



AIRSERVICES AUSTRALIA

## **ENVIRONMENTAL PRINCIPLES AND PROCEDURES FOR MINIMISING THE IMPACT OF AIRCRAFT NOISE**



Environment Branch  
19 August 1997  
(Revised 21 November 2002)

# **ENVIRONMENTAL PRINCIPLES AND PROCEDURES FOR MINIMISING THE IMPACT OF AIRCRAFT NOISE**

## **PART A**

### **FUNDAMENTAL PRINCIPLES**

The following fundamental principles are to be used in environmental assessments (of proposals for new air routes and for changes to existing arrangements) and as the basis for selecting preferred noise abatement procedures.

#### **Total Noise Dose**

Principle 1: Noise abatement procedures should be optimized to achieve the lowest possible overall impact on the community.

#### **Spatial Distribution of the Noise Dose**

Principle 2: Noise should be concentrated as much as possible over non-residential areas.

Principle 3: Noise exposure should be fairly shared whenever possible.

Principle 4: No suburb, group or individual can demand or expect to be exempt from aircraft noise exposure.

#### **Upper and Lower Limits of Noise Exposure**

Principle 5: Noise is not considered significant when selecting noise preferred options if exposure amounts to less than 40 Leq<sub>24</sub> and there are less than 50 overflights per day.

Principle 6: No residential area should receive more than 60 Leq<sub>24</sub>, i.e., no residential area should receive more noise exposure than that which is considered “unacceptable” for residential housing under Australian Standard AS2021.

Principle 7: There should be a current agreed aircraft noise exposure level above which no person should be exposed, and agreement that this level should be progressively reduced. The goal should be 95 dB(A).

## **Timing / Historical issues**

- Principle 8: When comparing options, operations that are conducted at night or on weekends should be treated as being more sensitive than those which occur during the daytime or on weekdays.
- Principle 9: Both short-term and long-term noise exposure should be taken into account in deciding between options.
- Principle 10: Options which allow for a gradual change from the current to planned procedures should be given preference.
- Principle 11: In deciding between mutually exclusive, but otherwise equivalent options, involving
- (i) the overflight of an area which has previously been exposed to aircraft noise for a considerable period of time (and which a large proportion of residents would therefore have been aware of the noise before moving in); or
  - (ii) a newly exposed area,
- option (i) should be chosen.

## **Reciprocal Flightpaths**

- Principle 12: To the extent practicable, residential areas overflowed by aircraft arriving on a particular runway should not also be overflowed by aircraft departing from the runway in the reciprocal direction.

## PART B

### STRATEGY FOR WORKING THROUGH A HIERARCHICAL SET OF ENVIRONMENTAL STANDARDS

The following strategy for working through a hierarchical set of environmental standards shall be followed so that the highest order standard is met 'as far as is practicable'.

To the extent that higher order principles have been satisfied and there remains a need to decide on operational arrangements, the following operational standards and procedures are to be considered. These are presented as a hierarchical set, the most preferred environmental condition being presented first. **In all cases, aviation safety, including system safety through simplified operating arrangements, will be given priority over noise abatement considerations.** However, assuming safety conditions have been satisfied, the sole test for moving to a lower level standard is that the higher standard is "not operationally practicable". If lower rather than higher standards are chosen, then well documented reasons for the decision are required. The noise standard chosen should be achievable for at least 90% of movements.

#### Assessment Process

Standards have been developed for five operational categories:

- A. Jet aircraft operations
- B. Propeller aircraft entering/departing terminal area
- C. Helicopter operations
- D. Flights within terminal area
- E. Airwork activities

**For each category, the highest practicable standard is to be selected.**

#### A. JET AIRCRAFT

##### 1. *No overflight of residential areas*

Standard departure and arrival procedures should be designed so that jet aircraft do not overfly residential areas. Radar headings and procedural tracks (in any form) should be assigned to ensure jets do not overfly residential areas.

If this cannot be achieved, then;

**2. *No overflight of residential areas below 5,000 ft AGL.***

A height of 5,000 ft AGL is considered to be the minimum acceptable altitude for the avoidance of significant noise impact on residential populations by jet aircraft. (For reference, the noise at ground level from a climbing B747 at 5,000 ft is about 75 dB(A)s maximum).

In all instances standard departure and arrival procedures should be designed to ensure that jet aircraft do not overfly residential areas at altitudes below 5,000 ft AGL. Radar headings and procedural tracks (in any form) that are assigned to jet aircraft should whenever possible ensure the aircraft do not overfly residential areas at altitudes below 5,000 ft AGL.

If this cannot be achieved, then;

**3. *Minimisation of incidence of jet aircraft flying below 5,000 ft AGL.***

Where jet aircraft flight below 5,000 ft AGL is unavoidable, procedures are to be designed with due consideration for the preferences of the affected community, as determined through a process of consultation with community representatives, in determining which areas will receive greater noise exposure where there are mutually exclusive options for the flight tracks.

The occurrences where departing or arriving aircraft are required to maintain level flight, when below 5,000 ft AGL, are to be kept to a minimum.

If this cannot be achieved, then;

**4. *Minimisation of noise impact on residential areas by Jet Aircraft below 5,000 ft AGL.***

In choosing climb and descent procedures into and out of airports, options that produce the minimum impact on the community which is overflowed are to be selected (within the operational capabilities of the aircraft in terms of performance and safety).

**B. NON-JET AIRCRAFT ENTERING/DEPARTING TERMINAL AREA**

**1. *No overflight of residential areas***

Standard departure and arrival procedures should be designed so that these aircraft do not overfly residential areas. Radar headings and procedural tracks (in any form) should be assigned to ensure they do not overfly residential areas.

If this cannot be achieved, then;

## **2.     *No overflight of residential areas below 3,000 ft AGL.***

A height of 3,000 ft AGL is considered to be the minimum acceptable altitude for the avoidance of significant noise impact on residential populations by non-jet aircraft with a maximum take-off weight greater than 5700kg. (For reference, the noise at ground level from a climbing SAAB-340 at 3,000 ft AGL is about 70 dB(A)s maximum). In the case of multi-engine piston aircraft with a maximum take-off weight equal to or less than 5700kg a height of 1,500 ft AGL is to be considered the minimum acceptable altitude.

In all instances, standard departure and arrival procedures should be designed to ensure that non-jet aircraft do not overfly residential areas at altitudes below 3,000 ft AGL (or 1,500 ft AGL for multi-engine piston aircraft equal to or less than 5700kg). Radar headings and procedural tracks (in any form) that are assigned to non-jet aircraft should whenever possible ensure the aircraft do not overfly built up areas at altitudes below 3,000 ft AGL (or 1,500 ft AGL for multi-engine piston aircraft equal to or less than 5700kg).

If this cannot be achieved, then;

## **3.     *Minimisation of Incidence of Non-jet Aircraft flying below 3,000ft AGL.***

Where aircraft flight below 3,000 ft AGL (or 1,500 ft AGL for multi-engine piston aircraft equal to or less than 5700kg) is unavoidable, procedures are to be designed with due consideration for the preferences of the affected community, as determined through a process of consultation with community representatives, in determining which areas will receive greater noise exposure where there are mutually exclusive options for the flight tracks.

The occurrences where departing or arriving aircraft are required to maintain level flight, when below 3,000 ft AGL (or 1,500 ft AGL for multi-engine piston aircraft equal to or less than 5700kg), are to be kept to a minimum.

If this cannot be achieved, then;

## **4.     *Minimisation of Noise Impact on residential areas by Non-jet Aircraft below 3,000 ft AGL.***

In choosing climb and descent procedures into and out of airports, those options that produce the minimal impact on the community which is overflown are to be selected (within the operational capabilities of the aircraft in terms of performance and safety).

## **C. HELICOPTER OPERATIONS**

### **1. *No overflight of residential areas***

Standard departure and arrival procedures should be designed so that helicopters do not overfly residential areas. Radar headings and procedural tracks should be assigned to ensure helicopters do not overfly residential areas.

If this cannot be achieved, then;

### **2. *No overflight of residential areas below 1,500 ft AGL.***

A height of 1,500 ft AGL is considered to be the minimum acceptable altitude for the avoidance of significant noise impact on residential populations by twin-engine helicopters (For reference the noise at ground level from an overflying Bell 412 at 1,500 ft is about 70 dB(A) maximum). In the case of a single-engine helicopter a height of 1,000 ft is to be considered the minimum acceptable altitude. (For reference the noise at ground level from an overflying Bell 206L at 1,000 ft is about 70 dB(A) maximum).

In all instances, standard departure and arrival procedures should be designed to ensure that helicopters do not overfly residential areas at altitudes below 1,500 ft for twin-engine helicopters (or 1,000 ft AGL for single-engine helicopter). Radar headings and procedural tracks that are assigned to helicopters should whenever possible ensure that the aircraft do not overfly built up areas at altitudes below 1,500 ft AGL for twin-engine helicopters (or 1,000 ft AGL for single-engine helicopters).

If this cannot be achieved, then;

### **3. *Minimisation of Incidence of Helicopters flying below 1,500ft AGL***

Where twin-engine helicopter flight below 1,500 ft AGL (or 1,000 ft for single-engine helicopters) is unavoidable, procedures are to be designed with due consideration for the preferences of the affected community, as determined through a process of consultation with community representatives, in determining which areas will receive noise exposure where there are mutually exclusive options for the flight tracks.

The occurrences where departing or arriving helicopters are required to maintain level flight, when below 1,500 ft AGL for twin-engine helicopters or below 1,000 ft for single-engine helicopters, are to be kept to a minimum.

#### **4. Minimisation of Noise Impact on residential areas by Helicopters below 1,500 ft AGL**

In choosing climb and descent procedures into and out of airports, those options that produce the minimal impact on the community which is overflown are to be selected (within the operational capabilities of the aircraft in terms of performance and safety).

In order to reduce the noise impact on residential areas climb and descent procedures should be developed such that twin-engine helicopters maintain a Closest Point of Approach (CPA) distance of at least 1,000 ft (305 m) on take-off and at least 2,500 ft (760 m) on approach from residential or other noise sensitive locations. In the case of single-engine helicopters the recommended CPA is 1,000 ft (305 m) for both take-off and approach.

Where helicopters are flying at a designated altitude within a helicopter access lane then CPA distance to residential areas should be 1,500 ft (460 m) for twin-engine helicopters. In the case of single-engine helicopters the recommended CPA is 1,000 ft (305 m).

The speed at which a helicopter is flown should be such that these CPA distances can be maintained (within the operational capabilities of the aircraft in terms of performance and safety). It is recommended that speed be kept to 100 knots or less.

Where overflight of residential areas cannot be avoided, and the overflight altitudes and CPA distances are less than that considered to be the minimum required to minimise the noise impact on the residential areas, consideration should be given to constraining helicopter operations (with the exception of emergency operations) to between 7am and 10pm on weekdays and between 8am and 10pm on weekends and public holidays.

#### **5. Minimisation of Noise Impact on residential areas by Hovering/Circling Helicopters**

Residential and other noise sensitive areas should be avoided by helicopters involved in hovering or circling operations. A minimum CPA of 2,000 ft (610m) to the nearest residential or noise sensitive area should be maintained

Where overflight of these areas cannot be avoided, a minimum altitude of 2,000 ft AGL should be maintained. Helicopter hover/circling operations in these locations should have for maximum duration of 1 minute. **(As a guide, a helicopter hovering with a L<sub>Amax</sub> noise level of 70dB(A) would exceed the 40 Leq<sub>24</sub> principle after approximately 80 seconds!).**

The noise exposure is generally higher on the tail rotor side of the helicopter, therefore the tail rotor side should be kept away from the residential and other noise sensitive areas during hover/circling. Hovering turns should be made with the tail of the helicopter away from the noise sensitive area if practical.



The hover/circling operation should be conducted downwind of any residential or noise sensitive areas if practical.

## **6. *Implement Fly Neighbourly Procedures.***

It is recommended that helicopter operators adopt "Fly Neighbourly" piloting techniques such as those set out in the Helicopter Association International (HAI) "Fly Neighborly Guide". In the Australian context these techniques would include:

- Avoid noise sensitive areas
  - Follow high ambient noise routes (Highways, etc)
  - Follow unpopulated routes (Waterways, etc)
- Near Noise sensitive areas:
  - Maintain a flyover altitude of 1,500ft for twin engine helicopters (1,000ft for single engine helicopters) where possible.
  - Maintain a hover/circling altitude of 2,000ft where possible
  - Reduce speed
  - Observe low noise speed/descent settings
  - Avoid sharp manoeuvres
  - Vary your route - Repetition is annoying
  - Use high take-off/descent profiles.

## **D. FLIGHTS WITHIN TERMINAL AREA**

### **Circuit Training**

#### **1. *Minimum height for level flight over residential areas.***

A minimum circuit height of 1,000ft AGL is to apply for fixed wing aircraft involved in circuit training. In the case of circuit training for helicopters, a minimum height of 800ft AGL is to apply.

#### **2. *Limit the number of circuits and the number of aircraft permitted to overfly identified areas.***

In conjunction with operators, operations are to be designed to spread noise over different areas where practical options are available.

#### **3. *Limit the hours that circuit training is permitted.***

At locations where a noise problem exists circuit training may be limited. During week days, it is proposed that circuit training be limited to 7:00 am - 8:00 pm except for 1 night per week where circuits to may be conducted to 10:00 pm. At weekends and on declared public holidays these operations would be contained within the period 9:00 am - 8:00 pm. Consideration may

need to be given to extending the times beyond those proposed to account for daylight saving periods.

The actual times for circuit operations should be determined through consultation with community representatives, industry representatives and airport operators.

## **E. AIRWORK AIRCRAFT**

### **1. Built-up Areas**

Operators are to avoid residential areas.

If this cannot be achieved, then;

### **2. Sensitive Areas**

Operators are to avoid areas identified as particularly sensitive (with advice from representative community groups).

### **3. Minimum Limits**

If it is not practicable to avoid operations over residential areas, operators are to conduct their operations above 3,000ft AGL for propeller driven aircraft or helicopters and above 5,000ft AGL for jet aircraft.

### **4. Practice Instrument Approaches**

Aircraft engaged in practice instrument approach training are permitted, irrespective of the runway, provided there are no more than 4 approaches per hour between 7:00 am - 8:00 pm on weekdays and between 9:00am - 8:00pm on weekends and on declared public holidays. The actual number of approaches per hour should be determined through consultation with community representatives, industry representatives and airport operators.

### **5. Community Input**

If heights below 3,000 ft AGL (propeller aircraft and helicopters) and 5,000 ft AGL (jet aircraft) are required for airwork on a continuing basis, the number of operations per week permitted is to be the subject of agreement with community representatives.

## **PART C**

### **A SCREENING PROCESS USING QUANTIFICATION OF IMPACTS TO DETERMINE WHETHER PROPOSED NEW ARRANGEMENTS REQUIRE DETAILED ENVIRONMENTAL ASSESSMENT.**

This noise assessment procedure has been adapted from the Noise Screening Procedure for Certain Air Traffic Actions Above 3,000 Feet AGL developed by the US Federal Aviation Administration and modified to reflect Australian requirements. The basis for the screening process is to identify whether a proposed air traffic action will result in a 3 decibel increase in aircraft noise exposure to underlying residential areas. It is proposed that the use of a 3 decibel change criterion is acceptable as long as the noise level averaged over 24 hours ( $Leq_{24}$ ) of aircraft does not exceed 45 dB(A) for urban residential areas and 40 dB(A) for rural residential areas.

The use of the Noise Screening Procedure proposed below can be linked with the hierarchy of principles mentioned above to provide an adequate, and defensible, initial assessment process for changes to aircraft flight paths in Australia.

#### **Environmental Assessment of Changes to Flight Tracks**

The issues that must be considered with regard to proposed changes to flight tracks are:

- The number and type of aircraft,
- Time of operations (day or night),
- Proximity to existing flight tracks, and height of the track over a residential area.

The attached flow chart outlines the process to be undertaken to determine whether any change is likely to be environmentally significant and therefore require a more formal environmental assessment.

## Assessment of Impact of New/Modified Flight Tracks

This refers to any new or modified arrival/departure procedures and any new or modified airways (See Figure 1).

- A. If the change is not over a residential area (e.g. over water or uninhabited areas, although wilderness areas will be given special consideration) then the change conforms with the highest environmental principle and no further assessment is required.
- B. If the track is over a residential area then the next principle applies (i.e. Jet tracks to be 5000 feet AGL or above over residential areas). If the track is below 5000 feet AGL then a more formal environmental assessment is required. The procedure for this assessment is considered later.
- C. If the track is above 5000 feet AGL then it must be considered in terms of whether or not the proposed change will produce noise over a new residential area and whether there will be a 3 decibel Leq change in the aircraft noise exposure of the underlying residential area.

## Procedure

The following steps are to be used to determine whether a 3 decibel Leq increase in noise exposure will occur:

**Step 1:** *Does the proposed action introduce noise exposure from large jets (>34,000kg) which may require further assessment of noise impacts?*

Use Table 1 data to identify the conditions required for the possible exceedance of a 40 dB(A) Leq<sub>24</sub> level of aircraft noise (see Note). If the conditions in Table 1 are met then the assessment proceeds to Step 2. While the conditions set out in Table 1 may indicate further assessment is not necessary, there may be situations involving noise sensitive areas that will require a full assessment.

**Step 2:** *Does the proposed action introduce large jets over residential areas which are not routinely exposed to jet aircraft noise?*

Use Table 2 to check the lateral position of the proposed new or moved track in relation to an existing track and determine whether the noise exposure should be regarded as new, or as an increase to existing noise exposure.

The lateral spread of noise from aircraft on a track is represented by a band located symmetrically on the ground below the nominal track. This is a consequence of both the propagation of sound from the aircraft, and the normal lateral dispersion of aircraft which are following a nominally identical flight path. The width of the band either side of the track

depends on the height above ground of the aircraft: the higher the aircraft, the wider the spread of its noise. Outside the band, the aircraft noise exposure is not significant. The width of the band is referred to as the “lateral minimum”.

If a proposed new or moved track lies beyond the lateral minimum of an existing track as given in Table 2, the community underlying the new or moved track is considered to be exposed to aircraft noise for the first time. Regardless of altitude, any new track lying at least 3 nautical miles from an existing track is considered to expose the underlying community to new aircraft noise. In these cases the assessment proceeds to Step 4.

If Table 2 shows that the new or moved track lies within the lateral minimum of an existing track, the residential area underlying the new or moved track is not considered to be newly exposed to jet aircraft noise, but the proposed action may increase the existing aircraft noise exposure. Proceed to Step 3 to determine whether a 3 decibel change will result.

**Step 3:** *Will a change to altitude or numbers of jet aircraft on an existing track increase the aircraft noise exposure by 3 decibels?*

Use Table 3 to determine if the change in aircraft noise exposure is at least 3 decibels. If it does, the assessment proceeds to Step 4.

Note that if a new track and an existing track are to co-exist, and the lateral minima of the two tracks overlap, then for the purpose of use of Table 3, the numbers of aircraft on the two tracks are cumulative.

**Step 4:** *Will the proposed action bring the aircraft noise exposure to 40 dB(A)  $Leq_{24}$  in rural residential areas, or 45  $Leq_{24}$  in other areas?*

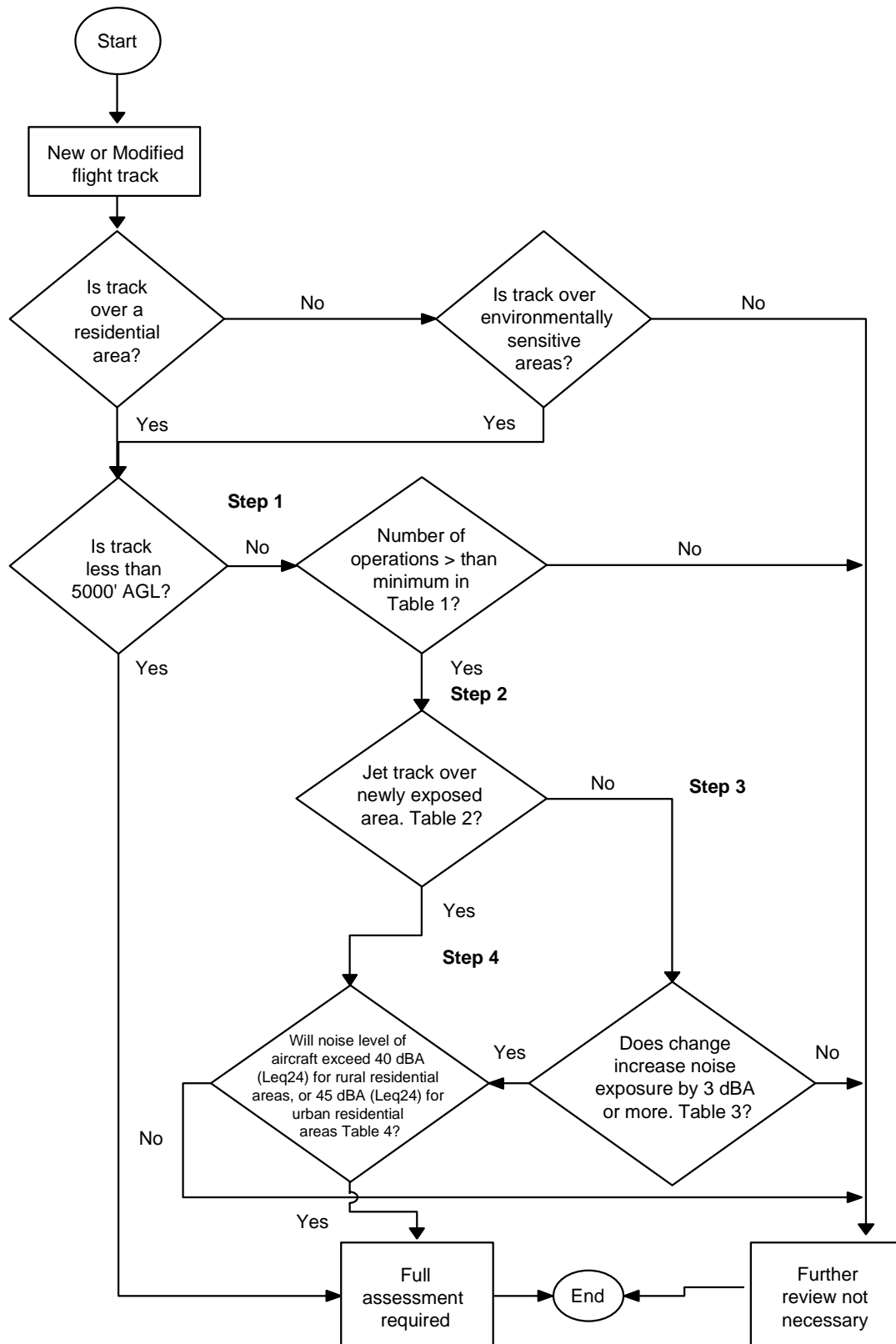
Use Table 4 to decide whether the numbers of jet aircraft will cause these noise criteria to be exceeded.

If the screening procedure (Steps 1 to 4) leads to “Full Assessment Required” on the flow chart, the change requires a more detailed evaluation of the environmental impact to be made.

If the screening procedure leads to the “Further Review Not Necessary” box on the flow chart, the change is deemed not significant, i.e. there is less than a 3 decibel change and/or the aircraft noise exposure will not exceed the criteria (40 and 45 dB(A)  $Leq_{24}$  for rural residential and urban residential areas, respectively).

Note: The datum level for the calculation of aircraft noise exposure is the Boeing 747. The use of the B747 reflects the aircraft type producing the greatest noise impact and ensures that the noise exposure is not undervalued.

**Figure 1      Flow Chart for Noise Impact Assessment for New or Modified Jet Aircraft Tracks**



## APPENDIX 1

### STEP 1

**Does the proposed action introduce noise exposure from large jet aircraft (>34,000Kg) which may require further review of noise impacts?**

#### **Application**

The procedure applies to new or modified aircraft flight tracks which meet the following conditions:

- \* involves airports with more than 1,500 large jet aircraft (>34,000kg) operations per year; and
- \* represents a permanent change or planned test; and
- \* concerns changes to departure/arrival routes or tracks, used by large jet aircraft, between 5,000 and 18,000 feet AGL

#### **Process**

- (a) Refer to Table 1.
- (b) If the estimated number of daily operations on the affected track are greater than the minimum, the answer is **YES** and proceed to **STEP 2**.
- (c) If the estimated number of daily operations on the affected track are less than the tabulated values, the answer is **NO** and further review is not necessary except in special situations.

**Table 1:**

<i>Aircraft Altitude (feet AGL)</i>	<i>Number of Daily Operations</i>	
	by large Jet aircraft (>34,000kg) on the Affected Route See Notes (1) and (2) below	
	<i>Departures</i>	<i>Arrivals</i>
5000	2	20
6000	3	30
7000	5	40
8000	6	50
9000	8	65
10000	12	80
11000	15	100
12000	20	120
13000	25	140
14000	30	160
15000	35	180
16000	45	200
17000	55	230
18000	65	260

- (1) Chapter 2 jet aircraft (e.g. B727, FK28) and large International jet aircraft (Chapter 2 and Chapter 3) shall be counted in full. Count 50% of all other Chapter 3 jet aircraft.
- (2) Each nighttime (1900 - 0700) flight counts as four operations.



## STEP 2

**Does this action introduce large jet aircraft over residential areas which are not routinely exposed to jet aircraft noise?**

### **Process**

- (a) Refer to Table 2.
- (b) If the location of the new track is greater than 3 nautical miles from the nearest existing track, the answer is **YES** and proceed to **STEP 4**.
- (c) If the new or moved track is within 3 nautical miles of the existing track minimum but at a distance such that the noise could be regarded as new, as determined by reference to Table 2, the answer is **YES**. Proceed to **STEP 4** to determine whether the action will cause aircraft noise exposure to exceed 40 dB(A) Leq<sub>24</sub> in rural residential areas or 45 dB(A) Leq<sub>24</sub> in urban residential areas.
- (d) If the new or moved track lies within the lateral minimum distance from the existing route, as determined by reference to Table 2, the answer is **NO** and proceed to **STEP 3** to determine whether the action will cause a 3 decibel increase in existing aircraft noise exposure.

**Table 2:**

<i>Aircraft Altitude (feet AGL)</i>	<i>No Change Lateral Minimum (nautical miles)</i>
5000 — 6000	1
6000 — 12000	2
above 12000	3

## STEP 3

**Will a change to altitude or numbers of jet aircraft on an existing track increase the aircraft noise exposure by 3 decibels?**

### Process

- Refer to Table 3.
- If Table 3 indicates the change in aircraft noise exposure is 3 or more decibels, the assessment then proceeds to **Step 4**.
- If Table 3 indicates that the change in aircraft noise exposure is less than 3 decibels, no further assessment is necessary.

**Table 3: Change in Aircraft Noise Exposure (decibels)**

		Change in Number of daily Operations of Jet Aircraft (%)																					
		-90	-70	-50	-30	-10	0	10	30	50	70	90	100	110	130	150	170	190	210	230	250	260	
Change in Altitude of Jet Aircraft (%)	10	-11	-6	-4	-3	-1	-1	-1	0	1	1	2	2	2	3	3	3	4	4	4	4	5	
	5	-11	-6	-4	-2	-1	-1	0	1	1	2	2	2	3	3	3	4	4	4	4	5	5	5
	0	-10	-5	-3	-2	0	0	0	1	2	2	3	3	3	4	4	4	5	5	5	5	6	
	-5	-9	-5	-3	-1	0	1	1	2	2	3	3	4	4	4	5	5	5	6	6	6	6	
	-10	-9	-4	-2	0	1	1	2	2	3	3	4	4	4	5	5	5	6	6	6	7	7	
	-15	-8	-3	-1	0	1	2	2	3	4	4	5	5	5	5	6	6	6	7	7	7	7	
	-20	-8	-3	-1	1	2	2	3	4	4	5	5	5	6	6	7	7	7	7	8	8	8	
	-25	-7	-2	0	2	3	3	4	4	5	6	6	6	6	7	7	7	8	8	8	9	9	
	-30	-6	-1	1	2	3	4	4	5	6	6	7	7	7	7	8	8	8	9	9	9	9	
	-35	-5	-1	2	3	4	5	5	6	6	7	7	8	8	8	9	9	9	10	10	10	10	
	-40	-4	0	3	4	5	6	6	7	7	8	8	9	9	9	10	10	10	10	11	11	11	
	-45	-4	1	3	5	6	6	7	8	8	9	9	9	10	10	10	11	11	11	12	12	12	
	-50	-3	2	4	6	7	8	8	9	9	10	10	11	11	11	11	12	12	12	13	13	13	
	-55	-1	3	6	7	8	9	9	10	10	11	11	12	12	12	13	13	13	14	14	14	14	
	-60	0	5	7	8	9	10	10	11	12	12	13	13	13	14	14	14	15	15	15	15	25	
	-65	1	6	8	10	11	11	12	12	13	14	14	14	16	16	16	16	18	18	17	17	27	
-70	3	8	10	11	13	13	13	14	15	15	16	16	16	17	17	17	18	18	18	18	29		
-75	5	10	12	13	15	15	15	16	17	17	17	18	18	19	19	19	20	20	20	20	21		
-80	7	12	14	16	17	17	18	19	19	20	20	20	21	21	22	22	22	22	23	23	23		

Note that if a new track and an existing track are to co-exist, and the lateral minima of the two tracks overlap, then for the purpose of use of Table 3, the numbers of aircraft on the two tracks are cumulative.

## STEP 4

Considering the type of residential community, will the noise ( $Leq_{24}$ ) from large jet aircraft reach 40 dB(A) in rural residential areas, or 45 dB(A) in other areas?

### Process

- (a) Refer to Table 4.
- (b) If the estimated number of daily operations on the affected track is greater than the minimum then the answer is **YES** and a detailed environmental assessment is required.
- (c) If the estimated number of daily operations on the affected track is less than the minimum then the answer is **NO** and further noise assessment is not necessary except in special situations.

**Table 4: Minimum Number of Daily Operations by Large Jet Aircraft (34,000Kg) on the Affected Route.**

Aircraft Altitude (feet AGL)	Departures		Arrivals	
	Residential Community		Residential Community	
	(see below)		(see below)	
	<i>Rural</i>	<i>Urban</i>	<i>Rural</i>	<i>Urban</i>
5000	2	6	20	60
6000	3	10	30	90
7000	5	15	40	120
8000	6	20	50	150
9000	8	25	65	200
10000	12	35	80	240
11000	15	45	100	300
12000	20	60	120	360
13000	25	75	140	420
14000	30	90	160	480
15000	35	110	180	>500
16000	45	130	200	>500
17000	55	160	230	>500
18000	65	200	260	>500

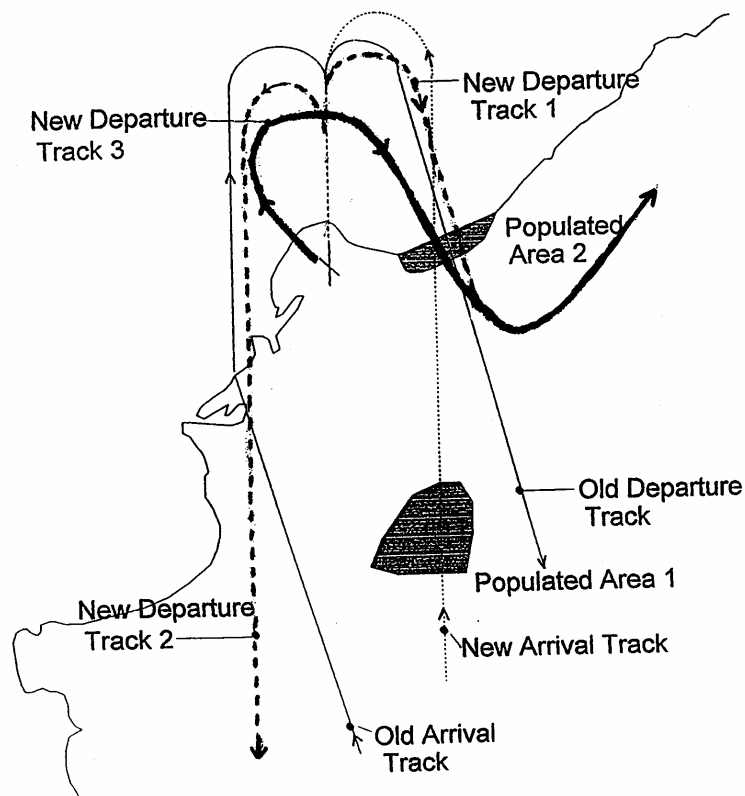
- (1) Chapter 2 jet aircraft (e.g. B727, FK28) and large International jet aircraft (Chapter 2 and Chapter 3) shall be counted in full. Count 50% of all other Chapter 3 jet aircraft.
- (2) Each nighttime (1900 — 0700) flight counts as four operations.
- (3) If the composition of an area is not known, classify the area as rural residential.

## Examples of new tracks subjected to proposed assessment procedure

### Scenario

The airport proposing the changes has more than 1,500 large jet aircraft (>34,000kg) operations a year. The proposed changes are to be permanent and the changes involve tracks used by large jet aircraft between 5,000 and 18,000 feet AGL (See Figure 2).

**Figure 2. Diagram representing existing and proposed tracks.**



## **Departure Tracks**

### **Proposed New Track 1.**

This track is a new track over a residential area at 5000 feet AGL. Therefore it requires assessment using the noise screening process to determine whether the change is likely to produce a 3 decibel increase in aircraft noise exposure on the underlying community.

Step 1. The number of jet aircraft movements on this track is estimated to be 27 per day. As the number of jet aircraft exceeds the number of operations in Table 1 at 5000 feet AGL, the assessment proceeds to Step 2.

Step 2. The proposed new track lies outside the No Change lateral minimum at 5000 feet AGL, i.e. beyond 1 nautical mile of a pre-existing departure track, therefore the assessment proceeds to Step 4.

Step 4. The estimated number of jet aircraft departures exceeds the number set out in Table 4. As the proposed change is assessed as being likely to result in a 3 decibel increase in exposure from aircraft noise on the underlying community, further assessment to determine the environmental significance of the proposed change is required.

### **Proposed New Track 2.**

This is a new departure track, however, it will not be over a residential area or a wilderness area, therefore no further assessment is required.

### **Proposed New Track 3.**

This track is a new track that passes over a residential area at 6000 feet AGL. Therefore it requires assessment using the noise screening process to determine whether the change is likely to produce a 3 decibel increase in aircraft noise exposure on the underlying community.

Step 1. The number of jet aircraft movements on this track is estimated to be 5 per day. As the number of jet aircraft exceeds the number of operations in Table 1 at 5000 feet AGL, the assessment proceeds to Step 2.

Step 2. The new track lies within the No Change lateral minimum of the existing route closest to the community therefore the assessment proceeds to Step 3.

Step 3. The existing track has 29 jet movements. The new track will have 5 jet movements i.e. an 83% decrease, therefore Table 3 indicates that the change in aircraft noise exposure is less than a 3 decibel increase. This indicates that no further assessment is required.

## **Arrival Tracks**

### **Proposed New Track 1.**

The track will pass over two residential areas, one approximately 25 nautical miles from the airport and another approximately 10 nautical miles from the airport. The number of jet aircraft using the track daily is 46.

#### **Residential area 1.**

Step 1. The aircraft will be at approximately 7500 feet AGL over the first populated area. Table 1 indicates that the acceptable number of aircraft at this level is approximately 45. Therefore proceed to Step 2.

Step 2. The new track is outside the no change lateral minimum therefore proceed to Step 4.

Step 4. As the area is urban, Table 4 indicates 130 jet arrivals would be required to increase aircraft noise exposure by 3 decibels. This track has 46 arrivals, therefore no further assessment is required.

#### **Residential area 2.**

Step 1 The aircraft will be at approximately 5000 feet AGL over the second populated area. Table 1 indicates that the required number of arrivals to increase noise exposure by 3 decibels is 20, therefore proceed to Step 2.

Step 2. Table 2 indicates that, as the new track is within 1 nautical mile of a pre-existing track, it is within the no change lateral minimum, therefore proceed to Step 3.

Step 3. Table three is used to assess the impact of the increase or decrease in traffic. The new track will introduce 46 arrivals, and, as there will be a coexisting departure track with 5 departures, the total number of jet aircraft overflights will be 51. Table 3 indicates that this increase will produce an increase in noise exposure greater than 3 decibels, therefore further assessment to determine the environmental significance of the proposed change will be required.