



GHANA
CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR AC 14-021

RUNWAY END SAFETY AREA PROGRAMME

GENERAL

Ghana Civil Aviation Authority (GCAA) Advisory Circulars from Aerodrome Safety and Standards (ASAS) contain information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Directives.

An AMC is not intended to be the only means of compliance with a Directive, and consideration will be given to other methods of compliance that may be presented to the Authority.

PURPOSE

This Advisory Circular provides methods, acceptable to the Authority, for showing compliance with Part 24 of the Ghana Civil Aviation (Aerodrome) Directives, 2011, LI 2004, as well as explanatory and interpretative material to assist in showing compliance.

REFERENCE

The Advisory Circular relates specifically to the Aerodrome GCADs and Manual of Standards (MOS).

STATUS OF THIS AC

This is the first AC to be issued on this subject.

FOREWARD

This document provides guidance to Aerodrome Operators on runway safety area (RSA) or runway end safety area (RESA). The AC offer guidance to certified aerodrome operators to maintain the surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

APPROVAL

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1. PURPOSE

The purpose of this programme is to establish procedure which the Authority's inspectors will follow in implementing the programme

2. BACKGROUND

The Runway End Safety Area is an integral part of the runway environment. RESA dimensions are established in the Manual of Aerodrome Standards (MOS) and is intended to provide a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs.

3. OBJECTIVE

The objective of the Runway Safety End Safety Area Programme is that all RESAs at aerodromes to which Parts 24 and 25 are applicable shall conform to the standards contained in the Manual of Aerodrome Standards, to the extent practicable.

4. RESA INVENTORY

The Director shall assign Aerodrome Inspectors (AIs) to collect and maintain data on the RESA for each runway of all aerodromes to which Parts 24 and 25 are applicable. The data will include the current width of each RESA and the length that the RESA extends beyond each runway end. The data will also contain the MOS standards that apply to each RESA at the aerodrome. In addition, all objects within the area that comprises a standard RESA shall be documented. A format for the collection of the data is provided in Table 3-1.

5. RESA DETERMINATION

5.1. SUPPORTING DOCUMENTATION.

An assigned AI shall prepare documentation for each RESA. Paragraph 6.8, on Supporting Documentation for RESA Determination provides guidance that must be adhered to in preparing this documentation. The Director will decide the level of detail required for all planning, environmental, and engineering factors that are to be incorporated in analyzing the practicable alternatives. The objective is to assure that accurate and complete information supports the decision making process on RESA determinations.

- (1) For a RESA that does not meet current standards, the Assigned AI will make a determination based on this documentation.
- (2) Determinations are based on the best, current, available information. However, information that becomes available at a later date can effect changes or revisions to a determination and, as a result, updates the determination. For example, the final determination may depend on environmental factors. Until that outcome is known, a determination is made on the best, current, available information.

(3) Although for data collection purposes it is convenient to describe the RESA in terms of runway ends, the determination shall be made for the entire RESA, i.e., both runway ends as well as the full width.

A. **Determination.** The AI or Manager shall review the data collected for each RESA in Paragraph 3.4, along with supporting documentation prepared by the assigned inspector for that RESA, and make one of the following determinations:

- i. The existing RESA meets the current standards contained in the MOS.
- ii. The existing RESA does not meet standards but it is practicable to improve the RESA so that it will meet current standards.
- iii. The existing RESA can be improved to enhance safety, but the RESA will still not meet current standards.
- iv. The existing RESA does not meet current standards, and it is not practicable to improve the RESA.

B. **Form of Determination.** The RESA determination will be signed and dated by the AI or Manager and kept on file along with the supporting documentation. The determination and its date will also be included in the RESA database.

C. **Revision to Determination.** If new information becomes available, the Director may issue a revised determination. The revised determination shall be in a form required by in accordance with this AC and supported by documentation, where required. The date of the revised determination shall be recorded in the RESA file.

5.2. TIMING OF DATA COLLECTION AND DETERMINATION

The RESA inventory and RESA determinations specified in the MOS.

5.3. IMPLEMENTATION OF RESA IMPROVEMENTS

- A. A project to improve the RESA in accordance with the MOS may be initiated at any time.
- B. Whenever a project for a runway involves construction, reconstruction (includes overlays), or significant expansion, the project shall also provide for improving the RESA in accordance with the MOS. Reconstruction and significant expansion are construed as any project that results in changing the capability of the aerodrome or the load-bearing strength of the pavement, restores the original design life of the pavement, or changes the actual or potential design aircraft use.

6. SUPPORTING DOCUMENTATION FOR RESA DETERMINATIONS

6.1. GENERAL

RESA determinations must be supported by documentation that provides the rationale upon which the determination was based. The extent of the documentation will vary, depending upon the circumstances. For example, in cases where the RESA already meets the current standards through a traditional graded area surrounding the runway a simple statement to this effect will suffice. Where declared distances have been implemented to obtain the RESA, the documentation would contain a statement to this effect and also identify the graded area that exists beyond each runway end. In contrast, in cases where it is not practicable to improve a safety area to meet current standards, the documentation must address the alternatives that were considered and explain the reasons why one was selected over the others.

6.2. CONSIDERATIONS IN RE-EVALUATING ALTERNATIVES

In evaluating alternatives for obtaining or improving RESAs, there are many factors that could affect the viability of the alternative. What may be viable at one aerodrome may not be viable at another. Factors to be considered include:

- (1) Historical records of aerodrome accidents/incidents.
- (2) The aerodrome plans as reflected in current and forecast volume of passengers, number of operations, design aircraft and percent runway use, both for all weather and instrument flight rules operations,
- (3) The extent to which the existing RESA complies with the standard.
- (4) Site constraints. These include, for example, precipitous terrain drop-off, the existence of bodies of water, wetlands, a major highway, a railroad at a runway end, etc.
- (5) Weather and climatic conditions. These include conditions such as low visibility, rain, and the frequency of these conditions. Overruns on contaminated runways constitute a significant percentage of runway excursions.
- (6) Availability of visual and electronic aids for landing.

6.3. ALTERNATIVES TO BE CONSIDERED

The first alternative to be considered in every case is constructing the traditional graded area surrounding the runway. Where it is not practicable to obtain the entire safety area in this manner, as much as possible should be obtained. Then, the following alternatives shall be addressed in the supporting documentation. The applicability of these alternatives will vary, depending on the location.

- (1) Relocation, shifting, or realignment of the runway.
- (2) Reduction in runway length where the existing runway length exceeds that which is required for the existing or projected design aircraft,

- (3) A combination of runway relocation, shifting, grading, realignment, or reduction
- (4) Declared distances

6.4. CONSIDERATIONS IN ASSESSING ALTERNATIVES

- A. When making determinations about the practicability of obtaining the RESA, the first attempt shall consist of investigating fully the possibility of obtaining RESA that meets the current standards through a traditional graded area surrounding the runway. Land acquisition, grading requirements as well as environmental conditions must be examined. Any portion of land that will increase the RESA, even if it is but an incremental increase (see Paragraph 6.8.4B below) and will not result in meeting the standard fully, is preferable and will serve as a starting point for the consideration of additional alternatives (see paragraphs 6.8.4C through F below).
- B. Incremental gains must be obtained whenever possible. The gain may be relatively very little, but any gain is valuable. The following example illustrates this. Assuming there is a standard for an RESA of 300m by 150m beyond the runway end and this is not met. The dimensions are 150m by 250m on each of the ends. By filling and grading, another 60m could be gained on one end. This should be accomplished as an incremental gain, even though it will not provide the design standard. Other alternatives would then be considered for obtaining the remainder of the safety area.
- C. When obtaining a standard RESA is not practicable through traditional means (e.g. land acquisition, grading, fill, etc.), alternatives must be explored. During some types of projects, it may be feasible to relocate, realign, shift, or change a runway in such a way that the RESA may be obtained. It is recognized that the costs of this kind of adjustment may be justified only in an extensive project, but the concept should be evaluated to determine if it is a practicable alternative.
- D. Another alternative to be addressed is a reduction in runway length. This is a viable option if the current critical aircraft requires less than what is presently available, or the use of other runways, if available, will accommodate the larger aircraft.
- E. When considering the configuration of RESA, if the total RESA area available is less than the total required to meet the design standard, an appropriate balance may be achieved by allocating a greater portion of RESA to one runway end. The factors to consider in this allocation are: NAVAIDS (ILS, PAPI, PLASI, VASIs), which provide vertical guidance and lessen the likelihood of an undershoot; predominant direction of runway use by air carrier aircraft, and historical data on overruns on the runway. For example, the total available RESA is 420m. Because there is an ILS for air carrier use, a determination is made to allocate 270m to the departure end of this runway and 150m to the approach end of the runway. ILS is located on the approach end of the runway

- F. Declared distances present another alternative that may provide an acceptable means of providing RESA. This requires a thorough understanding of user needs and views, since their cooperation is an integral factor in selecting this alternative. However, the Aerodrome Operator, in conjunction with the Authority, will determine the final disposition of this type of situation.

Table 6-1 RUNWAY END SAFETY AREA DATA FORM				
1	RUNWAY			
	Runway Orientation:			
	Runway Dimension:			
	Runway Length			
	Runway Width			
	Runway Ends			
	Actual RESA Length			
	Actual RESA Width			
	Dimensional Uniformity			
	RESA Grade (+-5%)			
2	CRITICAL AIRCRAFT			
	Code Number			
	Code Letter			
	Visibility Minimums			
3	SAFETY AREA STANDARDS			
	Length			
	Width			
		YES	NO	N/A
4	Critical Aircraft(RSA Determination)			
	Currently Meets Standards			
	Practicable to meet Standards			
	Can be improved But Will Not Meet Standards			
	Not Practicable to Improve			
	Date of Determination (Month/Year)			
5	Published Runway(Planned Improvements)			
	RESA to Design Standards Obtainable			
	Runway Realignment or Relocation			
	Shift Runway From			

	Present Alignment			
	Use Declared Distances			
	Other			

Uniformity Comments:

Improvement Comments:

NAME OF INSPECTOR: _____ **SIGN:** _____ **DATE:** _____