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28 April 2010

Jeanette Radcliffe
Committee Secretary
Senate Standing Committee on Rural Regional Affairs and Transport.
Jeanette.Radcliffe@aph.gov.au

Dear Ms Radcliffe,

SENATE INQUIRY INTO THE EFFECTIVNESS OF AIRSERVICES AUSTRALIA'S MANAGEMENT OF AIRCRAFT NOISE

SUPPLEMENTARY SUBMISSION AND REQUEST TO APPEAR BEFORE THE COMMITTEE

Comment on Airservices Supplementary Submission of 9th April 2010
On 3rd March 2010 the committee referred three submissions perceived by the committee to be inflammatory to AirServices for consideration and response. Although the submission of The Village Building Co (VBC) was not one of those referred to Airservices, the Airservices supplementary submission of 9th April focussed on a *"dispute"* between VBC and Canberra International Airport and Airservices itself in such a manner as to potentially damage the interests of VBC.

Specifically the submission refers to legal action by VBC in the Federal Court and the Federal Court of Appeal and states that "*Airservices endorsements of CIA's ANEF's were appropriate against its legislative obligations"* This comment goes to the very core of VBC's concern about the role of Airservices in the endorsement of ANEF's. VBC made application to the court because it was not satisfied with the way the ANEF was endorsed.

As the Airservices submission properly states, the courts held that Airservices had acted within its "*legislated obligations*". These obligations are set out in a Ministerial direction which requires Airservices to endorse ANEFs but does not require Airservices to check the assumptions behind an ANEF. Airservices has called its process of endorsing ANEFs without first checking the assumptions upon which they are based, "*endorsement for technical accuracy*"

In the transcript attached to the Airservices supplementary submission, Mr. Russell said inter alia that the Airservices role is only required *"to advice technically if the noise assessments have been done correctly*". When questioned further by Senator Nash about testing the accuracy of the underlying assumptions, Mr Russell responded *"With respect to forecasts, no work was done*" and he further stated *"It is not our brief to question the forecasts of traffic movements*". When Senator Nash asked who was responsible for ascertaining the veracity of the airports underlying claims, Mr. Dudley responded by saying *"We do not assess whether it is feasible for them to do it or not*". Mr. Wilson subsequently said *"in terms of determining the veracity of the projections, that is the business of the individual airport"*

The Airservices position is placed beyond doubt by the following statement in the supplementary submission. *"Air services has no role in developing airport master plan air traffic forecasts or whether these forecasts or future assumptions are feasible, achievable or have merit"*

It is clear from this evidence from the officers of Airservices that in the preparation of an ANEF the assumptions that underpin the ANEF i.e. type of aircraft and number and time of movements, is at the absolute discretion of the airport and is not subject to scrutiny or testing by Airservices or any other government agency.

ANEF contours are intended to guide land use planning authorities on appropriate land uses around airports. While they are somewhat difficult for the public to understand, ANEFs also give the community an indication of the overall aircraft noise impacts. Under the limited statutory obligations of Airservices as outlined above, it is open to an airport to minimize its noise footprint as reflected in

the ANEF contours by understating the assumptions. Equally it is open to an airport to expand its noise footprint by exaggerating the underlying assumptions. An example of the consequence can be seen in the absurd situation where the area enclosed by the ANEF contours for Sydney airport has shrunk in recent years while at the same time the ANEF contours for Canberra Airport have increased fourfold.

In its supplementary submission Airservices states that *"Canberra International Airport and VBC are in a long running dispute about related planning issues".* Briefly, VBC is the proponent of a proposed residential development known as Tralee, which complies with Australian Standard AS2021 which provides the basis of land use planning decisions in areas affected by aircraft noise. Australian Standard AS2021 defines the ANEF System which was recently endorsed in the Aviation White Paper.

For its own reasons Canberra Airport opposes the Tralee development, but it must be noted that the Airport owners are the largest property developer in Canberra and are in direct competition with the VBC. Canberra International Airport has manipulated the ANEF contours by overstating the assumptions upon which the ANEF is based. This is made possible because there is no rigorous or independent testing of these assumptions. The motivation of the Airport in exaggerating these assumptions is to expand the ANEF footprint in an attempt to block the Tralee development.

Officers of AirServices have been sceptical of the Canberra Airport ANEF assumptions. This is clearly demonstrated in the attached email from Mr. Adrian But to Mr. Leigh Kenna in which he described the Airports assumptions for the 2050 ANEF as being *"dreamtime*" and for the purpose of Canberra Airport's *"ulterior desire to force Queanbeyan Council to develop elsewhere"*

The concerns expressed by Airservices about the Tralee development are contrary to the attached Airservices policy document entitled *"The Australian Noise Exposure Forecast System and Associated Land Use Compatibility Advice for Areas in the Vicinity of Airports, September 2001".* This policy document embraces the ANEF system and states it *"is intended for land-use planning around aerodromes…It is considered that the public interest is best protected by ensuring that the long term viability of the aerodrome is preserved wherever possible by planning in accordance with the guidance material contained in this document"*

Because of the constraints of limited "*legislated obligation*", Airservices is complicit in an outcome which results in a distorted noise contour. The Airservices Act or the regulations under the Act need to be amended to ensure that Airservices has the obligation to properly assess the feasibility, achievability and merits of the assumptions upon which an airport bases its ANEF contours.

Airservices and Public Statements

In its supplementary submission Airservices states that it is not unusual *"to go on the public record with its professional view on the impacts of aircraft noise on proposed residential developments that are near flight paths"* and quotes a submission into proposed residential development at Kurnell. However there is a sharp distinction between the behaviour of Airservices in relation to Tralee, and Kurnell and other residential developments. In the case of Kurnell, Airservices while making a submission did not issue a press release nor did it enter into public controversy.

In the case of Tralee, Airservices has chosen to enter public debate by using a controversial press release which canvasses a number of issues. This press release raised the spectre of noise sharing if Tralee was approved. Airservices knows that such an outcome is not possible under its own guidelines for aircraft noise sharing.

Experience at other airports where there is no noise sharing indicates that Tralee will not cause noise sharing. Every major airport in the nation has substantial areas of housing in the vicinity of the airport with far greater noise than Tralee. Noise sharing would already be in place at every other airport if noise at Tralee is a problem. A report by acoustics expert, Wilkinson Murray identifies 14 recently approved residential areas around every major airport in the country in areas with far greater noise than Tralee. In not one of these cases did Airservices object or make any submission publicly or privately in opposition to these developments.

The interest of Airservices in the Tralee development is unique and contrary with Airservices written policy and its actions on recent projects with more aircraft noise.

The concerns expressed in our original submission are reinforced by the supplementary submission of Airservices and are clearly within the terms of reference of the Committee Inquiry. In view the Australia-wide significance of these issues and the specific reference by Airservices to VBC we would appreciate the opportunity to appear before the committee hearing to further explain the concerns we have raised.

Yours sincerely,

Ken Ineson
General Manager, Special Projects and Feasibilities

INTEROFFICE MEMORANDUM

Sensitivity: COMPANY CONFIDENTIAL

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

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

Subject: Canberra 2050 ANEF #2

Leigh,

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

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

Adrian

AIRSERVICES AUSTRALIA

THE

AUSTRALIAN

NOISE EXPOSURE FORECAST SYSTEM

AND ASSOCIATED

LAND USE COMPATIBILITY ADVICE

FOR

AREAS IN THE VICINITY OF AIRPORTS

Sixth Edition

September 2001

THE AUSTRALIAN NOISE EXPOSURE FORECAST SYSTEM AND ASSOCIATED LAND USE COMPATABILITY ADVICE FOR AREAS IN THE VICINITY OF AIRPORTS

The aircraft Noise Exposure Forecast (NEF) technique was first developed in the United States of America in the late 1960s. It was subsequently refined in Australia in 1982.

The NEF system is a procedure for calculating aircraft noise exposure levels around aerodromes. It is intended for land-use planning around aerodromes. In the Australian NEF system, noise exposure levels are calculated in Australian Noise Exposure Forecast (ANEF) units, which take into account the following factors of aircraft noise:

(a) The intensity, duration, tonal content and spectrum of audible frequencies of the noise of aircraft take offs, approaches to landing, and reverse thrust after landing (for practical reasons, noise generated on the aerodrome from aircraft taxiing and engine running during ground maintenance is not included).

(b) The forecast frequency of aircraft types and movements on the various flight paths, including flight paths used for circuit training.

(c) The average daily distribution of aircraft arrivals and departures in both daytime and night-time (daytime defined as between 07:00am and 07:00pm and night-time defined as between 07:00pm and 07:00am).

ANEF charts are provided for most aerodromes throughout Australia. The charts are simply plans of the aerodrome and the surrounding localities on which noise exposure contours of 20, 25, 30, 35 and 40 ANEF units have been drawn. These contours indicate land areas around an aerodrome that are exposed to aircraft noise; the higher the ANEF value, the greater the noise exposure.

In the areas outside 20 ANEF, noise from sources other than aircraft tends to predominate over aircraft noise. Within the area from 20 ANEF to 25 ANEF, aircraft noise exposure starts to emerge as an environmental problem, while above 25 ANEF the noise exposure becomes progressively more severe.

The land-use compatibility recommendations in this booklet relate to the above ANEF contours

In 1979, the then Department of Transport together with the Department of Defence jointly sponsored the National Acoustic Laboratories (NAL) of the Department of Health in undertaking a major socio-acoustic investigation to assess the impact of aircraft noise on residential communities in Australia. In the social survey, personal interviews were conducted with 3575 residents around the major airports in Sydney, Adelaide, Perth and Melbourne, and the RAAF Base Richmond, N.S.W. From the responses to the questionnaire, subjective reaction to aircraft noise was measured in terms of general reaction (GR), a composite of a number of ratings of dissatisfaction, annoyance and fear, as well as reports of activity disturbance and complaint disposition. A high score of GR was used to define whether or not respondents were 'seriously affected' by aircraft noise. Noise measurements were made at several sites around each airport either by tape-recording flyovers or by the unattended logging of noise levels over periods of two weeks. The noise exposure at each of the dwellings in the social survey was estimated in terms of 20 different noise indices.

Analysis by NAL showed that 'equal-energy' indices such as NEF were more highly correlated with community reaction than other types of index, including 'peak-level' indices. However, it was found that the standard weighting given to night flights was too high, and that there should be a weighting applied to flights during evening hours. Attitudes towards the aviation industry, personal sensitivity to noise, and fear of aircraft crashing were found to be important in modifying the extent to which a person will be affected by a given amount of aircraft noise. Demographic variables such as age, sex, occupation and education were found to be of generally minor importance in explaining subjective reaction.

The report of NAL's extensive and definitive study was published in 1982. As a result of NAL's findings, the Department of Aviation decided to revise its existing American-based NEF system to reflect the specific Australian findings. The system was renamed the ANEF system.

The following changes were included in the new system:

(i) The 'night-time' period was changed from between 10:00pm and 07:00am to between 07:00pm and 07:00am. The weighting of noise in the 'night' hours was lowered from 12 decibels to 6 decibels.

(ii) The 20 ANEF contour was included on all newly issued ANEF charts (despite the relatively low degree of confidence in its location).

(iii) Tabulations of aircraft movements and runway usages were included on ANEF charts.

The findings of the NAL survey also provided information on the percentage of residents living around established aerodromes who are either moderately or seriously affected by aircraft noise. Such information, which is called a dose/response relationship, provides the basic information necessary for formulating appropriate recommendations on compatible land use around Australian aerodromes.

Prior to 1982, Australian land use recommendations were essentially similar to the criteria used in the U.S. NEF system. However, with the availability of an Australian dose/response function derived from the NAL social survey, the U.S. criteria were revised to take into account the general reaction of Australian communities to aircraft noise.

In essence, this revision was limited to a firmer definition of the criterion for residential land-use compatibility. In the NEF system as originally adopted in Australia, the U.S. criterion of 30 NEF was adhered to, but, in accordance with a recommendation of the House of Representatives Select Committee on Aircraft Noise made in 1970, cautious restraint was urged to be applied by land-zoning authorities when applying the system to Australian conditions. Where possible, the 25 NEF contour was used rather than the 30 NEF as a conservative safeguard until the system was validated in Australia.

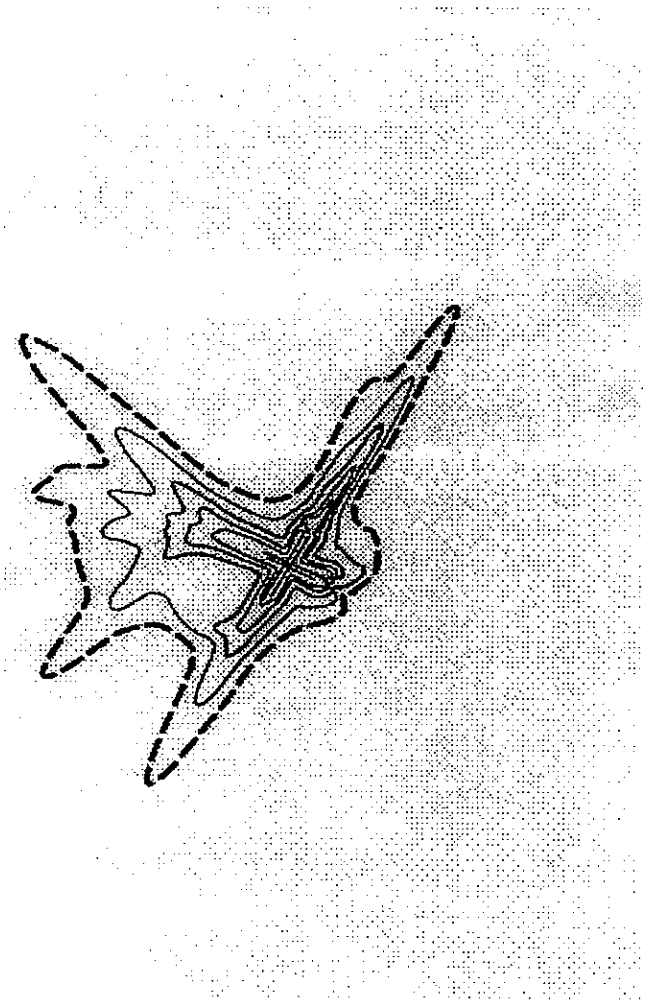
The NAL Report provided substantial evidence to support the use of 25 ANEF as the appropriate criterion for residential land usage. The 25 ANEF as a residential land usage criterion was recommended in 1985 by the House of Representatives Select Committee on Aircraft Noise, and subsequently adopted as policy by the Commonwealth Government. The only qualification which arises from the findings of the NAL Report is that some people will find that the noise exposure at 25 ANEF is still unacceptable (refer to Appendix A for the percentage of people affected in the 20 ANEF to 25 ANEF zone). Accordingly, the issuing authorities enter the 20 ANEF contour on all ANEF charts. It is to be stressed, however, that the actual location of the 20 ANEF contour is difficult to define accurately, because of variations in aircraft flight paths, pilot operating techniques, and the effect of meteorological conditions on noise propagation. For that reason, the 20 ANEF contour is shown as a broken line on ANEF charts. An example of ANEF contours is shown in Figure 1.

Land-use planning is a function carried out by State or local government authorities in all but the Commonwealth Territories. It is realised that many unrelated non-aviation factors have to be taken into account and could influence decisions taken in specific land-use considerations. However, it is considered that the public interest is best protected by ensuring that the long-term viability of the aerodrome is preserved wherever possible by planning in accordance with the guidance material contained in this document. The land-use recommendations in Appendix B are most readily applicable to new development on undeveloped land around aerodromes. In those areas around some of the major Australian airports where established residential development has existed for some considerable time, it is generally not feasible to apply appropriate land-use criteria unless the opportunity for rezoning of individual properties arises.

Appendix A shows the dose/response relationship between aircraft noise and community reaction. The land-use recommendations in the ANEF system are given in Appendix B. Appendix C is a technical description of the ANEF formulation. Appendix D describes the different types of aircraft noise contour charts prepared using the ANEF system.

FIGURE 1

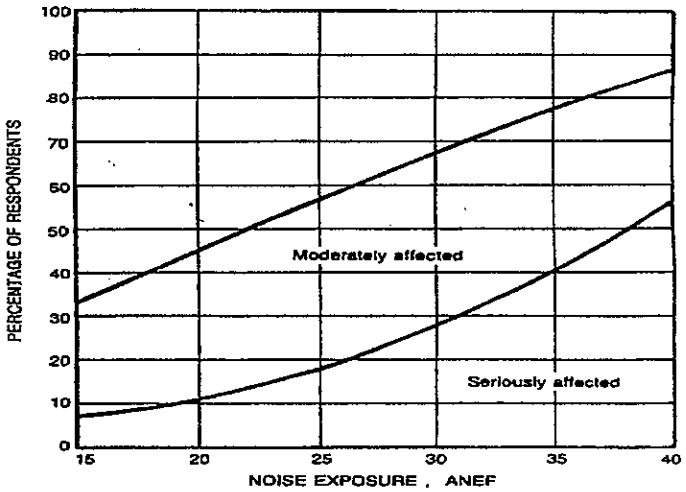
EXAMPLE OF ANEF CONTOURS



APPENDIX A

FIGURE A1

RELATIONSHIP BETWEEN NOISE EXPOSURE FORECAST LEVEL AND COMMUNITY REACTION IN RESIDENTIAL AREAS



NOTE: This graph was derived from the National Acoustic Laboratories Report No. 88. 'Aircraft Noise in Australia: A survey of Community Reaction', February 1982.

APPENDIX B

TABLE 2.1
(Extracted from Australian Standard AS 2021-2000)
BUILDING SITE ACCEPTABILITY BASED ON ANEF ZONES
(To be used on conjunction with Table 3.3 from AS 2021-2000)

Building Type	ANEF zone of site		
	Acceptable	Conditional	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF (Note 1)	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF (Note 1)	20 to 30 ANEF	Greater than 30 ANEF
Commercial Building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Notes:

1. The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variations in aircraft flight paths. Because of this, the procedure of Clause 2.3.2 may be followed for building sites outside but near to the 20 ANEF contour.
2. Within 20 ANEF to 25 ANEF, some people may find that the land is not compatible with residential or educational uses. Land use authorities may consider that the incorporation of noise control features in the construction of residences or schools is appropriate (see also Appendix A)
3. There will be cases where a building of a particular type will contain spaces used for activities which would generally be found in a different type of building (eg. an office in an industrial building). In these case Table 2.1 should be used to determine site acceptability, but internal design noise levels within specific spaces should be determined by Table 3.3.
4. This Standard does not recommend development in unacceptable areas. However, where the relevant planning authority determines that any development may be necessary within existing built-up areas designated as unacceptable, it is recommended that such development should achieve the required ANR determined according to Clause 3.2. For residences, schools, etc., the effect of aircraft noise on outdoor areas associated with the buildings should be considered.
5. In no case should new development take place in greenfield sites deemed unacceptable because such development may impact airport operations

APPENDIX C

THE ANEF FORMULA

The ANEF system is firmly based on survey evidence of the reaction of Australian communities to aircraft noise. The ANEF unit incorporates, in a single formula, the noise levels produced by the various aircraft operating at an airport, plus a logarithmic function of the daily average number of aircraft noise events, with a weighting included if they occur during the evening or night-time hours when the sensitivity of people to noise is increased. The forecast frequency of aircraft movements on various flight paths (either take-off, landing or touch-and-goes), and the proportion of aircraft movements by day and by night, provides the input to determine this aircraft number weighting factor.

The basis for combining aircraft noise levels with a logarithmic function of frequency of occurrences is called the principle of energy equivalence. Briefly, this principle holds that people respond to a number of noise events in the same way as they react to their loudness, and therefore the number of noise events should also be expressed in logarithmic form. This implies that a loud noise perceived only a few times per day produces similar subjective response to a moderate noise perceived many times. Most social surveys, including the Australian survey by the National Acoustic Laboratories, have confirmed that 'equal energy' units of aircraft noise exposure are better correlated with community reaction than are other units known as peak-level indices which have also been postulated for aircraft noise exposure measurement.

The ANEF combines the above two factors of aircraft noise (ie. noise level and frequency of operations) by a mathematical formula. Noise of evening/night operations (defined as between 07:00pm and 07:00am in the ANEF system) of aircraft is weighted to account for the increased sensitivity of communities to noise during periods of relaxation or sleep. The actual aircraft noise level measurement used in the ANEF formulation is the complex Effective Perceived Noise Level (EPNdB) which takes into account known annoying aspects in both the temporal and frequency domains. (The EPNdB unit is also used for the international noise certification of new aircraft). Its calculation is complex but its principles are fairly basic.

The three basic physical properties of noise are measured: level, frequency distribution and time variation. Specifically, the instantaneous sound pressure level in each of 24 one-third octave bands of the noise is gathered for each one-half second increment of time during the aircraft fly over. The following are then computed:

(a) The instantaneous one-third octave levels are converted to perceived noisiness by reference to a subjective annoyance table (NOY table).

(b) A tone correction factor is calculated to account for spectral irregularities.

(c) A duration correction factor is calculated.

(d) The EPNdB is the algebraic addition of the maximum perceived noise level of the overflight plus the tone and duration corrections.

Formula derivation

Noise levels of most civil transport aircraft, military aircraft and a representative sampling of light aircraft now operating in Australia, are known with a reasonable degree of accuracy. Aircraft manufacturers in the USA and Europe provide accurate noise definitions of their products. Additionally, aircraft noise data have been collected over the years from airport noise-monitoring systems at major airports, and from measurements of light and military aircraft noise.

The noise information, together with aircraft performance information giving the aircraft's height, speed and engine power level at the various stages of its takeoff or arrival flight path, are incorporated into the aircraft noise modelling computer software.

If the flight path of an aircraft is known, the typical noise level at any point along and to the side of the flight path can be calculated. If the aircraft flies that operation on the same flight path N_d times in daytime hours and N_n times in evening/night-time hours, the partial *ANEF* value due to that aircraft

type on that particular flight path can be calculated from the following equation:

$$ANEF_{ij} = EPNdB_{ij} + 10 \log_{10} (N_d + 4 N_n) - 88$$

where

$ANEF_{ij}$ = noise exposure due to aircraft type i on flight path j

$EPNdB_{ij}$ = noise level of aircraft type i on flight path j

N_d, N_n = number of flights during the day and night respectively, of aircraft type i on flight path j, and

The figure '88' is an arbitrary constant chosen so that ANEF numbers typically lie in a range where they are not likely to be confused with other noise ratings.

It can be seen from the above equation that if there were only one aircraft flight, in daytime hours only, then the partial *ANEF* value would be directly proportional to the noise level of the aircraft. Also, it can be seen that the *ANEF* increases as the logarithm of the number of operations increases. The total *ANEF* at any point on the ground around an aerodrome is composed of all individual noise exposures (summed logarithmically) produced by each aircraft type operating on each flight path over the period of one day as follows:

$$ANEF = 10 \log_{10} \sum_{i=1}^{i=I} \sum_{j=1}^{j=J} antilog_{10} \left(\frac{ANEF_{ij}}{10}\right) 0$$

where

I = total number of aircraft types

J = total number of flight tracks

$ANEF$ = total noise exposure forecast.

In line with many other acoustic descriptors, the *ANEF* value is a form of decibels.

Traffic forecasts and flight path allocation

The ANEF method is sensitive to the forecast of air traffic movements and to the allocation of such air traffic to the flight paths on which departing and arriving aircraft are routed. Every attempt is made to ensure that the traffic forecast and flight paths are as accurate as possible. However, at major airports particularly, accurate definition of flight paths to the extent of the 20 ANEF contour is difficult to achieve. For that reason, the confidence in the location of the 20 ANEF will be less than for the 25, 30, 35 and 40 ANEF contours.

The ANEF computation is based on forecasts of air traffic movements on an average day. Allocations of the forecast movements to runways and flight path are on an average basis and take into account the existing and forecast air traffic control procedures at the airport which nominate preferred runways and preferred flight paths for noise abatement purposes (as described in Airservices Australia Aeronautical Information Publications). Aircraft movements are categorised by—

(a) night or day;

(b) type of aircraft;

(c) take off, landing or touch-and-go;

(d) range/route;

(e) runway used; and

(f) flight path.

APPENDIX D

TYPES OF AIRCRAFT NOISE CONTOUR CHARTS

There are three different types of aircraft noise contour charts produced using the ANEF system. All three types of chart are prepared using the same computational procedures: the differences arise from the types of data that have been input to produce the following charts:

(a) *ANEF—Australian Noise Exposure Forecast* This is a contour map showing the forecast of noise exposure levels that will exist in a future year. It may be for a particular year, generally about 10 years from the date of issue, or in the case of some of the busier civil airports, it may represent the airport operating at "ultimate capacity". It is based on a firm forecast of aircraft movement numbers, aircraft types, destinations and a given set of runways at the aerodrome.

The ANEF chart is the only one of the three types of chart which is intended to have status in land-use planning decisions. It will have been subjected to review by relevant authorities before release, and the chart will display the official endorsement of Airservices Australia or the Department of Defence.

(b) *ANEI—Australian Noise Exposure Index* This is a contour map based on historical data from a previous year, where exact numbers and types of aircraft which used the aerodrome are known. It shows the average daily aircraft noise exposure around the aerodrome for that year.

ANEI charts are used principally as benchmarks or indicators of change of aircraft noise exposure.

(c) *ANEC—Australian Noise Exposure Concept* This is a noise contour map which may be produced during consideration of options for aerodrome development. It is based on a hypothetical set of conditions of runways, aircraft types and so on, and there may be several ANEC charts prepared for the same future year. It may be a supposition for a long way into the future, and may never occur.

Because it has a hypothetical basis and may not have been subject to review by relevant authorities, an ANEC chart is not intended for use for land-use planning purposes.

Additional Reading

Further information on the ANEF system and its application can be found in Australia Standard AS2021 (Acoustics – Aircraft noise intrusion – Building siting and construction).

Acknowledgements:

Hede, A.J. and Bullen, R.B. Aircraft Noise in Australia: A survey of Community Reaction, National Acoustic Laboratories Report No. 88, Australian Government Publishing Service, Canberra, February 1982.

Standards Australia: Australia Standard AS2021-2000 Acoustics – Aircraft noise intrusion – Building siting and construction.

NOTES