



# **Aerodrome and Air Traffic Standards Division (AATSD)**

## **Notice of Proposed Amendment 01/2013**

### **Amendments to CAP 168**

### **Licensing of Aerodromes**

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This Notice of Proposed Amendment (NPA) is made up of following parts:

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### **B. THE PROPOSALS**

This includes the proposed amendments to CAP 168 by chapter.

## **PART A – EXPLANATORY NOTE**

### **1. General**

The purpose of this amendment to Civil Aviation Publication CAP 168 Licensing of Aerodromes is to propose changes to the requirements for licensed aerodromes.

The Aerodrome Policy and Standards Team has adopted this format, which has two purposes. Firstly, it is consistent with the style adopted by the European Aviation Safety Agency (EASA) for their NPA process; second, the format is intended to make it easier for recipients to review the document, by including only the proposed changes.

Several factors have driven the need for and timing of this amendment. Principally, these are due to developments of good practice from industry and the introduction of new technology as well as incorporating information from Information Notices into CAP 168. Incorporating these changes will ensure that CAP 168 remains current in the run-up to EASA undertaking rulemaking for aerodromes for countries in the European Union, which is anticipated to take place from 2014 onwards.

### **2. Consultation**

In order to reach a wide audience and collect relevant comments, the text of this NPA is submitted for consultation to all aerodrome licence holders and other interested parties on the Consultations area of the CAA website via [www.caa.co.uk/consultations](http://www.caa.co.uk/consultations).

Comment forms should be accessed from the Consultations web page, completed, and submitted via [consultation.aatsd@caa.co.uk](mailto:consultation.aatsd@caa.co.uk). There is a specific comment form for each chapter with the intent to ease the process for consultees. Consultees can review chapters at their convenience and respond to each in turn. Please ensure that comments are returned using the comments form for the correct chapter.

**Additionally, as part of the Impact Assessment, we have posed a specific question to aerodrome licence holders regarding certain changes to ‘Clearway’ definition. This is contained in Part 5 of this Explanatory Note. The normal comments form should be used for responses.**

In accordance with advice from the Better Regulation Executive, an 8-week consultation period is offered for this amendment. Comments should be received by no later than 27 February 2013. Comment received after this deadline may not be considered. In addition, comments may not be considered if the form provided for this purpose is not used.

The format of the consultation is consistent with that used by ICAO for State Letters and EASA Notice of Proposed Amendment.

CAP 168 NPA is therefore presented as follows: The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~Text to be deleted is shown with a line through it text to be deleted~~
2. **New text to be inserted is highlighted with grey shading new text to be inserted**

3. ~~Text to be deleted is shown with a line through it~~ followed new text to replace existing text by the replacement text which is highlighted with grey shading.

### **3. Comment Response Document**

All comments shall be reviewed by the Aerodrome Policy and Standards Team unless they are of such nature that they necessitate the establishment of a working group. All comments received will be responded to and incorporated in a Comment Response Document (CRD), which will also be posted on [www.caa.co.uk/consultations](http://www.caa.co.uk/consultations). The CRD will contain a list of all organisations that have provided comments.

### **4. Preliminary Impact Assessment**

#### Intent

The intent of this amendment to Civil Aviation Publication CAP 168 Licensing of Aerodromes is to ensure that the requirements for licensed aerodromes remain current. All licensed aerodromes may be affected by these proposals, which arise notably from changes to ICAO SARPs and AAIB Recommendations, and the withdrawal of obsolete guidance.

#### Options

The alternative option would be to do nothing but this may not provide the necessary clarification of the text. Additionally, requirements and guidance information for aerodromes would be neither current nor contained in CAP 168. Instead aerodromes would be required to search for information in a variety of sources.

#### Impacts

**Safety:** The intended changes are expected to have a positive impact on safety.

**Economic:** The majority of the proposed changes both bring into CAP 168 requirements that are already in place by incorporating the content of Information Notices, or anticipated changes likely to arise from possible future International (ICAO) or EASA aerodrome regulations, and are not envisaged to create a significant economic impact.

#### Conclusion of the Preliminary Impact Assessment

The majority of the proposals of this NPA are considered as having a positive safety impact and of a limited economic impact. Therefore the progress of the proposals is justified.

### **5. Discussion of the Proposals**

#### a) Administrative changes

The following changes have been incorporated throughout this amendment to CAP168. They are mainly administrative, thus will not be outlined or consulted upon in Section B “The Proposals”.

- i) Typographical errors have been corrected.
- ii) References to other documents have been updated.

b) Other changes

All other changes are outlined in Part B to this NPA. For each Chapter, only the amended paragraphs are shown in tabular format, providing the rationale for the change, the previous text (if applicable) and the proposed amendment. Shading denotes new or amended text, whereas text to be deleted is shown with a line through it. Tables and diagrams are shown in their entirety.

c) Questions

We would welcome the views of those persons and aerodromes affected by the changes below:

**Question 1**

A significant change to clearway definition has been included in this revision to Chapter 3 ([Para 9.4.2-9.4.3](#)). This has been done in order to align with the draft proposed Aerodrome rules recently published by EASA. Aerodrome Licence Holders are therefore requested to assess the impact of the change on their clearways and inform the CAA should there be a necessity to review the aerodrome licence conditions. Aerodrome Licence Holders should use the comment form provided for advising the CAA of their impact assessment.

**Part B – Proposed Changes**

**Chapter 2 – The Aerodrome Manual**

<b>Paragraph 4.3</b>	Rationale: Clarity on when the Aerodrome Manual should be presented to the Aerodrome Inspector prior to any planned audit.
Previous Text: As shown – proposed text highlighted	
Proposed Text:  <b>4      Amendment of the Manual</b>  4.3      Amendments to the Manual will be needed either because the document requires to be brought up to date or in response to a request by the CAA. Any amendments or additions must be furnished to the CAA by the licence holder before or immediately after they come into effect. Consideration should be given to the currency of the Aerodrome Manual related to any CAA planned audit so to provide both the Auditors and the Aerodrome staff, reasonably sufficient time to be adequately prepared.	

## **Chapter 2 - Appendix 2B – Low Visibility Operations**

<b>Appendix 2B</b>	Rationale: Appendix content totally revised with new guidance material added to provide clarity on the processes involved in Low Visibility Operations.
Previous Text: As shown – proposed text highlighted	
<p>Proposed Text:</p> <p><b>1 Low Visibility Operations</b></p> <p>1.1 Aircraft operations at aerodromes during reduced visibility or low cloud conditions present additional hazards to aircraft and to other aerodrome users. As visibility reduces, the ability of air traffic service staff, pilots, vehicle drivers and other personnel to identify hazards and to take remedial action in a timely manner becomes limited. In conditions of low cloud, the time available for the pilot of an approaching aircraft to visually assess the aerodrome environment is reduced.</p> <p>1.2 Low Visibility Operations (LVOs) is a general term used for airside operations in conditions of reduced visibility or low cloud conditions and consists of low visibility safeguarding and Low Visibility Procedures (LVPs).</p> <p>1.3 Low visibility safeguarding is the process carried out which prepares the aerodrome for low visibility procedures.</p> <p>1.4 Low visibility procedures are the actions carried out by ATC in respect of aircraft operations and vehicle movements.</p> <p>1.5 LVPs are required for the following types of operation:</p> <ul style="list-style-type: none"><li>• Lower than Standard Category I;</li><li>• Category II;</li><li>• Other than Standard Category II;</li><li>• Category III;</li><li>• Take-offs below 400 m RVR;</li><li>• Approaches utilising an Enhanced Vision System (EVS) where the actual RVR is below 550 m.</li></ul> <p>1.6 Aerodromes that operate in Category I and above conditions but meet the criteria for Visibility Condition 2 (see paragraph 6.3) should implement suitable provisions as described in paragraph 6.4 and 6.5</p> <p><b>2 Low Visibility Safeguarding</b></p> <p>2.1 The point at which LVOs are implemented will vary from one aerodrome to another and will depend on local conditions and facilities available. However, a period of time is required to prepare the aerodrome and, in particular, the movement area, in readiness for LVPs. The safeguarding measures must ensure that at the point when LVPs are in force, all actions to protect aircraft operations have been put in place.</p> <p>2.2 When the visibility deteriorates to approximately 1000 metres RVR and is expected to fall further below 550 metres RVR, safeguarding should be initiated. The withdrawal of vehicles and personnel involved in non-</p>	

essential activities on the manoeuvring area should be initiated. Any temporary work-in-progress on the movement area should normally cease and the work areas should be vacated and returned to operational condition or clearly marked/lit and notified as unavailable for use. Routine maintenance on visual and non-visual aids should be suspended and the ILS localiser and glide path sensitive areas should be cleared of all traffic.

2.3 Aerodrome operators, in conjunction with the Air Traffic Service Provider where applicable, should develop actions that ensure that, in good time prior to the introduction of LVPs, all airlines and other organisations with movement area access are notified. This is particularly important where companies exercise control over their own apron areas and maintenance facilities adjacent to the manoeuvring area.

2.4 Particular attention should be given to the protection of the runway and radio navigational aids. Access to the manoeuvring area should be restricted to essential operational safety vehicles and personnel.

2.5 The decision to commence or continue work, especially involving construction, when a significant probability for the need to invoke LVPs exists, should take account of the time it will take to cease the work, remove all persons and equipment, and prepare the site for LVPs. The planning process employed in the development of major construction projects should detail the control measures that would be implemented should it be deemed necessary to continue both WIP and aircraft operations during LVPs.

### **3 Responsibilities with respect to Low Visibility Procedures**

3.1 It is the responsibility of the aerodrome operator to develop and maintain the LVPs used at their aerodrome.

3.2 Whilst ATC are responsible for advising pilots of the status of LVPs at an aerodrome, it is the responsibility of the aerodrome operator to ensure that all measures required to protect aircraft operations in poor weather conditions are in place. ~~before advising ATC that LVPs can be declared to be in force.~~

### **4 Declaration of Low Visibility Procedures in force**

4.1 It is essential that **all** LVP measures be verified as in place before LVPs are declared to be in force by ATC. Similarly, LVPs should be declared as cancelled before the aerodrome operator withdraws any measures. It should be remembered that aircraft established on an approach may have commenced that approach believing that LVPs are in force and that measures taken to protect the approach aid and runway remain in place until all such aircraft have completed their approach.

4.2 At aerodromes that support operations listed in paragraph 1.5 and in conditions that preclude Category I operations, under no circumstances should LVPs be declared to be in force if the appropriate safeguards for these operations are not fully in place to protect the landing aids and runway.

4.3 Misunderstandings about the status of LVPs can easily arise during periods when the procedures are being introduced or withdrawn. This is particularly true at aerodromes where LVPs include a phase where preparatory actions are taken prior to the full implementation and declaration of 'LVPs in force', or where some measures may be left in place during what may be a temporary improvement in the weather conditions so that full LVPs can be re-instituted at short notice should the weather deteriorate again. Local processes should ensure that the status of LVPs is clearly understood by all those that are involved in aerodrome operations.

## **5 Low Visibility Procedures**

5.1 As the RVR deteriorates to lower than 550 m, or the cloud ceiling reduces to 200 ft, Low Visibility Procedures should be fully implemented. The withdrawal of non-essential vehicles and personnel from the manoeuvring area should be completed, free ranging should have ceased and all activities on the manoeuvring area should be under the direct control of ATC. ATC should apply increased spacing between aircraft to allow additional time for the preceding arriving aircraft to vacate the Localiser Sensitive Area (LSA) or the previous departing aircraft to have overflown the localiser. Interference with the localiser and glide path signal can cause a deviation to an aircraft's flight path requiring a go-around to be flown.

5.2 The point at which LVPs are to be implemented must be clearly defined in terms of a specific RVR, expressed in metres, or cloud ceiling measurement, expressed as a height in feet, and must be promulgated in relevant notices and documentation to all those persons involved.

5.3 The cloud ceiling criteria for the entry into LVPs may be considered as "cloud ceiling below 200ft" if approved by the CAA.

5.4 In order that flying operations may be safely conducted at aerodromes in low visibility conditions, aerodrome operators, in consultation with local ATS staff, should determine the movement rate that they wish to sustain and develop LVPs that will support the desired movement rate. The aircraft movement rate will be dependent on the aerodrome infrastructure including the ground markings and lighting.

5.5 LVPs will vary with each aerodrome and are subject to acceptance by the CAA prior to inclusion in the Aerodrome Manual and the Manual of Air Traffic Services Part 2 and their subsequent implementation.

5.6 In order to protect aircraft operating on the ground in low visibilities, it is essential to prevent unauthorised vehicular traffic from entering the movement area. The area should, where practicable, be fenced and provided with manned controlled entry points. Where unguarded gates are provided, they should be kept locked and inspected regularly to ensure that they remain secure. Where physical closure is not practicable, for example between aircraft maintenance areas and manoeuvring areas, entry points should be manned and where the opening is too wide for visual surveillance, then it should be fitted with intruder detection equipment suitable for operation in low visibility conditions. By protecting

the movement area in this manner it should be possible to exclude unauthorised personnel who will not be aware of aerodrome traffic control procedures.

5.7 Complete protection can be expensive and is sometimes difficult to achieve, particularly on large aerodromes where taxiways cross vehicular traffic routes, and where maintenance areas compete with parking aprons for space. Where it is not practicable to secure the area in the manner recommended above, the aerodrome operator shall satisfy the CAA as to the security of the aerodrome's operations in low visibility conditions.

5.8 When LVPs are in force, only vehicles essential to the aerodrome operation and driven by formally tested and authorised drivers should be allowed onto the movement area. All such vehicles should be equipped with an airfield chart permanently displayed in the driver's cab clearly showing all taxiways, runways, holding points and vehicle routes marked with their appropriate designation. The chart should be accompanied by written instructions clearly detailing the action that the driver should take in the event that the vehicle should break down or that the driver should become unsure of his position on the airfield. In addition, all vehicles operating on the manoeuvring area should be equipped with R/T and the driver required to maintain contact with ATC at all times. Authorised drivers should be thoroughly briefed and familiar with the aerodrome layout including closed taxiway junctions and runway access points, the meaning of all markings, signs and aerodrome lighting, and where appropriate, standard R/T phraseology. Drivers that are restricted to certain areas of operation should be familiar with the limits of those areas, particularly if they cannot be clearly marked, for example, on the aerodrome surface. Authorised drivers should be checked periodically for competence and knowledge of local instructions. All non-essential vehicles and personnel, e.g. works contractors and maintenance parties and their equipment, must be withdrawn from the manoeuvring area.

5.9 In order to continue unrestricted operations for as long as possible whilst weather conditions deteriorate, LVPs at many aerodromes are designed to implement most of the ground-based measures in good time, and in certain circumstances before they are absolutely necessary. The final measures, which are wholly within the control of ATC, should be implemented only when the weather conditions demand it. However, in such cases there is potential for misunderstandings to occur as to the status of LVPs at the aerodrome. Processes should ensure that the potential for such misunderstandings is minimised and that there is a single point from which definitive information about the current status of LVPs can be confirmed.

5.10 Rescue and Fire Fighting Service (RFFS) vehicles are essential to airfield operations at all times and response and deployment times are of vital concern to aerodrome operators. Although it is unlikely that RFFS response time will be significantly affected in visibilities down to 200 m, temporary relocation of vehicles to strategic points may be necessary for a very large or complicated aerodrome. In visibilities below 200 m there is greater probability that response times will be affected. Operational instructions and training should be developed in accordance with the guidance at Chapter 8, paragraph 25.5.

5.11 Similarly, because congregations of birds are difficult for both ATS staff or pilots to observe in poor weather conditions, bird hazard control operations should not be restricted during LVPs. Processes should ensure that adequate time between movements is afforded to permit bird hazard control measures to be implemented. The importance of maintaining a runway inspection regime in sustained periods of LVP implementation is also highlighted. This too should be accounted for when determining the declared movement rate.

5.12 The risk of inadvertent runway incursion by an aircraft, or aircraft mis-routing, is increased in low visibility conditions. Wherever possible this risk should be minimised by keeping taxiway routings as simple as is practicable. This can be best achieved by restricting the available taxiway system wherever possible to a single route from the apron to the runway, with intermediate junctions closed, a clearly defined runway entry point, holding point and a separate exit taxiway and return route for landings or rejected take-offs. All other runway access or crossing points should be closed. This can be achieved by the use of red stop-bars or by a physical barrier using the unserviceability markers described in Chapter 7 paragraph 4.6.2. Markers used in this manner should either be retro-reflective or augmented by lights of the type described at Chapter 4 paragraphs 12.10.1 and 12.10.2. In this way the procedural control of aircraft and vehicles at complex aerodromes can be simplified. On major aerodromes where traffic is such that several routes are operated simultaneously, a Surface Movement Guidance and Control system is likely to be required in order to achieve the declared movement rate.

5.13 ICAO Annex 14 currently recommends the provision of Surface Movement Radar (SMR) at aerodromes where operations in RVR less than 400 m take place. However, unless the CAA has approved specific procedures, SMR is a monitoring tool only; SMR enhances existing ATC procedures and its use should **not** be regarded as the prime method by which collision avoidance can be effected.

## **6 Visibility Conditions and Associated Actions**

6.1 **Visibility Condition 1:** Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, and for ATC personnel to exercise control over all traffic on the basis of visual surveillance.

6.2 No additional requirements for the protection of ground operations by aircraft are required during Visibility Condition 1.

6.3 **Visibility Condition 2:** Visibility sufficient for a pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, but insufficient for ATC personnel to exercise control over all traffic on the basis of visual surveillance.

6.4 Actions required in Visibility Condition 2 are dependent on the dimensions of the manoeuvring area and the position of the control tower. Procedures and visual aids will allow the pilot to determine his position and follow the required route.

6.5 In the lower ranges of Visibility Condition 2, the necessary measures might limit the movement rate unless some additional aids are available, such as Surface Movement Guidance and Control Systems, which may enable a greater movement rate to be achieved safely. Adequate safeguards against runway incursions should be in place, such as limited taxi routing, surface movement radar and stop-bars or physical barriers at runway access points.

6.6 **Visibility Condition 3:** Visibility sufficient for the pilot to taxi but insufficient for the pilot to avoid collision with other traffic on taxiways and at intersections by visual reference, and insufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance. For taxiing, this is normally taken as visibilities equivalent to an RVR of less than 400 m but more than 75 m.

6.7 In such visibility conditions it is likely further ATC measures, such as block control, to assist aircraft and vehicle movement including RFF vehicles, should be considered.

6.8 **Visibility Condition 4:** Visibility insufficient for the pilot to taxi by visual guidance only. This is normally taken as an RVR of 75 m or less.

## 7 Precision Instrument Approach Operations

7.1 Pilots will expect a precision instrument approach aid to be fully safeguarded and available for the operations listed in paragraph 1.5 and any guided take-off, if LVPs are declared to be in force by ATC at the aerodrome.

## 8 Review of Low Visibility Procedures

8.1 Aerodrome authorities, in co-operation with local ATC staff and other agencies involved in LVP operations, should regularly review the effectiveness of LVPs. Any need for change should be agreed with the CAA prior to implementation and inclusion in the Aerodrome Manual and the Manual of Air Traffic Services Part 2.

8.2 LVP table-top exercises should be completed on a regular basis to ensure all stakeholders are familiar with the procedures. It should also be considered for any forthcoming operational changes and development works that may significantly impact on the LVPs.

## 9 EU-OPS Approach Operations

9.1 EU OPS and other National Authorities regulations may allow approved operators to carry out Lower than Standard Category I or Other than Standard Category II approach operations if certain conditions (specified in EU OPS) are met.

9.2 Lower than Standard Category I operations allow operators to carry out a Category I approach but with a lower RVR limit than previously available. The actual RVR limit will depend on a number of factors including the:

- Lowest decision height available;
- Level of Aeronautical Ground Lighting available including approach

- lighting;
- ILS specification.

Aerodromes which are suitable for Lower than Standard Category I operations should ensure that their LVPs are suitable for the lower RVR limit possible. Further details of Lower than Standard Category I or Other than Standard Category II approach operations can be found on the [CAA website](#).

9.3 EU OPS and other National Authorities regulations may allow approved operators to carry out specified approach operations utilising Enhanced Vision Systems which reduce the traditional RVR minima. Aerodromes that are suitable for the specified approach operations should review their LVPs to ensure they are adequate for aircraft and vehicle operations in such visibilities. Further details of EVS operations can be found on the [CAA website](#).

## 10 Additional information

10.1 Low visibility operations are discussed in greater detail in ICAO Doc 9476 Manual of Surface Movement and Guidance Control Systems Chapter 5. and ICAO European Doc 013 European Guidance Material on All Weather Operations at Aerodromes.

10.2 Systems designed to enable movement rates to be sustained are discussed in ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual.

## 11 Conversion of Reported Meteorological Visibility to RVR

11.1 At aerodromes where RVR measurements are not made, or in case of unserviceability of RVR measuring equipment, LVPs should include criteria for implementation and withdrawal based on the reported meteorological visibility.

11.2 Pilots, when converting meteorological visibility to an equivalent RVR, may apply the factors Table 2B.1 provides. This method of obtaining RVR is not intended for direct application by aerodrome authorities but is included in order to provide assistance for aerodromes at which RVR is not available. The conversion method is not to be applied by aerodrome authorities and then provided to aircrew as an RVR.

**Table 2B.1**

Lighting Elements Available	RVR = Reported Met Visibility	
	Day	Night
High Intensity Approach and Runway Lighting	1.5	2.0
Any type of lighting installation other than above	1.0	1.5
No lighting	1.0	-

## Chapter 2 - Appendix 2C – Aerodrome Safety Management System

<b>Paragraph 3.1</b>	Rationale: Clarity on who employs the Accountable Manager to align with the proposed EASA rules on Aerodrome Operator Requirements.
Previous Text: As shown – proposed text highlighted	
Proposed Text: <b>3 Accountable Manager</b> 3.1 Schedule 12 of the Air Navigation Order requires an aerodrome operator to nominate an Accountable Manager and include the name and status of the Accountable Manager in the Aerodrome Manual.	

<b>Paragraph 3.5</b>	Rationale: Clarity on the role of the Accountable Manager to align with the proposed EASA rules on Aerodrome Operator Requirements.
Previous Text: Deleted – proposed new paragraph text highlighted	
Proposed Text: <b>3 Accountable Manager</b> <del>3.5 The level of technical knowledge and understanding expected of an Accountable Manager is essentially high level, with particular reference to his/her own role in ensuring that standards are maintained.</del> 3.5 If the responsibilities mentioned in paragraph 3.7 are delegated, the level of technical knowledge and understanding expected of an Accountable Manager is high level, with particular reference to his/her own role in ensuring that standards are maintained. If the responsibilities mentioned in paragraph 3.7 are not delegated, the Accountable Manager should meet the qualification requirements for each non-delegated task and responsibility.	

<b>Paragraph 3.7</b>	Rationale: Clarity on the role of the Accountable Manager to align with the proposed EASA rules on Aerodrome Operator Requirements.
Previous Text: NIL – Proposed new paragraph text highlighted	
Proposed Text: <b>3 Accountable Manager</b> 3.7 Depending on the size and the complexity of operations, the Accountable Manager may delegate some of the responsibilities to other persons within the organisation, who have demonstrated that they possess adequate experience, knowledge and technical expertise in those areas. Such responsibilities could be: (1) the day-to-day management of aerodrome operations, coordination with Air Traffic Services and apron management services if provided; (2) establishment and implementation of an aerodrome emergency plan and the provision of adequate rescue and firefighting services;	

- (3) implementation and maintenance of an appropriate aerodrome wildlife risk management programme;
- (4) establishment and implementation of an appropriate aerodrome infrastructure maintenance programme;
- (5) establishment, implementation, coordination and recording of a personnel training programme; and
- (6) the implementation and management of the quality and security management of aeronautical data and aeronautical information provision activities.

In any case, the accountability, ultimately, remains with the Accountable Manager.

## **Chapter 3 – Aerodrome Physical Characteristics**

<b>Paragraph 3.5</b>	Rationale: To correct an error in the calculation and align with ICAO/EASA.
Previous Text: Delete text - Proposed new paragraph text highlighted	
Previous Text: <p><b>3.5 Distance between slope changes</b></p> <p><del>3.5.1 Undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance in metres between the points of intersection of two successive slope changes should not be less than the sum of the two slope changes in absolute terms multiplied by:</del></p> <p><del>a) 300 where the code number is 4;</del></p> <p><del>b) 150 where the code number is 3;</del></p> <p><del>c) 50 where the code number is 1 or 2.</del></p> <p><del>— The minimum distance between two successive slope changes should never be less than 45 m.</del></p>	
Proposed Text: <p><b>3.5 Distance between slope changes</b></p> <p><b>3.5.1</b> Undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance between the points of intersection of two successive curves should not be less than:</p> <p>a) the sum of the absolute numerical values of the corresponding slope changes multiplied by the appropriate value as follows:</p> <p>(i) 30 000 m where the code number is 4;</p> <p>(ii) 15 000 m where the code number is 3; and</p> <p>(iii) 5 000 m where the code number is 1 or 2; or</p> <p>b) 45 m; whichever is greater.</p>	

<b>Paragraph 7.2.3</b>	Rationale: To correct a previous omission.
Previous Text: Proposed new paragraph text highlighted.	
Previous Text:	
7.2.3 A straight portion of a taxiway should have a width of not less than:	
a) 25 m where the code letter is F;	
b) 23 m where the code letter is E, or D and the taxiway is intended to be used by aeroplanes with an outer main gear wheel span of 9 m or more;	
c) 18 m where the code letter is D and the taxiway is intended to be used by aeroplanes with a <b>outer</b> main gear wheel span of less than 9 m; or	
d) 18 m where the code letter is C and the taxiway is intended to be used by aeroplanes with a wheelbase of 18 m or greater;	
e) 15 m where the code letter is C and the taxiway is intended to be used by aeroplanes with a wheelbase of less than 18 m;	
f) 10.5 m where the code letter is B;	
g) 7.5 m where the code letter is A.	

<b>Paragraph 9.4.2</b>	Rationale: To remove obsolete regulation. The performance of modern aircraft has resulted in the existing regulation becoming obsolete. Aircraft no longer need ground effect to complete the take-off. The removal of this requirement aligns with ICAO/EASA.
Previous Text: Deleted	
Previous Text:	
<del>9.4.2 <b>Horizontal plane clearway</b></del>	
<del>9.4.2.1 Except as provided in paragraph 9.4.2.2, if the ground in the clearway falls at a longitudinal gradient exceeding:</del>	
<del>a) 1.25% (1:80) for runways where the code number is 3 or 4; or</del>	
<del>b) 2.0% (1:50) for runways where the code number is 1 or 2;</del>	
<del>— clearway may be declared on the basis of a horizontal plane commencing at runway level at the end of TORA and extending to the first upstanding obstacle, providing that the ground profile is never more than 9 m below the horizontal plane. Lightweight, frangible or frangibly mounted objects are permitted to infringe the horizontal plane by not more than 0.9 m without affecting the declaration of clearway.</del>	
<del>9.4.2.2 The elevation at the end of clearway for all gradients of clearway at or less than 1.25% (1:80) for codes 3 and 4 and 2.0% (1:50) for codes 1 and 2 is to be taken as actual ground level at the end of the clearway (i.e. origin of the TOCS). Should the length of the clearway and the gradient combined create a drop of more than 9 m from a horizontal profile taken from the origin of the clearway, then paragraph 9.4.2.3 would apply, in principle.</del>	
<del>Figure 3.5 - deleted</del>	
<del>Figure 3.6 - deleted</del>	

<b>Paragraph 9.4.3</b>	Rationale: To remove obsolete regulation. The performance of modern aircraft has resulted in the existing regulation becoming obsolete. Aircraft no longer need ground effect to complete the take-off. The removal of this requirement aligns with ICAO/EASA.
Previous Text: Deleted	
<p>Previous Text:</p> <p><del>9.4.3 <b>Runway Continued Plane Clearway</b></del></p> <p><del>9.4.3.1 If the last part of the runway where the code number is 3 or 4 in the direction of takeoff has a downward slope over a distance exceeding 300 m or 15% of TORA if this is greater, and the ground in the clearway falls more than 9 m below the elevation of the end of TORA, the clearway plane is a continuation of the last downhill part of the runway or of the mean overall downhill slope of TORA if this is steeper. For clearway to be calculated by this method, the down-sloping clearway plane cannot be penetrated by any obstacle for a distance of 610 m measured from the end of TORA. Beyond this point, clearway is calculated on the basis of a horizontal plane subject to the limits on distance specified in paragraph 9.4.2.</del></p> <p><del>9.4.3.2 Runway Continued Plane Clearway (RGPC) requires both the last part of the runway to slope downhill for the minimum distances specified in paragraph 9.4.3.1 and the ground to fall more than 9 m below the elevation of the end of TORA. If the ground in the clearway falls to less than 9 m below the elevation of the end of TORA, the aeroplane can be considered to be in</del></p> <p><del>Figure 3.7 - deleted</del></p>	

<b>Paragraph 5</b>	Rationale: To clarify the requirements for the maps for aerodrome licence and aerodrome manual.
Previous Text: Nil – proposed new paragraphs. Existing paragraphs 5-7 to be renumbered 6-8.	
<p>Previous Text:</p> <p><b>5 Runway End Safety Areas (RESA)</b></p> <p><del>5.1 RESAs are intended to minimise risks to aircraft and their occupants when an aeroplane overruns or undershoots a runway. These areas should be provided at each end of the runway strip enclosing all runways where the code number is 3 or 4, and instrument runways where the code number is 1 or 2. RESAs should be considered for non-instrument runways where the code number is 1 or 2, particularly where there are movements by jet aircraft not using public transport performance factors, or a high proportion of runway-limited movements at the higher weights.</del></p> <p><del>5.2 The length of RESA needed for a specific runway will depend on a number of variables, such as the type and level of aircraft activity, and local conditions. The minimum requirement is 90 m for all code 3 and 4 runways, and code 1 and 2 instrument runways. The RESA width should be that of the associated cleared and graded area, with a minimum of twice runway width, symmetrically disposed about the extended centreline of the runway.</del></p>	

~~5.3 Licence holders should not assume that the minimum distance of RESA will necessarily be sufficient, particularly where there have been changes to the environment on or around the aerodrome, or to the type or level of traffic; it is recommended that RESAs extend to at least 240 m for code 3 and 4, and up to at least 120 m for code 1 and 2 instrument runways, wherever practicable and reasonable. Therefore, as part of their system for the management of safety, licence holders should review and determine on an annual basis the RESA distance required for individual circumstances, taking into account in their risk assessments factors such as:~~

- ~~a) the nature and location of any hazard beyond the runway end;~~
- ~~b) the type of aircraft and level of traffic at the aerodrome, and actual or proposed changes to either;~~
- ~~c) aerodrome overrun history;~~
- ~~d) overrun causal factors;~~
- ~~e) friction and drainage characteristics of the runway;~~
- ~~f) navigation aids available;~~
- ~~g) scope for procedural risk mitigation measures; and~~
- ~~h) the net overall effect on safety of any proposed changes, including reduction of Declared Distances.~~

~~5.4 Further guidance from the CAA is available for licence holders on the issues surrounding risks from aeroplanes overrunning aerodrome runways, and the process of undertaking risk assessments.~~

~~5.5 If a RESA beyond the 90 m minimum is deemed necessary but there are physical constraints to achieving the desired distance, Declared Distances should be reduced unless other mitigation measures can be demonstrated to achieve an equivalent safety result for the same set of operational circumstances. Mitigation measures that may be acceptable, singly or in combination, as alternatives to the reduction of Declared Distances, include:~~

- ~~a) improving runway surfaces and/or the means of recording and indicating rectification action, particularly for contaminated runway states — know your runways and their condition and characteristics in precipitation;~~
- ~~b) ensuring that accurate and up-to-date information on weather, the runway state and characteristics is notified and passed to flight crews in a timely way, particularly when flight crews need to make operational adjustments;~~
- ~~c) improving the aerodrome management's knowledge, recording, prediction and dissemination of wind data, including wind shear, and any other relevant weather information, particularly when it is a significant feature of an aerodrome's weather pattern;~~
- ~~d) minimising the obstruction environment in the area beyond the RESA;~~
- ~~e) upgrading visual and instrument landing aids to improve the accuracy of aeroplane delivery at the correct landing position on runways (including the provision of Instrument Landing Systems);~~
- ~~f) formulating, in consultation with aeroplane operators, adverse weather and any other relevant aerodrome operating procedures or restrictions, and promulgating such information appropriately;~~
- ~~g) installing suitably positioned and designed arrestor beds, to supplement the~~

~~RESA where appropriate; minimum requirement, taking account of other risks that they may introduce; and~~

~~h) publishing the RESA provision in the AIP.~~

~~The above list is not in any particular order, is not exhaustive and should complement other action by aeroplane operators and licence holders, working in co-operation to reduce overrun risks.~~

~~5.6 The surface of a runway end safety area need not be prepared to the same standard as that of the graded area of the associated runway strip. It should enhance the deceleration of aeroplanes in the event of an overrun, but it should not:~~

~~a) hinder the movement of rescue and fire fighting vehicles, the effectiveness of the rescue and fire fighting provision; or~~

~~b) endanger aircraft in the event of an aeroplane undershooting or overrunning.~~

~~5.7 Should soft ground arrester beds be considered, the licence holder needs to be aware of the risks to aircraft and possible increase in rescue and fire fighting provision that their establishment may introduce. Soft ground arrester beds are not intended to replace RESA and, therefore, should not be located within the minimum RESA distance.~~

~~5.8 The overall longitudinal slope in a runway end safety area should not exceed a downslope of 5% (1:20), and should be such that no part of the safety area penetrates the approach or take-off climb surfaces. Where the ground in a runway end safety area exceeds a downslope of 5% (1:20), it may be acceptable in the case of an overrun RESA to increase the length of the area beyond that considered to be adequate for the particular circumstances in order to compensate for steeper slopes, up to a maximum of 10% (1:10) gradient.~~

~~5.9 Transverse slopes should not exceed 5% (1:20).~~

~~5.10 Slope changes and transitions between slopes should be gradual: abrupt changes of slope or a slope reversal should be removed.~~

~~5.11 Aids to navigation, which because of their function must be placed within a runway end safety area to meet air navigation requirements, should be constructed and sited to reduce the potential hazards to a minimum and consequential risks to an acceptable level.~~

Proposed Text:

## **5 Runway End Safety Areas (RESA)**

**5.1** RESAs are designated areas at each end of the runway intended to minimise the risk of damage to an aeroplane where an aeroplane overruns or undershoots a runway. The RESA is beyond and in addition to the runway strip, as shown in CAP 168, Figure 3.11.

**5.2** RESAs are required at each end of the runway strip enclosing all runways where the code number is 3 or 4, and instrument runways where the code number is 1 or 2.

- 5.3 Additionally, RESAs should be considered for non-instrument runways where the code number is 1 or 2, particularly where there are movements by jet aircraft not using public transport performance factors, or a high proportion of runway-limited movements at the higher weights.
- 5.4 The minimum requirement for a RESA is 90 m from the end of the runway strip for all code 3 and 4 runways, and code 1 and 2 instrument runways.
- 5.5 Licence holders should not assume that the minimum distance of RESA will necessarily be sufficient; it is recommended that RESAs extend to at least:
- a) 240 m from the end of the runway strip for code 3 and 4 runways;
  - b) 120 m from the end of the runway strip for code 1 and 2 instrument runways;
- 5.6 The RESA width should be that of the associated cleared and graded area, with a minimum of twice runway width, symmetrically disposed about the extended centreline of the runway.
- 5.7 For applicable runways where the RESA does not extend to the recommended distance, as part of their Safety Management System, licence holders should assess the risk of a runway excursion on a regular basis as circumstances change, and implement appropriate and suitable mitigation measures as necessary.
- 5.8 Further guidance on RESA risk assessments and potential mitigating measures can be found in CAP 168, Appendix 3I.
- 5.9 The surface of a runway end safety area need not be prepared to the same standard as that of the graded area of the associated runway strip. It should enhance the deceleration of aeroplanes in the event of an overrun, but it should not:
- a) hinder the movement of rescue and fire fighting vehicles, the effectiveness of the rescue and fire fighting provision; or
  - b) endanger aircraft in the event of an aeroplane undershooting or overrunning.
- 5.10 The overall longitudinal slope in a runway end safety area should not exceed a downslope of 5% (1:20), and should be such that no part of the safety area penetrates the approach or take-off climb surfaces. Where the ground in a runway end safety area exceeds a downslope of 5% (1:20), it may be acceptable in the case of an overrun RESA to increase the length of the area beyond that considered to be adequate for the particular circumstances in order to compensate for steeper slopes, up to a maximum of 10% (1:10) gradient.
- 5.11 Transverse slopes should not exceed 5% (1:20).
- 5.12 Slope changes and transitions between slopes should be gradual: abrupt changes of slope or a slope reversal should be removed.
- 5.13 Aids to navigation, which because of their function must be placed within a runway end safety area to meet air navigation requirements, should be constructed and sited to reduce the potential hazards (delethalised and frangible) to a minimum and consequential risks to an acceptable level.

## Arresting systems

- 5.14 Research programmes, as well as evaluation of actual aircraft overruns into arresting systems, have demonstrated that the performance of some arresting systems is predictable and effective in arresting aircraft overruns. Engineered Material Arresting System (EMAS) may be installed at UK licensed aerodromes as an alternative where a 240 m RESA cannot be achieved;
- 5.15 The CAA accepts the US Federal Aviation Administration (FAA) performance specification and guidance material as suitable for use in EMAS design in the UK, subject to a suitable safety assessment by each aerodrome on their own circumstances (i.e. where to site the system, dimensions, operating conditions etc.
- 5.16 EMAS may be located within the runway strip or RESA as determined by the design assessment.
- 5.17 The CAA will permit an increase in runway declared distances that can be achieved from the installation of EMAS only where installation of EMAS has provided the equivalent to a 240 m RESA and 60 m strip end (a full length EMAS for the design size aircraft).
- 5.18 Should arresting systems other than EMAS be considered the licence holder needs to be aware of the risks to aircraft and possible increase in Rescue and Fire Fighting provision that their establishment may introduce. Arresting systems may be sited inside the RESA only where their performance and frangibility has been demonstrated. Aerodrome licence holders evaluating such systems should contact the CAA for further advice.
- 5.19 Soft ground arrester beds are not intended to replace RESA and, therefore, should not be located within the minimum RESA distance.

<b>Para 13.5</b>	Rationale: To add clarification to declared distances from runway intersections
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### **13.5 Declared distances from runway intersections**

~~13.5.1 Aerodromes make use of intersection take-offs to maintain runway capacity and efficiency. Declared distances from a runway intersection shall be calculated from the downwind edge of the taxiway. When defining the downwind edge, note should be taken of possible redundant paved areas at the side of a taxiway. The edge of the taxiway should be used as the start of the projection to the runway for the origin, excluding the redundant area.~~

~~13.5.2 The origin of full-length declared distances is, in most cases, the end of concrete; therefore, following aircraft line-up, the origin is behind the aircraft. An allowance for the length of the aircraft is taken into account when calculating the remaining distance. ICAO publishes the following in Annex 6 Part I, Chapter 5, paragraph 5.2.8.1:~~

~~"In determining the length of the runway available, account shall be taken of the loss, if any, of runway length due to alignment of the aeroplane prior to take-off." Aircraft performance manuals make the same calculation for line-up allowance irrespective of where that line-up occurs along the runway. Therefore, flight crews would expect to calculate a similar correction distance at an intersection departure as for a full-length departure, regardless of where the origin is located. The use of the downwind origin as the basis for calculating declared distances from a runway intersection provides consistency with the full-length calculation.~~

~~13.5.3 Figures 3.14–3.16 illustrate how to determine the origin of intersection departures. Aerodrome licence holders should use this method to determine the origin of the Take-Off Run Available, in order to measure the distances for intersection departures accurately. Licence holders should liaise with their Aerodrome Inspector in order to notify intersection take-off distances in the AGA section of the UK Aeronautical Information Publication (AIP). A NOTAM should be issued to cover the period up to publication of the revised AIP entry.~~

### **13.5 Declared distances from runway intersections**

**13.5.1 Aerodromes make use of intersection take-offs to maintain runway capacity and efficiency.**

**13.5.2 The origin of full-length declared distances is, in most cases, the end of pavement; therefore, following aircraft line-up, the origin is behind the aircraft. An allowance for the loss of runway based on the dimensions of the aircraft is taken into account when calculating the remaining distance and so is particular to the aircraft type. ICAO publishes the following in Annex 6 Part I, Chapter 5, paragraph 5.2.8.1: 'In determining the length of the runway available, account should be taken of the loss, if any, of runway length due to alignment of the aeroplane prior to take-off.' Aircraft performance manuals for each take-off position make a line up allowance; these are typically 0°, 90° and 180°, although occasionally an intermediate allowance maybe used. It is therefore important to provide performance specialists with sufficient and accurate information on which to base their calculations.**

13.5.3 Declared distances from a runway intersection should be calculated from the downwind edge of the taxiway (excluding any excessive taxiway width, fillets or redundant areas), which should be projected to the runway edge and then projected perpendicular from the runway edge to the runway centreline.

*Note 1: Figures 3.14 provide the example.*

*Note 2: Should the taxiway be wider than needed to meet the code, a line drawn parallel, downwind to the taxiway centreline (at a distance based on the minimum semi-width for that taxiway code), should be projected to the runway edge and then projected perpendicular from the runway edge to the runway centreline.*

13.5.4 Aerodrome licence holders should therefore use these methods in order to determine the origin of the Take-Off Run Available (TORA) to measure the distances for intersection departures accurately. Note that TODA is limited to 1.5 times TORA and so, as the TORA decreases, the clearway may also need to be adjusted. Aerodrome licence holders should liaise with their Aerodrome Inspector to notify intersection take-off distances in the UK Aeronautical Information Publication (AIP). A NOTAM should be issued to cover the period up to publication of the revised AIP entry. Take-off distances should be accompanied with the position's elevation and full coordinates. This information shall enable aircraft performance specialists to calculate the correct line up allowances.

**Figures 3.14-3.16**

Rationale: Figures 3.14-3.16 are replaced as per below. the new Figure 3.14 is provided in order to add clarity for determining the origin point when calculating declared distances from runway intersections

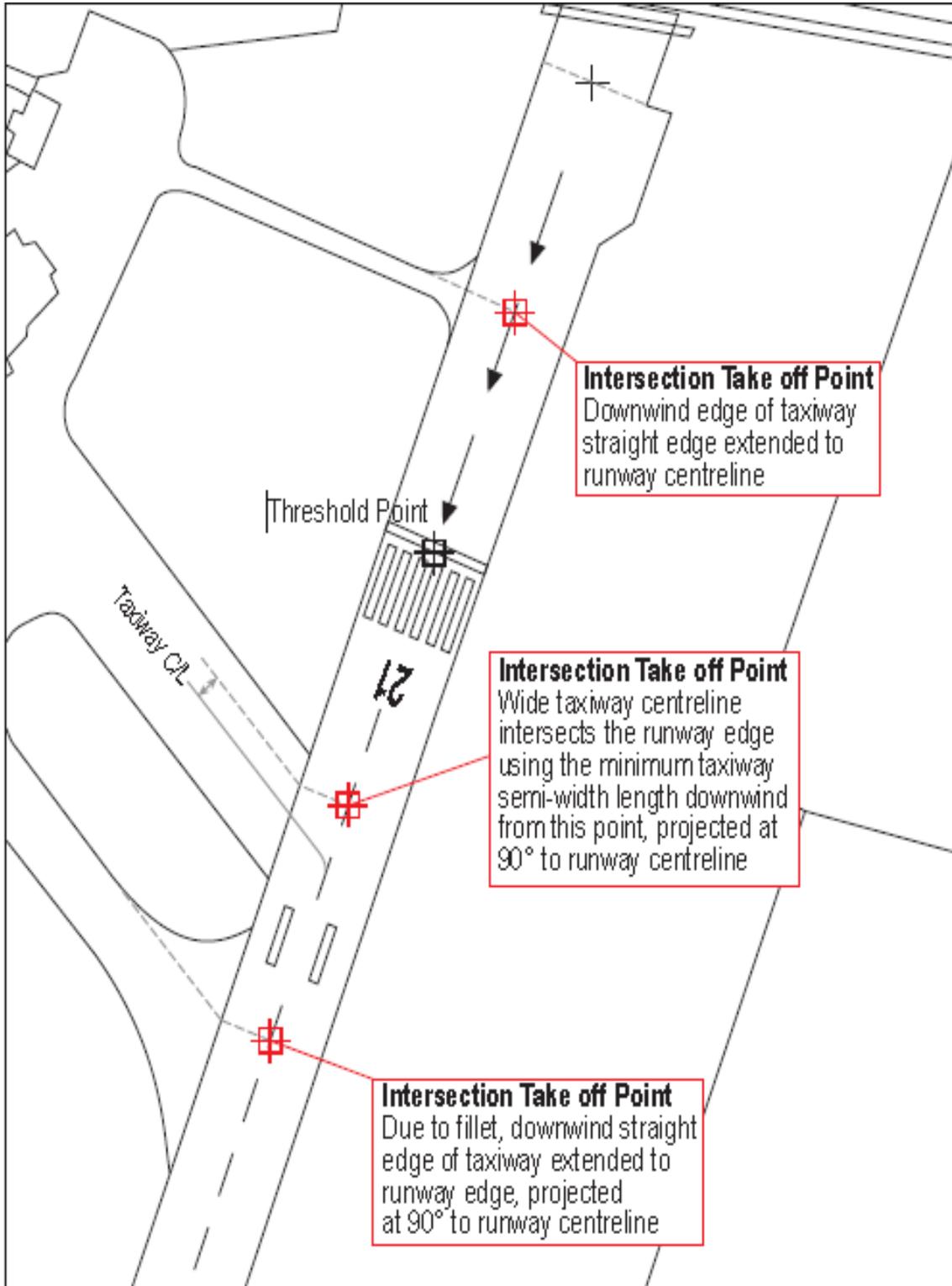


Figure 3.14

## **Chapter 3 – Appendix 3D - National Snow Plan including Procedures for Dealing with Winter Contamination of Aerodrome Surfaces**

<b>Appendix 3D</b>	Rationale: To add clarification to the reporting process for snow closures and Snowtam action.
<p><b>6 Notification Procedures</b></p> <p>6.3 For as long as conditions warrant, runway surface conditions should be reported by those aerodromes contributing to the OPMET Broadcast system of disseminating information, every half hour in the following format:</p> <p style="padding-left: 40px;">runway designator, type, extent and depth of deposit; and braking action if on compacted snow and ice.</p> <p style="padding-left: 40px;">The report is included as an eight digit code at the end of routine aerodrome meteorological reports (METARs) – see AIP GEN 3–5.</p> <p>6.4 RTF reports to pilots should provide a description of the available runway length and width along with an assessment of the prevailing conditions i.e. ice, snow or slush, together with the time of the measurement.</p> <p>6.5 If the aerodrome is snow closed through snow, a NOTAM in addition to the SNOWTAM must be sent to <del>EGGNYNYX</del> EUECYIYN for NOTAM action promulgation as per AIC Y 086/2009 (<b>GUIDANCE FOR THE DISTRIBUTION AND COMPLETION OF SNOWTAM FORM (CA 1272)</b> which can located via the <a href="#">NATS AIS website</a>.</p>	

## **Chapter 3 - Appendix 3I – Runway End Safety Area (Assessment)**

<b>APPENDIX 3I</b>	Rationale: New Appendix to provide guidance to those aerodrome operators wishing to assess the effectiveness of their RESA.
<p>Proposed Text:</p> <p style="text-align: center;"><b>APPENDIX 3I RUNWAY END SAFETY AREAS (ASSESSMENT)</b></p> <p><b>Introduction</b></p> <p>1 Aerodromes are required to provide Runway End Safety Areas (RESA) for runways as specified in Chapter 3, paragraph 5. For applicable runways where the RESA does not extend to the recommended distance, as part of their safety management system, licence holders should assess the risk of a runway excursion on a regular basis and implement appropriate and suitable mitigation measures as necessary.</p> <p>2 For the purpose of this guidance, runway excursions include an undershoot on landing, an overrun on landing and an overrun during an aborted take-off. An aerodrome’s assessment of RESA should consider each of these scenarios.</p> <p>3 The aim of this guidance is to assist licence holders in assessing the level of risk of an aeroplane undershooting or overrunning a runway at their aerodrome and suggest mitigation measures that may be appropriate, both to reduce the likelihood and to reduce the potential effects of an event.</p>	

## **Aeroplane performance**

- 4 In general pilots must calculate the take-off and landing distance required using performance charts/tables provided for each type of aeroplane by the manufacturer. These calculations must take into account the weight and configuration of the aeroplane and operational variables such as the physical characteristics of the runway, the obstacle environment surrounding the runway and environmental conditions such as temperature, pressure, precipitation and the head or tail wind component.
- 5 For public transport or commercial air transport operations, there is a legal requirement to include a safety margin in the calculations to allow for unforeseen variations in conditions and to provide an assured level of safety. These include an additional safety margin for wet or contaminated runway conditions. It is important to note that non public transport or non commercial air transport operations are not legally required to add these additional safety margins.
- 6 The likelihood of an aeroplane actually undershooting or overrunning a runway and needing the use of a RESA is very low and generally only happens in extreme circumstances.

## **Risk Assessment**

- 7 The risk of an aeroplane undershooting or overrunning a runway involves a large number of variable factors. These factors include prevailing weather conditions, the type of aeroplane (e.g. large jet aircraft, business jet, turboprop), the landing aids available, runway characteristics, the surrounding environment and pilot performance. Many of these factors are completely outside the control of the aerodrome but each of them can make a significant contribution to the overall level of risk. The nature of the hazard and level of risk will be different for each aerodrome and even for each runway direction at any one aerodrome.
- 8 The risk assessment should be able to:
  - a) Show that the risk of an undershoot or overrun has been assessed in terms of severity and likelihood;
  - b) Show that the risk has been mitigated as much as is reasonable and practicable;
  - c) Show that the level of remaining risk meets the safety standards of the aerodrome licence holder;
  - d) Provide the aerodrome management with a means of assessing the impact on the overrun risk of any future changes to the aerodrome environment or the number or type of aeroplanes using the aerodrome.
- 9 Licence holders should take into account in their risk assessments, factors such as:
  - a) The nature and location of any hazard beyond the runway end, including the topography and obstruction environment beyond the RESA and outside the runway strip;
  - b) The types of aeroplane and level of traffic at the aerodrome, and actual or proposed changes to either;

- c) Aircraft performance limitations arising from runway length and slope;
- d) Aerodrome overrun history;
- e) The percentage of operations not using public transport performance safety factors;
- f) Runway surface friction and drainage characteristics, which may affect aeroplane braking action if degraded by the presence of contaminants or the accumulation of rubber deposits;
- g) The type and level of use of navigation aids, such as ILS or PAPI;
- h) ATC procedural risk mitigation measures to avoid creating conditions that increase the chance of a rushed/unstabilised approach;
- i) Actual RESA provision and options for enhancement.

### **Level of Risk**

- 10 There are different methods available to try and assess the overall level of risk. CAP 760 *Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases* details a suitable risk assessment process. In general the level of risk should be assessed in terms of severity and likelihood so that an overall level of risk can be identified using a suitable risk tolerability matrix. Once the level of risk has been identified, where necessary, suitable risk mitigation measures can be used to reduce the level of risk to an acceptable level either by reducing the severity if the risk actually occurs or reducing the likelihood of the risk occurring.

### **Severity**

- 11 In most scenarios the level of severity of an aeroplane undershooting or overrunning will depend on the area surrounding the runway. Any improvements to the area surrounding the runway, such as increasing the RESA distance, removing any obstacles, delethalising, removal of or improvement to the infrastructure surrounding the runway will decrease the severity if an undershoot or overrun actually occurs. The severity of an undershoot or overrun should be assessed in terms of the worst realistic scenario.

### **Likelihood**

- 12 Determining the likelihood of an aeroplane undershooting or overrunning a runway is more difficult to assess. Some aerodromes have accumulated data over many years and use this to work out a reasonable likelihood of an undershoot or overrun by comparing the number of events with the number of total movements. However, most aerodromes will not have had previous experience of an event and may choose to use UK or worldwide statistical data from various sources to identify an appropriate level of likelihood.
- 13 European data from 1998 to 2007 shows an average of 42 runway excursion accidents worldwide annually. These accidents involved turbine powered aeroplanes with a mass greater than 5700 kg involved in air transport operations. A Dutch study using worldwide data between 1970 and 2004 estimated a landing overrun accident rate of 0.5 per million flights.

- 14 The table below shows generalised UK data for the number of undershoots, veer-offs and overruns. The data covers the period from January 2001 to December 2010 and includes all overruns, veer-offs and undershoots that occurred during take-off or landing at a UK reporting aerodrome. UK reporting aerodromes are those which report their aircraft movements to the CAA and are defined as those with more than 15,000 passenger units per year. The category Commercial & Business includes all commercial air transport flights, plus flights by business-jet operators. The non-commercial category includes all other flights, with Cessna 152s, Piper PA28s and Robin 200s being fairly typical of the category.

Type of Occurrence	Commercial & Business (per million flights)	Non-Commercial (per million flights)
Overrun	0.75	6.23
Veer-off	0.58	3.70
Undershoot	1.41	19.86
All Excursions & Undershoots	2.73	29.78

- 15 Use of this type of data alone does not take into account the increased risk of an undershoot or overrun from an increase in traffic, new and larger types of aeroplanes using the runway, or changes to the infrastructure or physical characteristics of the runway.

- 16 Even though there may be a safety margin built into the performance calculations used by pilots, the likelihood of an overrun increases as the proportion of the declared distance required for take-off or landing increases. Aeroplanes that do not require the full distance available for either takeoff or landing effectively have a built-in additional distance that could be used for stopping the aeroplane in addition to any RESA provided. Although the distances required will depend on the actual weight of the aeroplane and the weather conditions on the day it should be possible to identify aeroplanes that could be described as being more likely to be performance-limited for a particular runway.

- 17 Depending on the actual conditions (aeroplane weight, temperature, pressure altitude, wind component, runway surface condition and obstacle environment) it may sometimes be necessary for an aircraft operator to reduce or limit the take-off weight (regulate the take-off weight) of the aeroplane in order to use a particular runway due to the length of the runway. Similarly the weight of the aeroplane on landing will affect the landing distance required and sometimes an aeroplane will not be able to land on a particular runway until the weight is reduced below a specified figure.

- 18 Under these conditions the aeroplane is performance-limited and needs all the available runway length (taking into account any safety margins added) in order to take off or land. Even though this is acceptable from a performance perspective it does mean the aeroplane is operating at the limit for that runway and there is no excess runway available beyond the included safety margins.

19 To help assess the likelihood of an aeroplane overrunning a runway, licence holders should assess the traffic using their aerodrome to identify what percentage of operations is likely to be performance-limited.

20 An objective assessment of the severity, likelihood and overall level of risk of an aeroplane undershooting or overrunning a runway will have to be made using all the information available. Depending on the level of risk further mitigation measures to reduce either the severity and/or likelihood of an event happening may need to be considered.

### **Possible Mitigation Measures to Consider**

21 If the risk assessment reveals that the level of risk of an undershoot or overrun is of concern, mitigation measures will be required to reduce the level of risk to as low as reasonably practicable (ALARP). It may be that the cost of a particular mitigation measure is beyond the scope of an aerodrome and will not be feasible; however, it is likely that many mitigation measures will be reasonably practicable and should therefore be considered.

22 The following list outlines some of the measures that may be considered, singly or in combination, to reduce the risks (in terms of severity or likelihood) of an undershoot and/or an overrun occurring. Mitigation measures that reduce the likelihood of either an undershoot or overrun include:

- a) Improve the friction characteristics of runway surfaces and/or limit the lowest friction values allowed. CAP 683 specifies the requirements for runway friction. Any improvement in the friction levels of runway surfaces either by maintenance or the removal of contamination or rubber deposits will increase the chances of an aeroplane stopping on the paved surface especially when wet or contaminated;
- b) Ensure that a regular assessment and maintenance programme is in place to maintain adequate levels of grip at all times;
- c) Ensure that accurate and up-to-date information on weather and the runway state is available to pilots;
- d) Upgrade visual and instrument landing aids to improve the accuracy of aeroplane delivery at the correct landing position on runways (including the provision of Instrument Landing Systems and/or PAPIs);
- e) Consider GPS approaches for runways with non precision approaches;
- f) Ensure that touchdown zone markings are correctly located and clearly visible;
- g) Install touchdown zone lighting;
- h) Install coded runway centreline lights or yellow caution zone edge lights to indicate that the end of the runway is near.
- i) In consultation with aeroplane operators and air navigation service providers formulate procedures to help ensure stabilised approaches;
- j) In consultation with aeroplane operators and air navigation service providers consider operating procedures or restrictions for severe weather conditions;
- k) Ensure the accuracy of any AIP entries with regard to the obstacle environment and declared distances;

- l) Ensure an open dialogue between the aerodrome, air navigation service provider and aeroplane operators to raise awareness of the factors that could lead to a runway excursion;
- m) Where possible reduce the number of tail wind landings and review any limitations in the use of reverse thrust due to noise abatement requirements;
- n) Implement/promote a go-around policy for aircraft that have not touched down by the end of the touchdown zone;
- o) During work in progress ensure that any temporarily reduced declared distances are clearly communicated to pilots and that any lighting, signs and markings correspond to the actual declared distances available;
- p) During runway resurfacing projects ensure that accurate information regarding the condition of the runway surface is effectively promulgated to pilots.

23 Mitigation measures that reduce the severity of either an undershoot or overrun include:

- a) Reduce the declared runway distances in order to provide an increased length of RESA. Licence holders should consult with their operators to determine what effect a reduction in declared distances would have on their operations. Any increase in the length of a RESA provided will help to reduce the severity of an aeroplane actually undershooting or overrunning a runway and should be considered a high priority wherever possible;
- b) Install suitably positioned and designed arresting systems to supplement a RESA where appropriate. Further guidance on suitable arresting systems is available on the CAA website and from Aerodrome Policy and Standards;
- c) Minimise the obstruction environment in the area beyond the RESA. A reduction in obstructions surrounding the runway should decrease the severity if an aeroplane departs the runway unintentionally. This includes making obstructions frangible wherever possible and delethalsing the surrounding areas appropriately.

24 The above list is not exhaustive or in any particular order and should complement action by aeroplane operators, designers and aviation regulators. Aerodrome licence holders are reminded of the need to advise the CAA about changes to the physical characteristics of the aerodrome, in accordance with the licence conditions.

### **Optimising the available RESA**

25 It is recognised that improving RESA distance is often difficult. However, it is important to note that incremental gains should be obtained wherever possible, as any gain is valuable. Therefore, whenever a runway project involves construction consideration should also be given to improving the RESA further. This includes:

- a. Relocation or realignment of the runway - it may be possible to construct additional pavement at the start of take-off end to make more pavement available to retain the declared distances. The start and end of declared distances can be moved towards the downwind (start of take-off) end, thereby retaining the declared distance and creating space for a longer RESA;

- b. In the case where landing RESA is limited and the runway has a displaced landing threshold, examine whether the threshold can be moved (downwind) to increase the RESA;
- c. Increasing the RESA provision including land acquisition, improvements to the grading and realigning fences or roads to provide additional area;
- d. Improving the slopes in the RESA to minimise or remove downward slopes;
- e. Providing paved RESA with known friction characteristics.

### **Reviewing the risk assessment**

26 As part of the aerodrome's SMS, licence holders should review their RESA risk assessment on a regular basis and whenever significant changes occur that would affect either the likelihood or severity of a runway excursion.

Changes affecting the level of risk include:

- a) Changes to the declared distances;
- b) New aircraft types;
- c) Changes to the number of movements;
- d) Changes to the traffic mix;
- e) Runway resurfacing projects;
- f) Proposed changes or projects involving the surrounding infrastructure;
- g) Changes to ATC procedures.

## **Chapter 5 – Risk Management for Aerodromes**

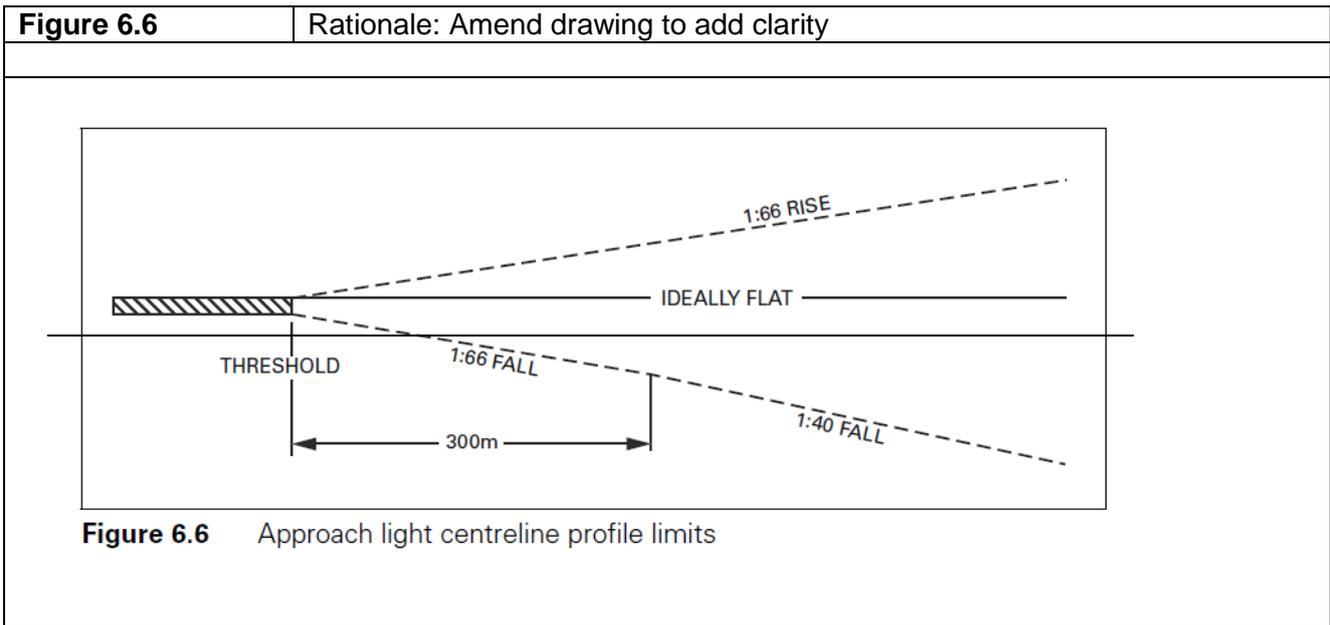
<b>Paragraph 2</b>	Rationale: To align with ICAO/EASA, all reference to bird control will be replaced by wildlife control.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
<b>Chapter 5</b> <del>Birdstrike</del> <b>Wildlife Risk Management for Aerodromes</b>	
<b>2</b> <del>Bird</del> <b>Wildlife Control Management</b>	
2.1 A <del>Bird</del> <b>Wildlife</b> Control Management Plan should be developed to:	
a) assess the potential <del>bird</del> <b>wildlife</b> strike risk;	
b) reduce bird infestation on the aerodrome as much as practicable;	
c) implement a safeguarding system to identify, and, where possible, address existing and planned developments within 13 km of the aerodrome that may have the potential to increase the <del>birdstrike</del> <b>wildlife</b> strike risk;	
d) monitor and assess wildlife strike events; and	
e) strive to improve the effectiveness of the plan through ongoing evaluation by competent personnel.	
2.2 Details of, or reference to, the <del>Bird</del> <b>Wildlife</b> Control Management Plan should be included in the Aerodrome Manual.	

## Chapter 6 – Aeronautical Ground Lighting

<b>Paragraph 6.8.2</b>	Rationale: To correct an error in the calculation and align with ICAO/EASA.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
6.8.2 Edge markers should have a minimum viewing area of 4.5 <b>0.015</b> sq m and be blue in colour; centreline studs should be green, and have a minimum viewing area of 0.2 <b>0.002</b> sq m.	

<b>Paragraph 10.3</b>	Rationale: Change to paragraph to support the deletion of Para 10.4
Previous Text: Deleted	
10.3 If no alternate power supply is available, the aerodrome authorities should notify the effect by NOTAM. The NOTAM action should be taken by only one source on the aerodrome. ATS should notify flight crew on initial RTF contact and by ATIS when possible. Flight crews can then be expected to follow the appropriate instructions in their operations manual. There is no need to withdraw a system from service or to downgrade it arbitrarily. <del>unless the failed power source is not recovered within two hours.</del>	

<b>Paragraph 10.4</b>	Rationale: Obsolete requirement that is no longer relevant.
Previous Text: Deleted	
<del>10.4 If the unavailability of an alternate power supply exceeds a period of two hours, approaches should be restricted to non-precision status and take-offs limited to visual ranges greater than 400 m.</del>	



<b>Paragraph 11.1.9</b>	Rationale: Provisions covered by previous paragraph.
Previous Text: Deleted	
<p><del>11.1.9 Commercial-off-the-shelf (COTS) systems may provide a cost and time-effective solution for the design of a part or even the whole AGL system. COTS includes all types of software and electronic or electrical processing equipment and may also be applied to luminaires and other hardware. The following conditions in addition to paragraph 11.1.8 shall be satisfied where a COTS product is being considered for AGL safety related applications:</del></p> <p><del>a) the scope of the design specification for the COTS product shall include the purpose for which it is intended to be used;</del></p> <p><del>b) the COTS product shall be designed, manufactured and tested to an appropriate standard or to a level consistent with the safety-related aspects of its application;</del></p> <p><del>c) the functionality of the COTS product shall conform to the applicable safety requirements;</del></p> <p><del>d) any changes or user-defined modifications to the COTS product shall be made under a suitable configuration change control system;</del></p> <p><del>e) proof of a) to d) above can be provided and submitted to the CAA.</del></p>	

<b>Paragraph 12.1.1</b>	Rationale: Obsolete requirement that is no longer relevant.
Previous Text: Deleted	

~~12.1.1 The Electricity at Work Regulations 1989 encompass all work carried out on AGL and other electrical installations in and around aerodromes. Under certain circumstances the Electricity Safety, Quality and Continuity Regulations 2002 may also apply. As these are Statutory Instruments, compliance with them is mandatory. The equipment and system shall be shown to be electrically safe by means of demonstrated compliance with recognised Standards and Approvals and shall comply with all Health and Safety and personal safety requirements in this respect. This includes the compliance with the Low Voltage Directive 2006/95/EC where applicable.~~

**Paragraph 13.1.3** | Rationale: Obsolete requirement that is no longer relevant.

Previous Text: Deleted

~~13.1.3 Where an electrical installation is of a low-voltage type (e.g. the control and monitoring equipment) — but **excluding** the secondary series circuits — the current BS 7671:2008 IEE Wiring Regulation requirements should be applied. However, BS 7671:2008 is not wholly appropriate for the electrical installation of the constant current series circuit, therefore special consideration should be given to this type of installation to ensure the correct operation of the equipment and the safety of personnel involved in the installation, operation and maintenance of the AGL system.~~

**Paragraph 13.1.4** | Rationale: Obsolete requirement that is no longer relevant.

Previous Text: Deleted

~~13.1.4 Parallel circuits should be used only when there are few fittings in the circuit and accurate luminous intensity balance is not critical, e.g. a short taxiway or blue edge lighting of a paved area.~~

**Paragraph 13.2** | Rationale: Obsolete requirement that is no longer relevant.

Previous Text: Deleted

## 13.2 Earthing

13.2.1 The equipment in the control and distribution centres should be bonded to earth in accordance with BS 7671:2008.

13.2.2 Primary series circuits shall not be earthed and all attempts to work on these circuits when live shall be prevented. In an ideal installation it should be unnecessary to earth the secondary series circuits; however, the installation environment, repairs and wear and tear do not provide an assurance that the installation is ideal. On the other hand, if earthing of the secondary series circuits is provided, there is no guarantee of the safety of personnel who happen to come into direct or indirect contact with a live circuit. Certain equipment failure modes (e.g. double earth faults and isolating transformer primary-secondary shorts) could present a potentially hazardous situation for maintenance personnel even if the equipment is apparently earthed. Therefore, whether or not it is the practice to earth the secondary series circuit, care shall be taken to ensure that adequate protection from electric shock is provided (see paragraph 12.3.1).

13.2.3 Where provided, earth connections should be measured to be no greater than 6 ohms in order to provide protection from electric shock.

13.2.4 Where shielded cable is used in a constant current series circuit (for EMC purposes), the shield should be continuous throughout the loop and earthed at the ends of the primary series circuit within the CCR. Cable shields also provide some protection against insulation deterioration due to high voltage stress and it is recommended that the shield be earthed at every practicable point.

13.2.5 Where a counterpoise is provided (for protection against lightning) it may be used as an earth source for AGL installations if no suitable alternative exists and it meets the requirement of paragraph 13.2.3. Care should be taken to ensure that, in the event of a lightning strike, the connection of equipment to a counterpoise will not cause unacceptable damage to the AGL.

<b>Appendix 6E</b>	Rationale: New Appendix to provide guidance to aerodrome operators on the maintenance of AGL Systems.
Proposed text	
<b>Appendix 6E Guidance on Maintenance of AGL Systems</b>	
<b>1 General</b>	
1.1	The maintenance of AGL equipment should consider the objectives of aerodrome operations and address the impact on such operations whilst maintenance activities are being carried out. In addition, during periods of maintenance, or equipment failure, it may be necessary to operate AGL circuits on local control at the remote power centres, thus removing control from ATC whilst the work is being carried out. A procedure for local operation should be agreed with ATC before local switching of AGL circuits commences. A record of all maintenance operations should be kept, including periods when local operation

of a circuit or power centre is under the control of maintenance staff. A log book should be provided at each power centre for this purpose and retained for at least three years after the date of the last entry. All log books, together with installation drawings and operating and maintenance manuals, should be available for examination during licensing inspections.

1.2 By assessing the performance of each light on a regular basis and targeting maintenance on the under-performing light, the overall performance of the installation can be considerably improved. Targeting work on those lights that are underperforming ensures that maximum benefit can be obtained from maintenance activity, thereby minimising wastage and enabling maintenance expenditure to be optimised.

1.3 The conventional AGL maintenance strategies of block change, or change on failure, have been shown to be inadequate with many of the lamps failing to meet the required standard either immediately or shortly after the maintenance activity (see paragraph 12.3.8). Lamps and associated equipment do not age at a uniform rate and consequently only limited benefit is achieved from a routine block change. On the other hand, if the performance of individual lights is allowed to decay until lamp failure occurs, then each light will be operating below the required standard for a substantial percentage of its life. Both strategies result in the possibility of entering LVPs with the installation operating below the required serviceability levels. Routine and regular targeted maintenance procedures are essential if this scenario is to be avoided.

1.4 The performance of lights can change rapidly, especially at large aerodromes with high movement rates. Therefore, it is important to assess performance accurately on a regular basis and act upon the information collected. The frequency with which such assessments should be undertaken is dependent upon the type and age of the installation, maintenance policy adopted, movement rates and prevailing weather conditions. Typically, a weekly survey, with associated maintenance, has been found to be adequate for a major aerodrome.

1.5 Changing the light fitting will not always ensure the required performance is achieved since the luminous intensity of the beam is dependent on the total electrical and optical system. The importance of maintaining the primary series circuit current is only a single factor in the system and additional work may be required at specific locations, for instance a faulty transformer or a slightly dirty lens can reduce output by up to 50%. A single application of de-icing fluid to a runway can reduce the light output of centreline lights by up to 70%.

## **2 Maintenance Practices**

2.1 Persons should be protected against dangers that may arise from contact with live parts of the installation. Only limited protection against overcurrent and open circuit can be provided therefore no work should be undertaken on live AGL constant current series circuits unless adequate provisions are made to ensure the safety of personnel.

2.2 Approach and runway lighting patterns are designed for viewing from the air. At ground level the pattern may appear to be perfect, but small errors in the setting of lights may present a ragged and apparently incomplete pattern to flight crew. If local circumstances permit, maintenance staff should be given the opportunity to view the AGL from the air.

2.3 The overall performance of AGL can be dramatically improved and maintained with the introduction of an adequate cleaning regime. The nature of their general location makes inset fittings particularly susceptible to the presence of dirt, dust, moisture and the effects of heavy loads. Staining of the glassware and rubber deposits can considerably reduce the light output of these lights and reductions of the order of 50% are not uncommon. The periodicity of AGL cleaning will depend upon environmental and operating conditions but

typically AGL on runways that are subjected to a heavy traffic density should be cleaned at least once per week, and other AGL should be cleaned at least once every two weeks.

- 2.4 A routine ground inspection of all AGL systems where practicable should be made daily or before use as appropriate and any defects remedied as soon as practicable. All deficiencies and associated remedial action should be logged and the system should again be inspected before use after remedial action.
- 2.5 As an aid to maintenance it is recommended that each AGL location be marked with an identification number where practicable, large enough to be legible from a passing vehicle (e.g. 27/A/14 refers to light fitting No 14 of circuit A on runway 27) as follows:
- a) Lights in paved areas – numbers painted with white road paint adjacent to the light fitting;
  - b) Lights in grassed areas – numbers painted on the light fitting;
  - c) Pole or mast mounted lights – numbers painted on plates attached to the poles or masts.
- 2.6 An up-to-date set of drawings showing the AGL layout, light fitting location numbers and cable routing, along with operating and maintenance manuals containing adequate information for the safe operation and maintenance of the AGL system should be provided at all appropriate sites.
- 2.7 Where AGL and equipment is installed on private land, rights of access should be maintained in order that regular maintenance may be carried out.
- 2.8 If the process detailed in paragraph 12.2.2 is carried out on a regular and adequate basis, individual lamp conformance can be assessed and therefore a lamp could be changed or cleaned on an individual basis and only when necessary. Where it is not possible to perform this level of maintenance, AGL lamps should be replaced in groups as part of a planned change programme based on the length of operating time or an observed deterioration. Lamps should be changed after 90% of nominal life at maximum luminous intensity (operating time at other luminous intensity levels being ignored). Any observed deterioration of an AGL pattern should be promptly corrected. The replacement of AGL lamps only on failure should be a last resort.
- 2.9 The insulation value of a primary series circuit may decrease by a very significant amount before any operational effect on the AGL is noticed; however, in this case there would be a much greater risk of harm to maintenance or installation persons. Therefore, a device should be provided to measure the insulation value of the primary series circuit with an error of not greater than 10%. The measurement should be performed as part of the routine maintenance or by using an automatic facility. Where an automatic measurement facility is provided, the measurement shall be done at a rate of not less than once per hour. Remedial action should be taken where the insulation between primary and secondary series circuits and between primary series circuit and earth falls below 30 M $\Omega$ . The insulation properties of secondary series circuit cables should be checked on a regular basis and when an insulation failure is suspected. The resistance between secondary series circuit and earth should be not less than 5 M $\Omega$ .
- 2.10 Adequate spares should be held on site in order to support the complete AGL system maintenance procedures. An appropriate parts control system should be instigated in order to ensure that the correct parts are available and used when replacements are carried out. Components such as lenses may appear to be identical but may have substantially different photometric performance.
- 2.11 Licence holders should adopt maintenance practices to minimise the potential for intergranular corrosion of aluminium alloy light fittings. Corrosion may be initiated by the use of high alkaline property cleaning fluids, which may damage or destroy the passivated layer

protecting the fitting from corrosion.

2.12 To minimise future cracking of aluminium alloy light fittings due to intergranular corrosion, licence holders should prevent the contact of fluids with a high acidic or alkaline property (PH less than 4 to greater than 8.5) with aluminium alloy parts of AGL fittings. Licence holders should address the potential for corrosion where there is an essential operational need to use a fluid with a high acidic or alkaline property in the vicinity of AGL and a suitable alternative with a more neutral solution cannot be found.

2.13 Mechanical loading may affect the structural integrity of AGL fixtures and fittings whilst in service, and may also exacerbate the effects of corrosion. Accordingly:

- a) staff should look for the effects of poor installation, especially with regard to debris entrapment between fitting, seating ring and base, and rectify as necessary;
- b) replacement components should, where possible, form a part of a bespoke or homogenous assembly, and attention should be paid to the compatibility and suitability of materials;
- c) seating rings should be designed and constructed to the same tolerances as the AGL fitting. If signs of wear exist, the stud location and load transfer surfaces should be jig-checked and discarded if found to be out of tolerance.

## **Chapter 7 – Aerodrome Signals, Signs and Markings**

**Figure 7.14e**

Rationale: Correct error in signage for the CAT II/III hold.

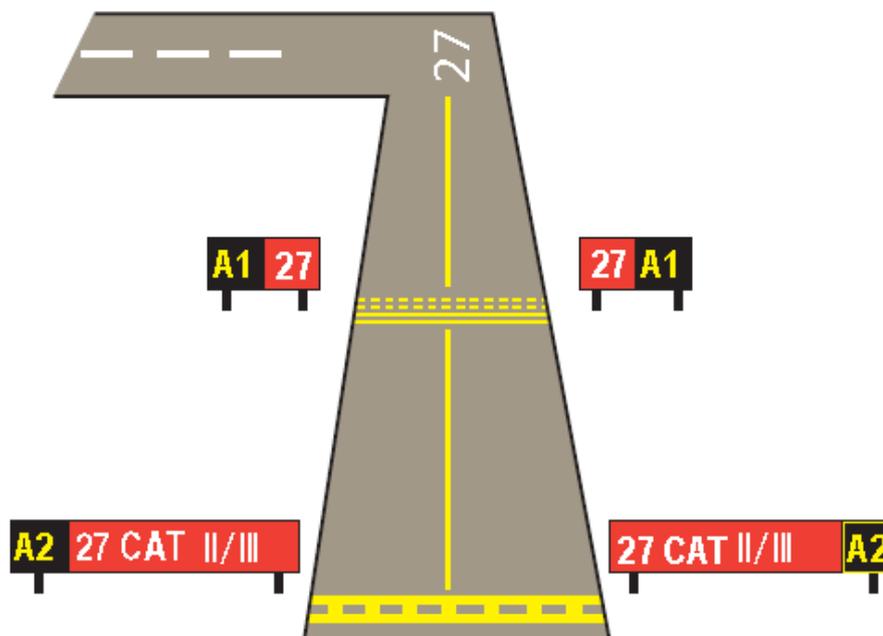


Fig 7.14 (e)

**Figure 7.15**

Rationale: Figure amended to support the strategy of not allowing taxiway designation to continue across a runway.

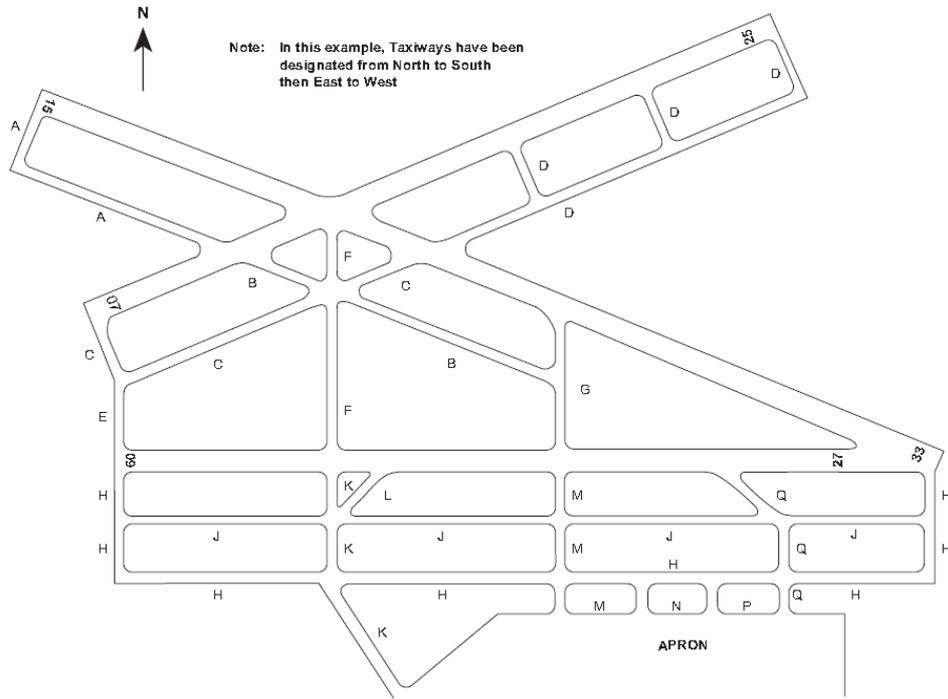
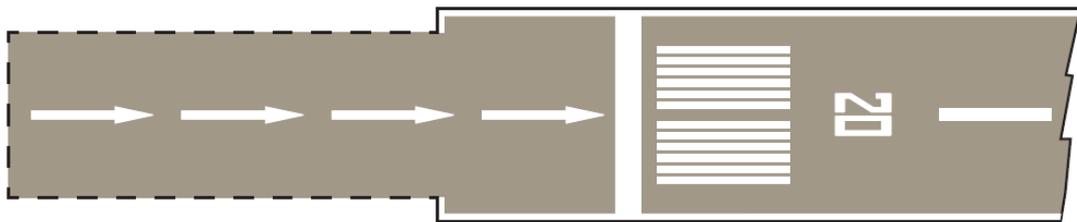


Fig 7.15 Example: Designating Taxiways

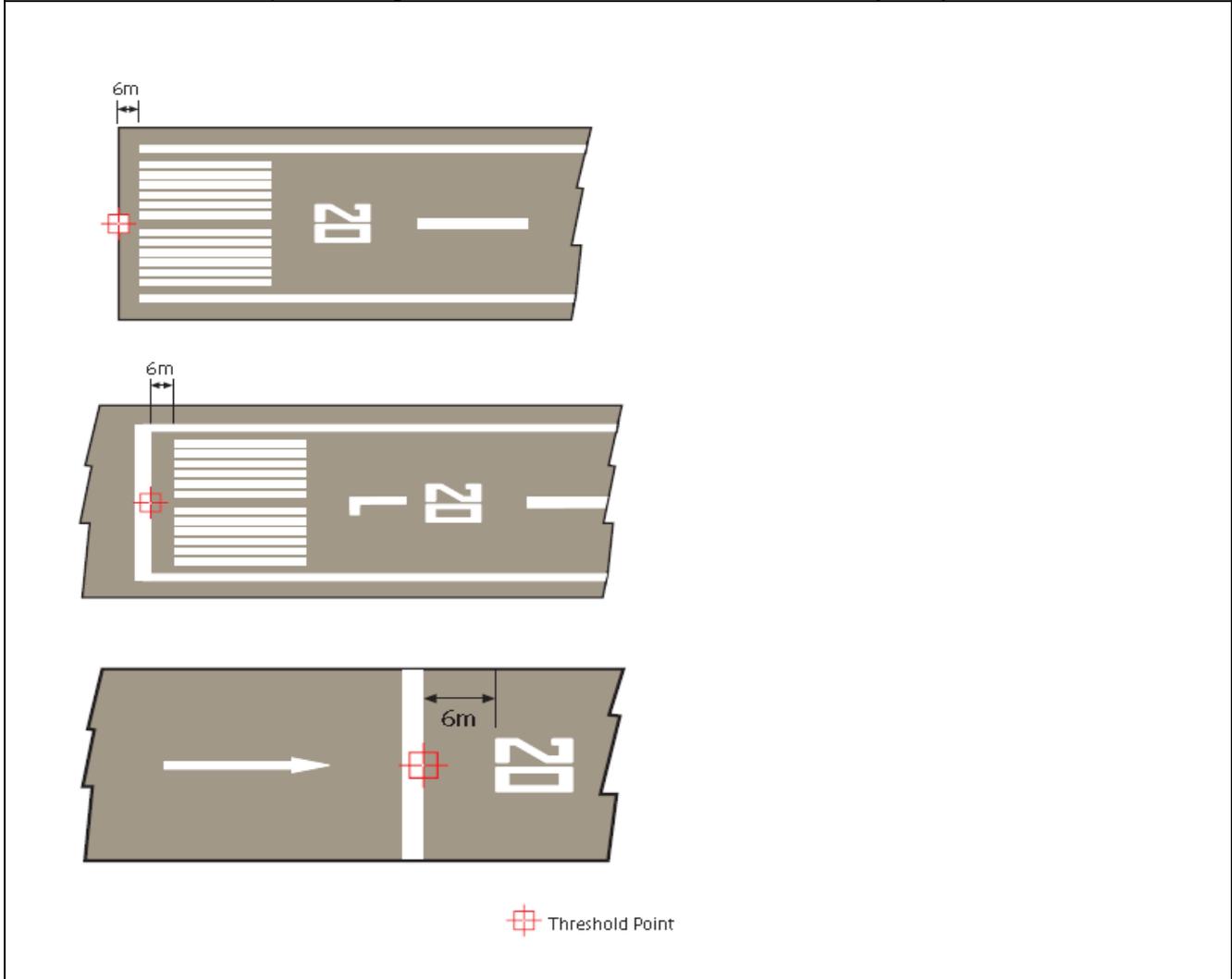
**Figure 7.23(c) 2(i)**

Rationale: To provide clarification to pre-threshold area of runway fit for movement of aircraft.





<b>Figure 7.23(f)</b>	Rationale: To provide clarity for determining the correct survey position of the threshold when calculating declared distances and future alignment with CAP 232 Aerodrome Survey Requirements
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<b>Paragraph 4.2.4</b>	Rationale: Include a description of the location of the threshold. The exact location of the threshold becomes more important with the introduction of Performance Based Navigation systems.
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Previous Text: As shown – proposed text highlighted

Proposed Text:

4.2.4 Runway threshold markings should be provided according to the status of the runway, as shown at Figure 7.23. The dimensions of threshold markings are given in Table 7.3. The threshold position is located 6 m downwind of the threshold marking or on the upwind edge of the threshold transverse stripe.

## **Chapter 8 – Rescue and Fire Fighting Services (RFFS)**

<b>Paragraph 2.4</b>	Rationale: Changes required to reflect latest guidance on reductions of RFFS.
Previous Text: Part deleted – proposed text highlighted.	
Proposed Text:	
<p>2.4 <del>The aerodrome category</del> Subject to 2.10, the aerodrome (RFFS) category shall be determined from Table 8.1 and shall be based on the longest aeroplanes normally using the aerodrome and their fuselage width.</p>	

<b>Paragraph 2.10</b>	Rationale: Changes required to reflect latest guidance on reductions of RFFS.											
Previous Text: Deleted – proposed text highlighted												
Proposed Text:												
<p><del>2.10 The use of a Nominated Diversion Aerodrome (NDA) with a RFFS one category below the aeroplane RFFS category is allowed subject to an agreement between the aerodrome licence holder and each affected airline.</del></p>												
<p>2.10 Notwithstanding the requirement in Para. 2.4 it is acknowledged there are occasions when the RFFS provision may be reduced:</p>												
<table border="1"> <thead> <tr> <th>Flight Type</th> <th>Reduction</th> </tr> </thead> <tbody> <tr> <td>a) Where the aerodrome is a Nominated Diversion Aerodrome (NDA);</td> <td>1 Category<sup>1</sup></td> </tr> <tr> <td>b) Cargo only flights;</td> <td>2 Categories<sup>2</sup></td> </tr> <tr> <td>c) Low occupancy aircraft flights e.g. business jets;</td> <td rowspan="4">Determined by risk assessment as part of the SMS.</td> </tr> <tr> <td>d) Training flights;</td> </tr> <tr> <td>e) End of aircraft life flights;</td> </tr> <tr> <td>f) Short term reductions as part of contingency plans.</td> </tr> </tbody> </table>		Flight Type	Reduction	a) Where the aerodrome is a Nominated Diversion Aerodrome (NDA);	1 Category <sup>1</sup>	b) Cargo only flights;	2 Categories <sup>2</sup>	c) Low occupancy aircraft flights e.g. business jets;	Determined by risk assessment as part of the SMS.	d) Training flights;	e) End of aircraft life flights;	f) Short term reductions as part of contingency plans.
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b) Cargo only flights;	2 Categories <sup>2</sup>											
c) Low occupancy aircraft flights e.g. business jets;	Determined by risk assessment as part of the SMS.											
d) Training flights;												
e) End of aircraft life flights;												
f) Short term reductions as part of contingency plans.												
<p><sup>1.</sup> Links to ICAO Annex 6, Part 1, Chapter 4, Para. 4.1.4, Attachment K.</p> <p><sup>2.</sup> For Dangerous Goods cargo also see CAP 789, Chapter 8, section 4.</p>												
<p>2.11 Prior to agreeing to the reduction the aerodrome licence holder should:</p> <ul style="list-style-type: none"> <li>a) ensure that, as part of their SMSs, the airline operator and the aerodrome Accountable Manager have identified the risks, appropriate mitigation measures and the ownership of the residual risks;</li> <li>b) ensure that any agreement is implemented between the airline operator and the aerodrome licence holder, covering RFFS provision and any other operating issues deemed necessary;</li> <li>c) ensure that a review of resources and tactics is carried out;</li> <li>d) review the impact as part of local community emergency planning arrangements;</li> <li>e) implement a recording procedure for reduced RFFS category operations;</li> </ul>												

f) document the details in the aerodrome manual.

<b>Paragraph 2.10.1</b>	Rationale: Changes required to reflect latest guidance on reductions of RFFS.
Previous Text: Deleted	
<p>2.10.1 <del>Prior to agreeing to be an NDA, aerodrome licence holders should:</del></p> <ul style="list-style-type: none"> <li><del>a) ensure that an agreement is implemented between the airline operator and the aerodrome licence holder, covering RFFS provision and any other operating issues deemed necessary;</del></li> <li><del>b) ensure that a review of resources and tactics is carried out;</del></li> <li><del>c) review the impact on the emergency planning arrangements;</del></li> <li><del>d) implement a recording procedure for reduced RFFS category diversions.</del></li> </ul>	

<b>Paragraph 27.1</b>	Rationale: Update the table.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
Date	Incident Identifier
Type of incident	Time incident closed
Type of aircraft	No. of pax on board
Location of incident	No. of pax evacuated
Time of call	No. of pax rescued
Called by	Slides deployed
Time in attendance	Slides used
Size of fire	By how many pax?
Fire fighting agents used	Was PEMS used?
Amount of agents used	Hazardous materials involved
Initial extinguishment	What
Prolonged control	How much
Time of burn before agent applied	Source of ignition
Category reduced	Category restored
RFFS vehicle attending	Fire fighting equipment used
FRS vehicles attending	Rescue equipment used

No. of RFFS personnel	Damage to aircraft
Actions by others, Ffg. Or Rescue	Area of damage sq m
Fatalities	Time to evacuate
Casualties	Follow up actions Date closed
Vehicle accidents/incidents	

<b>Paragraph 6.2</b>	Rationale: Introduces the new Appendix 8D that describes how to undertake a Task and Resource Analysis.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
<p>6.2 In determining the minimum number of rescue and fire fighting personnel and supervisory levels required a Task Resource Analysis (TRA) should be completed(see Appendix 8D), and the level of staffing promulgated in, or referenced to, the Aerodrome Manual.</p>	

**Paragraph 6.4 q)**

Rationale: Aligns with the term used for this function.

Previous Text: As shown – proposed text highlighted.

Proposed Text:

q) Incident task analysis: feasible worst case scenarios, workload assessment, human performance/factors. To include:

- Mobilisation.
- Deployment to scene.
- Scene management.
- Fire fighting.
- Suppression and extinguishment.
- Application of complementary agents.
- Post fire security/control.
- Personnel protective equipment.
- Rescue teams.
- **Passenger Evacuation Management.**
- Extinguishing agent replenishment.

The aim is to identify any pinch points within the current workload and proposed workload.

## **Chapter 8 – Appendix 8A – Surface Level Heliports**

<b>Paragraph 5.2</b>	Rationale: Change to reduce level of authority.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
5.2 At a surface level heliport, the operational objective of the rescue and fire fighting service <del>shall</del> <b>should</b> be to achieve response times not exceeding two minutes in optimum conditions of visibility and surface conditions.	

<b>Table 8A.5</b>	Rationale: The asterisk after H3 does not appear to have any meaning, therefore remove.
Previous Text: As shown – asterisk deleted.	
Proposed Text:	
<b>Equipment Resource RFFS Categories H1, H2 &amp; H3</b>	
Axe, aircraft non-wedging Saw, general purpose Crowbar Side cutting pliers Set Screwdrivers (Phillips and Slotted) Fire resistant blanket Ladder/steps (appropriate to helicopter size) General Purpose Line	Bolt cropper Hacksaw (with spare blades) Harness Knife (with sheath) Tin snips Adjustable wrench Hook, grab or salving Powered Cutting Tool (H3* only)

<b>Table 8A.4</b>	Rationale: Replacing 'Airport Junior Officer' with 'Aerodrome Supervisor' aligns with current terminology.	
Previous Text: As shown – proposed text highlighted.		
Proposed Text:		
<b>Helicopter RFFS Category</b>	<b>Minimum number of personnel</b>	<b>Minimum supervision level</b>
H1	Two	To be determined locally
H2	Three	Lower Category Aerodrome <del>Junior Officer/Supervisor</del> <b>Aerodrome Supervisor</b>
H3	Four	Lower Category Aerodrome <del>Junior Officer/Supervisor</del> <b>Aerodrome Supervisor</b>

**Chapter 8 – Appendix 8B – Rescue and Fire Fighting Service (RFFS)  
Requirements at Category One and Two  
Aerodromes**

<b>Paragraph 6.1</b>	Rationale: Delete 'other' as the word is not necessary in the context of the paragraph.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
6.1 The operational objective of the RFFS should be to achieve a response time not exceeding three minutes to any <del>other</del> part of the manoeuvring area in optimum visibility and surface conditions.	

<b>Table 8B.4</b>	Rationale: Replacing 'Airport Junior Officer' with 'Aerodrome Supervisor' aligns with current terminology.	
Previous Text: As shown – proposed text highlighted.		
Proposed Text:		
<b>RFFS Category</b>	<b>Minimum number of personnel</b>	<b>Minimum supervision level</b>
1	Two	To be determined locally
2	Three	Lower Category Aerodrome Junior Officer/Supervisor Aerodrome Supervisor

<b>Paragraph 9.1</b>	Rationale: Replace 'helicopter' with 'aircraft' to avoid confusion. The paragraph applies to a wider scope than helicopter.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
9.1 A vehicle fit for purpose shall be provided and be readily available for immediate use to carry personnel and RFFS equipment to the scene of the incident. Non self-propelled appliances (trailers) are permissible but they must be connected to a suitable towing vehicle during <del>helicopter</del> <b>aircraft</b> movements.	

<b>Table 8B.5</b>	Rationale: Remove Powered Cutting Tool from table as a lower category aerodrome is not required to have a powered cutting tool.
Previous Text: As shown – text deleted.	
Proposed Text:	
<b>Equipment Resource - Categories 1 and 2</b>	

Axe, aircraft non-wedging	Bolt cropper
Saw, general purpose	Hacksaw (with spare blades)
Crowbar	Harness Knife (with sheath)
Side cutting pliers	Tin snips
Set Screwdrivers (Phillips and Slotted)	Adjustable wrench
Fire resistant blanket	Hook, grab or salving
Ladder/steps (appropriate to helicopter size)	Breathing Masks (filter)
General Purpose Line	<del>Powered Cutting Tool (H3* only)</del>

**Chapter 8 – Appendix 8C – Initial Emergency Response (IER)**  
**Requirements for RFFS Category Special Aerodromes – Aeroplanes and Helicopters**

<b>Paragraph 3.1</b>	Rationale: Renumber paragraphs to add clarity to section numbering system.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
3.1	A vehicle that is mechanically reliable, fit for purpose, and which is capable of accommodating IER personnel should be provided. The vehicle, including any towed equipment, should be capable of traversing the terrain likely to be encountered in response to any incident; all-wheel drive may be necessary. Specified equipment should be carried either on the vehicle or on a suitable trailer connected to the vehicle.
3.2	Radio communications equipment should be provided and should have a range that will ensure effectiveness within the expected response area.
<del>3.2</del> 3.3	A minimum quantity of ancillary equipment appropriate to the sizes and types of aircraft should be provided.

<b>Paragraph 3.4</b>	Rationale: New paragraph to add clarity to the section.
Previous Text: As shown – proposed text highlighted.	
Proposed Text:	
3.4	Account should be taken of the Provision and Use of Work Equipment Regulations (PUWER) and the Personal Protective Equipment at Work Regulations which require equipment is: <ul style="list-style-type: none"> <li>a) suitable for the intended use;</li> <li>b) safe for use, maintained in a safe condition and, in certain circumstances, inspected to ensure this remains the case;</li> <li>c) used only by people who have received adequate information, instruction and training; and</li> <li>d) accompanied by suitable safety measures, e.g. protective devices, markings, warnings.</li> </ul>

## **Chapter 8 – Appendix 8D – RFF Task and Resource Analysis**

<b>Appendix 8D</b>	Rationale: New appendix to provide guidance on how to undertake a Task and Resource Analysis activity.
New Text: Proposed text highlighted.	
Proposed Text:	
<b>1 Introduction</b>	
1.1	This Appendix describes the stages that should be considered in carrying out a Task and Resource Analysis (TRA) to establish justification as to the minimum number of qualified/competent personnel required to deliver an effective Airport Rescue and Fire Fighting Service (RFFS) to deal with an aircraft incident/accident. If it is required for the RFFS to attend structural incidents and road traffic accidents in addition to aircraft incidents/accidents, due regard must be given to the inability to meet the required response times and robust procedures should be introduced accordingly.
<b>2 Purpose</b>	
2.1	By using a qualitative risk based approach, which focuses upon probable and credible worst case scenarios, a task and resource analysis seeks to identify the minimum number of personnel required to undertake identified tasks in real time before supporting external services are able to effectively assist RFFS.
2.2	Consideration should also given to the types of aircraft using the aerodrome, vehicle(s) and the need for personnel to use self-contained breathing apparatus, hand lines, ladders and other rescue and fire fighting equipment provided at the aerodrome associated with aircraft rescue and fire fighting operations. The importance of an agreed framework for incident command should form a primary part of the considerations. However, it must be achieved within the regulation relative to each Member State.
<b>3 General Information</b>	
3.1	The minimum requirements should be established including: minimum number of RFFS vehicles and equipment required for the delivery of the extinguishing agents at the required discharge rate for the specified ICAO RFFS category of the airport.
<b>4 Human Factors</b>	
4.1	The Task Analysis should observe human factor principles to obtain optimum response by all existing agencies participating in emergency operations. The principles should include the effects of human performance, for example workload, capabilities, functions, decision aids, environmental constraints, team versus individual performance and training effectiveness. Knowledge, experience, staffing including numbers, skill levels and organizational structure, safety and health aspects, safety systems and protective equipment, not forgetting fatigue and the need for adequate relief should also be considered. The examples given are not exhaustive.
<b>5 Task Analysis/Risk Assessment</b>	
5.1	A Task Analysis should primarily consist of a qualitative analysis of the RFFS response to a realistic, worst case, aircraft accident scenario. The purpose should

be to review the current and future staffing levels of the RFFS deployed at the aerodrome. The qualitative analysis could be supported by a quantitative risk assessment to estimate the reduction in risk. This risk assessment could be related to the reduction in risk to passengers and aircrew from deploying additional personnel. One of the most important elements is to assess the impact of any critical tasks or pinch points identified by the qualitative analysis.

## **6 Qualitative Approach**

6.1 The Task Analysis including a Workload Assessment aims to identify the effectiveness of the current staffing level and to identify the level of improvement resulting from additional staffing. A credible worst-case accident scenario should be analysed to assess the relative effectiveness of at least two levels of RFFS staffing.

## **7 Quantitative Risk Assessment**

7.1 This will generally be used to support the conclusions of the qualitative analysis by examining the risks to passengers and aircrew from aircraft accidents at the airport. This comparison of the risk allows the benefit of employing additional RFFS staff to be evaluated in terms of the risk reduction in passengers and aircrew lives saved. This could be expressed in monetary terms and may be compared with additional costs incurred in employing the additional personnel. However, this is of little, if any, value in determining minimum levels of personnel.

## **8 Task Analysis**

8.1 The following items will assist in determining the basic contents of an analysis:

- Human factors.
- Description of aerodrome(s) including the number of runways.
- Promulgated RFFS Categories (Aeronautical Information Publication).
- Response Time Criteria (Area, times and number of Fire Stations).
- Current and future types of aircraft movements.
- Operational Hours.
- Current RFFS Structure and Establishment.
- Current Level of Personnel.
- Level of Supervision for each operational crew.
- RFFS Qualifications/Competence (Training Programme and Facilities).
- Extraneous Duties (To include Domestic and First Aid Response).
- Communications and RFFS Alerting System including Extraneous Duties.
- Appliances and Extinguishing Agents available.
- Specialist Equipment - Fast Rescue Craft, Hovercraft, Water Carrier, Hose Layer, Extending Boom Technology.
- First Aid - Role Responsibility.
- Medical Facilities - Role Responsibility.
- Pre-Determined Attendance: Local Authority Services - Police, Fire and Ambulance etc.
- Incident Task Analysis (Feasible Worst Case Scenarios, Workload Assessment, Human Performance/Factors). To include: Mobilisation,

Deployment to Scene, Scene Management, Fire Fighting, Suppression and Extinguishment, Application of Complementary Agent(s), Post Fire Security/Control, Personnel Protective Equipment, Rescue Team(s), Aircraft Evacuation and Extinguishing Agent Replenishment. Note: The aim is to identify any pinch points within the current workload and proposed workload.

- Appraisal of existing RFFS provision.
- Future requirements. Aerodrome development and expansion.
- Enclosures could include: Airport Maps, Event Trees to explain tasks and functions conducted by the RFFS etc.
- Airport Emergency Plan and Procedures.

**Note:** The above list is not exhaustive and should only act as a guide.

## **9 Phase 1**

9.1 The aims and objectives of the RFF services must be clear as to required tasks that personnel are expected to carry out.

### **9.2 Example**

### **9.3 Aim**

9.4 To maintain a dedicated RFFS of qualified and competent fire and rescue personnel equipped with vehicles and specialist equipment to make an immediate response to an aircraft incident/accident on or in the immediate vicinity of the airport within the specified response time criteria.

### **9.5 Principal Objective of the Rescue and Fire Fighting Service**

9.6 The principle objective of the rescue and fire fighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The rescue and fire fighting service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. The rescue may require the use of equipment and personnel other than those assessed primarily for rescue and fire fighting purposes.

9.7 The most important factors bearing on rescue in a survivable aircraft accident are: the training received; the effectiveness of the equipment; the speed with which personnel designated for rescue and fire fighting purposes can be put into use.

### **9.8 Tasks:**

- Meet the required response time.
- Extinguish an external fire.
- Protect escape slides and exit routes.
- Assist in the self-evacuation of the aircraft.
- Create a survivable situation.
- Rescue trapped personnel.
- Maintain post fire security/control.
- Preserve evidence.

**Note:**

- The above list is not exhaustive and all relevant tasks must be identified before moving to Phase 2.
- Each task/mission may include numerous functional activities/actions.

**10 Phase 2**

10.1 Identify a selection of representative realistic, feasible accidents that may occur at the airport This can be achieved by a statistical analysis of previous accidents on airports and by analysing data from both international, national and local sources.

10.2 Note - All incidents should involve fire to represent a feasible worst-case scenario that would require an RFFS response.

**10.3 Example:**

- Aircraft engine failure on take-off with a fire (aborted take-off).
- Aircraft aborts and overruns into the Runway End Safety Area (RESA) with fire on take-off.
- Aircraft into aircraft with fire (collision)
- Aircraft into structure - terminal building(s) with a fire.
- Aircraft leaves the runway on landing into the runway strip (full emergency evacuation).
- Internal aircraft fire (cabin fire, baggage hold, cargo hold, avionics bay(s)).

**11 Phase 3**

11.1 Identify the types of aircraft commonly in use at the airport; this is important as the type of aircraft and its configuration has a direct bearing on the resources required in meeting Phase 1 above. It may be necessary to group the aircraft types in relation to common aircraft configurations for ease of analysis or identify precise aircraft type that may have a unique configuration.

**11.2 Example**

- a) Long wide-bodied aircraft with multiple passenger decks and multiple aisles.
- b) Long narrow-bodied aircraft with single aisle, high passenger density.
- c) Short narrow-bodied aircraft with single aisle, high passenger density.

11.3 A representative aircraft type can then be chosen:

- a) Airbus A 380
- b) Airbus A 340
- c) Airbus A 320
- d) Boeing 747
- e) Boeing 777
- f) Boeing 757
- g) Boeing 737

## 12 Phase 4

12.1 Every airport is unique in that the location, environment, runway and taxiway configuration, aircraft movements, airport infrastructure and boundary etc may present specific additional risks.

12.2 In order that the feasible accident scenario can be modeled/simulated, a major factor is to consider the probable location for the most realistic accident type that may occur.

12.3 To confirm the location of the scenario it is important that a facilitator using a team of experienced fire service personnel, who have knowledge of the airport and the locations in which an aircraft accident is likely to occur, evaluate the scenario.

12.4 The role of the facilitator is to seek agreement in identifying the credible worst-case locations and by using a scoring system place these locations in order of relevance and priority. The team must determine why the locations have been identified and provide a rationale for each location. One methodology would be to award a weighted number to each location; the total numbers can then be added up in relation to each identified location.

### 12.5 Example

12.6 The team may have identified that the following contributed to a worst-case location:

- \* Response time.
- \* Route to the accident site (on or off paved surfaces).
- \* Terrain.
- \* Crossing procedures for active runway(s).
- \* Aircraft congestion on route (taxiways).
- \* Surface conditions.
- \* Communications.
- \* Supplementary water supplies.
- \* Adverse weather conditions - Low visibility Procedures.
- \* Daylight or darkness.

12.7 An additional time delay for any of the factors listed above should be estimated and recorded and the location with the highest additional response time could be identified with the worst-case location.

12.8 It is important to note that the location of an accident could have an impact on the resources and tasks that will be required to be carried out by RFF personnel.

12.9 From the above analysis a location or a number of locations could be identified, in agreement with the airport operator, the TRA facilitator and if necessary the regulator.

### 12.10 Example

1. Taxiway Bravo: Runway Holding Position Bravo 1 - leading onto Runway 06L.
2. Runway 13 - Runway and Service Road Crossing Point (Grid Reference A5).

3. Runway 28 Overrun - Runway End Safety Area (RESA).
4. Runway 24 Undershoot RESA.
5. Aircraft Stand A33 (Alpha Apron).
6. Grid Reference A6 (Runway 06 Localizer Road).
7. Taxiway Alpha: Intermediate Taxi-Holding Position- A3.
8. Aircraft Stand A5 (On taxi lane).

### 13 Phase 5

13.1 This Phase combines the accident types to be examined as described in Phase 2, with the aircraft identified in Phase 3 and the locations as described in Phase 4. The accident types should be correlated with the possible location, in some cases this could be in more than one location on an airport, for which a task and resource analysis needs to be carried out.

13.2 The above information is to be built into a complete accident scenario that can be analyzed by experienced supervisors and firefighters for the task and resource analysis in Phase 6.

### 13.3 Example

#### Scenario No 1

Accident Type: Aircraft Overrun into Runway 06 - Runway End Safety Area (RESA).

Aircraft Identified: Boeing 747- 400 - Phase 3.

Accident Location: Runway 06 RESA - Phase 4.

13.4 The Boeing 747-400 is a wide-bodied multi-deck aircraft, its typical seating configuration can be 340 Economy, 23 Business, and 18 First Class passengers on the lower deck. On the upper deck provision is made for a further 32 Business Class passengers, giving an estimated aircraft seating capacity of 413 excluding the crew. The aircraft typically has 4 exits on both sides of the lower deck and one each side of the upper deck.

13.5 During the take-off phase the aircraft suffers a fire in the number 3 engine and the pilot decides to abort the take-off. During this phase the fire develops rapidly and impinges on the fuselage. The aircraft overruns the runway and comes to rest in the RESA. Flight Deck Crew orders an evacuation.

13.6 The RFF services are informed by ATC and respond accordingly and the aerodrome emergency procedures are activated.

### 14 Phase 6

14.1 By using a TRA facilitator with teams of experienced airport supervisors and firefighters the accident scenario(s) developed in Phase 5 are subject to a task and resource analysis carried out in a series of table-top exercises/simulations.

14.2 When carrying out a task and resource analysis the principal objective should be to identify in real time and in sequential order the minimum number of RFF personnel required at any one time to achieve the following:

- Receive the message and dispatch the RFF service (the dispatcher may have to respond as part of the minimum riding strength).
- Respond utilising communications, taking appropriate route and achieving the defined response criteria.
- Position appliances/vehicles in optimum positions and operate RFF appliances effectively.
- Use extinguishing agents and equipment accordingly.
- Instigate Incident Command Structure - Supervisors
- Assist in passenger and crew self-evacuation.
- Access aircraft to carry out specific tasks if required, e.g. fire fighting, rescue.
- Support and sustain the deployment of fire fighting and rescue equipment.
- Support and sustain the delivery of supplementary water supplies.
- Need to replenish foam supplies.

14.3 The task and resource analysis should identify the optimum time when additional resources will be available to support/augment and/or replace resources supplied by RFF services (Aerodrome Emergency Plan). It can also provide vital evidence to support the level of RFF vehicles and equipment.

14.4 In order to start a task and resource analysis the required category of the airport must be identified as required by the regulatory authority This should confirm the minimum number of vehicles, the minimum extinguishing agent requirements and discharge rates, and should also determine the minimum number of personnel required to functionally operate the vehicles and equipment.

14.5 The results of the analysis should be recorded in a table or spreadsheet format and should be laid out in a method that ensures that the following is recorded:

- Receipt of message and dispatch of the RFF response.
- Time: This starts from the initial receipt of call and the time line continues in minutes and seconds until additional external resources arrive or the facilitator decides an end time.
- List of assessed tasks, functions and priorities achieved.
- The resources (personnel, vehicles and equipment) required for each task is defined.
- Comments to enable team members to record their findings.
- Identified pinch points

## 15 Working Example of a Qualitative Task Resource Analysis - Scenario 1.

- Major Foam Tenders are identified as MFTs A, B, and C and D.
- Minimum numbers of personnel riding the MFTs are identified as: A1, A2, B1, B2 etc. See Table 1.

### 15.1 Major Foam Tenders:

- 4 MFTs carrying 11,000 litres with a total water capacity of 44,000 litres: (A,B, C and D)
- Minimum number of RFFS personnel: Total 14

### 15.2 Supervisors:

- Watch Manager: 1= A1
- Crew Managers: 3= B1, C1 and D1

### 15.3 Firefighters:

- Total - 10.
- A2 and A3.
- B2 and B3.
- C2, C3, and C4.
- D2, D3, and D4.

### 15.4 Table 8D.1: Minimum numbers of appliances/vehicles and personnel riding the MFTs

 <p>MFT A</p>	
 <p>MFT B</p>	
 <p>MFT C</p>	
 <p>MFT D</p>	

#### Note:

1. For this example the RFFS is deployed from a single fire station at an airport with a single runway designated 06-24.
2. The TRA should ensure that the tasks could be conducted within the regulation relative to each Member State.
3. Time has been defined in minutes and seconds.
4. For this TRA the dispatcher is outside of the minimum number of RFF personnel.

### 15.5 Stated objectives for the RFFS:

- Instigate aerodrome emergency plan.
- Respond within the required response time.
- Select appropriate route and communications.
- Position appliances in optimum positions and operate effectively.
- Instigate Incident Command System.

- Suppress/extinguish any fires.
- Assist with self-evacuation of the aircraft.
- If appropriate extinguish any internal fire.
- If required ventilate aircraft to create survivable conditions.
- Maintain post fire control of the critical area.
- Preserve evidence.

15.6 **Table 8D.2: Task and Resource Analysis**

TIME	TASKS	RESOURCES	COMMENTS
00.00	Call received from ATC as aircraft accident runway 06 RESA. Boeing 747-400.	Dispatcher	Achieved
00.00	RFF personnel mobilised by dispatcher.	Dispatcher	Achieved
00.15	Call made to operate the airport emergency plan.	ATC/Dispatcher/Operations Unit	Achieved- ATC
00.30	Personnel donning in appropriate RPE.	Minimum riding strength	Achieved
00.40	Route selected and all appliances mobile en route to 06 RESA.	MFTs A, B, C, & D.	Achieved- Supervisors & Drivers
00.50	Supervisor(s) utilises appropriate communications (RTF): Discreet frequency, ATC, Local Authority etc.	Supervisor(s)	Achieved Note: Aircraft may have already instigated evacuation (Air Crew)
02.00	All appliances in position: Priority identified by Supervisor(s) to extinguish ground pool fire and fire in number 3 engine that is impinging on fuselage.  A1 instigates ICS Create and maintain survivable conditions for the passengers to reach a place of safety. Complementary agent required. D1 is Supervisor.	Supervisors & Drivers.  MFT's A, B, C & D.  A1 Supervisor B1 Supervisor C1 Supervisor D1 Supervisor  A2 A3 B1 B2 B3 C1 C2 C3 D1 D2 D3 deploy, use complementary agent D4	Achieved  A, B & C deploy monitors
02.15	D2 is Pump Operator Breathing Apparatus Entry Control Officer (BEACO).		
03.15	All external fires extinguished.	MFTs A, B, C, & D. All Crewmembers.	Achieved
03.20	Assist with self-evacuation, and maintain survivable conditions for the passengers to reach a place of safety.	MFTs A B. B1 A2 A3 B2 B3	Achieved: Hand lines deployed accordingly
03.20	Crew prepares to enter aircraft in respiratory protective equipment	MET D D1 D3 & D2 (Pump)	Achieved D1 D3 Briefed by

	(RPE).		BEACO.
03.20	Crew prepares appropriate entry point and hand line.  Note: MFT A maintains post fire control.	C1 C2 C3 C4  A2 A3	Achieved by use of: Specialist Vehicle/Equipment/Ladder.  Achieved
03.55	Crew enters aircraft in RPE with hand line. (BEACO).  Ladder made safe for internal crew.  Crews assist with hand line for BA entry team	D1 D3. D4  C4  B2 B3	Achieved  Achieved  Achieved  Achieved
04.15	Following self-evacuation of aircraft provide assistance with mustering passengers and crew to place of safety.	C1 C2 C3.	Achieved. Assistance provided by aircraft crew and additional responders from airport in accordance with the emergency procedures.
04.15	A2 remains as Monitor/Turret operator, and provides escape route protection.	MET A	Achieved
04.30	Supervisor A1 liaises with ATC, Rendezvous Point Officer and arriving emergency services to ensure appropriate resources are brought forward to the accident site/location.	A1	Achieved
04.50	Supervisor A1 instructs Airside Operations to assist in containing exiting passengers and crew and obtaining a head count of survivors.	A1	Achieved
04.55	D1 reports 20 survivors still on board aircraft require medical aid and assistance. There is no smoke in cabin or flight deck areas and survivors are having no difficulty with breathing.	D1 A1	Achieved
05.05	External emergency services are brought forward to the accident site with additional equipment to support the removal of the remaining survivors and to transport the survivors to the appropriate safety zone.	A1 and external commanders: <ul style="list-style-type: none"> <li>• Police</li> <li>• Fire</li> <li>• Ambulance</li> <li>• Medical</li> <li>• Etc</li> </ul>	Achieved
	Additional Points		

	<p>Note 1: At this point the airport emergency plan is fully instigated and the supporting services can relieve D1 D3, provide supplementary water if required from the nearest hydrant or emergency water supply, assist in the deployment of specialist fire ground equipment and if required support the teams that are engaged in removing the survivors to a place of safety.</p>		
	<p>Note 2: The facilitator may decide to terminate the analysis at this point or continue with the exercise to evaluate specific elements of the emergency plan. e.g. Preservation of Evidence.</p>		

**Notes:**

- It can be seen that ten firefighters and four supervisors including the officer in charge are required to achieve the above supported by four Major Foam Tenders.
- The time line can be further verified by the use of practical exercises and individual analysis to establish if the times are realistic and achievable for each task and function.
- Each of the above tasks can be sub-divided into individual functions associated with the specific task performed at a particular time.

**15.7 Example:**

- \* How long does it take to don protective clothing?
- \* How long does it take to don self-contained breathing apparatus?
- \* How long does it take to slip and pitch a ladder?
- \* How long does it take to open an aircraft door from the head of a ladder? (If required.)
- \* How long does it take to deploy one, two, three (etc) lengths of delivery hose?
- \* How long does it take to carry any item of rescue equipment over a specified distance and get to work?

**16 RFFS Activities**

16.1 Table 8D.3 gives an indication of the time line from the above analysis and can be utilized to verify an individual task, function or identify 'Pinch Points' ensuring each task is achievable effectively within the time line.

**Table 8D.3** Time Line Assessment for Personnel: Firefighters and Supervisors

Task Time	A1	A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3	D4
00.00														
00.15														
00.30														
00.40	A1	A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3	D4
00.50														
02.00	A1			B1			C1				D1			
02.15		A2	A3	B1	B2	B3	C1	C2	C3		D1	D2	D3	D4
03.15														
03.20		A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3	
03.20														
03.20		A2	A3											
03.55					B2	B3				C4	D1		D3	
04.15							C1	C2	C3					
04.15														
04.30	A1													
04.50	A1													
04.55	A1										D1			
05.05	A1													

**Note:**

From the above Table it can be seen that a potential Pinch Point exists with Firefighters A2 and A3. However, the tasks that they are performing are achievable as A2 and A3 are already utilizing a foam hand line to maintain the evacuation route and maintaining Post Fire Control. This is considered logical and an achievable process for this crew.

**17 Conclusion**

17.1 A task analysis can be as detailed as necessary. The aim is to itemise the knowledge and practical skills involved in carrying out the task or function effectively and to the correct standard of competence based on a qualitative analysis. Having gathered the appropriate data and agreed the outcome, the TRA should enable an RFFS to confirm and subsequently provide the correct level of vehicles, equipment and personnel. It would also enable the RFFS to develop a training specification and a learning programme can then be designed around role and task. When planning a Task and Resource Analysis ask the following questions:

- What is done?
- Why is it done?
- When is it done?
- Where is it done?
- How is it done?
- Who does it?

17.2 It is often difficult to assess the overall effectiveness of a complete unit by observation only. However, observation/demonstration does allow you to assess the effectiveness of individual units and any element(s) of the emergency arrangements. Documentary evidence relating to previous accidents or exercises may also assist in establishing if the current RFFS is staffed at an appropriate

level. The overall objective is to be satisfied that the RFFS is organised, equipped, staffed, trained and operated to ensure the most rapid deployment of facilities to maximum effect in the event of an accident. The above process can also be used to identify equipment shortages and training needs for personnel required to deal with identified tasks.