Advisory Circular

AC 139-15

Aeronautical Studies for Aerodrome Operators

Revision 0
12th Jan 2015

General

Civil Aviation Authority Advisory Circulars contain information about standards, practices, and procedures that the Director has found to be an **Acceptable Means of Compliance (AMC)** with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate Advisory Circular.

An Advisory Circular may also include **Guidance Material (GM)** to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

Purpose

This Advisory Circular provides information and guidance to assist aerodrome operators and other parties to undertake an aeronautical study.

Related Rules

This Advisory Circular relates specifically to Civil Aviation Rule Part 139

Change Notice

Initial issue

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Chapter 1 — General

1.1 Introduction

1.1.1 In accordance with the requirements of Rule Part 139.107, Aeronautical Study, where the holder of an aerodrome operating certificate must monitor operations and conduct an aeronautical study when a significant change in aerodrome operations occurs that may affect the safety of aircraft operations. These significant changes in aerodrome operations include a change in aerodrome aircraft traffic, a change in aircraft operations type, a change in the aerodrome physical characteristics, an increase in aerodrome accidents/incidents, or a change in airspace designation.

1.1.2 This Advisory Circular details how an aeronautical study is conducted to assess the impact of deviations from the aerodrome standards specified in Volume I to Annex 14 to the Convention on International Civil Aviation, and the national regulations, to present alternative means of compliance.

1.1.3 The aeronautical study estimates the effectiveness of each alternative and recommends procedures to compensate for the deviations from CAR Part 139 standards and requirements for aerodromes taking into account Papua New Guinea's aviation environment.

1.1.4 Aeronautical study justification may either be quantitative or qualitative.

1.2 Applicability

1.2.1 An aeronautical study is most frequently undertaken during the planning of a new airport, during the certification of an existing aerodrome or during the operation of an aerodrome.

1.2.2 For the purposes of, but not limited to Rule Part 139.17, 139.55, 139.89 and 139.119, it is recommended that this Advisory Circular provides guidance to aerodrome operators when analysing aeronautical problems.

Note — Aeronautical studies may not be conducted in cases of deviations from the standards, if not specifically recommended in Annex 14, Volume I.

1.3 Definitions

1.3.1 An aeronautical study is the study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety.

1.3.2 The scope of an aeronautical study usually reflects one of three situations:-

i. The existing operation, e.g. the aerodrome, airspace or ATS (or sometimes just a particular part of the operation); or
ii. A change to the existing operation; or
iii. A new operation.

Chapter 2 — Aeronautical Safety

2.1 Introduction

2.1.1 An aeronautical study is a tool used to review aerodrome and airspace processes and procedures to ensure that safety criteria in place are appropriate. The study can be undertaken in a variety of ways using various analytical methods appropriate to the aeronautical study requirements.

2.1.2. An aeronautical study should include the use of;

- current state review (baseline position)
- quantifiable data analysis
- stakeholder interviews
- safety/risk matrix

2.1.3 An aeronautical study may contain many elements; however risk assessment, risk mitigation and risk elimination are key components. Additionally there may be aviation system constraints.

2.1.4 The goal of risk management in an aeronautical study is to identify risks, and take appropriate action to minimise risk as much as is reasonably practicable. Decisions made in respect of risks must balance the technical aspects of risk with the social and moral considerations that often accompany such issues. For an effective outcome there should be a level of consensus as to their acceptability among the key stakeholders.

2.1.5 The safety outcomes is the focus of this Advisory Circular, however there may also be non-safety consequences, such as financial loss and operational loss of the aircraft, increased insurance costs and damage to reputation. This Advisory Circular serves as a guidance material for the conduct and evaluation of aeronautical studies/risk assessments for aerodrome operators and regulatory staff and goes on to describe the trigger factors that may lead to an aeronautical study, the conduct of the study and the types of activities that should be included in the study.

2.1.6 This Advisory Circular does not, and cannot, include a formula that is guaranteed to give the correct solution, nor does it tell the individual or organisation conducting a study what it should value. The appropriate constraints and goals are left to the judgement of those carrying out the study. The aeronautical study should be seen as a framework for effective decision-making, rather than as a guaranteed process to come up with the correct outcomes.

2.1.9 The aeronautical study process determines the site-specific need for services, identifies and recommends a course of action, or presents options for decision makers to act upon. In all cases the aeronautical study should document and demonstrate the site-specific need and rationale for the level of service, procedure design or operational requirements.

2.2 Trigger Factors

2.2.1 Aerodrome operators may use the aeronautical study as part of its operations and strategic planning. This forms an integral part of the aerodrome’s Quality Assurance and Safety Management Systems.

2.2.3 The aeronautical study is to be used to determine levels of operational safety, service or procedures that should apply at a particular aerodrome or location. The decision to undertake this type of study may be triggered by any one or more of a wide range of factors.

These may include changes to:-

- The number of movements; or
- The peak traffic periods; or
- The ratio of IFR to VFR traffic; or
- The type of operations - scheduled, General Aviation (GA), training, etc; or
- The types, and variety of types, of aircraft using the aerodrome (jet, turbo-prop, rotary, etc); or
- Aerodrome layout; or
- Aerodrome management structure; or
- Runway or taxiway and associated manoeuvring areas; or
- Operations of a neighbouring aerodrome or adjacent airspace.

Feedback about any changes should be sought from aviation stakeholders including pilots, individuals and other representative groups as part of the study.

2.2.4 An aeronautical study may be initiated by the Director Civil Aviation Safety Authority, an aerodrome operator or another interested party, such as an air traffic service provider or air operators.

2.2.5 The Civil Aviation Safety Authority of Papua New Guinea can assist in identifying whether an aeronautical study is required and the appropriate methodology for the aeronautical study and in reviewing the aeronautical study.

2.3 Concept of Risk Analysis

2.3.1 Risk as defined by ISO 31000 is the effect of uncertainty on objectives. In risk management an effect is considered a deviation from the expected — positive and/or negative.

2.3.2 Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process). Risk management is focused on safety, quality and security objectives.

2.3.3 Risk analysis is a key component of an aeronautical study. Risk is often characterized by reference to potential events and consequences, or a combination of these. Risk can best be described as the likelihood of loss/gain. Risk requires the following conditions:-

i. A potential loss/gain
ii. Likelihood
iii. Choice

2.3.4 A risk scenario is a sequence of events with an associated frequency of occurrence and consequence. This sequence of events may be summarised as “hazard – threats – controls – key event – mitigations – consequences”.

2.3.5 The hazard ultimately generates the loss; it may present a number of threats, each of which, without controls, leading to the “key event”. The key event is the point at which control of the hazard is lost. At this point (key event), mitigations may still avoid or reduce undesirable consequences.

Note. — Controls are proactive defences, while mitigations may be proactive or reactive.

2.3.6 Risk assessment and mitigation requires a systematic approach. The complete process can be divided into seven steps and may be iterative. These are illustrated in the flow chart Appendix 1.

2.3.7 Risk analysis techniques and models must be developed by the aerodrome operator as part of their Safety Management Systems (SMS) and Quality Management Systems (QMS).

Note. — Safety & Quality Management Systems must be base lined in accordance with the CAR Part 100 and its relevant Advisory Circulars.

Chapter 3 — Process

2.1 Introduction

2.1.1 An aeronautical study can identify and evaluate aerodrome service options, including service increases or decreases or the introduction or termination of services (such as the introduction of a rapid exit taxiway or removal of a grass runway). The initial baseline study will be followed by a review of operational issues; this will typically involve an in-depth safety analysis based on quantifiable data and extensive consultation with customers and stakeholders using various interview and data gathering processes. This may identify any changes that are required to ensure the safe, orderly and efficient operation of the aerodrome.

2.1.2 Larger projects may have distinct phases such as requirements definition, design evaluation, introduction to service and routine operation. The aeronautical study can be presented in parts corresponding to these phases as information becomes available; this is illustrated in the flow chart below.

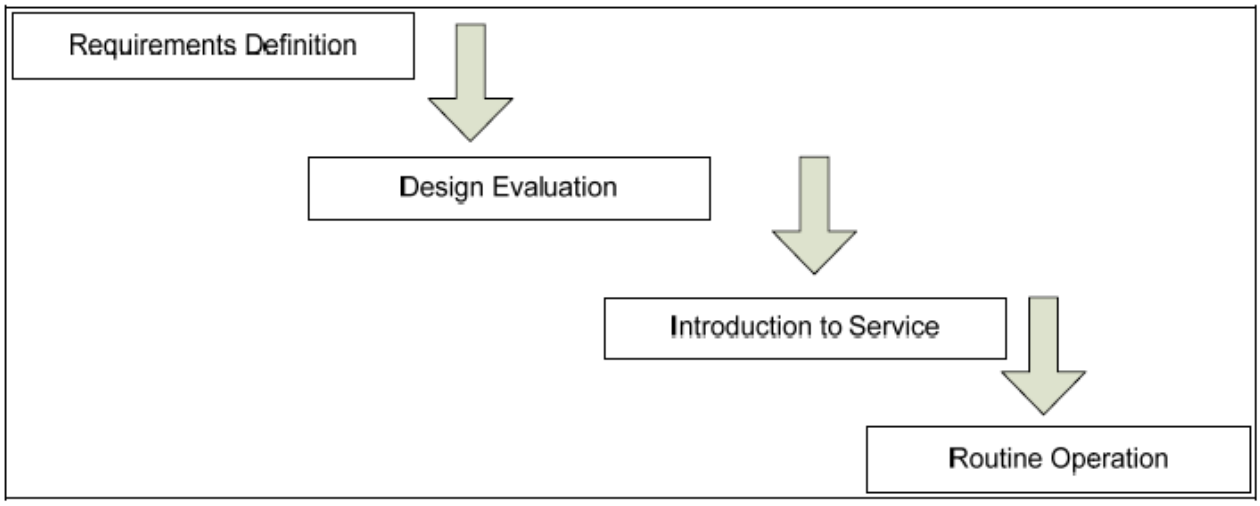


Figure 1: (UKCAA CAP 728 Chap 3)

2.2 Aeronautical Study Methodology

2.2.1 A generic model of an Aeronautical Study methodology may consist of initiation, preliminary analysis, risk estimation, risk evaluation, risk control and action/monitoring and is related to the flow diagram in Appendix 1.

1. Initiation: **Step 1**

This step consists of defining the opportunity or problem and the associated risk issues; setting up the risk management team; and beginning to identify potential users who may be affected by any change.

2. Preliminary Analysis: Step 2.

The second step consists of defining the basic dimensions of the risk problem and undertaking an initial identification, analysis and evaluation of potential risks. This preliminary evaluation will help determine:-

- Whether a situation exists that requires immediate action; or
- Whether the matter requires further study prior to any action being taken; or
- Whether the analysis should be ended as the risk problem is determined not to be an issue.

3. Risk Estimation: Steps 3 & 4.

These steps estimate the degree of risk. Step 3 estimates the severity of the consequences and step 4 estimates the probability of their occurrence.

4. Risk Evaluation: Step 5

The benefits and operational costs of the activity are integrated into the analysis and the risk is evaluated in terms of the safety implications of the activity and of the needs, issues, and concerns of affected users.

5. Risk Control: Step 6

This step identifies feasible risk controls and mitigations which will act to reduce either the probability of the event or the consequence of the event should it occur.

6. Action/Monitoring:

This step identifies the risk mitigation measures (Safety requirements).

7. Implementation of Mitigation Measures: Step 7.

This step entails implementing the chosen risk control options, evaluating the effectiveness of the risk management decision process, and implementing an ongoing monitoring program.

2.4 Consultation

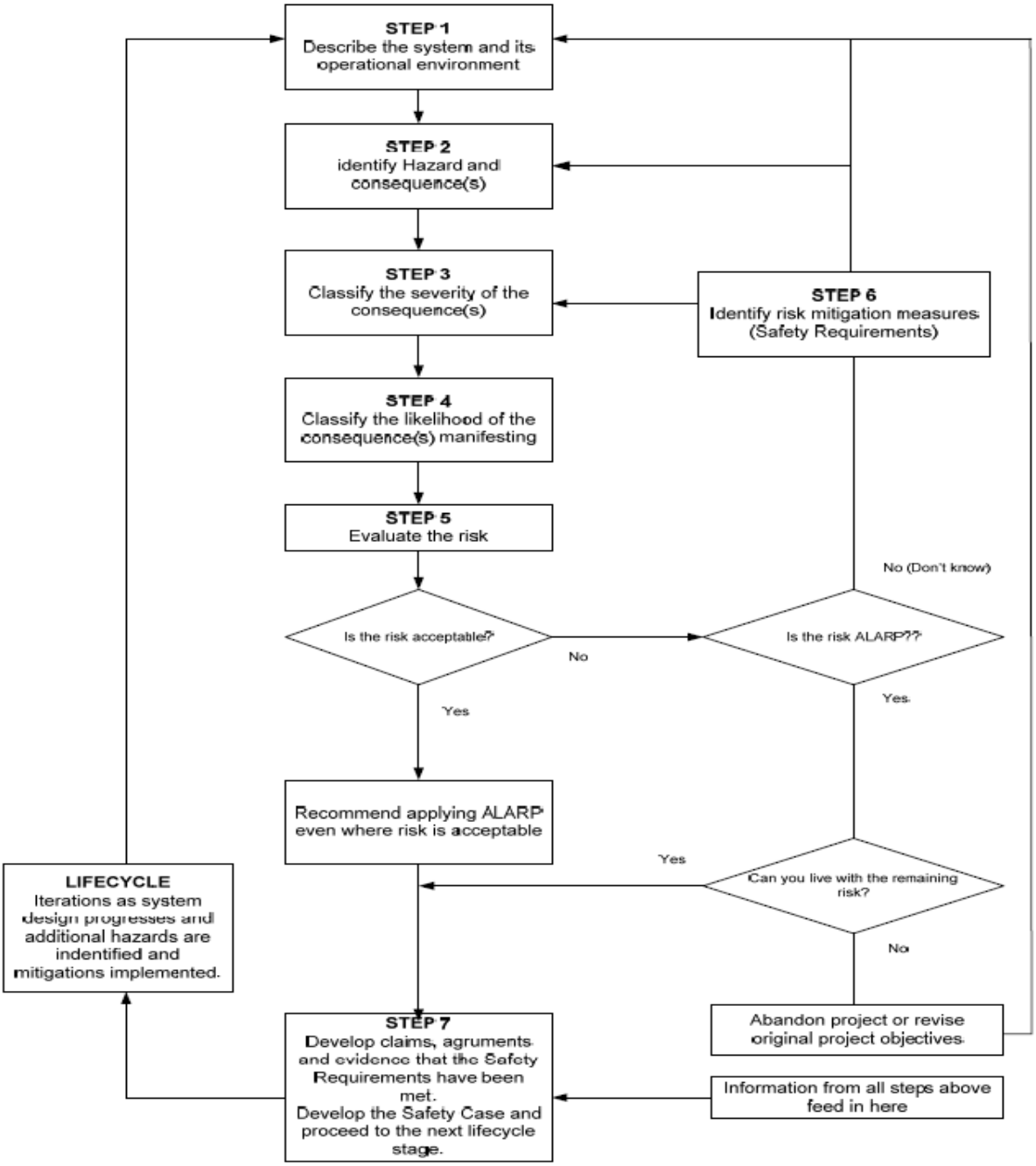
2.4.1 It is essential that, in conducting the aeronautical study, there is consultation with as wide a range of aerodrome users and other stakeholders as possible. Different users have different views of hazards and the corresponding threats, controls, mitigations and consequences. The following should be included in the consultation:

- Aerodrome operators (including adjacent affected aerodrome operators).
- Aerodrome users.
- Airspace user groups.
- Aircraft operators and operator groups.
- Pilot organisations.
- Air traffic service providers.

2.4.2 Experience has shown that consultation undertaken in open meetings, where ideas can be exchanged and debated, generally results in consensus being achieved. Individual consultation, on the other hand, tends to result in dissatisfaction for those whose proposals or viewpoints are not eventually accommodated.

Appendix 1

The Seven Step Approach (CAP 760 Chapter 2)



Note. — Having decided that a mitigation measure may be suitable it will be necessary to repeat steps 3, 4 and 5 in order to evaluate the acceptability of the risk with that proposed mitigation measure in place.