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AIRPORT PLANNING MANUAL

Part 2 — Land Use and Environmental Control

Third Edition — 2002

AMENDMENT NO. 1

1. Replace existing pages with the attached new pages dated 27/3/09:

a)	Page *(iii)*	—	Foreword
b)	Pages *(v)* and *(vi)*	—	Table of Contents
c)	Pages 1-1 and 1-2	—	Chapter 1
d)	Pages 2-1 to 2-5	—	Chapter 2
e)	Pages 3-1, 3-3 to 3-11	—	Chapter 3
f)	Pages 4-1 to 4-4	—	Chapter 4
g)	Pages 5-2 and 5-4 to 5-6	—	Chapter 5
h)	Pages 6-3 and 6-5	—	Chapter 6
i)	Pages A1-1 to A1-25	—	Appendix 1
j)	Pages A3-2, A3-31, A3-32, A3-41 and A3-42	—	Appendix 3
k)	Page A4-1	—	Appendix 4

2. Record the entry of this Amendment on page (ii).

Foreword

The purpose of this part of the manual is to provide guidance material on land-use planning in the vicinity of airports and on environmental control regarding airport development and operations. It was originally based on conclusions of the Special Meeting on Aircraft Noise in the Vicinity of Aerodromes held in 1969 and on the current practices of several States. It incorporates guidance material on airport environmental aspects as recommended by the Eighth Air Navigation Conference held in 1974.

"Land-use Planning" and "Environmental Control" are terms of relevance used by airport planners for planning the airport and its environs with a view to ensuring the safety of aircraft operations. Since these issues have evolved considerably in recent years, it was necessary to update the information included in previous editions of the manual.

This publication reflects updates from the Committee on Aviation Environmental Protection (CAEP) that were first presented to CAEP/4 in 1998. Further updates have since been added and this final version of the manual was approved at the CAEP/7 meeting in February 2007.

It is intended that the manual be kept up to date. Future editions will be improved based on the results of the work of ICAO and of comments and suggestions received from the users of this manual. Readers are therefore invited to give their views, comments and suggestions on this edition. These should be directed to the Secretary General of ICAO.

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Table of Contents

Chapter 1

General

1.1 THE AIRPORT AND ITS ENVIRONS

1.1.1 The compatibility of an airport with its environs is an ideal that can be achieved by proper planning of the airport, control of pollution-generating sources, and land-use planning of the area surrounding the airport. The aim is to provide the best possible conditions for the needs of the airport, the community in the surrounding area and the ecology of the environment.

1.1.2 Airport planning must be recognized as an integral part of an area-wide comprehensive planning programme. The location, size and configuration of the airport need to be coordinated with patterns of residential, industrial, commercial, agricultural and other land uses of the area, taking into account the effects of the airport on people, flora, fauna, the atmosphere, water courses, air quality, soil pollution, rural areas (such as deserts) and other facets of the environment.

1.1.3 Within the comprehensive planning framework, airport development and operations should be coordinated with the planning, policies and programmes for the area where the airport is located. In this way, the social and economic impact, along with the environmental effects of the airport, can be evaluated to ensure to the greatest extent possible that the airport environs are compatible with the airport and, conversely, that the physical development and use of the airport is compatible with the existing and proposed patterns of land use. To the extent that technical considerations permit a choice, decisions on runway alignment and other airport development should take into account their potential effects on the environment in order to prevent or minimize environmental conflicts. In effect, "land-use control" is a term which describes only a portion of the total planning process, and even highly innovative controls can have little impact unless they are imposed within the context of sound policies and careful planning. "Land-use planning" or "planning for compatible land uses which takes into account the needs of airport development" more adequately describes the process of achieving an optimum relationship between an airport and its environs.

1.2 THE NEED FOR ENVIRONMENTAL CONTROL

1.2.1 In recent years there has been increased public concern regarding the protection of the environment from the impact of transportation, and consequently, a growing emphasis on the need to employ effective measures to minimize such impacts. Since pollution may be generated within an airport as well as within the area surrounding it, environmental controls should be applied at the airport and its environs.

1.2.2 The environment has been defined as including:

a) air, land and water;

b) all layers of the atmosphere;

c) all organic and inorganic matter and living organisms; and

d) the interacting natural systems referred to in a) to c).

Since all of these components interact, disruption to one may have a profound effect on the entire system. Therefore, to lessen local and global impacts, it is important that the entire civil aviation industry endeavours to control harmful emissions. This includes the management of solid and hazardous wastes emanating from paints, lubrication oils, sludge, solvents, toxic chemicals, etc., handled at airports.

1.2.3 Pollution occurring in and around the airport has the potential to affect not only the immediate area, but also the surrounding areas. Because it can have an effect on human health and the ecology of the surrounding area, efforts should therefore be made towards pollution prevention. Environmental controls thus provide a means of either decreasing pollution at the source or reducing the potential for negative environmental impacts. Controls such as air and water quality guidelines, aircraft engine noise limits, waste management plans, environmental emergency plans, and environmental management plans are necessary.

1.2.4 Airports can operate with limited environmental impact by incorporating environmental management plans and procedures with land-use planning. In the past, environmental management has concentrated on pollution abatement or control by finding ways to dispose of waste after it has been produced. More recently, organizations have been shifting toward pollution prevention, which focuses on reducing or eliminating the need for pollution control. Pollution prevention can be defined as "the use of materials, processes or practices that reduce or eliminate the creation of pollutants and wastes at the source." It includes practices that reduce the use of hazardous and non-hazardous materials, energy, water or other resources. Anticipatory action is used to preempt the need for control or remedy.

1.3 THE NEED FOR LAND-USE PLANNING

1.3.1 The need for some public control of land in the vicinity of an airport was recognized in the early history of civil aviation. In general, these early measures were usually concerned with height control of possible hazards or obstacles to flight into or out of airports. Also recognized was the need to control potentially conflicting activities, such as:

a) activities that could cause electrical interference with radio communications and navigation aids;

b) lights that might confuse pilots in the clear interpretation of aeronautical lights;

c) the production of smoke that reduces visibility; and

d) the presence of accumulated solid waste on which birds may feed and thus could cause accidents to approaching or departing aeroplanes (Ref. *Airport Services Manual*, Part 3 — *Bird Control and Reduction* (Doc 9137)).

Although litigation regarding aircraft noise did occur in the early 1960s, it was only after the widespread introduction of commercial turbo-jet aircraft that the compatibility of land use with noise exposure in the vicinity of airports became a major consideration. Today, aircraft noise is probably the most significant form of pollution caused by aircraft operation and is therefore a major factor influencing land-use planning in the vicinity of airports.

1.3.2 The requirement for land-use planning in the vicinity of an airport is twofold, namely:

a) to provide for airport needs, e.g. obstacle limitation areas and future airport development, and

b) to ensure minimal interference to the environment and the public, e.g. by locating residential areas away from zones subject to excessive noise or other pollution and by preserving parklands.

Chapter 2

Environmental Impacts Associated with Aviation Activities

2.1 GENERAL

This chapter deals with environmental problems related to airport and aircraft operations. It identifies most of the major environmental problems that may be directly associated with air transport and civil aviation in particular. However, this does not necessarily mean that all of the subjects are suitable for consideration in this manual. Excluded are problems concerning the conditions for passengers and crew (such as the effects of smoking, ozone, high altitude radiation, or noise and vibration within the cabin) and problems concerning the working conditions of airline or airport employees. These are defined as occupational health and safety issues. For each environmental issue presented, a brief description is provided, including a summary of past and present ICAO activities aimed at solving the problem, as well as comments on the relevant activities of other Organizations, whenever pertinent.

2.2 AIRCRAFT NOISE

2.2.1 Since the introduction of jet aircraft, noise has been considered to be perhaps the most important environmental problem associated with civil aviation. Noise levels in the vicinity of airports are affected by two opposing trends: the replacement of noisy aircraft by quieter ones and the increasing number of aircraft movements. As a result, the problem of noise may decline at some airports but increase at others. The noise problem has prevented the expansion of airport capacity in some cases, thereby contributing to airport congestion. Because of this and other environmental problems, some States are considering limit-ing aircraft operations at airports based on environmental considerations, rather than on airport capacity. In other words, the standard "operational airport capacity" is replaced by measures of capacity based on environmental parameters.

2.2.2 Engine testing and auxiliary power units (APUs) used during ground operation, as well as other equipment such as ground power units (GPUs) and ramp vehicles, are additional noise sources at airports.

2.2.3 Sonic boom, caused by supersonic aircraft, is not a major problem at the present time but could become an issue if manufacturers proceed with plans for a new generation of supersonic aircraft. This problem was considered in detail by ICAO during the 1970s when supersonic aircraft operations were first introduced. Guideline material was published in 1975 (see Circular 126, *Guidance Material on SST Aircraft Operations*). ICAO's earlier work on this problem remains valid. At present, most States do not permit civil supersonic flights over their territories. For most aircraft types, the noise caused by aircraft en route (other than sonic boom) is not a significant problem because the aircraft are flying too high to cause a disturbance at ground level. However, this can be a problem in the case of helicopters and, if ever they materialize, aircraft driven by propfan engines.

2.2.4 Annex 16 — *Environmental Protection*, Volume 1 — *Aircraft Noise* sets the Standards for noise certification of large subsonic jet and propeller-driven aircraft, small propeller-driven aircraft and helicopters. The Committee on Aviation Environmental Protection (CAEP) keeps the Standards under review. At present, there are no specific Standards for supersonic aircraft. Annex 16 also includes guidelines for noise certification of APUs, as well as for noise monitoring.

2.2.5 A worldwide policy has been developed regarding operating restrictions on non-noise-certificated aircraft and Chapter 2 aircraft, as adopted in 1990 (Resolution A28-3[1]). Following the adoption of Resolution A28 3, some States with noise problems (e.g. ECAC/EC and the United States) introduced operating restrictions on Chapter 2 aircraft.

1. Superseded by A33-7.