MALDIVES CIVIL AVIATION AUTHORITY
Republic of Maldives

AIR SAFETY CIRCULAR
ASC 139 - 12

Aeronautical Studies for Aerodromes

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Table of Contents

1 Regulatory Compliance

1.1 This ASC shall be used as a guidance material.

2 Related Regulations

2.1 This Circular relates specifically to MCAR 139 and ASC 139-5.

3 Applicability

3.1 This Guidance Material applies to all persons or entities operating and/or maintaining aerodromes certified under MCAR 139.

4 Purpose

4.1 The purpose of this Guidance Material is to provide supplementary guidance to aerodrome operators on what is acceptable to the CAA to demonstrate compliance with MCAR 139 and ASC 139-5.

5 Overview

5.1 Aeronautical Study

5.1.1 An aeronautical study is a study of an aeronautical safety concern or noncompliance to identify possible solutions and select a solution that is acceptable without any reduction in the acceptable level of safety.

5.1.2 A comprehensive aeronautical study allows the aerodrome operator and the CAA to ensure safety and to be assured that the regularity of operations of aircraft is not unnecessarily compromised in the event of a non-compliance. However, regularity of operations might be compromised in order to maintain and achieve the acceptable level of safety.

5.1.3 In case of any deviation or non-compliance from a specific standard contained in the MCARs, the aerodrome operator is required to seek exemption from CAA.

5.1.4 The aeronautical study should be approved by the senior management of the organization before it is submitted to the CAA for acceptance.

5.1.5 It is important to note that this circular on its own does not change, create, amend or permit deviations from regulatory requirements nor does it establish minimum standards.

5.1.6 The study can be undertaken in a variety of ways using different analytical methods and various safety management tools that are appropriate to each specific aeronautical study requirement.

5.1.7 An aeronautical study may contain many elements; however, hazard identification, risk assessment, risk mitigation and risk elimination are key components. Additionally, there may be aviation system constraints. Guidance on conduct of safety risk assessment for aerodromes are provided in ASC 139-13.

5.1.8 The goal of risk management in an aeronautical study is to identify hazards and assess risks, then to take appropriate action to minimize risk as much as is reasonably

practicable to achieve the acceptable level of safety, as if the full compliance were in place.

5.1.9 The objectives of an aeronautical study for aerodrome operator are as follows:

a) To study the impact of deviations from the regulations;
b) To present alternative solutions to ensure the level of safety remains acceptable;
c) To estimate the effectiveness of each alternative;
d) To recommend operating procedures / restrictions or other measures to compensate for the deviation;
e) To check for any new hazards and their resulting risk arising from mitigation; and
f) To indicate the timescale for removal or re-assessment of any noncompliance.

5.1.10 Decisions made in respect of risks must balance the technical aspects of risk with the social and moral considerations that often accompany such issues.

5.1.11 These decisions may have a significant impact on an aerodrome's operation. Therefore, for an effective outcome, there should be appropriate involvement, consultation and a level of consensus as to their acceptability among all key stakeholders. However, in the end, some effect on operations may be necessary. While this Guidance Material focuses on the safety outcomes, there may also be non-safety consequences, such as service level and commercial implication, or financial loss and operational loss of the aircraft, increased insurance costs, and damage to reputation.

5.1.12 This Guidance Material outlines the trigger factors that may lead to an aeronautical study, the key aspects of safety risk management, the conduct of the study, and the sample activities that should be included in the study.

5.1.13 However, this Guidance Material does not, and cannot, include a formula that is guaranteed to give the correct solution, nor does it instruct the aerodrome operator 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. Occasionally, an aeronautical study may prove that the intended change is not viable.

5.1.14 This framework for conducting aeronautical studies proposes a systematic method for analyzing risk issues, that may be complex, to help the aerodrome operator decide with confidence and, if necessary, to articulate these decisions for submission to the CAA.

5.1.15 An aeronautical study is most frequently undertaken during the planning of a new aerodrome or new aerodrome facility, or during the certification of an existing aerodrome; or subsequently, when the aerodrome operator applies for an exemption, as a result of development or a change in the aerodrome operational conditions from the Aerodrome Regulations.

5.1.16 It is the aeronautical study process that determines the site-specific need for services, and identifies and recommends a course of action, or presents options for the aerodrome operator to act upon. In all cases, the aeronautical study should document and demonstrate the site-specific need and rationale for the level of services, procedure designs, or operational requirements to provide an equivalent level of safety as if the study had not been required.

5.2 Trigger Factors

5.2.1 The scope of studies can range from minor adjustments to large scale aerodrome configuration.

5.2.2 The decision to undertake this type of study may be triggered by any one or more of a wide range of factors that may generate a non-compliance. These may include:

a) the number of movements or step change in traffic density, i.e. light / medium / heavy;

b) the types, and variety of types, of aircraft using the aerodrome (jet, turboprop, rotary, etc.); or on smaller operations, just an aircraft model change such as from B737-700 to B737-800 with winglets;

c) aerodrome characteristics and layouts;

d) aerodrome operator management structure;

e) local development – whether structural or use e.g. affecting wildlife or number of people congregating under flight paths; and

f) introduction of any form of new operation or facility.

5.2.3 An aeronautical study may be initiated by the CAA, an aerodrome operator or another interested party, such as an air traffic service provider or air operators.

6 Introduction

6.1 General

6.1.1 Where an aerodrome operator is not able to comply with any standard or requirement stipulated in the Aerodrome Regulations, appropriate risk assessment and/or aeronautical studies shall be conducted to assess the impact of deviations from the standards or requirements. The purpose of such studies is to present alternative means of ensuring the safety of aircraft operations, to estimate the effectiveness of each alternative and to recommend procedures and/or alternative measures to compensate for the deviation.

6.1.2 An aeronautical study may only be undertaken in respect of subjects identified in Aerodrome Regulations or ICAO Annex 14 as appropriate for an aeronautical study, (listed in Appendix A to this Guidance Material).

6.1.3 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).

6.1.4 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, where available, and extensive consultation with aerodrome users and stakeholders using various interviews and data gathering processes including a hazard identification workshop. This study may identify any changes that are required to ensure the safe, orderly, and efficient operation of the aerodrome.

6.1.5 The study will normally cover phases such as requirements definition, design evaluation, introduction to service, and routine operation. The aeronautical study can be presented in parts corresponding to these developing phases as information becomes available, but CAA can only determine the acceptability of a study when it is complete.

6.2 Consultation

6.1.6 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. The following may be included in the consultation:

a) Aerodrome operators (including adjacent affected aerodrome operators);

b) Aerodrome users;

c) Airspace user groups;

d) Aircraft operators and operator groups;

e) Pilot organisations;

f) Air traffic service providers; and

g) CAA.

6.3 Technical Analysis

6.3.1 Technical analysis will provide justification for a deviation on the grounds that an equivalent level of safety can be attained by other means. It is generally applicable on situations where the cost of correcting a problem that violates a standard is excessive but where the unsafe effects of the problem can be overcome by some procedural or other means which offer both practical and reasonable solutions.

6.3.2 In conducting a technical analysis, an aerodrome operator should draw upon their practical experience and specialized knowledge. The aerodrome operator may also consult other specialists in relevant areas. When considering alternative procedures in the deviation approval process, it is essential to bear in mind the safety objective of the Aerodrome Regulations and the applicable standards and/or requirements so that the intent of the regulations is not circumvented.

7 Aeronautical Study for Aerodrome

7.1 The Aeronautical Study Contents

7.1.1 CAA will review these studies on a case-by-case basis and determine their acceptability.

7.1.2 An aeronautical study submitted to CAA for determination of acceptability should comprise the following parts:

a) Aim of the study;

b) Background including system description;

c) Hazard identification and safety assessment;

d) Recommendations;

e) Conclusion; and

f) Monitoring of the deviation.

7.2 Aim of the Study

7.2.1 The aim of the study should be explicitly stated. It should:

a) resolve the safety concerns;

b) identify safety measures to be put in place to ensure safe aircraft operations in an aerodrome;

c) make reference to the specific regulations which the study is meant to address; and

d) indicate how the acceptable level of safety will be achieved and maintained.

7.2.2 An example to illustrate this would be as follow:

"The aim of this aeronautical study is to address the operation of <name of aerodrome> with high ground on its north side that infringes the inner horizontal surface, and to put in place <list of safety measures> necessary to ensure safe operation of all aircraft at <name of aerodrome> with reference made to <reference to specific regulation>…"

7.3 Background

7.3.1 Information on the current situation faced by the aerodrome operator, current procedures that have been put in place and other relevant details should be clearly stated and explained in this sub-section. Clear explanation should be provided, particularly on the following:

a) What is the current situation? i.e. a system description

b) Where are the areas that will be affected by the proposed deviation?

c) When will the aerodrome operator be able to comply with the specific standard if it is due to development of the aerodrome?

d) Why is there a need to review the current processes and procedures?

e) How will the proposed deviation affect the operation of aircraft at the aerodrome?

7.3.2 An example to illustrate this would be as follows:

"All aerodrome are required by the regulation to comply with specific obstacle limitation surfaces according to the operation of the aerodrome. Due to high ground to the north of <name of aerodrome>. This study is undertaken to ensure the safe and efficient operation of <name of aerodrome> by identifying the hazards of the high ground, assessing the safety risks and determining appropriate actions and procedures…"

7.4 Hazard Identification and Safety Risk Assessment

7.4.1 Guidance on conduct of safety risk assessment for aerodromes are published separately in ASC 139-13.

7.4.2 There is no standard methodology to conduct a safety assessment and it is up to the aerodrome operator to determine the appropriate methodology for each aeronautical study, depending on the size and complexity of the situation and the severity of the safety implications. However, the methodology adopted should be consistent with that established in the aerodrome operator's Safety Management System (SMS).

7.5 Recommendations

7.5.1 To allow the aerodrome operator and CAA to be assured that the proposed deviation will not pose a reduction in the level of safety, the aerodrome operator should recommend operating procedures / restrictions or other measures that will address any safety concerns. In addition, the aerodrome operator should estimate the effectiveness (through trials, surveys, simulations, etc.) of each recommendation listed to identify the best means to address the proposed deviation.

7.5.2 The aerodrome operator should also ensure that the affected parties are well informed of such changes. The notification procedure including process flow, time frame, and different means of notification such the Aeronautical Information Publication (AIP) in accordance with the AIRAC cycle, if applicable, and Notice to Airmen (NOTAM) should be included in the study.

7.5.3 An example to illustrate this would be as follow:

"The following are some of the operating procedures / restrictions or other measures as well as their measured effectiveness, which could be adopted to ensure safe aircraft operations in <name of aerodrome>:

<Name of the operating procedures/restrictions or other measures and their corresponding measured effectiveness>

The notification procedure to the affected parties is as follow:

<Description of the notification procedure including process flow, time frame, and different means of notification>

7.6 Conclusion

7.6.1 The aerodrome operator, after taking into account all the necessary considerations listed above, should summarize and conclude the results of the aeronautical study, and come to a decision on any safety measures that should be adopted. The aerodrome operator should also specify a date to put in place all the necessary safety measures and show how they maintain the same level of safety with the recommended safety measures mentioned in the aeronautical study, as well as stating the interim measures until all such safety measures are implemented.

7.6.2 An example to illustrate this would be as follow:

"*The results of this aeronautical study have concluded that <obstacle in the inner horizontal surface> would have posed a reduction in the level of safety. However, by adopting prohibition of flight on that side of the aerodrome, this reduction in the level of safety can be safely addressed. These safety measures will be put in place on <proposed date> to address the proposed deviation. With these safety measures put in place, the same level of safety can be achieved as if the <the cause of the study> had not occurred due to segregation of the hazard from the operation.*"

7.7 Monitoring of the Deviation

7.7.1 After the completion of the aeronautical study, the aerodrome operator should monitor the status of the deviation and ensure that the implemented recommendations have been effectively carried out, and that the level of safety is not compromised at any time. This assessment is to allow feedback into the safety assessment process, if required.

7.7.2 An example to illustrate this would be as follow:

"*<Name of the aerodrome operator > will monitor the deviation's status <fixed period of time> and ensure the safety measure has been effectively carried out and the level of safety is not compromised at any time. <Name of the aerodrome operator> will review the safety assessment process, if required. Any inadvertent flight on the north side of the aerodrome shall be investigated and reported to CAA, together with any necessary enhancement of procedures to avoid any repetition.*"

7.7.3 For temporary deviations, the aerodrome operator should also notify CAA after the deviation has been corrected.

7.8 Submission of Aeronautical Study to CAA

7.8.1 The aerodrome operator should note the guidance provided in this circular and use the suggested checklist provided in Appendix B to ensure that any aeronautical study submitted to CAA for consideration of acceptance is thoroughly conducted and documented.

7.8.2 The CAA can assist in identifying whether an aeronautical study is required and the appropriate methodology for the aeronautical study and will review the outcome of the aeronautical study.

7.9 Issuance of Exemptions

7.9.1 MCAR 139.90 grants CAA with the power to exempt, in writing an aerodrome operator from complying with specific provisions of MCAR 139.

7.9.2 The CAA, where satisfied with the results of the aeronautical study, equivalent level of safety and mitigating measures provided, may offer an exemption to the compliance within the provision of the regulations. The exemptions may be withdrawn when the Authority is of opinion that the applicant is not inclined to resolving the non-conformances for which the exemptions were issued. Conversely, application for exemption may be disapproved by the Authority where the degree of hazard is intolerable and may significantly affect safety.

For the Civil Aviation Authority

Hussain Jaleel
Chief Executive

Appendix A Aeronautical Study Applicability

Below is an example of list of non-compliances for which an aeronautical study may be applied or considered.

1) Dimensions of a runway end safety area;
2) Dimensions of a runway strip width;
3) Width of a radio altimeter operating area;
4) The separation distance between the centre line of a taxiway and the centre line of a runway, the centre line of a parallel taxiway, or an object;
5) Anything which may endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal surface and conical surface;
6) Permitting new objects or extensions of existing objects above approach surface, transitional surface, conical surface, and inner horizontal surface; or above any of the surfaces required by Aerodrome Regulations;
7) Permitting existing objects above the approach surface, transitional surface, take-off climb surface, conical surface, and inner horizontal surface; or above any of the surfaces required by Aerodrome Regulations;
8) Objects which extend to a height of 150 m or more above ground elevation;
9) Marking and lighting of a fixed obstacle that extends above a take-off climb or an approach surface within 3,000 m of the surface's inner edge; or above a transitional surface; or above a horizontal surface; or other objects that could constitute a hazard to aircraft;
10) Marking and lighting of overhead wires, cables, etc., crossing a river, waterway, valley, or highway; and their supporting towers; and other objects outside the obstacle limitation surfaces;
11) Extended beam spread of medium and high-intensity obstacle lights;
12) Use of high-intensity obstacle lights;
13) Marking and lighting of wind turbine rotor blades, nacelle, and supporting mast;
14) The wheel clearances above threshold;
15) The azimuth spread of the PAPI/APAPI light beam;
16) Removal of, or actions for objects above a PAPI/APAPI obstacle protection surface; and
17) Not providing a location sign in conjunction with a direction sign.

Appendix B Checklist for Aeronautical Study

This appendix provides Aerodrome operators as well as Aerodrome Inspectors with a suggested checklist for reviewing of an aeronautical study. An aerodrome operator may use this checklist as a guide for developing an aeronautical study tailored to its individual situation.

The suggested checklist for reviewing of an aeronautical study is as shown below:

CHECKLIST FOR AERONAUTICAL STUDY/SAFETY ASSESSMENT	YES	NO	REMARKS
1. Aim of the study including a) address safety concerns, b) identify safety measures, and c) refer to specific standards in MCAR;			
2. Consultation with stakeholders, senior management team and divisions/ departments affected;			
3. The study is approved by a senior executive of the organization;			
4. Background information on the current situation;			
5. Proposed date for complying with the standard, if the deviation is due to development of the aerodrome;			
6. Safety assessment including (a) identification of hazards and consequences and (b) risk management;			
7. The safety assessment used in the study (e.g. hazard log/risk register, risk probability and severity, risk assessment matrix, risk tolerability and risk control/mitigation);			
8. Recommendations (including operating procedures/restrictions or other measures to address safety concern) of the aeronautical study.			
9. How the proposed deviation will not pose a drop in the level of safety; details			
10. Estimation of the effectiveness of each recommendation listed in the aeronautical study;			
11. Notification procedure including process flow, time frame and the publication used to promulgate the deviation;			
12. Conclusion of the study;			
13. Monitoring of the deviation; and			
14. Notification to CAA once the temporary deviation has been corrected.			