entry or exit points for an airport could be defined by distance from touch-down or start of roll.

This type of approach would not be new. It can be seen by reference to **Figure 8.3** that in California a buffer of two miles from an airport boundary is the default basis for defining an airport influence area for the purposes of land use planning.

The choice of the size of the buffer would depend on the controls to be implemented inside the buffer. For example, whether the buffer is to be used to restrict the encroachment of noise sensitive development or whether it is to be used to implement other strategies such as aircraft noise disclosure or restrictions on the heights of buildings and trees (Obstacle Limitation Surfaces (OLS)). The size of the buffer would also depend on the extent of existing greenfield areas that the local authorities may wish to protect.

The concept of using a distance based buffer zone is commonly used in planning schemes to protect housing from the adverse impacts of major industries or noxious activities (e.g. housing is often not permitted to be built within a specified distance from a sewage treatment works, quarries, etc).

Advantages

- Avoids the costs and complexities associated with producing noise contours and the difficulties associated with their interpretation.
- Gives much more certainty about the location of the boundary compared to using a 'pure' noise contouring approach.
- Compared to the flight path approaches it may allow for more flexibility in changing flight paths to meet future needs.

Disadvantages

- It could lead to sub-optimal use of some land (depending on the restrictions imposed) since some areas inside the buffer may never be exposed to high noise doses (this will depend on the flight path locations).

4.3 Comments

Delineating the buffer will require negotiation and/or the agreement on a set of criteria for determining the buffer boundaries. For example, if a flight path corridor is to be defined how wide should it be and at what point does it end – when the aircraft reach an altitude of 3000ft, or maybe 5000ft? The answers to these questions are likely to be very site specific. For example if a corridor is being preserved between already established residential areas to allow aircraft to reach the sea or unoccupied land (that has no noise sensitive development potential) the question is not where the corridor ends but simply how wide does it need to be? The width may well be determined by pre-existing natural boundaries or planning zones.

While the concept of developing buffer zone boundaries through negotiation has many advantages over using computer generated noise contours, these may be lost if the only effect is to change the criteria for establishing the ‘planning line’. The opportunity for establishing a broader and more flexible approach to airport land use planning will have been missed. This issue is discussed in the next three Chapters.

CHAPTER 5 Adopting More Holistic Approaches to Airport Planning

The previous two chapters have examined possible ways in which changes could be made to the present approach of defining a 'planning line'. However, there are strong arguments to suggest that simply adopting some or all of those concepts would not take us too far forward. The off-airport approaches for managing aircraft noise would still largely be a rigid one-dimensional answer to a multifaceted problem.

5.1 Moving beyond 'black and white' approaches

5.1.1 Current approach – 'micro' planning

Under the current ANEF approach to land use planning around airports the decision making process essentially depends on each Development Application being assessed, on an individual basis, purely against the location of the ANEF contours.

This approach tends to lead to 'black and white' decisions. In examining planning applications, one site will be considered 'noise affected', yet another site just metres away, but on the other side of 'the line', will be treated as noise free. For example, if there is a proposal to build a school in an area which has a noise exposure of 19 ANEF it is, to all intents and purposes, treated by planners as being in a location where there is no significant aircraft noise. This is despite the fact that the proposed school site may be directly under a busy flight path.

5.1.2 Wider planning approach – looking at the context

Experience and consultation has shown that there is a need to think beyond the use of a simple 'black and white' approach to land use planning. Strong arguments are being made for introducing more flexible approaches which allow factors other than simply a computer generated 'one size fits all' 'noise line' to be taken into account when land use planning decisions are made. For example, it is self evident that the planning issues facing a 'greenfield' airport are different to those encountered at an airport in an urban area.

It is argued that an airport is a vital community asset for many regional centres and that decisions about land uses in its vicinity cannot be effectively made without considering broader issues. In particular the availability of other development land in the area and also the wider community aspirations about the long term future and role for the airport. In a similar vein, land use planning around an urban GA airport may well need to be considered in the context of broader planning policies. For example, urban consolidation policies may impact on, or even conflict with, decisions that would be made if the 'acceptable/unacceptable' concepts of the ANEF system were just being directly applied.

5.2 Facilitating local solutions

Regional centres, in particular, have indicated that they need local solutions to meet individual community concerns and aspirations. This need is recognised in the Federal Government's *Stronger Regions, A Stronger Australia* policy **[Ref 2]**. The concept of 'one size fits all' for land use planning near airports does not take into account local conditions and therefore there are compelling reasons for examining the application of land use planning regimes on an **airport-by-airport** basis.

There are already examples of airports in Australia where planning authorities have considered that the 'pure' ANEF approach to the issue would not give the desired outcome and have adopted other strategies (see Section 8.4). This has led to land use planning controls being put in place which either overlay the ANEFs or in fact substitute for ANEFs. Introducing a flexible approach to land use planning would also be consistent with the concept of the balanced approach endorsed by ICAO (International Civil Aviation Organization) in 2001 **[Ref 15]**. ICAO's balanced approach to noise management recognises the need for a degree of flexibility to accommodate local and regional differences. It recommends an airport-by-airport approach where solutions to noise problems are tailored to meet the special conditions of an airport's environs.

Many rural and regional airports are owned by the local government authority and this therefore places them, both as the planning authority and the airport owner, in an ideal position to form a balanced view of the extent to which the community wishes to protect its airport from encroachment.

It is recognised that the introduction of any change in permitted uses around an airport is not a simple matter. Issues such as pre-existing rights, non-conforming uses, claims for compensation, etc. all need to be addressed. However, these are issues that commonly have to be tackled when there are any proposed changes to land use planning schemes. Ultimately a decision which balances competing needs and wants has to be made by the relevant planning authorities.

5.3 Land use planning as part of a package of aircraft noise management measures

The holistic concept can be taken further. The previous two sections have discussed integrated planning approaches. However, the broad aim of land use planning around airports is to achieve compatibility between airports and their surrounding communities and land use planning is not the only way to deal with this issue.

In general terms aircraft noise can be managed by two broad strategies – ‘active’ and ‘passive’ approaches.

‘Active’ aircraft noise management strategies are those directed at reducing the community noise dose through imposing controls on the source of the noise (ie the aircraft). These approaches include controlling

- how much noise is emitted by each aircraft - through aircraft noise certification

- where the noise is emitted - through imposing noise abatement flight paths and/or flight path corridors
- when the noise is emitted – through using tools such as curfews
- the total amount of noise which is emitted - through imposing, for example, airport movement caps.

'Passive' approaches, on the other hand, are those directed at reducing the community aircraft noise dose and/or reaction by protecting the receiver from the noise. In broad terms these approaches can be broken down into restrictive measures (ie those which stop people doing certain things) and approaches directed at 'assistance'.

- Restrictive measures
  - imposing land use planning controls to keep people away from noise.
- Assistance measures
  - 'real' aircraft noise disclosure strategies (see **Figure 5.1**)
  - assisting people to leave noise affected areas through property acquisition and relocation assistance schemes
  - protecting people who are exposed to high levels of aircraft noise through acoustic insulation of residences
  - assisting noise tolerant activities (eg industry) to locate near an airport.

The first two of the 'assistance measures' are basically aimed at selectively finding a noise tolerant population that has no objection to living near flight paths.

The mind map at **Figure 5.2** illustrates how land use planning can be treated as one of a family of 'passive' aircraft noise management measures.

5.4 Comments

It is clear that implementing more holistic approaches to land use planning around airports would turn the current externally imposed system of decision making into one that would facilitate many more opportunities for local communities to find local solutions.

With an holistic approach to land use planning, factors other than noise, for example, the need to protect an airport's Obstacle Limitation Surface (OLS), can be integrated into planning thinking – the airport is treated as an important planning entity rather than as a collection of relatively minor parts.

Historically, land use planning around airports has been treated in isolation from other measures that may be used to manage aircraft noise issues. Recognising that land use planning is just one tool in a possible package of aircraft noise management measures opens up new horizons and it may mean that agreed noise outcomes can be achieved without having to rely on land use planning controls.

There has been strong support for enhanced noise disclosure strategies to be adopted to complement planning controls. This is especially important for areas outside the conventional ANEF contours but under flight paths with high overflight activity. It is likely that a person buying a house outside the noise contours, or at some distance from an airport, will have an expectation of not being exposed to aircraft noise and then will be aggrieved if they find that they have purchased a home under such a flight path. This is a particular issue for airports with high levels of training activity. One of these airports has indicated that it has unsuccessfully lobbied planning authorities for a noise disclosure scheme to be put in place within the airport's three nautical mile control zone (the area that essentially captures the training circuits).

This discussion raises the question of the vehicle that can be used to deliver a more holistic/integrated approach to managing aircraft noise around smaller Australian airports. Possible concepts are discussed in the next two chapters.

Aircraft Noise Disclosure

- One of the broad aims of aircraft noise disclosure is to selectively achieve a population of noise tolerant people living in the vicinity of flight paths.

- Experience has shown that a significant number of aircraft noise complaints come from people who have been exposed to some form of 'surprise noise'. Typically they have unknowingly moved into an area underneath a busy flight path or have received greater noise than they expected from examination of published noise contours such as the ANEF.

- Conventionally aircraft noise disclosure is seen as placing advice about the noise on the titles or formal sales notices for houses. However, while this is a valuable strategy the advice often tends to be very general in nature and does not portray what the noise will really be like. For example, the advice is likely to be along the lines of '…this house is subject to high levels of aircraft noise…'. There is little doubt that a much clearer message could be transmitted than is currently achieved under these schemes.

- Little real noise disclosure is achieved by showing people ANEF contours or other land use planning maps/material. In order for people to get a feel for what is happening they need to be provided with information about the location of flight paths and the timing and number of flights on them. Consistent with this approach real estate agents in San Francisco now advise prospective house buyers to check the San Francisco Airport's website, which displays dynamic (10 minute delayed) flight paths, before signing a contract of house sale **[Ref 16]**.

- The issue of producing 'real' aircraft noise information was examined in some detail in a Discussion Paper entitled *Expanding Ways to Describe and Assess Aircraft Noise* which was released by the Department in 2000 **[Ref 17]**. The practical application of transparent aircraft noise information concepts is explained in a joint DOTARS/Environment Australia publication entitled *Guidance Material for Selecting and Providing Aircraft Noise Information* **[Ref 18]**.

- Aircraft noise disclosure goes much further than advising potential house buyers about the noise. If aircraft noise is to be effectively managed it is equally important that the community be properly informed on an on-going basis about what is happening at an airport. This can be achieved, for example, through placing information on web sites and/or publishing regular aircraft activity reports.

- It is very important that the community is informed when there are proposals or events which will significantly change noise exposure patterns. For example, when there is a proposal to permanently change flight paths, if surprise noise is to be avoided, there needs to be full disclosure using 'real' information. This will facilitate community debate and understanding (not necessarily acceptance) of the proposal. On a more simple level, if there is to be a particularly unusual high activity day at an airport adverse community reaction would probably be lessened if noise sensitive residents were made aware of the forthcoming activities (and the reason for them).

Figure 5.1: Aircraft Noise Disclosure

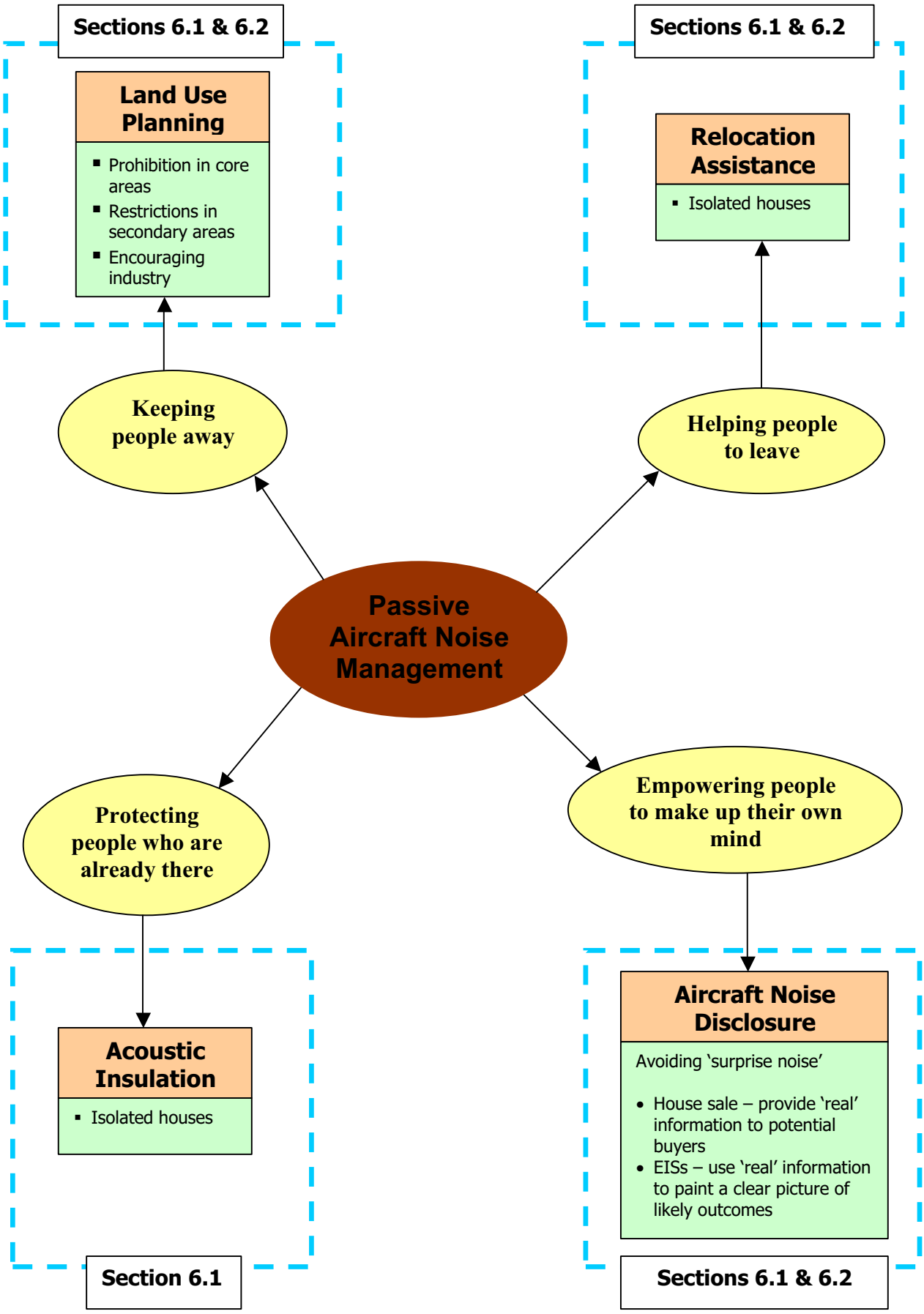


Figure 5.2: Mind map for Passive Aircraft Noise Management Strategies

CHAPTER 6 Special Use Areas – the 'Airport Environs Planning Zone'

All State planning legislation has provision for the declaration of special use areas. It would appear that this provision could be used as a tool to facilitate a more holistic approach to airport planning.

There are several examples where special use zones have been declared for airports. However, it appears that these have generally been declared to provide for specific planning conditions on the land occupied by, or in the immediate vicinity of, the airport rather than as a tool to encompass the broad area which surrounds an airport.

It is envisaged that the planning provisions of an 'airport environs planning zone' in the context of this paper, while encompassing the land occupied by the airport, would focus on managing 'off-airport' land use (ie land use for areas surrounding the airport rather than for land on the airport per se). The zone would be a planning regime principally designed to cater for aircraft noise and the protection of the airport's Obstacle Limitation Surface (OLS). If desired, it could also encompass other issues such as the implementation of runway safety zones.

For the purposes of this paper the concept of a two stage zone is discussed – a zone consisting of a core area plus what would probably be a much larger secondary area.

6.1 The Core Area

The core area would be the area with the most stringent planning conditions.

Area Defined: It is most likely that the definition of this area would be underpinned by some form of noise contours and/or the location of a flight path area (eg area under training circuits) or possibly a combination of the two using the concepts discussed in Chapters 3 & 4. Runway safety zones could be superimposed on this area if this were considered desirable.

If the core area were determined using noise contours it would be important to recognise that careful consideration would need to be given to deciding the future requirements of the airport – as indicated earlier in this paper even extremely busy training circuits lie outside the area covered by conventional noise contours.

Planning Provisions: The core area could be subject to similar building provisions to those currently contained under the ANEF system. That is noise sensitive developments could be prohibited or restricted in certain noise or flight path areas or within the runway safety zones.

Alternatively, rather than simply transposing the ANEF land use compatibility advice across, consideration could be given to more dynamic use of land. For example, as a way of allowing for future growth at an airport without sterilising, or sub-optimally using, land it may be appropriate to allow 'temporary' use of land for noise sensitive developments. In this context 'temporary' could mean several decades (airports in Australia are now commonly looking at 50 year planning horizons).

The above comments essentially relate to the development of 'unoccupied' land around airports. At an airport that is already built out, while the focus of aircraft noise management is likely to be on measures other than land-use planning, issues such as population density, building construction standards and urban design are important considerations for planners and local government.

Additional Passive Strategies: Noise disclosure is a key aircraft noise management strategy in this area. If any new noise sensitive land uses are approved it would appear to be fundamental that this be on the condition that the future users of those premises are made aware of the aircraft noise exposure levels prior to taking occupancy. Similar requirements would need to be place for existing dwellings (say at point of sale or lease renewal) if a similar level of noise awareness were to be achieved. Aircraft noise disclosure is briefly discussed in the box at **Figure 5.1**.

Incentives could be given to encourage noise tolerant land uses inside the airport environs zone by, for example, local government giving rates concessions to appropriate businesses.

Other passive assistance measures such as acoustic insulation and relocation assistance may also be an appropriate supplementary noise management strategies in the core area.

Acoustic Insulation

Acoustic insulation for existing buildings is unlikely to be a key strategy at regional or small airports. This is because there are very few parallels between the smaller Australian airports and Sydney and Adelaide airports which have large-scale acoustic insulation programs in place. The nature of the noise exposure at the smaller airports is generally far removed from that which triggers eligibility under those schemes. Nevertheless, there is nothing to preclude an airport owner or operator offering to insulate a 'one-off' building in much the same way as an industry would assist a badly affected neighboring house. This might for example be appropriate if there is an isolated building very close to the end of a runway at a major regional airport.

By the same token, if the construction of a new noise sensitive building were approved in the core area it could well be appropriate to require it to incorporate significant acoustic insulation measures.

Relocation Assistance and/or acquiring a buffer

While this approach may have limited application it may prove useful, in a similar manner to insulation, in certain 'one-off' circumstances. This would involve say an airport purchasing the property of a resident who is particularly intolerant to aircraft noise and then selling/renting it to new owners/tenants who have been fully informed beforehand of the possible noise impacts. Under this approach a clause would be inserted into the sale or rental contract that the occupier has been advised of the exposure to aircraft noise. The aim of this strategy, would be the same as that of the noise disclosure strategy, to selectively achieve noise tolerant communities living close to airports. In recognition of the fact that people's sensitivity to noise can change over time, an airport may see the rental option, based on granting relatively short-term leases, as the best way to implement this approach.

Information has been provided which indicates that this strategy has been applied at least two regional airports in Western Australia.

A related strategy is to buy land adjacent to the airport, and retain it for its current noise tolerant use (say rural) to maximise control over development. Ultimately the most certain way to stop encroachment is for an airport to acquire a buffer of land (in much the same way as other industries such as mines and quarries acquire buffers around their premises).

6.2 The secondary area

Area Defined: This area could be defined by criteria such as flight path corridors or by distance buffers as discussed in **Chapter 4.** Another alternative could be to define the area based on the airport's OLS surface. Mildura Airport has, for example, based the boundaries of what is essentially a noise buffer on OLS criteria (see **Figure 8.1**).

Planning Provisions: The alternative planning approaches suggested for the core area in **Section 6.1** (eg dynamic land use) could equally well be applied in the secondary area.

While in the core area the focus may be on prohibition of certain land uses, in the secondary area the requirements could be less onerous and could, for example, be on ensuring that there is no increase in residential density over that which is already approved under the existing planning regime. In effect re-zoning to higher densities could be prohibited.

The provisions could go beyond noise and provide for controls to protect the airport's OLS. During consultation, airports repeatedly raised the issue of Obstacle Limitation Surfaces (OLS) as being a matter of prime concern. For many airports OLS restrictions are already a constraint on airport operations while aircraft noise is seen as a possible constraint in the future.

Additional Passive Strategies: In a similar manner to the core area, aircraft noise disclosure is likely to be a fundamental strategy in this area (see **Figure 5.1**). Other measures directed at achieving a noise tolerant population in this area are likely to be useful – assisting noise sensitive people to relocate away from the airport and assisting noise tolerant land uses, such as industry, to locate near the airport.

6.3 Comments

The concept of introducing some form of 'off-airport' airport environs planning zone is not new. It has direct parallels with the way the overlay controls contained in Victorian planning legislation have been applied to airports and to the airport influence zone in the Californian land use planning legislation (see **Figure 8.3**).

The 'Airport Environs Planning Zone' approach is attractive in that it would not, as far as is known, require new legislation. It would introduce levels of flexibility which are not currently present and would therefore allow local communities a greater say in land use planning around airports. Treating airports as a planning 'whole' rather than as collection of unrelated 'parts' would appear to offer the potential for more informed decision making.

CHAPTER 7 Airport Environs Overflight Plan

7.1 The Concept

Clearly there is a very close nexus between the adoption of appropriate land use planning controls and the way an airport is operated. Ideally there should be integration between the 'active' and 'passive' aircraft noise management measures referred to in **Section 5.3**. For example, an undertaking by a land use planning authority to not place houses under an agreed 'flight path corridor' would probably be of little benefit if aircraft were not required to fly within the agreed corridor.

The concept in this Chapter therefore is to take an airport environs planning zone one step further and to develop a plan which would superimpose an operating regime on the planning regime. As such, this plan could be considered to be akin to an 'airport environs planning zone' and an 'airport operating plan' rolled into one. For the purposes of this paper such a plan has been termed an Airport Environs Overflight Plan.

This type of plan could be drawn up by the airport owner in close consultation with all interested parties – the community living in proximity to the airport, local commercial interests, relevant government agencies, aviation authorities, aircraft operators, etc. This consultative process could be formalised through legislation to give a structure similar to that used to draw up airport Master Plans (recognising that there are jurisdictional issues – see **Chapter 8**). For example, it could involve mandatory advertising, specified comment periods, rights of appeal, provision for consultation on proposed changes to the plan, etc.

The process of developing an Airport Environs Overflight Plan would be a good avenue for a community to debate what it wants from its airport and how it values the services the airport provides. A regional centre may wish to discuss whether it sees its airport as simply being a transport link or whether it sees it as a potential commercial growth centre. For example, are there possibilities for turning the airport into a regional passenger transport hub or are there opportunities for establishing a major flying school at the airport? Should it be a freight base for agricultural products?

Once a view is formed on the desired long-term role for the airport, issues such as land use planning and operating arrangements at the airport can be considered. These discussions are likely to focus on issues such as the availability of other land in the area for residential development, the location of current and possible future flight paths (including the design of training circuits), etc. It is envisaged that this would then lead to the declaration of an 'airport environs planning zone' and agreements about the way aircraft noise will be managed (e.g. land use planning controls, aircraft noise disclosure, flight paths, noise preferred runways, types of aircraft, etc.)

An outline of the airport environs overflight plan concept is shown in **Figure 7.1**.

Airport Environs Overflight Plan

Concept

- A community-based approach which encapsulates the visions and aspirations for the airport and protects the long term viability of the airport through combining land use planning and airport operational controls.
- Akin to an 'airport environs planning zone' and 'operating plan' rolled into one.
- Be given formal status or authority through appropriate legislative instruments.

Developing the Plan - A Consultative Process

- Establish a consultative forum for developing and reviewing the Plan.
- Interested parties may include representatives from Local Government and State Planning and Transport Authorities, airport owner, CASA, Airservices Australia, aircraft operators, airport users, surrounding landholders, local businesses and other community members (e.g. those potentially exposed to aircraft noise).

- Application Area

- The land use planning elements of the Plan, which would take into account the airport's operating regime, could be implemented within a specially designated area called the **airport environs planning zone** which would be incorporated in the town plan.

Basic Elements

- Determine local aspirations for the airport in terms of future uses, growth and types of operations.
- Discuss issues related to the airport such as aircraft noise, pressures on adjacent land, availability of alternative development sites, etc.
- Investigate options and discuss the best land use planning strategy for dealing with the issues while protecting the aspirations for the airport. Determine complementary strategies such as noise disclosure programmes.
- Incorporate within the airport planning zone measures to protect public safety (via safety zones at the ends of runways) and operational airspace (via limitations on heights of structures and restrictions on uses which are hazardous to flight).
- Incorporate operational parameters in the Plan such as noise preferred flight paths and runways, etc.
- Establish arrangements for monitoring and reporting on the implementation of the Plan.

Figure 7.1: Airport Environs Overflight Plan

7.2 Comments

It is generally recognised that 'moving' an airport is a very major undertaking and that, due to a large number of constraints, suitable sites for airports are difficult to identify. Finding locations for new residential or other noise sensitive developments is likely to be considerably easier. This reasoning largely underpins the thinking that airports need protection. Nevertheless, this does not mean that airports should make no accommodation for other land uses. Ideally the Airport Environs Overflight Plan approach would lead to the right balance being achieved between the competing interests.

Historically, programs to put in place 'active' aircraft noise management measures (eg deciding on noise abatement flight paths) have often been developed through a process which is quite divorced from the land use planning process. Clearly there would be benefits in integrating the development and application of 'active' and 'passive' measures so that they can be as complementary as possible.

As discussed earlier, an example of integrating 'active' and 'passive' strategies is to base land use planning on agreed flight path corridors. However, in a changing world it is never likely to be possible to establish perfect long-term integration. On the one hand there may be unforeseen imperatives for the flight paths at the airport to be moved some years after the Plan is originally established. Equally, pressures for land use may evolve over time in unexpected directions and ultimately there may be imperatives to construct noise sensitive buildings within the flight path corridors. Recognising this, it is important that any Plan be reviewed ideally on a continuous, but at least on a regular, basis. This would provide the opportunity for the Plan to be constantly adjusted so that the two strategies can be integrated as far as possible.

Acknowledging that the world is not static makes dynamic land use concepts for areas around airports an attractive option. Over time, due to changing circumstances, 'passive' measures other than land use planning, such as relocation assistance, may assume a greater role in the implementation of an airport's Environs Overflight Plan.

Chapter 8 Implementation Issues

8.1 Introduction

The previous Chapters have suggested concepts and frameworks that have the potential to underpin future land use planning arrangements around smaller Australian airports. In particular, it is proposed that the principles embodied in any final framework will be directed at facilitating the implementation of local solutions. While detailed discussion of implementation issues is beyond the scope of this paper it is important to identify any constraints which may impact on the introduction of possible new approaches.

This chapter outlines some of the practical implementation issues that will need to be given cognizance if the adoption of new land use planning approaches is being considered. In particular, attention is given to the jurisdictional interests/powers/conflicts which are likely to be important. In order to demonstrate the feasibility of implementation, the chapter also includes examples of approaches that have been adopted at some Australian and overseas airports which go beyond using noise contours as the basis for land use planning.

8.2 Need for certainty in planning

One of the arguments that has been put forward in favour of the current ANEF based approach to land use planning around airports is that it gives all the interested parties some certainty about what land use can or can't be implemented at any particular location around an airport. However, at the point of implementation (ie the decision to approve or not approve a particular Development Application) the same level of certainty can be provided by the concepts discussed in Chapters 6 and 7 as with using ANEFs. The principle difference between the ANEF and the 'Airport Environs Planning Zone' or the 'Airport Environs Operating Plan' is that there is flexibility and local input into determining the location of the 'planning lines' and the planning rules applying to different areas around the airports. Once the lines and planning rules are determined these can be implemented in essentially the same way as the ANEF if strict application/interpretation of the rules is considered desirable.

8.3 Jurisdictional issues

Land use planning is in the domain of State/local governments while operational and other noise controls for aviation can fall under the jurisdiction of either the Australian or State governments. Therefore, implementation of many of the concepts discussed in Chapters 6 & 7 would involve all three levels of government. The feasibility of successful implementation would depend to a large extent on on whether the three levels of government would see it in their interest to cooperate in a way that would enable any new approaches to work effectively.

Planning and operational issues surrounding airports tend to be complex and it is likely that there will be competing interests, not only between, but also within some of the levels of government. For example, a State Transport agency may have very different priorities to a State Development agency. One of the key attractions of the holistic approaches is that they allow all the players with an interest in the airport to have input into developing the airport planning/operating regime. The roles and responsibilities of the different levels of government are briefly discussed in the following paragraphs.

8.3.1 Australian Government

The Australian Government has a range of interests in the operation of smaller Australian airports.

Regional airports

From a broad policy perspective, as discussed in Chapter 1, the Australian Government has an interest in ensuring that the viability of key regional transport nodes is not compromised by inappropriate land use decisions. Consistent with its policy of encouraging local communities to find local solutions, it does not now normally become directly involved in the operations or land use questions around these airports. This situation contrasts markedly with that which occurred before the Australian Government transferred responsibility for operating most of these airports to local authorities under the Aerodrome Local Ownership Plan (ALOP) in the 1980s. The Australian Government does have specific interests and legislated powers at these airports (eg specification of security arrangements) but these would not be expected to be in conflict with, or be adversely affected by, any changes in land use planning arrangements.

The Civil Aviation Safety Authority (CASA) and Airservices Australia are Australian Government agencies which have interests and powers which can have important land use planning implications for airports. These bodies essentially determine where aircraft fly in the vicinity of airports and hence which areas are exposed to aircraft noise. CASA establishes the operating rules which determine the location of flight paths into and out of airports. If the construction of a building or structure is approved which penetrates an airport's Obstacle Limitation Surface (OLS) CASA may require restrictions on aircraft movements in the vicinity of the airport (eg changes in flight paths) to ensure the safety of aviation. Airservices does not have a presence at many smaller regional airports. However, at those airports where it does Airservices' air traffic controllers have the powers to determine where aircraft fly.

Urban GA airports

The Australian Government has a more direct interest in the operation of these airports as many of the urban GA airports in Australia fall under the jurisdiction of the *Airports Act 1996* which is administered by the Department of Transport and Regional Services.

In a similar manner to the regional airports, both CASA and Airservices have powers and responsibilities which have a strong influence on noise exposure patterns around these airports.

8.3.2 State/Territory Governments

Regional airports

State governments have a strong interest in implementing policies that ensure the long-term viability of key State transport infrastructure such as regional airports. These governments are responsible for setting the policy for land use planning in the vicinity of airports. This is usually put in place through formal town plans, local/regional environment plans, etc. The plans can be underpinned by formal policy documents such as those adopted by the Queensland Government in mid 2002 **[Ref 19]**.

In addition to land use planning responsibilities, State Governments also have a key role in the management of aircraft noise at those airports which are not subject to the Airports Act 1996. For example, while aircraft in flight are controlled by CASA rules, State authorities could manage aircraft noise through imposing restrictions on the hours of operation of an airport/airfield which falls within its jurisdiction. Therefore State Governments would have a direct interest in both the land use planning and airport operations aspects of an Airport Environs Overflight Plan.

Urban GA airports

As the major urban GA airports fall under the Airports Act 1996, the responsibilities of State governments at these airports is generally limited to land use planning in areas which are 'off-airport' (ie not Australian Government land) around the airports, but which are the areas where residents are exposed, or potentially exposed, to aircraft noise.

8.3.3 Local Government

Regional airports

Local Government generally has a multifaceted interest at these airports. On the one hand it is generally the owner/operator of these airports and, in this role, it has a strong interest in ensuring that operations at these airports are not compromised by urban encroachment. However, on a broader level it has strong interests in ensuring the economic viability of the local region. When acting in its role as land use planner and/or decision maker on Development Applications it has to balance the benefits of protecting the airport from encroachment against the disbenefits of either sterilising, or sub-optimally using, land in the vicinity of the airport and/or flight paths.

The concept in the options in **Chapters 6 & 7** is to facilitate decisions to be made at the local level so that the community that is most likely to be directly affected by these balancing decisions is the one which makes the decisions.

Urban GA airports

In a similar manner to State Governments, local government's formal role at these airports is largely restricted to land use planning in the vicinity of the airport (ie off-airport issues). However, local government tends to be actively involved in airport operational matters to the extent that these impinge on land use planning decisions (eg changes in flight paths or operations at these airports) and also on the welfare of ratepayers (local government councillors and/or officers commonly act as representatives of the community on airport consultative committees).

8.4 Practical examples

8.4.1 Introduction

It would appear that a mindset has evolved in Australia over the past two decades that in order to be effective land use planning around airports has to be based on the use of noise contours. However, examination of land use planning practices for areas around airports both in Australia and overseas reveals that a wide variety of approaches have been, and are being, used. These do not necessarily involve the use of, or total reliance on, noise contours.

8.4.2 Australian airports

The land use planning controls around some Australian airports are based on approaches that go beyond strict implementation of ANEF contours.

Ceduna

The Ceduna Development Plan, which was adopted in September 2001, has implemented a two stage planning approach for Ceduna Airport which is akin to the 'core' and 'secondary' areas proposed in **Chapter 6**. A 'Special Use (Airport) Zone' has been declared for what is essentially land within the boundary of an airport/commercial/light industrial zone. A 'Rural (Deferred Aviation) Zone' has been declared for a buffer area around the airport. The boundaries of these zones are based on existing cadastral boundaries, not on aircraft noise contours, and extend to a distance of approximately two kilometres from the centre of the Airport. Under the Plan uses such as tourist facilities and open land (eg golf course) are permitted in first zone while in the outer zone dwellings and sub-division of land are designated as non-complying **[Ref 20]**.

Mildura

Mildura is an example of a major regional airport that is protected by planning buffers which are not based on noise contours. This is discussed in the box at **Figure 8.1**.

8.4.3 Overseas airports

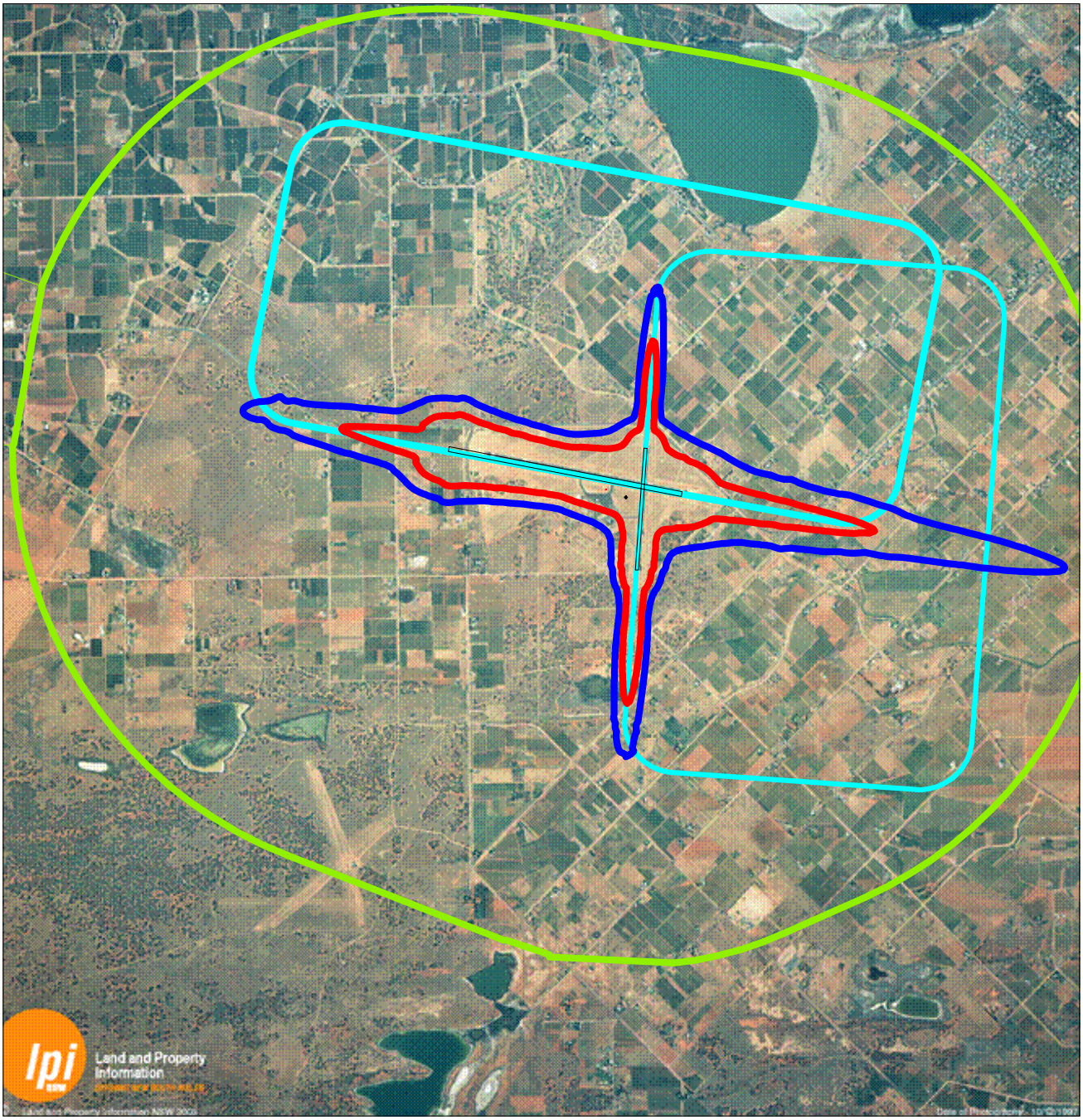
California

The State of California in the United States has implemented a land use planning regime for airports which is much more holistic than the strict noise contour based approach that has been widely adopted in Australia. This is discussed in the box at **Figure 8.3**.

An Example of Planning for Noise: Mildura Airport

- Mildura Airport is the busiest regional airport in Victoria in terms of numbers of passengers. Over the past decade the number of passengers has approximately doubled. The City of Mildura is a vibrant regional centre with a population that is growing at approximately 1.5% per annum. Clearly there is, and will likely remain, a continuing demand for new housing.
- Mildura Airport has recognised that these trends have the potential to lead to conflict between the airport and the community on aircraft noise issues. In order to address this issue the Airport has commissioned two Master Plans in the past 5 years. A key part of the Master Planning process has been to put in place land use planning controls designed to limit urban encroachment.
- Land use planning controls around the airport are imposed under the Mildura Planning Scheme which came into effect in August 2000. The controls are put in place through two Airport Environs Overlays (AEO1 and AEO2). The land under AEO1 is subjected to higher noise exposure levels than that under AEO2 and this is reflected in the differences in the planning controls which apply in the two areas.
- **Figure 8.2** shows both AEO1 (the inner overlay area) and the airport's ANEF contours for the year 2015. It can be seen that the area covered by AEO1 extends some distance beyond the contours but that this overlay captures training circuit flight paths. It can also be seen in the north-eastern corner of the image that urban encroachment (ie subdivided residential development) has reached the edge of the AEO1 zone.
- The AEO approach is in place at a number of airports in Victoria – the AEOs are normally based on the ANEF contours. However, at Mildura the AEOs are based on the OLS protection area rather than on the ANEF contours. This approach has apparently been used as a device to halt encroachment at a distance which is further away than that which would be provided by ANEF contours **[Ref 21]**.
- Subsequent to the adoption of the current noise planning area, a new draft Master Plan was prepared for the airport in November 2000. Amongst other things this contains a recommendation that the overlays no longer be based on the OLS but instead be based on the ANEFs. In effect this is a recommendation for the size of the noise buffers be considerably reduced. It appears that this recommendation is based on a desire to see the AEOs consistently applied throughout the State rather than on an evaluation that the Airport has unnecessarily large noise buffers.
- Amongst other things, it can be seen from **Figure 8.2** that if the noise buffers were changed to reflect the ANEF contours protection from encroachment under training circuit flight paths would be removed.

Figure 8.1: An Example of Planning for Noise: Mildura Airport



25 ANEF

20 ANEF

Training Circuit Flight Tracks

Boundary of Planning Overlay AEO1 (3 nautical miles from runway)

Figure 8.2: Mildura Airport - ANEF Contours for 2015

California Land Use Planning Regime

- California requires an Airport Land Use Commission (ALUC) to be set up for each public-use airport in the State. The ALUC is responsible for preparing and adopting airport land use compatibility plans for these airports. In preparing the compatibility plans an ALUC is required to be guided by the California Department of Transportation's *Airport Land Use Planning Handbook* **[Ref 22]**.

- The ALUC is required, through consultation with local jurisdictions, to define an *airport influence area* (AIA) for land use planning purposes around its airport. If no such area has been adopted, then **all land within two miles of the airport boundary is taken as the default AIA**.

- The ALUC is required to define aircraft noise compatibility zones with associated planning restrictions within the AIA which take into consideration factors other than standard mapped noise contours, such as flight paths. Hence the noise compatibility zones will normally extend to areas beyond the conventional noise contours.

- The Handbook recommends that a lower noise threshold for non-compatible land uses be adopted for airports with primarily general aviation operations compared to major airports.

- The ALUC is also responsible for defining safety compatibility zones within the AIA which take into account the historical spatial distribution of aircraft accidents and flight operational characteristics particular to each runway end.

- Airspace protection compatibility zones which limit the height of structures are also required to be delineated within the AIA.

- Measures to alert prospective property buyers of overflight impacts are recommended for all parts within the airport influence area. It is suggested that descriptions of aircraft noise impacts be recorded on deed notices as a condition for development approval within the AIA. Since the influence area encompasses the noise, safety and airspace protection compatibility zones, it covers a much wider area than the noise threshold contour for residential development. Thus aircraft noise disclosure is required for areas well beyond the standard noise contours.

- California has recently passed legislation which states that from 2004 onwards homebuyers must be provided with a statement cautioning of aircraft noise impacts prior to purchase for transactions involving the sale of subdivided land within an AIA **[Ref 23]**.

Figure 8.3: California Land Use Planning Regime

CHAPTER 9 Taking the Concepts Further - Next Steps

9.1 Overview

It has been demonstrated in this document that under current land use planning procedures there is little protection to stop urban encroachment on smaller airports. In addition, ANEF planning controls imposed on GA airports are unable to prevent housing developments being built directly underneath training circuits. The submissions made to the Department indicate that there is a growing view that both of these outcomes are undesirable.

A number of suggested approaches to address these issues have been raised in this paper. These suggested approaches are largely ideas that have been put to the Department in submissions or have arisen as part of the consultation process.

This discussion paper is intended purely as a preliminary step in the process and has deliberately only raised options at a conceptual level to ascertain the broad view of the types of directions that affected parties believe are worth pursuing. If the feedback on this paper identifies support for the adoption of different approaches it is intended that the process be taken to a next level.

9.2 National Guidelines

Under the current land use planning regimes for airports in Australia there has been little guidance for land use planning around smaller airports other than the land use compatibility advice contained in Australian Standard AS2021. The lack of guidance material has led to some States producing specific documents (e.g. Queensland State Planning Policy document **[Ref 19]**) relating to land use planning around airports to give advice to local authorities.

Subject to the feedback on this paper it is proposed that some form of National Guidelines be drawn up relating to land use planning around smaller airports. It is intended that these would be 'National' in the sense that we would seek to develop the Guidelines jointly under the auspices of the Australian Transport Council and the Local Government and Planning Ministers' Council in order to obtain endorsement from the Australian, State and Territory Governments. It is envisaged that this would be approached in the conventional manner of developing papers through the transport and planning officials' committees/groups and their sub-committees/working groups.

9.3 National Guidelines – Local Approaches

Throughout this paper, in response to the submissions made to the Department, emphasis has been placed on the establishment of a framework that permits local approaches to land use planning around airports. The 'one size fits all' land use planning advice contained in the ANEF system is widely seen as being inappropriate for land use planning around regional and GA airports.

Therefore, while it is suggested that National Guidelines be developed it is not proposed that these will lead to National Standards. Rather it is envisaged that they would lead to the establishment of a framework which would facilitate harmonious relations between airports and communities through the adoption of location specific solutions on an airport-by-airport basis.

It is recognised that 'regional airports' in particular are not homogeneous and the circumstances surrounding them can be very different. A significant number of these airports can be considered to be totally or at least partially greenfield sites (ie at least one side of the airport is free of urban encroachment). For these airports the focus of the land use planning strategy is likely to be the establishment of some form of buffer. However, some regional airports are effectively built-out and for these airports, and urban GA airports in a similar situation, the solutions are more likely to rest in areas like noise disclosure and the setting of agreed operational procedures.

It must also be recognised that for many smaller airports, which are distant from housing, the 'do nothing' option may be the best approach. For these airports, the community may consider that due to lack of developmental pressures in areas around the airport, there is no need, and indeed it would be an inappropriate allocation of resources, to consider drawing up formal land use planning strategies at the present time.

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