



**MALDIVES CIVIL AVIATION AUTHORITY**  
**Republic of Maldives**

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**AIR SAFETY CIRCULAR**

**ASC 11-1**

**ISSUANCE OF TERRAIN or OBSTACLE ALERT / WARNING**

Initial Issue, 15<sup>th</sup> November 2022

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**1.0 INTRODUCTION**

The Maldives Civil Aviation Authority, in exercise of the powers conferred on it under articles 5 and 6 of the Maldives Civil Aviation Authority Act 2/2012, brings out this circular. The related regulation for this Circular is MCAR-11.

This ASC is provided for information and guidance purposes. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This ASC on its own does not change, create, amend, or permit deviations from regulatory requirements, nor does it establish minimum standards.

This ASC may use mandatory terms such as “must”, “shall” and “is/are required” so as to convey the intent of the regulatory requirements where applicable. The term “should” is to be understood to mean that the proposed method of compliance is strongly recommended, unless an alternative method of safety protection is implemented that would meet or exceed the intent of the recommendation.

**1.1 Purpose**

The purpose of this ASC is to bring to the attention of Air Traffic Service (ATS) providers that ground-based surveillance systems and their associated functions must provide the necessary levels of terrain avoidance protection to aircraft provided with radar services by ATC. This includes the need to ensure that there is adequate terrain clearance in all phases of flight in and around controlled airports where MSAW is installed and used.

**1.2 Applicability**

This ASC is applicable to ATS providers using ground-based surveillance systems that are capable of generating a Minimum Safe Altitude Warning (MSAW).

## 2.0 REFERENCES

2.1 The following reference material may be consulted for information purposes:

- 1) ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) Doc 4444
- 2) MCAR-11 and MCAR-15

2.2 Definitions and Abbreviations

1) Definitions

Note: The term MSAW can be found in ICAO documents; however, an ICAO definition has not been established as yet.

2) Abbreviations

- (a) **APRAST**: Asia Pacific Regional Aviation Safety Team
- (b) **ATC**: Air Traffic Control
- (c) **ATCO**: Air Traffic Controller
- (d) **ATS**: Air Traffic Services
- (e) **eTOD**: Electronic Terrain Obstacle Data
- (f) **GASP**: Global Aviation Safety Plan
- (g) **MSAW**: minimum safe altitude warning
- (h) **RASG**: Regional Aviation Safety Group
- (i) **SEI**: safety enhancement initiative

## 3.0 BACKGROUND

3.1 ICAO in its Global Aviation Safety Plan (GASP) 2013 continues to prioritize action in three areas of aviation safety – improving runway safety, reducing the number of Controlled Flight into Terrain (CFIT) accidents, and reducing the number of loss of control in-flight accidents and incidents. All these actions will contribute to the overarching priority of the GASP to continually reduce the global accident rate.

3.2 In line with the ICAO's GASP and, the RASG/APRAST Controlled Flight into Terrain Subgroup developed a Safety Enhancement Initiative (SEI) focused on Minimum Safe Altitude Warning Systems (MSAW) with a goal of precluding future CFIT accidents.

3.3 Minimum Safe Altitude Warning (MSAW) is a ground-based safety net intended to warn the Air Traffic Controller (ATCO) about the increased risk of controlled flight into terrain by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles.

The main purpose of MSAW is to enhance safety and not to monitor adherence to any specified minima. In practice MSAW is a part of the ATC system and from this perspective it can be regarded as a “function”.

3.4 The MSAW function monitors the levels reported by aircraft transponders with pressure-altitude reporting capability against defined minimum safe altitudes. When the level/altitude of an aircraft is detected or predicted to be lower than the applicable minimum safe altitude, an acoustic and visual warning is

generated to an Air Traffic Controller within whose area of responsibility the aircraft is operating.

- 3.5 MSAW adds independent alerting logic to the control loop to help prevent controlled flight into terrain by generating alerts of existing or pending situations related to aircraft proximity to terrain or obstacles, which require attention/reaction.
- 3.6 In order to provide the MSAW function with proper data for monitoring, a terrain and obstacles model should be created in the Air Traffic Control system. ICAO Annex 15 (Chapter 10) requires states to provide Electronic Terrain and Obstacle Data (eTOD) for the use in different air navigation applications, including MSAW. The eTOD should be provided as data sets having specific numerical requirements and covering the following areas:
- Area 1: the entire territory of a State
  - Area 2: within the vicinity of an aerodrome, sub-divided in smaller sections
  - Area 3: the area bordering an aerodrome movement area
  - Area 4: the area extending 900x60m prior to the runway category II or III threshold.
- 3.7 In addition ICAO Doc. 4444 PANS-ATM provides guidance on the development of local instructions concerning the use of the MSAW function.

#### **4.0 PERFORMANCE**

- 4.1 The performance of the MSAW function can be described as the best balance between warning time and nuisance alert, taking into account local environment. In this way an Air Traffic Controller would be able to rely on the MSAW during the provision of service.

#### **5.0 INVESTIGATIONS**

- 5.1 However the operational use of MSAW has not always led to the best advantage being taken of its potential as a safety net. Investigations of accidents and serious incidents which occurred in an ATS environment where MSAW was available sometimes disclosed problems with the display of MSAW alerts to controllers, its selection and serviceability and with the operational procedures and associated training.

#### **6.0 TRUST, TRAINING AND ANALYSIS**

- 6.1 The use of MSAW depends in part on the controller's trust. Trust is a result of many factors such as reliability and transparency. Neither mistrust nor complacency is desirable; training and experience are needed to build trust at the appropriate level. An excessive amount of false alarms can reduce the controller's confidence in the MSAW.
- 6.2 Good practices of using the MSAW have shown that the increasing complexity of the MSAW and the environment in which it is used is addressed through appropriate training and competency assessment. The primary goal of the

training is to develop and maintain an adequate level of trust in MSAW, i.e., to make controllers aware of situations where MSAW is likely to be effective and, more importantly, situations in which MSAW will not be so effective (e.g., sudden, unexpected manoeuvres).

- 6.3 Retaining electronic records by the ATS provider of all MSAW alerts generated may facilitate statistical analyses. The data and circumstances pertaining to each alert should be analyzed to determine whether an alert was justified or not. Non-justified alerts, e.g., during visual approach, should be ignored. A statistical analysis should be made of justified alerts in order to identify possible shortcomings in airspace design and ATC procedures as well as to monitor overall safety levels.

## **7.0 ACTION BY ATS SERVICE PROVIDER**

- 7.1 ATS Service provider should enhance aviation safety by:
- 1) Ensuring that ground-based surveillance systems and their associated functions provide the necessary levels of terrain avoidance protection to aircraft operating within the airspace under their control; and
  - 2) Ensuring that Air Traffic Controller training is adequate and appropriate to operate and use MSAW systems.

## **8.0 EFFECTIVITY**

- 8.1 This Air Safety Circular comes into effect on 30<sup>th</sup> November 2022.



**For the Civil Aviation Authority**  
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