



**ENVIRONMENTAL  
Code of Practice for  
Aircraft Operations**

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**Amenity Values**

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**NOISE ABATEMENT**

## Introduction

In accordance with the requirements to preserve amenity values as described in the RMA, aerial operators need to manage noise. By following the principles detailed in this code, that can be achieved. This code forms part of the Environmental Management System offered as part of the AIRCARE SMS run by the Aviation Industry Association of NZ. AIRCARE is an accreditation program that was (*is to be*) accredited by the Minister for the Environment under the RMA.

It recognises the issues involved with the operation of aircraft in and around noise sensitive areas and details a plan by which the aviation industry and regulators can work together so that short term gains can be made in order to achieve the long term goal of limiting the noise and environmental impact of aircraft.

Technology is becoming available to make an impact on noise reduction in existing fixed wing aircraft and manufacturers are working to develop lower noise levels in new generation helicopters. Some quieter aircraft are already available. Pilots flying both new and older types can modify their in-flight procedures to minimise the impact of noise and this code details how that can be achieved. Operators joining this program should commit to a program of fleet replacement or modification that will see the adoption of quieter aircraft.

By taking a proactive approach the aviation community has an opportunity to circumvent the possibility that legislation will be enforced upon the industry that could itself be unworkable and not recognise the limitations that effect aircraft.

Aircraft serve specialised functions and important roles in the nation's commerce and transportation system. Aircraft are a versatile and valued segment of the multimodal transportation infrastructure. Aircraft provide the only means *all* people, regardless of age, infirmity and physical capability, can experience our remote and rugged areas without leaving any lasting trace on the environment such as tracks, roads, huts and litter.

The helicopter's unique hovering; vertical takeoff and landing capabilities fulfill a broad range of missions. Helicopters carry out vital roles including:

- air ambulance services
- law enforcement
- fire fighting
- rescue
- Regional Council/DOC track servicing/remote hut servicing/riverbed surveys/weed control

- wild animal control

In addition aircraft *enable*:

- flexible shuttle services
- news coverage
- heli-hunting
- heli-skiing
- aerial tourism
- aerial support of agriculture, horticulture, viticulture and forestry

Some of these activities involve flight at low level. When aircraft are involved in low-level operations, there are fewer options for noise mitigation than when operating at higher levels. Nevertheless, this code advises ways to mitigate noise that can be achieved.

In 2009 aircraft operations contributed \$9.7 billion to the NZ economy. (*NZ Trade & Enterprise New Horizons Report 2010*)

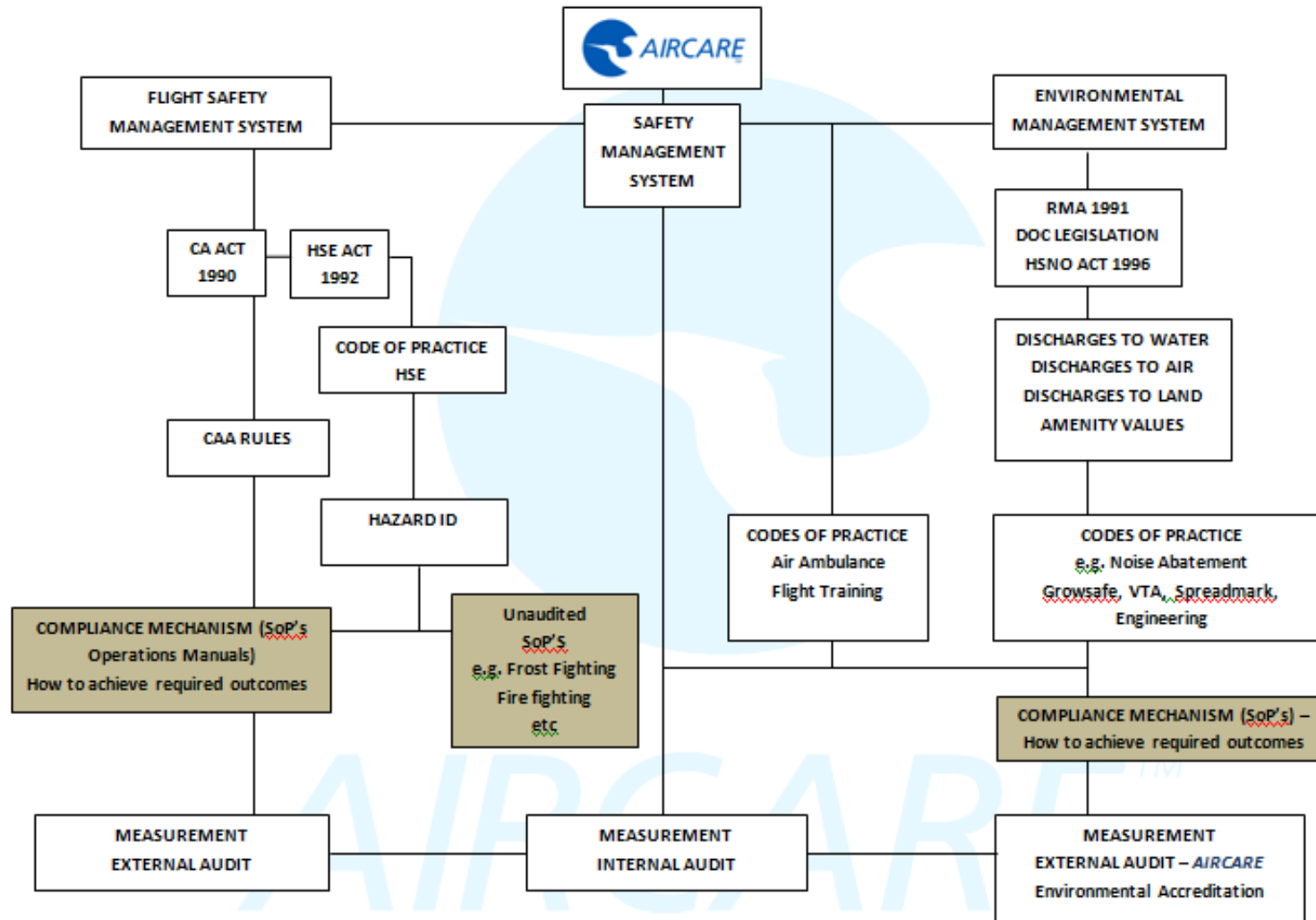
It is obvious that people see aircraft in different ways depending on the aircraft's mission and their own circumstances. A trumper who criticizes the noise a helicopter makes as it overflies him is likely to be accepting of that noise if he has a broken leg and the same machine is flying in to affect his rescue. Some visitors to national parks may have a perception that they will experience peace and quiet whilst they enjoy the scenic values on offer yet completely disregard the footprint they may have made getting access to the park in the first place whether they travelled by bus, boat, car or aircraft. Regulators e.g. DOC have a responsibility to warn visitors that if they tramp in *Valley Y* they are likely to hear aircraft noise whereas if they tramp in *Valley X* they may not hear aircraft. By providing this notification, visitors' expectations are more likely to be met.

The aviation community extends an invitation to regulators to work with the industry to identify flight paths that reduce the impact of aircraft noise.

Members of the aviation community are invited to join this accreditation program that both trains and measures pilots and operators in 'flying neighbourly' procedures and in noise abatement methods.

AIRCARE Environmental Management Committee

Compliance Flowchart



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## Referenced Documents

- Non-military Urban Noise Study, Report to Congress, December 2004
- Quiet Aircraft Technology For Propeller Driven Airplanes and Rotorcraft US Congressional Report, 1996
- The IATA Technology Roadmap Report, Issued June 2009
- [http://www.space.com/business/technology/070727\\_helicopter\\_industry.html](http://www.space.com/business/technology/070727_helicopter_industry.html)
- Fly Neighbourly Guide, Helicopter Association International, Inc.
- Resource Management Act 1991 including the RM Amendment Act 2009

## Abbreviations

AGL	Above ground level
AIA	Aviation Industry Association of NZ Inc
CAA	Civil Aviation Authority of NZ
DOC	Department of Conservation
FAA	Federal Aviation Authority (USA)
H&S	Health and Safety
NZHA	NZ Helicopter Association – a division of AIA
RMA	Resource Management Act including amendments
SMS	Safety Management System

## Definitions

AIRCARE	A brand owned by AIA
Accreditation	The reward for demonstrating compliance with a code of practice every time operations referred to in that code are carried out
Aircraft	Fixed wing aeroplanes and helicopters
Amenity values	Means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes
Noise Sensitive Area	An area where the impact of adverse effects from noise diminishes the amenity values of that area
Populous Area	A collection of ten residences or more in an area less than two hectares, or a gathering of more than 100 people.

## 1. SCOPE

This code has been developed to cover the operation of aircraft with a capacity of less than 19 seats in New Zealand.

### 1.1 NZ Legislation

- a) The Resource Management Act 1991 empowers legislators to control elements of aircraft operations e.g. noise as it impacts on amenity values. This voluntary code seeks to address aircraft noise issues that impact on people when the aircraft is being operated.
- b) The Civil Aviation Act 1990 empowers the CAA to control aircraft operations. The Civil Aviation Act does not empower CAA to have any control of aircraft noise. Notwithstanding this, the majority of complaints that CAA fields are noise related.
- c) The Conservation Act 1987, Specifically Part 3B Concessions Section 170 (2) says that no activity will be carried out in a conservation area unless authorized by a concession.
- d) The National Parks Act 1980 Specifically Section 14 Wilderness Areas s14(2)(d) This clause prohibits aircraft landing or hovering in Wilderness Areas.

### 1.2 Compliance

For the purposes of this Code the word “shall” refers to practices that are mandatory for compliance with the Code and the word “should” refers to practices that are advised, recommended or are industry best practice.

## 2. OVERVIEW

### 2.1 NOISE – CAUSE & REMEDIES

Over the past couple of decades, significant technological advances have been made in aviation noise reduction. In fixed wing aircraft, new types of aircraft, propellers and engines have been developed that generate a significantly smaller noise footprint than older types. A number of older types can be retrofitted with these new engines and propellers. There are exceptions but in general turbine powered aeroplanes are quieter than piston powered ones. In the case of propeller driven aeroplanes the majority of the noise people hear comes from the propeller(s). Progress has been made in the noise these types produce by developing aircraft and engines that have propellers that run at lower speed than older types. This does not eliminate the noise they emit but it certainly reduces it.

Helicopters exhibit a unique “impulsive” noise characteristic which is different from that produced by fixed wing aircraft. Much of the scientific investment for rotorcraft has benefited in physical understanding and phenomenon modeling, such as Blade Vortex Interaction (BVI) and High Speed Impulsive (HSI) noise during approach and high speed cruise, respectively. Blade-Slap or BVI noise occurs during the descent condition for landing and when maneuvering. It is the result of interaction by a rotor blade with previously shed tip vortices. These interactions generate a complex unsteady pressure field that propagates below the rotor as high impulsive noise.

A Congressional Report on “Quiet Aircraft Technology for Propeller-Driven Airplanes and Rotorcraft” identified the technical status of the United States Research and Technology (R&D) for the rotorcraft sector. The 1996 report concluded that, in general, quiet rotorcraft technology was immature and too slow to market.

The FAA and the International Civil Aviation Organization (ICAO) continue to assess and revise helicopter noise certification requirements for increased noise stringency that are based upon reasonably achievable noise reduction technology. The noise certification process establishes reference conditions for the manufacturer to demonstrate that a design complies with the standard. These standards are changing over time as technological advances lead to the increased ability to reduce helicopter noise.

One area in which manufacturers are concentrating their technological development efforts is in reducing the aerodynamic noise made by helicopter main and tail rotors. Aerodynamic noise is responsible for most helicopter noise that people on the ground hear.

Manufacturers are now designing new helicopters with four or more main rotor blades. This avoids the distinctive chopping noise that the older, twin-bladed Bell UH-1 "Huey" helicopter makes, which can be heard miles away.



Meanwhile, Eurocopter uses a technology called the "fenestron" to reduce the noise made by tail rotors. The fenestron is a tail rotor enclosed within a duct and positioned in line with the fuselage. This reduces noise and improves safety. Eurocopter also spaces its aircraft tail-rotor blades unevenly, reducing "phase modulation" effects to make the tail rotors quieter and more pleasant-sounding.

There are two major challenges facing the helicopter industry:

- Balancing cost to implement low noise technology within an overall affordable market cost to users and operators.
- Quiet helicopter technology is immature and too slow to market although some manufacturers have taken on the challenge and successfully developed quieter machines.

One further remedy for noise reduction is the use of larger capacity aircraft. One aircraft carrying 15 passengers makes a smaller noise footprint than three aircraft carrying five passengers.

## **2.2 NOISE - EFFECT**

In general, there are a number of possible explanations for heightened community response to aircraft noise. The possible explanations, which are not mutually exclusive, include the following:

1. A subsection of the population may be more sensitive to low-frequency helicopter noise than is the majority of the population;
2. Noise-induced building vibration and rattle has been shown to significantly increase concerns;
3. Noise annoyance and aircraft sound is rich in low-frequency content;
4. There is some evidence that suggests helicopter noise is slightly more annoying than fixed-wing aircraft noise at the same sound exposure level;
5. Helicopter noise may be more noticeable because of its periodic impulsive characteristic;
6. There is the possible phenomena of "virtual noise" in which a set of non-acoustical factors, such as bias (a personal judgment that the aircraft does not need to fly here) and fear (of crashes / injury / death), greatly enhances people's negative attitudes; and
7. The way aircraft are operated can influence reactions.

Clearly it is the very fact aircraft are so versatile that makes it difficult to manage their footprint in a way that meets everyone's expectations. Equally clearly, it is the responsibility of aircraft operators to ensure that they do everything within their power to minimise the impact of their presence on others.

The Fly Neighbourly Program offers the technical information necessary for helicopter operators to fly both current and new advanced helicopters as quietly as practical, and to make helicopter operations compatible with nearly all land uses.

Whilst not targeted at fixed wing aeroplanes, elements of the Fly Neighbourly Program are adopted by this code in order to deliver the same benefits.

## **3 THE PROGRAM**

### **3.1 Responsibilities**

#### **3.1.1 Pilots**

- (a) To meet the requirements of this code pilots shall complete the Fly Neighbourly training program and pass an assessment set by the AIA. The Fly Neighbourly Guide upon which this training is based is included as Appendix 1. The term of this qualification shall be three years.
- (b) Pilots shall take all reasonable steps to minimize their noise footprint. In flight, pilots should observe the following noise abatement procedures:
  - 1) Avoid noise-sensitive areas altogether, when possible.
  - 2) Follow high ambient noise routes such as highways, or where possible, unpopulated routes.
  - 3) If it is necessary to fly near or over noise-sensitive areas maintain an altitude as high as possible in line with the recommendations in the Fly Neighbourly program. Fly normal cruising speed or slower and observe low-noise speed and descent recommendations, avoid sharp manoeuvres, use steep takeoff and descent profiles (helicopters only) and vary the route, since repetition contributes to annoyance.
  - 4) When operating in noise sensitive areas, pilots of fixed wing aircraft should operate their propellers at the low end of the propeller recommended RPM operating range for all phases of the flight.
  - 5) When company operating areas or transit routes are developed, pilots should confine their flights to those places.
  - 6) When carrying out low level operations pilots shall give consideration to things they can do to manage their noise footprint. Some examples are operating RPM, repetitive track placement (e.g. keeping high ground or shelter belts between their tracks and any nearby residence when this is possible) hours of operation and timing of operation. If operations are required adjacent to a populous area then the impact of noise will be less during the working week than at the weekend when workers are more likely to be at home.
- (c) The requirements of this code do not apply where they would conflict with Civil Aviation Regulations, air traffic control clearances or instructions, or where an altitude of less than that recommended in the Fly Neighbourly Program is considered necessary by a pilot to operate safely. Pilots unable to comply with the company guidelines in respect to noise abatement for any of the above reasons shall document the event

and notify the operator using the Event Notification form used by the operator and required under the AIRCARE SMS Program.

### 3.1.2 Operators

- a) To meet the requirements of this code operators shall:
- 1) Maintain a policy on noise minimisation that shall be promoted to all staff. This policy shall reflect the operator's intent to reduce the amount of noise created by the operator's aircraft and other equipment. The policy will identify current and anticipated areas of noise concern and will be recorded in the company's AIRCARE SMS along with policies on quality and safety.
  - 2) Plan flight operations in accordance with noise abatement procedures to minimize the impact of aircraft movements.
  - 3) In sensitive areas, develop the location of operational areas and transit routes in consultation with the relevant local authorities. Such routes shall take account of flight safety and adverse effects on passengers.
  - 4) Formulate guidelines that are intended to assist flight crews and flight operations personnel to formulate responsible mission profiles without infringing on operational reality. They must also not conflict with civil aviation regulations, air traffic control instructions, or aircraft operating limitations. These guidelines shall emphasize awareness of sensitive routes and landing areas.
  - 5) When low level operations are to be carried out near populous areas, consider the fleet and select an aircraft type that has the least intrusive noise footprint.
  - 6) Maintain a register of noise complaints including corrective and preventative actions undertaken. This register shall include the name and address of the complainant, location of the concern and the date and time to which the event refers.
  - 7) Maintain a procedure to ensure that all relevant staff attend the Fly Neighbourly training course conducted by AIA and that each satisfactorily passes an assessment on the noise abatement procedures detailed in that course. The procedure shall ensure that each participant undergoes recurrent training and assessment every three years.
  - 8) Ensure that when aircraft manufacturers provide information on noise abatement in an Aircraft Flight Manual, that pilots are assessed on their knowledge of this aspect of the aircraft at the time of their annual recurrency flight check.
  - 9) Ensure that noise abatement procedures are considered at every annual recurrency flight check.
  - 10) As part of the company management review required under the AIRCARE Environmental Management System, ensure that the

noise minimisation policy is considered to ensure that it is still relevant in respect to any changing conditions or legislation and that it is revised when required.

- 11) Educate customers about noise abatement procedures, in order to prevent or minimize conflicts between their expectations and company policy.
- 12) Ensure that in areas where a User Group has been established under CAA and Airways protocols, the operator maintains membership of that User Group and takes an active part in its activities.
- 13) Ensure that the procedures detailed here result in continual improvement in respect to the operator's noise footprint.

(b) It is recommended that operators adopting this code of practice should:

- 1) Establish a practice of promoting both the safety record and the benefits of aircraft use to the public at large to improve public acceptance of aircraft.
- 2) Where possible, when operations below 500ft AGL are anticipated, arrange notification to all affected parties near the proposed flight path.
- 3) Develop good working relations with the media with a view to presenting favourable aircraft related media coverage of events, achievements and outcomes including Fly Neighbourly seminars.
- 4) Stage demonstrations and press conferences covering such capabilities as fire fighting, emergency medical evacuation, search and rescue and the benefits of aircraft transportation to the general public.
- 5) Engage in public relations to develop awareness of the Fly Neighbourly Program. This can be achieved through attendance at meetings of local government, government agencies, service clubs and environmental groups.

### **3.1.3 Land Owners/Administrators**

- a) When aircraft operations are planned over sensitive areas, it is the responsibility of the Land Owner/Administrator to notify people who could be adversely affected by the aircraft noise. Doing this will reduce the element of surprise and disappointment that often lead to frustration for visitors and owners/administrators alike. Some examples include:
  - 1) A restaurant owner should notify neighbours when an aircraft is being used to fly customers to or from the venue.
  - 2) All visitors to the DOC Estate should be advised that they might hear aircraft noise during their visit.
  - 3) In National Parks, trampers should be advised that they might hear aircraft noise and that it will be particularly prevalent on the days that

tracks are being maintained or huts resupplied or other aerial work is planned.

- b) Landowners/Administrators should work with aircraft operators to identify flight routes that will cause the minimum of noise nuisance. Note that the requirements of 3.1.2 a) 3) shall be met.

## **4.0 Training Requirements**

- 4.1** To satisfy the requirements of 3.1.1 and 3.1.2 a person undergoing initial training in noise abatement shall attend a face to face course. The subsequent three yearly renewal requirement can be met by an on-line assessment. In both cases AIA Office shall issue a certificate to successful candidates.
- 4.2** Operators having their own in-house noise abatement training course may apply to AIA for an authorisation to have their in-house training replace the AIA training course as a means to qualify pilots in the Fly Neighbourly program.

## **5.0 CONCLUSION**

The adoption of this code of practice, together with the Fly Neighbourly training courses, and use of the noise abatement procedures that are detailed in the Fly Neighbourly Guide, provide the basis for lowering the noise generated by aircraft in day-to-day operations. In addition, the noise abatement procedures offer a way of reducing the impulsive noise characteristic of helicopters that occur during normal operations and often cause complaints. By adopting and following the Fly Neighbourly Procedures, a high level of public acceptance can be achieved and this is important given that new generation 'quiet' aircraft are still not widely used.

It should also be noted that current public acceptance of aircraft is in general, poor and unless the program outlined in this guide is adopted, further international, national, and local regulations will be enacted to limit aircraft operations. Therefore, AIA strongly recommends that its members adopt this code of practice.

If the procedures given in this code are followed, public acceptance will be improved and the aviation industry will be able to flourish and grow, without being restricted by the burden of new noise regulations and operational restrictions.