

Number: 01/2017

Issued: 5 April 2017

MITIGATING MEASURES TO REDUCE PROBABILITY AND SEVERITY OF AIRCRAFT UNDERSHOOTING OR OVERRUNNING A RUNWAY AT AN AERODROME

1 Introduction

- 1.1 Reports from the ICAO Accident / Incident Data Reporting (ADREP) system show that aircraft undershooting or overrunning the runway during landings or take-offs suffer significant damage. To minimize such damage, it is considered necessary to provide an additional area beyond the end of the runway strip. This area is known as the Runway End Safety Area (RESA). A RESA should be capable of adequately supporting any aircraft which overruns or undershoots the runway and should be clear of all equipment and installations which are not frangible.

2 Purpose

- 2.1 The purpose of this NOTAO is to assist aerodrome operators in assessing the level of risk of an aircraft undershooting or overrunning a runway at their aerodromes and suggest mitigating measures that may be appropriate to reduce probability and severity of an event.

3 Scope

- 3.1 This NOTAO is addressed to all certified aerodrome operators in Singapore.

4 Cancellation

- 4.1 This NOTAO supersedes NOTAO 01/2012.

5 Effective Date

- 5.1 This ASP takes effect on 5 April 2017.

6 Compliance with the Manual of Aerodrome Standards

- 6.1 Aerodrome operators are required to comply with the RESA requirements found in the Manual of Aerodrome Standards (MOAS), Section 7.2.5.

7 Aeronautical Study or Risk Assessment

- 7.1 Aerodrome operators, as part of their Safety Management Systems (SMS)

framework, should assess the risk of an aircraft undershooting or overrunning a runway, through an aeronautical study or risk assessment, where the RESA does not extend to the recommended distance for the runway code number.

8 Mitigating Measures

- 8.1 Mitigating measures will be required to eliminate the risks identified. In many cases where risks identified could not be eliminated, they should at least be reduced to a level that is as low as reasonably practicable.
- 8.2 The following lists provide mitigating measures which could be adopted by the aerodrome operator, singly or in combination to reduce the risks of an aircraft undershooting or overrunning a runway.

(a) **Probability** – *The likelihood that either an undershoot or overrun might occur.*

Mitigating measures include:

- (i) Establish a Runway Safety Programme using multidisciplinary approach to prevent and mitigate the effects of runway excursions and other events related to runway safety;
- (ii) Ensure an open communication between the aerodrome operator, air navigation service provider and aircraft operators to raise awareness of the factors that could lead to a runway excursion and to discuss and implement mitigating measures for such events;
- (iii) Put in place a maintenance programme for runway such that the runway will be inspected and their conditions monitored regularly;
- (iv) Improve runway friction characteristics;
- (v) Set higher friction levels for:
 - (1) Maintenance friction level below which corrective maintenance action should be initiated; and
 - (2) Minimum friction level below which information that a runway may be slippery when wet should be made available;
- (vi) Ensure visual aids for runway such as touchdown zone markings and lights are correctly located, clearly visible and are in accordance with the MOAS requirements;
- (vii) Ensure accurate and up-to-date information on weather and runway conditions is made available to pilots and the maintenance personnel;
- (viii) Ensure the accuracy of any Aeronautical Information Publications with regard to the obstacle environment and declared distances

are in accordance to the MOAS requirements and other requirements promulgated by the CAAS;

- (ix) During runway maintenance works, ensure that any temporary reduced declared distances are clearly communicated to pilots and that any visual aids correspond to the actual declared distances are available;
- (x) During runway resurfacing projects, ensure that accurate information regarding the condition of the runway surface is effectively promulgated to pilots;
- (xi) In consultation with aircraft operators and air navigation service providers formulate procedures to help ensure stabilised approaches;
- (xii) In consultation with aircraft operators and air navigation service providers consider operating procedures or restrictions for inclement weather conditions.

- (b) **Severity** – *The possible consequences of either an undershoot or overrun, taking as reference the worst foreseeable situation.*

Mitigating measures include:

- (i) Reduce the declared distances in order to provide an increased length of RESA. Aerodrome operator should consult the aircraft operators to determine what effects it would have on their operations;
- (ii) In the case where the runway has a displaced threshold, examine whether the threshold can be moved (downwind) to increase the RESA;
- (iii) Eliminate obstacles in the area beyond the RESA. In cases where it is not possible to eliminate the obstacles, they should be assessed for its purposes and make frangible whenever possible;
- (iv) Improve the slopes in the RESA to minimise or remove downward slopes if any;
- (v) Provide paved RESA with good friction characteristics;
- (vi) Consider land acquisition and realigning fences or roads to provide additional length of RESA.

9 Review of Aeronautical Study or Risk Assessment

- 9.1 Aerodrome operators should review their aeronautical study or risk assessment regularly and whenever significant changes occur that would affect either the probability or severity of an undershoot or overrun.

9.2 Changes include but are not limited to the following:

- (1) Changes to the declared distances;
- (2) New or larger aircraft types operating at the aerodrome;
- (3) Changes to the number of aircraft movements at the aerodrome;
- (4) Changes to the air traffic mix;
- (5) Runway closures for maintenance or projects near the end of a runway.

9.3 Any changes to the aeronautical study or risk assessment should be evaluated and properly documented.

10 References

Manual of Aerodrome Standards (MOAS);
ICAO Annex 14, Volume 1;
Doc 9859- Safety Management Manual.
UK CAA CAP 168, Runway End Safety Area, Clauses 162 - 174

11 Queries

11.1 If there are any queries with regard to this NOTAO, please address them to:

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