



ICAO

**The Fourth Meeting of the Aerodromes Operations and Planning Sub-Group (AOP/SG/4)**

*Video Teleconference, 10 to 13 November 2020*

**Agenda Item 4: Proposal of AOP in the Asia/Pacific Region**  
**- Certification and Operations of Aerodromes**

**APPROVAL OF AMENDMENT 3 TO PANS-AERODROMES**

(Presented by the Secretariat)

**SUMMARY**

This paper presents the approval of Amendment 3 to *Procedures for Air Navigation Services–Aerodromes* (PANS–Aerodromes, Doc 9981).

**1. INTRODUCTION**

1.1 The ICAO Air Navigation Commission, acting under delegated authority, adopted Amendment 3 to the *Procedures for Air Navigation Services–Aerodromes* (PANS- Aerodromes, Doc 9981) on 5 March 2020. Amendment 3 will become applicable on **5 November 2020**, except for amendments related to pavement rating which will become applicable on **28 November 2024**.

1.2 A State Letter has been issued to invite States to implement the provisions of the PANS-Aerodromes and request States to publish in their Aeronautical Information Publications (AIPs) a list of any differences which will exist on 5 November 2020, and on 28 November 2024 for amendments related to pavement rating, between the provisions of the PANS-Aerodromes and States' national regulations and practices. The State Letter is available in **Attachment A**.

**2. DISCUSSION**

Amendment 3 to PANS-Aerodromes

2.1 Amendment 3 to the PANS-Aerodromes (Doc 9981) contains provisions related to the development of eight new chapters for inclusion in Doc 9981 regarding day-to-day aerodrome operational management arising from the PANS-Aerodromes Study Group (PASG) in coordination with the Secretariat and the Aerodrome Design and Operations Panel (ADOP) and consequential amendments related to aerodrome specifications arising from ADOP/3. The eight new chapters are:

- a) training;
- b) inspections of the movement area;
- c) work in progress;
- d) foreign object debris control;
- e) wildlife hazard management;
- f) apron safety;
- g) runway safety; and
- h) airside vehicle driver permit scheme and vehicle/equipment safety requirements.

2.2 State Letter with reference **AN 4/27-20/25** containing the full text of Amendment 3 is available in **Attachment A**.

2.3 The content of this amendment may require an amendment of the Universal Safety Oversight Audit Programme (USOAP) continuous monitoring approach (CMA) protocol questions (PQs) in the area of aerodrome operations. The existing PQs may need to be amended or new PQs may be required. This will be assessed during the next amendment cycle of the PQs.

2.4 While ICAO has discontinued the publication of differences in Supplements to PANS documents following a Council decision on 1 October 1973, States are requested to publish in their AIPs a list of any significant differences which will exist on 5 November 2020, and on 28 November 2024 for amendments related to pavement rating, between the provisions of the PANS-Aerodromes and your national regulations and practices.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to note the information contained in this paper.

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Tel.: +1 514-954-8219 ext. 6717

Ref.: AN 4/27-20/25

10 June 2020

**Subject:** Approval of Amendment 3 to the PANS-Aerodromes

**Action Required:** a) Implementation of the amendment on 5 November 2020<sup>1</sup>; b) Publication of any differences as of 5 November 2020<sup>1</sup>

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, acting under delegated authority, on 5 March 2020, approved Amendment 3 to the *Procedures for Air Navigation Services — Aerodromes* (PANS-Aerodromes, Doc 9981) for applicability on 5 November 2020, except for amendments related to pavement rating which should be indicated as 28 November 2024. The amendment was approved on 14 May 2020 by the President of the Council on behalf of the Council in accordance with established procedure. A copy of the amendment is available as attachments to the electronic version of this State letter on the ICAO-NET (<http://portal.icao.int>) where you can access all other relevant documentation.

2. Amendment 3 stems from proposals arising from the PANS-Aerodromes Study Group (PASG) in coordination with the Secretariat and the Aerodrome Design and Operations Panel (ADOP) in the development of eight new chapters for inclusion in Doc 9981 regarding day-to-day aerodrome operational management; and from the third meeting of the Aerodrome Design and Operations Panel (ADOP/3) regarding a consequential amendment to the PANS-Aerodromes concerning aerodrome specifications.

3. An implementation task list, including an outline of guidance material, and an impact assessment for the amendment are presented in Attachments B and C, respectively.

4. Your Government is invited by the Council to implement the provisions of the PANS-Aerodromes. In this connection, I draw your attention to the decision taken by the Council, on 1 October 1973, to discontinue the publication of differences in Supplements to PANS documents and, instead, to request States to publish up-to-date lists of significant differences from PANS documents in their Aeronautical Information Publications (AIPs).

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<sup>1</sup> 28 November 2024 for amendments related to pavement rating.

5. May I, therefore, invite your Government to publish in your AIP a list of any significant differences which will exist on 5 November 2020, and on 28 November 2024 for amendments related to pavement rating, between the provisions of the PANS-Aerodromes and your national regulations and practices.

Accept, Sir/Madam, the assurances of my highest consideration.

Fang Liu  
Secretary General

**Enclosures:**

- A — Amendment to the Foreword of the PANS-Aerodromes
- B — Implementation task list and outline of guidance material in relation to Amendment 3 to the PANS-Aerodromes
- C — Impact assessment in relation to Amendment 3 to the PANS-Aerodromes





**IMPLEMENTATION TASK LIST AND OUTLINE OF GUIDANCE MATERIAL  
IN RELATION TO AMENDMENT 3 TO THE PANS-AERODROMES (DOC 9981)**

**1. IMPLEMENTATION TASK LIST**

1.1 Essential steps to be followed by a State to implement Amendment 3 to the PANS-Aerodromes:

- a) conduct a gap analysis between the new ICAO provisions and national regulatory framework;
- b) identification of the rule-making process necessary to transpose the new ICAO provisions into national regulations, where necessary;
- c) drafting the necessary modifications to the national regulations;
- d) official adoption of the national regulations and means of compliance;
- e) establishment of a national implementation plan that takes into account the new ICAO provisions;
- f) training of relevant aerodrome personnel prior to implementation of the new provisions;
- g) implementation of the new national regulations by aerodrome operators;
- h) modification of oversight framework according to the new national regulations;
- i) oversight by the State of the implementation of the regulations; and
- j) publication of significant differences, if any, in the State's AIP.

**2. STANDARDIZATION PROCESS**

2.1 Approval date: 14 May 2020

2.2 Applicability date: 5 November 2020 for the provisions concerning eight new chapters regarding day-to-day aerodrome operational management on training; inspections of the movement area; work in progress (WIP); foreign object debris (FOD) control; wildlife hazard management; apron safety; runway safety; and airside driver permit scheme and vehicle/equipment safety requirements; and a consequential amendment to the PANS-Aerodromes concerning aerodrome specifications.

2.3 Applicability date: 28 November 2024 for amendments related to pavement rating.

2.4 Embedded date(s): N/A

### 3. SUPPORTING DOCUMENTATION

#### 3.1 ICAO documentation

<b>Title</b>	<b>Type (PANS/TI/Manual/Circ)</b>	<b>Planned publication date</b>
<i>Manual on Ground Handling</i> (Doc 10121)	Manual	Available
<i>Airport Services Manual, Part 2 — Pavement Surface Conditions</i> (Doc 9137)	Manual	Available
<i>Airport Services Manual, Part 3 — Wildlife Hazard Management</i> (Doc 9137)	Manual	2Q 2020
<i>Airport Services Manual, Part 5 — Removal of Disabled Aircraft</i> (Doc 9137)	Manual	Available
<i>Airport Services Manual, Part 6 — Control of Obstacles</i> (Doc 9137)	Manual	Available
<i>Airport Services Manual, Part 8 — Airport Operational Services</i> (Doc 9137)	Manual	Available
<i>Aerodrome Design Manual, Part 3 — Pavements</i> (Doc 9157)	Manual	November 2020
<i>Manual of Surface Movement Guidance and Control Systems (SMGCS)</i> (Doc 9476)	Manual	Available
<i>Advanced Surface Movement Guidance and Control Systems (A SMGCS) Manual</i> (Doc 9830)	Manual	Available

### 4. IMPLEMENTATION ASSISTANCE TASKS

Type	<b>Global</b>	<b>Regional</b>
Regional workshop		ICAO Regional Offices

### 5. UNIVERSAL SAFETY OVERSIGHT AUDIT PROGRAMME (USOAP)

5.1 The content of this paper may require an amendment of the Universal Safety Oversight Audit Programme (USOAP) continuous monitoring approach (CMA) protocol questions (PQs) in the area of aerodrome operations. The existing PQs may need to be amended or new PQs may be required. This will be assessed during the next amendment cycle of the PQs.

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**IMPACT ASSESSMENT IN RELATION TO  
AMENDMENT 3 TO THE PANS-AERODROMES (DOC 9981)**

**1. INTRODUCTION**

1.1 Amendment 3 to the PANS-Aerodromes, Doc 9981, contains provisions related to the development of eight new chapters for inclusion in Doc 9981 regarding day-to-day aerodrome operational management arising from the PANS-Aerodromes Study Group (PASG) in coordination with the Secretariat and the Aerodrome Design and Operations Panel (ADOP) and consequential amendments related to aerodrome specifications arising from ADOP/3.

**2. IMPACT ASSESSMENT**

**2.1 Amendment concerning the development of eight new chapters for inclusion in Doc 9981 regarding day-to-day aerodrome operational management**

2.1.1 *Safety impact:* Positive. The contents of this amendment are safety-related and it is envisaged that their global implementation will enhance the safety of operations at aerodromes' movement areas. The proposed procedures and supporting guidance materials will provide aerodrome operators with tools to better plan, manage and oversee day-to-day airside safety-related activities.

2.1.2 *Financial impact:* In general, the impact on resources for States will be limited to updating regulatory amendments, familiarization of aerodrome inspectors with the new provisions and incorporation of the new provisions into existing oversight programmes. For industry, specifically aerodrome operators, the financial cost will be mainly derived from training of aerodrome-operations personnel exposed to the proposed provisions. However, it is envisaged that the potential long-term benefits for aerodrome operators arising from the implementation of the proposed provisions will eventually lead to a decrease in overall cost, due to the enhanced safety, efficiency and regularity of airside operations.

2.1.3 *Security impact:* Nil.

2.1.4 *Environmental impact:* Positive. The global implementation of the provisions contained in this amendment has the potential to reduce fuel consumption and emissions, due to better optimization and management of airside processes and activities.

2.1.5 *Efficiency impact:* Positive. It is envisaged that the global implementation of the provisions contained in this amendment will enhance the efficiency of airside processes and activities, and will contribute to better planning and management of factors which may otherwise impact or limit operation of aircraft on the movement areas of aerodromes.

2.1.6 *Expected implementation time:* Between one to two years. It mainly refers for aerodrome operators to the establishment of training programmes and operational procedures, and training of aerodromes operational personnel whose work is related to the new provisions. The length of the implementation process and its extent will vary from aerodrome to aerodrome, based on its local circumstances, characteristics and type of operations, among others.

3. **IMPACT ASSESSMENT**

3.1 **Consequential amendment concerning aerodrome specifications**

3.1.1 *Safety impact:* Positive. Aeroplanes with folding wing tips provide larger span in flight, yet have the benefit to aerodrome compatibility of the lower aerodrome reference code on the taxiway and apron systems.

3.1.2 *Financial impact:* In respect of provisions related to aeroplanes with folding wing tips, there is expected to be significant savings where not all parts of the aerodromes need to be improved to accommodate such aeroplanes to comply with the higher code.

3.1.3 *Security impact:* Nil.

3.1.4 *Environmental impact:* Positive. The global implementation of the provisions contained in this amendment has the potential to reduce instances of overdesign and/or overprovision, including maintenance of pavements, leading to lesser use of dependable material.

3.1.5 *Efficiency impact:* Positive. It is envisaged that the global implementation of the provisions contained in this amendment will enhance the efficiency of airside processes and activities, and will contribute to better planning and management of factors which may otherwise impact or limit operation of aeroplanes with folding wing tips on the movement areas of aerodromes. Once the wings are folded, the aeroplane can manoeuvre on areas designated for lower codes. This results in a more efficient use of aerodrome land surface and avoids unnecessary runway or taxiway modifications.

3.1.6 *Expected implementation time:* Between one and two years.

— END —

**AMENDMENT No. 3**

**TO THE**

**PROCEDURES  
FOR  
AIR NAVIGATION SERVICES**

**AERODROMES**

**(Doc 9981)**

**INTERIM EDITION**

The text of Amendment No. 3 to the PANS-Aerodromes (Doc 9981) was approved by the President of the Council on behalf of the Council on **14 May 2020** for applicability on **5 November 2020** and for applicability on **28 November 2024** for the elements related to pavement rating. This interim edition is distributed to facilitate implementation of the amendment by States. Replacement pages incorporating Amendment No. 3 are expected to be distributed in October 2020. (State letter AN 4/27-20/25 refers.)

**MAY 2020**

**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**NOTES ON THE PRESENTATION OF THE AMENDMENT  
TO THE PANS-AERODROMES**

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:

~~Text to be deleted is shown with a line through it.~~

text to be deleted

New text to be inserted is highlighted with grey shading.

new text to be inserted

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

new text to replace existing text

**TEXT OF AMENDMENT 3 TO THE  
PROCEDURES FOR AIR NAVIGATION SERVICES  
AERODROMES  
(PANS-AERODROMES, DOC 9981)**

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*Editorial Note.— Insert new text as follows.*

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*Editorial Note.*— End of new text.

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## FOREWORD

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### 6. CONTENTS OF THE DOCUMENT

6.1 The PANS-Aerodromes consists of two parts as follows:

**Part I — Aerodrome certification, safety assessments and aerodrome compatibility**

**Part II — Aerodrome operational management**

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### **PART II — AERODROME OPERATIONAL MANAGEMENT (applicable on 5 November 2020)**

#### **6.9 Structure**

6.9.1 The structure of each chapter within Part II is set up with three specific sections including a general part, the objectives to be achieved, and the operating practices related to these objectives.

6.9.2 The “general” section of the chapter includes an introduction to each of the topics covered in the subsequent chapter. It also provides an overview of the general principles in order to understand the procedures that follow.

6.9.3 The “objectives” section contains the basic principles that have been defined for the topic. These basic principles have been formulated as required for global uniform application. The “objectives” cover the whole subject matter and are not broken down into the individual subsections.

6.9.4 The “operational practices” section covers the specific operational practices and the ways in which they are applied in order to achieve the basic principles defined in “objectives”.

~~6.9.4 Part II, Chapter 1 contains provisions and procedures applicable for assessing and reporting the condition of a runway.~~

~~6.9.5 Part II, Chapter 2 (Airside inspections: to be developed)~~

~~6.9.6 Part II, Chapter 3 (Work in progress: to be developed)~~

~~6.9.7 Part II, Chapter 4 (Foreign object debris (FOD): to be developed)~~

~~6.9.8 Part II, Chapter 5 (Wildlife hazard management: to be developed)~~

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*Editorial Note.— Insert new text as follows.*

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### **6.10 Part II, Chapter 1 — Training**

6.10.1 This chapter outlines principles, obligations, and provisions pertaining to the training of aerodrome personnel involved in aerodrome operations, including training programmes and competence checks.

6.10.2 The Appendix and the Attachment to Chapter 1 contain elaborated provisions on demonstrating competence, as well as on the recommended structure and basic components of a training programme.

### **6.11 Part II, Chapter 2 — Reporting format using standard runway condition report (RCR)**

6.11.1 This chapter contains provisions for assessing and reporting the condition of a runway.

6.11.2 The Attachment to Part II, Chapter 2 lists methods and techniques of assessing runway surface conditions with different types of runway characteristics.

### **6.12 Part II, Chapter 3 — Inspections of the movement area**

6.12.1 This chapter contains provisions pertaining to inspections of the aerodrome movement areas (including runways, taxiways, aprons, and their associated aeronautical lighting systems, markings and signs), required to ensure the safe and efficient operation of aircraft.

6.12.2 The chapter outlines different types of inspections, their frequency, and relevant variables relating to the mix of aircraft operations, pavement materials and environmental conditions.

6.12.3 The Appendix to Part II, Chapter 3 elaborates on the type and content of the inspections of the movement areas, and provides provisions on general procedures and documented reporting.

### **6.13 Part II, Chapter 4 — Work in progress (WIP)**

6.13.1 This chapter details required procedures pertaining to the planning, coordination and safe execution of construction and other heavy works on the movement areas of aerodromes when aircraft operations continue in the works area.

6.13.2 The chapter lists possible precautions and considerations to be taken in order to ensure the safety of aerodrome operations, as well as the protection and safety of the worksite and workers.

6.13.3 The chapter contains provisions on reduced runway length operations, and examples of supporting documents and checklists.

#### **6.14 Part II, Chapter 5 — Foreign object debris (FOD) control**

6.14.1 This chapter contains procedures and processes pertaining to the control and management of foreign object debris (FOD) at aerodromes, including the establishment of FOD control programmes to address the prevention, detection, removal and evaluation of FOD, as well as related training and awareness activities.

6.14.2 This chapter details provisions on FOD-related training, FOD sources, methods and techniques of FOD detection, and its removal, evaluation, and reporting.

#### **6.15 Part II, Chapter 6 — Wildlife hazard management**

6.15.1 This chapter contains provisions relating to the reduction of the risk to aviation safety arising from wildlife, through the proactive management and control of wildlife at aerodromes and their vicinities.

6.15.2 The chapter details provisions on the establishment of a wildlife hazard management programme (WHMP) at aerodromes and WHMP components, including: expelling and deterring wildlife, reporting and recording wildlife incidents, habitat and land use management, and personnel training.

#### **6.16 Part II, Chapter 7 — Apron safety**

6.16.1 This chapter contains provisions on apron safety, including the identification of apron hazards and mitigation of risks, personnel awareness, the required coordination between the different parties involved in apron activities, and their responsibilities.

6.16.2 This chapter deals with airside vehicle rules and the dissemination of information to apron users.

#### **6.17 Part II, Chapter 8 — Runway safety**

6.17.1 This chapter contains provisions pertaining to runway safety. The chapter deals with the prevention of runway incursions, excursions and confusion through different strategies. These include effective identification of hazards related to runway safety, risk mitigation, coordination and cooperation between different stakeholders, establishment of runway safety action plans and runway safety teams (RSTs), and the collection, sharing and exchange of safety information.

6.17.2 The Appendix to Part II, Chapter 8 deals with RST composition and the terms of reference.

6.17.3 The attachments to Part II, Chapter 8 provide further detailed guidance on “hot spots”<sup>2</sup>, common causes of runway safety events, and suspension or closure of runway operations.

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<sup>2</sup> Definition from Annex 14 — *Aerodromes*, Volume I — *Aerodrome Design and Operations*:

“*Hot spot*. A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.”

## 6.18 Part II, Chapter 9 — Airside driver permit scheme and vehicle/equipment safety requirements

6.18.1 This chapter contains provisions on the establishment and implementation of an airside driver permit (ADP) scheme and safety requirements for vehicles and equipment operating at an aerodrome, with the objective of minimizing the risk of accidents causing injury to persons and damage to aircraft and property, arising from the use of vehicles in airside areas.

6.18.2 The appendices to Part II, Chapter 9 contain further detailed supporting provisions on the framework for an airside vehicle driver training programme, radiotelephony and record keeping.

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*Editorial Note.*— End of new text.

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**Table A. Amendments to the PANS-Aerodromes**

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Approved Applicable</i>
1st Edition (2015)	PANS-Aerodromes Study Group (2009)	Procedures for Air Navigation Services — Aerodromes (PANS-Aerodromes)	20 October 2014 10 November 2016
<sup>1</sup> 2nd Edition (2016)	Friction Task Force (FTF) of the Aerodrome Design and Operations Panel (ADOP) (formerly the Aerodromes Panel (AP))	Amendment concerning the use of an enhanced global reporting format for assessing and reporting runway surface condition.	20 April 2016 10 November 2016; 5 November 2020
2	Second meeting of the Aerodrome Design and Operations Panel (ADOP/2); Twelfth meeting of the Aeronautical Information Service (AIS) Aeronautical Information Management (AIM) Study Group (AIS-AIMSG/12)	Selection of engine for taxiway shoulder width; consequential amendment to changes to the SNOWTAM format as provided in the PANS-AIM (Doc 10066).	28 June 2018 8 November 2018; 5 November 2020

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<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Approved Applicable</i>
3 3rd Edition (2020)	PANS-Aerodromes Study Group (PASG) in coordination with the Secretariat and the Aerodrome Design and Operations Panel (ADOP); and the third meeting of the Aerodrome Design and Operations Panel (ADOP/3)	Amendment concerning eight new chapters regarding day-to-day aerodrome operational management on training; inspections of the movement area; work in progress (WIP); foreign object debris (FOD) control; wildlife hazard management; apron safety; runway safety; and airside driver permit scheme and vehicle/equipment safety requirements; and a consequential amendment to the PANS-Aerodromes concerning aerodrome specifications, *including amendments related to pavement rating.	14 May 2020 5 November 2020; *28 November 2024

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## ACRONYMS AND ABBREVIATIONS

ACN†	Aircraft classification number
ACNR††	Aircraft classification <del>number</del> rating
ADP	Airside driver permit
AGL	Above ground level
<del>AHWG</del>	<del>Ad hoc working group</del>
AIA	Accident investigation authority
...	
ANSP	Air navigation services provider
...	
AVOL	Aerodrome visibility operational level
AVP	Airside vehicle permit
CAA	Civil aviation authority
...	
FOD	Foreign object debris
ft	Feet
GSE	Ground support equipment
IAIP	Integrated aeronautical information package
IAS	Indicated airspeed
IFR	Instrument flight rules
ILS	Instrument landing system
km	Kilometers
kt	Knots
LDA	Landing distance available
...	
OFZ	Obstacle free zone
OLS	Obstacle limitation surface
...	
PCN†	Pavement classification number
PCNR††	Pavement classification <del>number</del> rating
...	

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† Applicable until 27 November 2024.

†† Applicable as of 28 November 2024.

RFF	Rescue and fire fighting
RST	Runway safety team
RTF	Radiotelephony
RVR	Runway visual range

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SARPs	Standards and Recommends Practices
SMGCS	Surface movement guidance and control systems
SMS	Safety management system

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VDGS	Visual docking guidance systems
VFR	Visual flight rules

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WGS-84	World Geodetic System — 1984
WHMP	Wildlife hazard management programme
WIP	Work in progress

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## PART I — AERODROME CERTIFICATION, SAFETY ASSESSMENTS AND AERODROME COMPATIBILITY

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### CHAPTER 4

#### AERODROME COMPATIBILITY

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#### Appendix to Chapter 4

#### PHYSICAL CHARACTERISTICS OF AERODROMES

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#### 2.5 RUNWAY STRIPS

##### 2.5.1 Runway strip dimensions

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2.5.1.5 Lateral deviation from the runway centre line during a balked landing with the use of the digital autopilot as well as manual flight with a flight director for guidance have shown that the risk associated with the deviation of specific aeroplanes is contained within the OFZ.

*Note.*— Provisions on OFZ are given in Annex 14, Volume I, and in Circ 301, New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Operational Measures and Aeronautical Study and Circ 345, New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Collision Risk Model and Aeronautical Study.

...

## 2.5.2 Obstacles on runway strips

### Introduction

2.5.2.1 An object located on a runway strip which may endanger aeroplanes is regarded as an obstacle, according to the definition of “obstacle” and should be removed, as far as practicable. Obstacles may be either naturally occurring or deliberately provided for the purpose of air navigation.

### Challenges

2.5.2.2 An obstacle on the runway strip may represent either:

- a) a) a collision risk for an aeroplane in flight or for an aeroplane on the ground that has veered off the runway; and
- b) b) a source of interference to navigation aids.

*Note 1.— Mobile objects that are beyond the OFZ (inner transitional surface) but still within the runway strip, such as vehicles and holding aeroplanes at runway-holding positions, or wing tips of aeroplanes taxiing on a parallel taxiway to the runway, should be considered.*

*Note 2.— Provisions on OFZ are given in Annex 14, Volume I, and in Circ 301, New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Operational Measures and Aeronautical Study and Circ 345 — New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Collision Risk Model and Aeronautical Study.*

...

## 11. PAVEMENT DESIGN

*Applicable until 27 November 2024*

...

## 11. PAVEMENT DESIGN

*Applicable as of 28 November 2024*

### Introduction

11.1 To facilitate flight planning, various aerodrome data [...].

*Note.— The aircraft classification ~~numbering~~ pavement classification ~~number~~ rating (ACN/PCN) (ACR-PCR) method is used for reporting pavement strength. Requirements are given in Annex 14, Volume I, section 2.6, and Attachment A, section 20. Doc 9157, Part 3 — Pavements, contains guidance on reporting pavement strength using the ACN/PCN-ACR-PCR method.*

...

11.3 Potential solutions can be developed by applying [...].

- c) a) restrictions on aeroplanes with higher ACNs-ACRs on specific taxiways, runway bridges or aprons; or

...

## Attachment A to Chapter 4

### AEROPLANE PHYSICAL CHARACTERISTICS

...

#### 6. WINGSPAN

The wingspan may have an impact on:

...

- h) equipment for disabled aeroplane removal; and
- i) de-icing.

In the case of an aeroplane equipped with folding wing tips, its reference code letter may change as a result of the folding/extending of the wing tips. Consideration should be given to the wingspan configuration and resultant operations of the aeroplane at an aerodrome.

*Note .— Further information concerning aeroplanes with folding wing tips, physical characteristics and the concept of normal and non-normal operations can be found in the manufacturer's aircraft characteristics for airport planning manual.*

...

#### 15. LANDING GEAR GEOMETRY, TIRE PRESSURE AND AIRCRAFT CLASSIFICATION NUMBER (ACN) VALUES

*Applicable until 27 November 2024*

...

#### 15. LANDING GEAR GEOMETRY, TIRE PRESSURE AND AIRCRAFT CLASSIFICATION NUMBER (ACN) RATING (ACR) VALUES

*Applicable as of 28 November 2024*

Landing gear geometry, tire pressure and ~~ACN~~ ACR values may have an impact on the airfield pavement and associated shoulders.

...

## Attachment D to Chapter 4

### SELECTED AEROPLANE CHARACTERISTICS

Data are provided for convenience, are subject to change and should be used only as a guide. Accurate data should be obtained from the aircraft manufacturer's documentation. Many aeroplane types have optional weights and different engine models and engine thrusts; therefore pavement aspects and reference field lengths will vary, in some cases enough to change the aeroplane category. Reference field length should not be used for the design of aerodrome runway length, as the required length will vary depending on various factors such as aerodrome elevation, reference temperature and runway slope.

...

<i>Aircraft model</i>	<i>Take-off weight (kg)</i>	<i>Aerodrome Reference Code</i>	<i>Reference field length (m)*</i>	<i>Wingspan (m)</i>	<i>Outer main gear span (m)</i>	<i>Nose gear to main gear distance (wheel base) (m)</i>	<i>Cockpit to main gear distance (m)</i>	<i>Fuselage length (m)</i>	<i>Overall length (maximum) (m)</i>	<i>Maximum tail height (m)</i>	<i>Approach speed (1.3×Vs) (kt)</i>	<i>Maximum evacuation slide length (m)*****</i>
777-300ER	351 534	4E	3 060	64.8	12.9	31.2	32.3	73.1	73.9	18.8	149	12.6
<b>777-9#</b>	<b>351 534</b>	<b>4E/4F</b>	<b>****</b>	<b>64.8/71.8</b>	<b>12.8</b>	<b>32.3</b>	<b>36.0</b>	<b>75.2</b>	<b>76.7</b>	<b>19.7</b>	<b>****</b>	<b>12.6</b>
B787-8	219 539	4E	2 660	60.1	11.6	22.8	25.5	55.9	56.7	16.9	140***	11.1
MD-81	64 410	4C	2 290	32.9	6.2	22.1	21.5	41.6	45.0	9.2	134	5.3
MD-82	67 812	4C	2 280	32.9	6.2	22.1	21.5	41.6	45.0	9.2	134	5.3
MD-83	72 575	4C	2 470	32.9	6.2	22.1	21.5	41.6	45.0	9.2	144	5.3
MD-87	67 812	4C	2 260	32.9	6.2	19.2	21.5	36.3	39.8	9.5	134	5.3
MD-88	72 575	4C	2 470	32.9	6.2	22.1	21.5	41.6	45.0	9.2	144	5.3
MD-90	70 760	3C	1 800	32.9	6.2	23.5	22.9	43.0	46.5	9.5	138	5.3
MD-11	285 990	4D	3 130	51.97	12.6	24.6	31.0	58.6	61.6	17.9	153	9.8
DC8-62	158 757	4D	3 100	45.2	7.6	18.5	20.5	46.6	48.0	13.2	138	6.7
DC9-15	41 504	4C	1 990	27.3	6.0	13.3	12.7	28.1	31.8	8.4	132	5.3
DC9-20	45 813	3C	1 560	28.4	6.0	13.3	12.7	28.1	31.8	8.4	126	5.3
DC9-50	55 338	4C	2 451	28.5	5.9	18.6	18.0	37.0	40.7	8.8	135	5.3
BOMBARDIER CS100****	54 930	3C	1 509	35.1	8.0	12.9	13.7	34.9	34.9	11.5	127	
CS100 ER****	58 151	3C	1 509	35.1	8.0	12.9	13.7	34.9	34.9	11.5	127	
CS300****	59 783	4C	1 902	35.1	8.0	14.5	15.3	38.1	38.1	11.5	133	
CS300 XT****	59 783	3C	1 661	35.1	8.0	14.5	15.3	38.1	38.1	11.5	133	
CS300 ER****	63 321	4C	1 890	35.1	8.0	14.5	15.3	38.1	38.1	11.5	133	
CRJ200ER	23 133	3B	1 680	21.2	4.0	11.4	10.8	24.4	26.8	6.3	140	
CRJ200R	24 040	4B	1 835	21.2	4.0	11.4	10.8	24.4	26.8	6.3	140	
CRJ700	32 999	3B	1 606	23.3	5.0	15.0	14.4	29.7	32.3	7.6	135	
CRJ700ER	34 019	3B	1 724	23.3	5.0	15.0	14.4	29.7	32.3	7.6	135	
CRJ700R****	34 927	4B	1 851	23.3	5.0	15.0	14.4	29.7	32.3	7.6	136	
CRJ900	36 514	3B	1 778	23.3	5.0	17.3	16.8	33.5	36.2	7.4	136	
CRJ900ER	37 421	4C	1 862	24.9	5.0	17.3	16.8	33.5	36.2	7.4	136	
CRJ900R	38 329	4C	1 954	24.9	5.0	17.3	16.8	33.5	36.2	7.4	137	
CRJ1000****	40 823	4C	1 996	26.2	5.1	18.8	18.3	36.2	39.1	7.5	138	
CRJ1000ER****	41 640	4C	2 079	26.2	5.1	18.8	18.3	36.2	39.1	7.5	138	

DHC-8-100	15 650	2C	890	25.9	7.9	8.0	6.1	20.8	22.3	7.5	101	
DHC-8-200	16 465	2C	1 020	25.9	8.5	8.0	6.1	20.8	22.3	7.5	102	
DHC-8-300	18 643	2C	1 063	27.4	8.5	10.0	8.2	24.2	25.7	7.5	107	
DHC-8-400	27 987	3C	1 288	28.4	8.8	14.0	12.2	31.0	32.8	8.3	125	
EMBRAER ERJ 170-100 STD	35 990	3C	1 439	26.0	6.2	10.6	11.5	29.9	29.9	9.7	124	
ERJ 170-100 LR, SU and SE	37 200	3C	1 532	26.0	6.2	10.6	11.5	29.9	29.9	9.7	124	
ERJ 170-100 + SB 170-00-0016	38 600	3C	1 644	26.0	6.2	10.6	11.5	29.9	29.9	9.7	125	
ERJ 170-200 STD	37 500	3C	1 562	26.0	6.2	11.4	12.3	31.7	31.7	9.7	126	
ER 170-200 LR and SU	38 790	3C	1 667	26.0	6.2	11.4	12.3	31.7	31.7	9.7	126	
ERJ 170-200 + SB 170-00-0016	40 370	4C	2 244	26.0	6.2	11.4	12.3	31.7	31.7	9.7	126	
ERJ 190-100 STD	47 790	3C	1 476	28.7	7.1	13.8	14.8	36.3	36.3	10.6	124	
ERJ 190-100 LR	50 300	3C	1 616	28.7	7.1	13.8	14.8	36.3	36.3	10.6	124	
ERJ 190-100 IGW	51 800	3C	1 704	28.7	7.1	13.8	14.8	36.3	36.3	10.6	125	
ERJ 190-200 STD	48 790	3C	1 597	28.7	7.1	14.6	15.6	38.7	38.7	10.5	126	
ERJ 190-200 LR	50 790	3C	1 721	28.7	7.1	14.6	15.6	38.7	38.7	10.5	126	
ERJ 190-200 IGW	52 290	4C	1 818	28.7	7.1	14.6	15.6	38.7	38.7	10.5	128	
* Reference field length reflects the model/engine combination that provides the shortest field length and the standard conditions (maximum weight, sea level, std day, A/C off, runway dry with no slope).												
** Span includes optional winglets.												
*** Preliminary data.												
**** Preliminary data — aircraft not yet certified.												
***** Longest deployed slide lengths, including upper deck slides, referenced from aircraft centre line as measured horizontally. Data are based primarily on aircraft rescue fire-fighting charts.												
# Aircraft with folding wing tips (FWT)												

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**PART II – AERODROME OPERATIONAL MANAGEMENT**  
**~~(applicable on 5 November 2020)~~**

**Chapter 1**  
**~~(applicable on 5 November 2020)~~**

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*Editorial Note.— Insert new Chapter 1 as follows*

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**TRAINING**

**1.1 GENERAL**

1.1.1 The activities conducted by an aerodrome operator require the competence and appropriate training of personnel in order to carry out their assigned tasks.

1.1.2 This training is generally conducted by the individual's employer, but may also be conducted by the aerodrome operator or other third parties.

1.1.3 This chapter provides the general obligations related to training programmes and competence checks for all personnel carrying out the procedures detailed in each of the following chapters of this document.

*Note.— Training for other activities, not contained in Part II of this document, may be carried out depending on the needs identified by the aerodrome operator.*

1.1.4 Additional material related to training procedures, including more detailed programmes or requirements, can be found in a number of chapters in Part II of this document.

*Note.— The additional material has been provided to add information related to activity-specific training.*

**1.2 OBJECTIVES**

1.2.1 Aerodrome operators shall ensure that training programmes are developed and implemented for all personnel involved in aerodrome operations.

1.2.2 The training programmes shall include procedures for the verification of personnel knowledge and for the practical application thereof, at adequate intervals.

**1.3 OPERATIONAL PRACTICES**

1.3.1 Aerodrome operators shall be responsible for ensuring that their staff and all personnel involved in aerodrome operations at the aerodrome are competent for each task they are required to carry out. The details of the training will vary depending on the person's experience and background and the complexity of the required task.

1.3.2 Training objectives shall be identified to ensure that competence is achieved and maintained. Based on these objectives, the training programme should include content and frequency for each technical subject, as well as a method to track the progress of the required training and the maintenance of training records.

1.3.3 A training programme should include:

- a) theoretical training;
- b) practical or on-the-job training;
- c) testing of understanding; and
- d) demonstrating competence or recurrent theoretical and/or practical training.

*Note 1.— Provisions on demonstrating competence are included in the Appendix to this chapter.*

*Note 2.— Demonstration of continued competence is an alternative to recurrent training.*

*Note 3.— The attachment to this chapter provides guidance on the structure of a training programme.*

1.3.4 Refresher training should be provided following an accident, incident or serious occurrence, if training-related issues have been identified as a contributing factor, or after a long-term absence to ensure that personnel are kept abreast of the most recent material, developments and practices.

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## **Appendix to Chapter 1**

### **DEMONSTRATING COMPETENCE**

1.1 In order to demonstrate competence in a specific task, personnel shall demonstrate that the theory, practical training and local knowledge can be applied together in a satisfactory way, usually by successfully completing a competence check.

1.2 Competence checks may be used as an alternative to recurrent training whereby personnel demonstrate continued competence in a task and therefore do not require recurrent training.

1.3 Competence checks can be completed during day-to-day activities by having a competent individual accompany and assess the staff member on a task they are required to complete.

1.4 Records of all the steps taken to achieve the task shall be made and an evaluation shall be completed.

1.5 For a team or section to be recognized as competent, periodical audits or checks should be carried out and recorded. All shortfalls should be addressed by reviewing and updating the training material, refresher training or the frequency of recurrent training. Similarly, after any accident, incident or serious occurrence, it may be prudent to review training programmes to ensure that they remain appropriate.

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**Attachment to Chapter 1**

**STRUCTURE OF A TRAINING PROGRAMME**

**1. INITIAL TRAINING**

Initial training should be composed of theoretical and practical training modules. Personnel should be assessed and demonstrate their capability to safely accomplish the required tasks upon completion of the initial training and prior to starting on-the-job training.

**2. RECURRENT TRAINING**

The aerodrome operator should ensure that personnel complete recurrent training at suitable intervals after the completion of their initial training programme. Continuous competence checking may be used as an alternative to recurrent training.

**3. REFRESHER TRAINING**

When a person has not performed any of their assigned tasks for a significant period of time, or has been involved in an accident, incident or serious occurrence, in which training-related issues have been identified as a contributing factor, that person should complete relevant refresher training prior to:

- a) performing assigned tasks; or
- b) being allowed unescorted access on the movement area and other operational areas of the aerodrome, as appropriate.

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*Editorial Note.— End of new text and renumber existing Chapter 1 as Chapter 2.*

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*Editorial Note.— Insert new Chapters 3 to 9 as follows.*

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## Chapter 3

### INSPECTIONS OF THE MOVEMENT AREA

#### 3.1 GENERAL

3.1.1 The inspection of aerodrome movement areas (including runways, taxiways and aprons, and their lighting systems, markings, signs, etc.) is required to ensure that hazards to aircraft are minimized and to create a safe and efficient operation. Aerodrome movement areas are complex and maintaining them in an optimal condition for safety depends on a large number of variables relating to the mix of aircraft operations, pavement materials and environmental conditions at each aerodrome. Inspection procedures are an integral part of ensuring the serviceability of the aerodrome and the detection of foreign object debris (FOD).

*Note.— Provisions on FOD control can be found in Part II, Chapter 5 of this document.*

3.1.2 Movement area inspections are mainly intended for:

- a) ensuring that the conditions of the movement area and associated equipment are fit for the intended operational use;
- b) identifying faults and potential hazards to the safety of aircraft or aerodrome operations and take appropriate action; and
- c) providing periodic, timely, and accurate updates on the condition of the movement area and the operational status of related facilities, to be reported to air traffic services (ATS), aerodrome operations, and aeronautical information services (AIS).

3.1.3 Several types of inspections are normally performed:

- a) *daily inspections* or “*Level 1 inspections*” provide an overview of the general condition of the movement area and its associated facilities; and
- b) *regular inspections* or “*Level 2 inspections*” are part of the preventive maintenance of the aerodrome and consist of a more detailed verification of the conditions of the movement area and its associated facilities.

*Note 1.— Daily inspections are referred to in Annex 14 — Aerodromes, Volume I — Aerodrome Design and Operations, section 2.9.*

*Note 2.— Guidance on carrying out daily inspections of the movement area and on control of FOD is also given in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476), the Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (Doc 9830) and the Airport Services Manual, Part 8 — Airport Operational Services (Doc 9137).*

3.1.4 Due to the potentially large areas and distances covered, Level 1 inspections may necessitate the use of vehicles. However, the higher the speed of the vehicle, the potentially less effective the inspection. The speed of the vehicle should therefore be kept as low as practical.

3.1.5 Detailed Level 2 inspections of paved surfaces, coordinated with the appropriate ATS unit, are best completed on foot, thus enabling a far more comprehensive assessment, as part of preventive maintenance.

3.1.6 Faults in the lighting systems will normally be detected via monitoring. Monitoring by visual display on the lighting control panel in the ATS unit will enable detection of circuit failures and verification that brilliancy selection by ATS is providing the desired light output. Monitoring by visual inspection also enables the detection of failed lamps and the contamination of fittings by dirt and rubber deposits or misalignment.

3.1.7 Although this chapter covers planned inspections, in certain circumstances, unplanned inspections may need to be carried out to ensure the safety of operations. These circumstances may include:

- a) following the completion of works;
- b) a reported incident;
- c) a pilot/ATC report;
- d) adverse meteorological conditions; and/or
- e) an emergency response.

## 3.2 OBJECTIVES

3.2.1 Inspections of the movement area shall be planned so as to ensure that an appropriate level of vigilance is maintained at all times. The inspections shall cover, at a minimum, the following items:

- a) the runway;
- b) the remaining manoeuvring area, including taxiways and adjacent areas;
- c) the apron and service areas;
- d) surface conditions;
- e) detection of FOD;
- f) status of visual aids, including visible electrical systems or part thereof; and
- g) status of obstacles outside the aerodrome boundary.

3.2.2 An inspection programme of the movement area commensurate with the size and complexity of the aerodrome, along with the objectives set in 3.2.1 shall be established by the aerodrome operator.

3.2.3 All aerodrome inspections shall be formally documented in a log by the aerodrome operator and all records shall be maintained for future reference.

3.2.4 Each inspection shall include a reporting and follow-up mechanism to ensure that appropriate action is taken.

### **3.3 OPERATIONAL PRACTICES**

#### **3.3.1 Frequency of inspections**

3.3.1.1 The frequency and detail of inspections may be increased from the minimum specified in Annex 14, depending on the traffic expected and the type of inspection being performed.

3.3.1.2 The frequency of aerodrome inspections should be commensurate with the level of risk identified in the aerodrome safety management system (SMS).

*Note 1.— The minimum mandatory frequency of Level 1 inspections is given in Annex 14, Volume 1, 2.9.3.*

*Note 2.— Guidance on SMS is given in the Safety Management Manual (SMM) (Doc 9859).*

#### **3.3.2 Inspection of the manoeuvring area**

##### ***Runways***

3.3.2.1 A runway inspection may involve the deliberate entry to an active runway. It is therefore essential that any potential hazards associated with this activity are identified and addressed so that staff with inspection duties have a clear understanding of what is involved and how the task is to be safely carried out.

3.3.2.2 All runway inspections undertaken on an active runway shall be conducted according to documented procedures developed to ensure the safety of aircraft operations and aerodrome personnel.

3.3.2.3 Procedures for the access to runways shall be established with the appropriate ATS unit. Prior to any runway inspection, radio contact shall be established with ATS and permission to begin the inspection shall be obtained and acknowledged by the inspection team.

*Note.— The Appendix to this chapter elaborates on the factors to be considered in the development of these procedures.*

3.3.2.4 If runway lighting is installed, inspections should be undertaken with the lights illuminated in order to enable the identification of unserviceable lamps and possible failures of light fittings.

3.3.2.5 When aircraft parts or aircraft tire pieces are found during a runway inspection, aerodrome operations and the appropriate ATS unit shall be informed immediately, so as to trace the origin of the parts and pieces and notify the appropriate aircraft operators.

*Note.— Provisions on foreign object debris (FOD) control can be found in Chapter 5.*

## ***Taxiways***

3.3.2.6 A daily inspection should be undertaken on taxiways in regular, active use. The frequency of inspections for remaining taxiways should be assessed to ensure that they remain suitable for use when required. All inspections undertaken on an active taxiway shall be conducted according to appropriate procedures developed for the location, which ensure the safety of aircraft operations and aerodrome personnel.

*Note.— The Appendix to this chapter elaborates on the factors to be considered in the development of these procedures.*

3.3.2.7 Procedures for access to taxiways shall be established with the appropriate ATS unit. Prior to any taxiway inspection, radio contact shall be established with ATS and permission to begin the inspection shall be obtained and acknowledged by the inspection team, unless a local safety assessment, taking into account also the aerodrome characteristics, size, complexity and level of traffic, has proven that a taxiway inspection can be safely conducted without radio contact with ATS, and a corresponding procedure has been documented and promulgated.

*Note — The safety assessment methodology is included in Part I, Chapter 3 of this document.*

### **3.3.3 Inspection of the apron**

3.3.3.1 Inspections of the apron area should be undertaken at defined frequencies. Considering the level of operations undertaken at each aerodrome, the frequency may be adjusted in accordance with the level of risk identified by the aerodrome SMS.

3.3.3.2 Inspections may be undertaken in segments to account for the size and complexity of the operation.

### **3.3.4 Inspection of the visual aids**

3.3.4.1 A routine ground inspection of all aerodrome ground lighting systems should be made daily or before use. Any deficiencies should be remedied as soon as possible, and the identified lights should again be inspected before use after the remedial action is taken. All deficiencies and associated remedial action should be logged.

3.3.4.2 Approach lighting systems should be inspected at adequate, defined frequencies. They may also be inspected upon request from aerodrome operations or ATS. The inspection should cover all the light units of the approach lighting system.

3.3.4.3 The inspecting team shall inform ATS before commencing the approach lighting system inspection.

3.3.4.4 ATS shall be informed when the inspection is complete in order to turn off any lights not required for regular operations.

3.3.4.5 If a major failure is discovered during the inspection, ATS and aerodrome maintenance shall be informed immediately.

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### Appendix to Chapter 3

## GENERAL PROCEDURES FOR THE INSPECTION AND DOCUMENTED REPORTING OF THE MOVEMENT AREA

### 1. PROCEDURE

1.1 Prior to entering the runway, an entry request (e.g. “[vehicle call sign] holding at [...] for runway inspection”) shall be made. Upon leaving the runway, the control tower shall be advised when the inspection vehicle is clear of the runway. Some inspections are carried out on an ON/OFF basis (i.e. where the inspection vehicle may be required to enter or leave the runway on short notice). The request for runway entry and the notification that the vehicle is clear of the runway shall be made on each occasion that the inspection vehicle enters and leaves the runway. A listening watch shall be maintained on the appropriate radiotelephony channel during any runway inspection.

*Note.— Provisions on aerodrome vehicles and drivers can be found in Chapter 9.*

1.2 If, during an inspection, the control tower requests the inspection personnel to vacate the runway, the vehicle shall move outside the runway before advising the control tower that they are clear. The inspection personnel shall not re-enter the runway until in receipt of specific clearance to do so. The inspection team shall never vacate a runway by driving through an instrument landing system (ILS) critical/sensitive area.

1.3 ATC clearance shall be obtained before crossing or entering any runway.

1.4 Runway inspections should be carried out in the direction opposite to that being used for landing or taking off, primarily to ensure the visibility of, and by, the operating aircraft.

1.5 Upon final completion of a runway inspection, the control tower shall be advised of the completion of the inspection, and on the status of the manoeuvring area, as necessary.

1.6 The times of commencement and completion of the inspection shall be noted and included in the record of inspection log.

### 2. REPORTING

2.1 If a dangerous unserviceability is discovered during a runway inspection (e.g. damaged pit covers or broken lights), it shall be immediately reported to ATS by radiotelephony (RTF) for appropriate ATS action to be considered. The entity in charge of aerodrome operations should also be informed.

2.2 If unserviceability is found during an inspection, but which does not affect the use of the runway, it should be reported to the entity in charge of aerodrome maintenance.

2.3 An inspection log should include:

- a) description and exact location of the failure;
- b) details of the task(s) and any remedial action(s) necessary or taken, such as notification to ATS and AIS, recording of events for further analysis (including as part of the aerodrome SMS) and informing maintenance services for further action;
- c) identifying the person/entity responsible for undertaking the task and/or further action; and
- d) identifying the timescale by which it should be completed.

### **3. LEVELS OF INSPECTION**

Inspection procedures on several levels are key to ensuring that the highest standards of safety and efficiency are maintained for all stakeholders on the movement area.

3.1 A typical two-level inspection system has the following main elements:

- a) daily inspections (Level 1): covering the entire movement area and zones adjacent to the aerodrome boundary; and
- b) regular inspections (Level 2): carried out by specialists whereby all runways, taxiways and aprons are divided up into a number of areas and inspected in more detail.

Inspections shall be performed using checklists which cover the various inspection areas and a sketch of the aerodrome, which enables the location and marking of detected problems.

3.2 A log shall be kept for all inspections, and will include:

- a) details of inspection intervals and times;
- b) names of persons carrying out the inspection; and
- c) results and observations, if any.

A log of all remedial actions identified following an inspection shall be recorded and verification of their implementation shall be undertaken.

#### **3.3 Daily Inspections (Level 1)**

3.3.1 Level 1 inspections are ideally carried out at defined intervals during the day, typically:

- a) a first light inspection prior to daytime operations;
- b) a last light inspection prior to night operations; and
- c) other inspections may be planned in between those described above, their frequency being dictated by the hours of peak traffic.

3.3.2 Additional Level 1 inspections, particularly relating to the runway, may be carried out depending on local circumstances, the aerodromes hazard identification and analysis, and the safety risk assessment process (see Part I, Chapter 3).

3.3.3 Standard inspection routes should be defined and followed so that an area cannot be forgotten.

3.3.4 Inspection personnel should report anything that affects safety and the serviceability of the following:

3.3.4.1 ***Runways***

- a) The runway, including its shoulders with regard to cleanliness, rubber build-up and pit/drain covers;
- b) runway cleanliness, particularly FOD which could cause engine ingestion damage;
- c) presence of contaminants affecting runway friction characteristics;
- d) signs of pavement surface damage, including the cracking and spalling of concrete, and looseness of aggregate material;
- e) runway signs and paint markings for damage and wear;
- f) the runway strip and runway end safety area (RESA) including drainage;
- g) failure of precision approach path indicator (PAPI) units, runway guard lights and any other runway lights and wing bars;
- h) any object that may affect the runway strip;
- i) all areas of work in progress on or adjacent to the runway;
- j) the condition of all wind direction indicators for day/night operations; and
- k) wildlife activity on and near the runway.

3.3.4.2 ***Taxiways and taxilanes***

- a) All taxiway pavement surfaces, particularly with regard to pavement damage, cleanliness and FOD;
- b) all taxiway signs and paint markings for damage or wear;
- c) any objects and excavations that may affect the taxiway strip;
- d) all work in progress on or adjacent to the taxiway system;
- e) all taxiway centre line and/or edge light fittings and markers;
- f) the general condition of drains and covers; and
- g) the state of the grass edge, including any waterlogged areas.

### 3.3.4.3 *Apron areas*

- a) All apron pavement surfaces, particularly with regard to pavement damage, cleanliness (fuel/oil spillages) and FOD;
- b) all apron signs and paint markings for damage or wear;
- c) any incorrect parking of aircraft, vehicles, equipment, passenger loading bridges, etc.;
- d) any work in progress areas; and
- e) the general condition of drains and covers.

### 3.3.4.4 *Aerodrome lighting*

- a) All runway approach lighting (including any Category III supplementary systems) should be inspected every evening at dusk prior to night operations and any defects reported;
- b) all runway lighting should be checked as soon as practicable after the lighting has been switched on. Individual light outages and circuit failures should be reported;
- c) all taxiway lighting should be checked as soon as practicable and should include all centre line lights, edge lights, stop bars, runway guard lights and lead-on/lead-off lights; and
- d) during the night period, all apron lighting should be inspected and any deficiencies reported.

*Note.— Lighting inspections may be integrated with other on-runway inspections and be flexible in timing to cater for the variability of daylight hours.*

### 3.3.4.5 *Grass areas (or other areas adjacent to the taxiway system)*

- a) The general condition of the vegetation, particularly any areas of jet blast erosion;
- b) the grass length and the amount of weeds, particularly near lights and signs;
- c) any areas of standing water (waterlogged grass areas should be noted and reported, particularly since they may be an attraction to birds);
- d) depressions or aircraft wheel tracks;
- e) excessive difference in levels at the edge of paved surfaces;
- f) the cleanliness of these areas with regard to FOD; and
- g) any work in progress areas.

3.3.5 When conducting routine daily inspections, general attention should be paid to the following points:

- a) general cleanliness with particular attention to FOD which could cause engine ingestion damage. This may include debris from runway maintenance operations or excessive grit remaining after runway gritting. Any build-up of tire rubber deposits should be noted;
- b) signs of damage to the pavement surface including cracking and spalling of concrete, condition of joint sealing, cracking and looseness of aggregate in asphalt surfaces or break-up of friction courses. Damage or deterioration which could cause aircraft damage should be reported immediately for inspection by maintenance services and, if the damage is sufficiently serious, the area should remain closed to aircraft pending the results of such an inspection;
- c) after rain, flooded areas should be identified and marked, if possible, to facilitate later resurfacing;
- d) damage of light fittings;
- e) cleanliness and visibility of runway markings; and
- f) the condition and fit of pit covers.

3.3.6 The extremities of the runway should be inspected for early touchdown marks; jet blast damage to approach lights, marker cones and threshold lights; cleanliness; and obstacles in the runway end safety area.

3.3.7 The main objective of grass cutting shall be to ensure that lights and markers are not obscured by tall vegetation. It should also be managed in such a fashion as to limit the attraction of the aerodrome to birds and other wildlife. It will be necessary to ensure that mounds of grass cuttings are not left on areas where engine ingestion is possible.

### **3.3.8 Zones outside the aerodrome boundary**

3.3.8.1 A cursory visual inspection of the areas surrounding the aerodrome shall be made by the aerodrome operations staff to verify that no objects seem to affect any protected surfaces, particularly in the approach and departure areas of all runways.

3.3.8.2 The status of the lighting and marking of authorized obstacles shall be inspected.

3.3.8.3 Any unauthorized detected obstacles, and marking or lighting deficiencies of authorized obstacles, shall be immediately reported to the designated persons, appropriate organizations or authorities, for corrective actions to be taken.

*Note.— Further guidance on obstacle control and management is contained in the Airport Services Manual, Part 6 — Control of Obstacles (Doc 9137).*

## **3.4 Regular Inspections (Level 2)**

3.4.1 Level 2 inspections consist of a more detailed verification of the condition on the movement area and its associated facilities than those carried out at Level 1. The Level 2 inspections should be carried out on

foot, thus enabling a far more comprehensive assessment.

3.4.2 Within the Level 2 inspections process, it is recommended to proceed by dividing the movement area up into a number of zones depending on the size of the aerodrome. Each zone should be inspected in detail at defined, regular intervals. Level 2 inspections may be carried out at a time that best suits the stand demand, runway in use or other operational requirements.

3.4.3 In the case of precision approach runways, Level 2 inspections of visual aids will be more frequent and detailed than those carried out on other runways.

3.4.4 In case of a detected damage, photos should be taken to assess the evolution of the damage, in order to facilitate decision-making.

3.4.5 Inspection teams should report anything that affects the serviceability and safety of the items below.

### ***Runways***

3.4.6 Runways should be inspected in detail every three months or at a reduced frequency based on runway usage, unless a documented analysis indicates a different frequency that would not affect the safety of aircraft operations. Typically, the runway may be divided up into a number of sections. Depending on the movement rate on the day of the inspection, a number of sections can be checked, as follows:

- a) *Surfaces.* The full length and width of the runway should be inspected during the cycle. The inspections should record cracks, general break-up and any other surface failure, particularly if there are signs of debris. Special attention should be paid to the touchdown zones and other areas highly trafficked by aircraft. The touchdown zones should also receive particular attention to assess the degree of rubber build-up that may affect the runway surface friction co-efficient. Attention should also be given to rapid exits, access taxiways and runway turn pads.
- b) *Signs, markings and lighting.* The general condition of all signs along the runway should be inspected to ensure compliance with Annex 14, Volume I requirements. All runway markings should be inspected for conspicuity, particularly in the touchdown zones where rubber deposits may have blackened certain markings. A selection of light fittings should be inspected for general safety, particularly with regard to the torque setting of the fixings. The regularity of testing should be adjusted to achieve the target level of serviceability applicable to the service being tested.
- c) *Runway strip.* The area surrounding the runway, including the strip, clear and graded area, and runway end safety area (RESA) should also be inspected. Attention should be given to its general bearing strength, the nature of the surface, any obstacle that should be frangible and any other features that could cause damage to an aircraft, should it overrun into these areas.
- d) *Runway approach lighting systems.* Twice a year, each full approach lighting system, its cables, light fittings, masts and other support structures should be analysed for its general safety and serviceability by a physical check on foot. During the lighting check, a general assessment of the lighting pattern will be made and any outages or gross misalignments noted and reported.
- e) *Zones surrounding the aerodrome.* At least once a week, aerodrome operations staff should conduct a review of the areas adjacent to and surrounding the aerodrome boundary to verify that there are no obstructions infringing protected surfaces, particularly in the approach and departure areas. Items of concern will include tall trees, cranes, lights that may cause confusion to pilots, and agricultural practices that could cause an increase in wildlife activity.

### ***Taxiways***

3.4.7 At a time dictated by traffic movements and runway(s) in use, each section of the taxiway area should be inspected on foot and all deficiencies should be marked on a specialized map/diagram of the area. The taxiways should be inspected for the following:

- a) *Surfaces*. All taxiway surfaces including any hard shoulders should be inspected. Surfaces should be inspected for cracks, deterioration and debris.
- b) *Signs, markings and lights*. All taxiway paint markings should be inspected and any repainting requirements noted. All signs should be checked for their conspicuity and stability, particularly where they may be affected by jet blast. A selection of taxiway light fittings should be verified for general safety.
- c) *Surrounding areas*. All taxiway strips and associated grass or other paved areas should also be inspected for their general safety, particularly with regard to obstructions and surface conditions in a similar way as the clear and graded areas of the runway are inspected.

### ***Aprons and stands***

3.4.8 The aprons and stand areas should be inspected and all defects noted on a specialized map/diagram of the area. All aprons and stands should be inspected for the following:

- a) *Surfaces*. All aprons, stands and associated equipment parking areas should be inspected for surface break-up, particularly where FOD is being created.
  - b) *Signs, markings and lights*. All surface paint markings associated with aircraft movement and parking should be inspected and any repainting requirements noted. Additionally, all signs, markings and lights associated with the visual docking guidance systems (VDGS) and advanced visual docking guidance systems (A-VDGS) should be checked for correct functionality and conspicuity.
  - c) *Surrounding areas*. All service roads and equipment parking areas supporting each stand should also be inspected for general serviceability and condition, particularly where the surface may cause damage to vehicles or injury to passengers or personnel. These areas should also be inspected for general cleanliness and parking discipline.
  - d) *Equipment*. When installed, all emergency telephones should be checked for serviceability.
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## Chapter 4

### WORK IN PROGRESS

#### 4.1 GENERAL

4.1.1 Periodically, construction and heavy maintenance activities are performed in movement areas. If aircraft operations are to continue around the site, or access is required through movement areas, there are a number of precautions to be taken to ensure the safety of aerodrome operations. These include the protection and safety of the worksite and workers.

4.1.2 Wherever major work affecting operational areas is planned, it is important that the aerodrome operator identifies and mitigates the risks generated by work in progress (WIP).

4.1.3 Part of effective safety management related to works lies in timely and comprehensive planning coordinated with all involved parties and relevant stakeholders.

4.1.4 Prior to their commencement, all measures necessary for the works to be undertaken safely, including timely notification of resulting operational changes, need to be communicated to all involved parties and relevant stakeholders.

#### 4.2 OBJECTIVES

4.2.1 The aerodrome operator shall develop a process for managing the aerodrome operational safety during works on the movement area.

4.2.2 The process shall clearly establish and document the responsibilities and procedures for:

- a) the authorization of the works;
- b) the implementation of any proposed change to operational facilities;
- c) the date and time when the facilities will be withdrawn or changed from normal operations;
- d) the methods by which such changes will be promulgated;
- e) the oversight and control of the WIP; and
- f) the compliance with all relevant movement area safety rules.

#### 4.3 OPERATIONAL PRACTICES

4.3.1 The process for managing the aerodrome operational safety during works should contain, at a minimum, the following elements:

- a) a works planning procedure;
- b) a procedure for a safety assessment of the planned changes to the operations or systems;
- c) a works authorization procedure;

- d) a procedure for the promulgation of information related to the works;
- e) a procedure for worksite establishment and return to aircraft operations; and
- f) a procedure for monitoring, oversight and control of the works.

*Note 1.— The safety assessment methodology is included in Part I, Chapter 3 of this document.*

*Note 2.— The works authorization procedure identified in c) refers to local aerodrome operator approval for the commencement of works.*

*Note 3.— Annex 15 — Aeronautical Information Services includes appropriate methods on the promulgation of information.*

*Note 4.— The process for managing the aerodrome operational safety during works may be concentrated in one local procedure or be divided to several procedures, depending on local circumstances.*

4.3.2 The works planning procedure should provide for the planning and coordination of works on the movement area so as to ensure that they are undertaken in a safe and compliant manner, while maintaining the operational safety, capacity, and efficiency of the aerodrome operations. During the planning process, representatives from aerodrome operations and other concerned stakeholders (such as ATS) should be involved at the earliest opportunity to consider the requirements for the efficient operations of the aerodrome during the proposed works.

4.3.3 A safety assessment of all planned works should be completed beforehand in order to ensure the risks to the safe operation of aircraft have been identified by the aerodrome operator in coordination with interested parties, and appropriate mitigation measures introduced to keep risks to an acceptable level.

4.3.4 Processes, procedures, actions and decisions should be documented and made available to all relevant parties and stakeholders involved in the works or affected by any change in operations.

4.3.5 Before implementation, draft operational procedures, instructions or other information to be promulgated, should be discussed and coordinated with the directly affected stakeholders, and subjected to verification, thereby ensuring that their meaning is clear to potential users. Practical checks of proposed arrangements should be made by personnel having a comprehensive understanding of the operational implications of the works.

4.3.6 Where reduced runway length operations are required due to works, procedures shall be developed and implemented by the aerodrome operator, in accordance with provisions in Appendix 1 to this chapter.

4.3.7 Prior to the commencement of works, an authorization should be provided by the aerodrome operator to the party conducting the works. An authorization document should be used to ensure that specific permissions and conditions are recorded and agreed upon between the aerodrome operator and the relevant stakeholders. This document should also be communicated to the contractors, in order for them to be fully aware of what they can and cannot do.

4.3.8 The following actions should be taken when establishing the worksite, as well as throughout the duration of the works, when necessary:

- a) unserviceability markers are displayed when any portion of a taxiway, apron, or holding bay is unfit for the movement of aircraft, but it is still possible for aircraft to bypass the area safely;
- b) existing markings leading into a worksite should be masked or the route closed;
- c) unserviceability lights should be used and existing aeronautical ground lighting and signs leading into a worksite should be extinguished or masked on a movement area used at night or during low visibility;
- d) suitable site fencing should be installed to protect from jet blast, and FOD containment within the site should be enforced; and
- e) the perimeter of the worksite should be clearly marked and/or lit, particularly at night or during reduced visibility.

*Note 1.— Unserviceability relates to areas temporarily not available for operational use.*

*Note 2.— A checklist for establishing worksites and returning them to operational use is included in the attachment to this chapter.*

*Note 3.— Unserviceability markers and lights are placed at sufficiently close intervals so as to clearly delineate the unserviceable area.*

*Note 4.— Measures for the situational awareness of pilots and drivers on the manoeuvring area need to take into consideration human factors that may lead to a runway incursion. Guidance material on Human Factors principles can be found in the Human Factors Training Manual (Doc 9683) and in the Manual on the Prevention of Runway Incursions (Doc 9870).*

4.3.9 Pre start-up and regular site meetings should be held to ensure that safety requirements are met and possible conflicts between the works and operations are resolved. Points to be considered include:

- a) safety awareness in relation to work on the movement area;
- b) workplace health and safety requirements;
- c) security requirements;
- d) protection of construction workers from aerodrome hazards, including jet blast and noise;
- e) procedure for quickly summoning emergency responders in case of a fire, spill, accident or similar event; and
- f) operational briefings on the interaction of the works with the aerodrome operations (e.g. runway(s) in use, likely visibility conditions, meteorological conditions, safety issues).

4.3.10 Procedures should be developed and implemented to monitor the safety of the aerodrome and aircraft operations in proximity of the works, such that timely corrective action is taken when necessary to assure their continued, safe operations. Additional procedures on worksite control are included in Appendix 2 to this chapter.

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## Appendix 1 to Chapter 4

### 1. REDUCED RUNWAY LENGTH OPERATIONS

*Note.— In some cases, conducting works on a runway while maintaining flight operations may be possible. This is a complex activity directly affecting aircraft performance and safety and requires close coordination with ATS and aircraft operators. The following provides procedures on conducting works under these conditions. It is important to note that additional hazards may arise when works involving a reduction in the available runway distances are conducted.*

1.1 In circumstances where works require the runway length to be reduced below the declared distances, the aerodrome operator shall:

- a) identify and assess the associated risk and mitigate as necessary the potential hazards before, during, and on cessation of operations with reduced runway length available and/or WIP in order to ensure the safety of aircraft operations;

*Note.— Risks may result from inappropriate or potentially misleading displays of visual aids; inappropriate or potentially misleading navigational aids; adverse environmental conditions; or unusual meteorological conditions; and from restricted obstacle clearance and wingtip separation distances. It is important to recognize that the identified hazards may cover a wide range of topics, including those that do not pose a risk only to aircraft but also to personnel, e.g. the potential risk from jet blast.*

- b) calculate and establish, where necessary, a revised runway strip, runway end safety area (RESA) and obstacle limitation surfaces (OLS), such as the approach and take-off climb surfaces;
- c) establish a safety zone between the area of the runway that is in use and the WIP or unusable runway;

*Note.— The location, size and shape of the safety zone depends on the temporary configuration of the runway, to provide for items such as RESAs, jet blast protection and abbreviated or simple approach lighting systems.*

- d) promulgate the details of the reduced runway distances established, using all appropriate methods. As a minimum, it is advisable to issue a NOTAM and, when possible, broadcast the information on automatic terminal information service (ATIS);

*Note.— Annex 15 — Aeronautical Information Services includes appropriate methods on the promulgation of information.*

- e) test, wherever practicable, the suitability of a procedure prior to its implementation;
- f) ensure that the roles and responsibilities for operations and tasks associated with the reduction of the runway length available and the WIP are clearly understood and complied with;
- g) provide markings and lights to clearly indicate the boundary of the safety zone and the WIP area;
- h) clearly mark, light and/or barricade any movement area that is to be used by persons involved in the WIP, and not to be used by aircraft;

- i) manage and control the movement on or around a runway or taxiway of contracted staff, who may not be as familiar with the aerodrome and aviation practices;
- j) consider and address the impact on the ability of RFF and emergency services to perform their functions; and
- k) promulgate in a timely manner all the relevant operational information to all relevant parties.

1.2 The aerodrome operator shall be responsible for the coordination and management of the opening/closing of the runway (and other movement areas, as necessary) and the WIP. If tactical decisions concerning aircraft operations deviate from the agreed operational procedures (with the exception of an urgent safety nature), they shall be coordinated with, and approved by the aerodrome operator.

1.3 Monitoring the safety of the aerodrome and aircraft operations in proximity of the works should be conducted by the aerodrome operator, to ensure that timely and corrective action is taken when necessary for continued, safe operations. This is particularly important when operational changes or unprecedented or unpredicted events occur.

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## **Appendix 2 to Chapter 4**

### **WORKSITE CONTROL PROCEDURES**

1.1 Aspects of the control and procedures for movement area works should include, but are not limited to:

- a) all contractor drivers should be escorted by a qualified vehicle operator or undergo movement area driver training and testing;
- b) access routes should be agreed upon in advance and clearly identified to minimize interference with operations on the aerodrome;
- c) the existing road layout may require changes depending on the vehicle traffic levels;
- d) staff access routes should also be agreed upon in advance and if such a route does not exist, then a safety risk assessment should be undertaken to ensure access can be safely achieved;
- e) hours of operation of the works should be agreed upon in advance;
- f) service clearance checks (underground location of services) should be undertaken before work commences to ensure that cables or pipes are not damaged;
- g) smoking restrictions should be advertised, monitored and enforced;
- h) hot works restrictions (possibly involving a separate hot works permit) should be described, monitored and enforced;
- i) the use of lookouts and/or a listening watch on the appropriate ATS frequency may be required, along with suitable training for this task;

- j) any cranes should be suitably lit and operating heights should not infringe the protected surfaces;
- k) should the construction activity continue into darkness or in low visibility conditions, procedures should be in place to discontinue or modify the activity, depending on its location and if necessary;
- l) procedures should be in place for taxiway crossings, if required;
- m) all contractors should have adequate FOD, noise and dust control measures in place to cover all eventualities;
- n) vehicles entering or exiting the worksite may need to be cleaned to prevent mud or debris being deposited in the movement area;
- o) in case of possible adverse meteorological conditions (e.g. lightning strikes, high winds, snow) or aircraft emergencies, an appropriate alerting mechanism should be in place and works activities may be suspended; and
- p) precautions should be taken to ensure that worksite floodlighting (light direction and/or height) does not affect aircraft and ATS operations.

1.2 In terms of customer service and the availability of facilities, a scheduling process should be in place to ensure that construction or maintenance works do not close or restrict too many stands or operational areas at once.

1.3 Where significant changes to markings or lighting are being made, it may be necessary for the aerodrome operator to conduct a preliminary check in order to ensure that the proposals have been correctly implemented and are functioning as intended.

1.4 Where shift working is in operation, it will be necessary to ensure that each shift is properly and fully briefed. The aerodrome operator should obtain feedback from the parties involved to ensure the implementation of corrective measures, if necessary.

1.5 The aerodrome operator should ensure that contractors have made available a point-of-contact outside normal working hours.

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## Attachment to Chapter 4

## WORKSITE CHECKLIST

WORKSITE CHECKLIST: SETTING UP SITE			
Date:	Time:	Work permit no:	Location:
Task			Task completed
1	Ensure work permit clearance with ATS watch manager, and apron advised of stand(s) affected		
2	Close area with ATS on RTF - either ground or tower		
3	Inform OPS control desk of area closed, who will advise fire service by land line		
4	Isolate area with barriers		
5	Ensure green centre line routes are suppressed through work area		
6	Ensure taxiway centre lines are blacked out		
7	Ensure taxiway sign boards are amended		
8	Check clearances from taxiway centre line to worksite fencing and height of fence		
9	Verify worksite lighting		
10	Ensure a safe route for contractor to site		

WORKSITE CHECKLIST: RE-OPENING SITE			
Date:	Time:	Work permit no:	Location:
Task			Task completed
1	Verify that pavement surface is sound and clean		
2	Verify that light fittings are secure and clean		
3	Ensure all pit lids are closed		
4	Verify grass areas are clear of FOD		
5	Verify that grass areas are reinstated and secure from aircraft blast		
6	Inspect reinstated taxiway lighting routes		
7	Ensure taxiway centre lines are reinstated		
8	Ensure taxiway sign boards are reinstated		
9	Final sweep of area		
10	Remove barriers and reopen area with ATS on RTF – either ground or tower		
11	Inform OPS control of reopening		

## Chapter 5

### FOREIGN OBJECT DEBRIS (FOD) CONTROL

#### 5.1 GENERAL

5.1.1 The presence of foreign object debris (FOD) on the movement area may pose a significant hazard to the safety of aircraft operations. FOD has the potential to damage aircraft during critical phases of flight, which can lead to catastrophic loss of life and airframe, and increased maintenance and operating costs. FOD hazards can be reduced through the implementation of an FOD control programme, which would normally include FOD prevention, detection, removal and evaluation.

5.1.2 It is important that all personnel with access to the movement area understand their role in the prevention of FOD. FOD control is normally a module of the initial training given to personnel with access to the movement area.

5.1.3 It is necessary to have an established process to regularly clear the movement area of FOD. Removing FOD is the responsibility of everyone.

5.1.4 FOD may be controlled by ensuring that all personnel with movement area access, in particular inspection/maintenance personnel and ground handlers, are aware of situations which may potentially cause FOD.

#### 5.2 OBJECTIVES

5.2.1 Aerodrome operators shall establish an FOD control programme commensurate with the assessed risks and appropriate to the local operating conditions. The programme shall consist of prevention, detection, removal and evaluation.

5.2.2 FOD prevention shall include awareness, training and education as well as measures for FOD prevention.

5.2.3 The detection of FOD shall include methods for the monitoring and inspection of the movement area.

5.2.4 Operational procedures and, where applicable, equipment, shall be provided for the removal, containment and disposal of FOD from the movement area.

5.2.5 Data and information about FOD shall be collected and analysed regularly to identify sources and trends.

## **5.3 OPERATIONAL PRACTICES**

### **5.3.1 FOD prevention**

#### **5.3.1.1 Awareness**

5.3.1.1.1 Aerodrome operators shall ensure that all personnel involved in aerodrome operations at the aerodrome are aware of the existence of the FOD control programme. Aerodrome personnel should be encouraged to identify potential FOD hazards, act to remove observed FOD, and propose solutions to mitigate related safety risks.

5.3.1.1.2 Aerodrome operators should designate an individual to manage the aerodrome's FOD control programme and clearly define his/her responsibilities.

*Note.— This designated individual can be a dedicated FOD manager or can have other duties (e.g. operations manager, safety manager).*

5.3.1.1.3 The FOD control programme should be actively supported by the senior management of all organizations operating on the movement area.

5.3.1.1.4 Aerodromes operators should consider establishing an FOD committee to assist in the management of the FOD control programme, including the determination of potentially hazardous FOD situations and evaluation of collected FOD data. The committee may include stakeholders in a position to produce or remove FOD, such as ground handlers, aircraft operators, aerodrome operations and contractor representatives, etc.

*Note.— The work of the FOD committee could be included in an already established safety-related committee (e.g. apron safety committee).*

#### **5.3.1.2 Training and education**

The primary objectives of the FOD training programme are to increase employee awareness of the causes and effects of FOD damage and to promote active employee participation in eliminating FOD during the performance of daily work routines. A typical FOD training syllabus is included in Appendix 1.

#### **5.3.1.3 FOD prevention measures**

Active prevention measures to reduce the generation of FOD, commensurate with the identified safety risks, should be detailed in an aerodrome's FOD control programme. Details of these measures are included in Appendix 2.

### **5.3.2 FOD detection**

5.3.2.1 Detecting FOD is an important activity at an aerodrome. This process involves not only the timely detection of any FOD, but also the identification of its potential source and location. Provisions on FOD detection processes, systems and equipment are included in Appendix 3.

5.3.2.2 Detection of FOD shall be included as part of the inspection regime.

*Note.— See Part II, Chapter 3 — Inspections of the movement area, for the establishment of appropriate inspection procedures.*

5.3.2.3 The inspection of an aircraft stand should be carried out prior to the arrival and departure of an aircraft, in order to detect and remove any FOD present.

5.3.2.4 Aerodrome operators shall establish procedures for handling FOD matters in cooperation with the appropriate ATS unit.

5.3.2.5 An aerodrome operator shall determine the most efficient way to notify all personnel involved in aerodrome operations at the aerodrome to remove the detected FOD, and notify ATS unit to take appropriate action if a risk is identified.

5.3.2.6 Although not all types of FOD will necessitate an immediate runway closure, a prompt decision is needed in all situations to assess the safety risk posed by FOD. Aerodrome operators should establish procedures for handling such matters in cooperation with the appropriate ATS unit.

5.3.2.7 When using continuously operating FOD detection technologies on a runway, a decision on the appropriate action to be taken shall be made as soon as an object is detected. If the location or characteristics of the FOD does not present an immediate safety risk, the object should be removed as soon as the operational schedule permits. If the location or characteristics of the FOD presents an immediate safety risk, provisions in the FOD management programme shall clearly indicate that a hazard exists and allow for an action to be taken that may lead to the temporary suspension of runway operations.

### **5.3.3 FOD removal**

5.3.3.1 Detected FOD should be removed as soon as practicable after detection.

*Note.— Removal of FOD can be achieved through various means including manual or mechanical methods.*

5.3.3.2 Provisions in the FOD management programme shall allow for an immediate removal of detected FOD which may pose an immediate safety risk to operations.

5.3.3.3 The removal of FOD should be included in the tasks of all personnel operating on the aerodrome. FOD removal operations should comply with the provisions in Appendix 3.

### **5.3.4 FOD evaluation**

5.3.4.1 All FOD identified and collected on the aerodrome should be recorded, analysed and evaluated. When appropriate, an investigation should be carried out to identify the source of the FOD.

5.3.4.2 The sources of FOD, including its location and the activities generating FOD on the aerodrome, should be identified and recorded. This information should be analysed in order to identify trends and problem areas as well as to focus efforts of the FOD control programme.

5.3.4.3 The FOD control programme should be periodically reviewed and updated based on the data and trends identified through the evaluation of FOD collected on the aerodrome. The FOD evaluation processes are included in Appendix 3.

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## **Appendix 1 to Chapter 5**

### **FOD TRAINING**

The following subjects should be included in the FOD training programme:

- a) safety of aircraft, personnel and passengers as they relate to FOD;
  - b) overview of the FOD control programme in place at the aerodrome;
  - c) causes and principal contributing factors of FOD;
  - d) the consequences of ignoring FOD, and/or the incentives for preventing FOD;
  - e) practicing clean-as-you-go work habits and the general cleanliness and inspection standards of work areas;
  - f) FOD detection procedures, including the proper use of detection technologies (if applicable);
  - g) requirements and procedures for the regular inspection and cleaning of movement areas;
  - h) FOD removal procedures;
  - i) proper care, use, and stowage of material and component or equipment items used around aircraft while in maintenance or on aerodrome surfaces;
  - j) control of debris in the performance of work assignments (e.g. loose items associated with luggage, ramp equipment and construction materials);
  - k) control over personal items and equipment;
  - l) proper control/accountability and care of tools and hardware;
  - m) how to report FOD incidents or potential incidents; and
  - n) continual vigilance for potential sources of FOD.
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## **Appendix 2 to Chapter 5**

### **FOD PREVENTION MEASURES**

#### **1. SOURCES OF FOD**

1.1 FOD is derived from many sources and can be generated from personnel, aerodrome infrastructure (pavements, lights and signs), the environment (wildlife, snow, ice) or the equipment operating at the aerodrome (aircraft, aerodrome operations vehicles, maintenance equipment, fuelling trucks, other aircraft servicing equipment and construction equipment).

1.2 FOD can accumulate both on and underneath ground support equipment (GSE) stored on the apron. Jet blast can then blow FOD onto the movement area, or on an aircraft. The outboard engines of four-engine aircraft can move debris from the runway edge and shoulder areas, where it tends to accumulate, back toward the centre of the runway or taxiway.

1.3 Helicopters that manoeuvre over freshly mowed or loose-dirt airside areas can also move FOD onto runways, taxiways, and ramps. In addition, the high velocity outwash vortices from a helicopter, which may also send FOD to a distance of approximately three times the diameter of the rotor, can propel lightweight GSE or materials staged nearby.

1.4 FOD is often more common when aerodromes begin construction activities, but it may also be prevalent in winter conditions as ageing pavement infrastructure may be influenced by weathering (freeze and thaw cycles) and begin to crack or break apart.

1.5 Meteorological conditions may also move FOD. For example, wind can blow dry debris, such as sand or plastic bags, from relatively non-critical areas onto the flight area. Rain water and drainage can stream mud, pebbles and other small items along the path of least resistance.

1.6 The activities listed below may become sources of FOD on an aerodrome. For each activity, mitigation measures are identified.

#### **2. AIRCRAFT SERVICING**

2.1 Aircraft operators, ground handling agents and other aerodrome stakeholders generate much of the FOD found on the apron, service roads, baggage make-up areas, and areas near flight kitchens. Refuelling, catering, cabin cleaning, and baggage/cargo handling can produce broken materials.

2.2 These stakeholders should establish procedures to inspect GSE or other vehicles for signs of wear and tear that can lead to FOD hazards.

2.3 Procedures to inspect the baggage loading and unloading areas every time an aircraft is serviced should be established. Baggage pieces, including bag tags and wheels, can break off luggage and either fall onto the apron or collect in the cargo door sill of the aircraft. They can then also be knocked out of the sills and onto the apron at the next stop/destination.

### 3. AIRCRAFT MAINTENANCE

3.1 These activities, which may be performed on the apron, require a variety of small objects such as rivets, safety wire, and bolts that become FOD when they are inadvertently left behind.

3.2 All tools should be accounted for as a matter of practice. Aids in the control of these items include checklists, shadow boards, and cut-out tool tray liners. All items should be contained in a spill-proof tote bag, tray or toolbox.

### 4. AIR CARGO

In an air cargo area, there is a high potential for blowing debris such as cargo strapping and plastic sheeting. Procedures to contain such debris, possibly by installing (and monitoring) fencing where appropriate may help to control the environment. Of course, FOD trapped by such fences should be removed regularly.

### 5. CONSTRUCTION

5.1 Specific FOD prevention procedures should be established and employed for each construction project. These procedures should be based on the proximity of the construction activities to the operational areas, but in general should stress containment and regular clean-up of construction debris.

5.2 Aerodrome preconstruction planning should include a means for controlling and containing FOD generated by the construction. This is especially true in high-wind environments where debris is more likely to become airborne.

5.3 The designated routes of construction vehicles on the movement area should be planned, so as to avoid or minimize crossing in critical areas of aircraft operations. If high-risk crossings cannot be avoided, subsequent provisions such as an increased frequency of FOD inspections could be implemented.

5.4 Contractors should fully understand and comply with the requirements and penalties incorporated in their contracts regarding the control and removal of FOD. To enforce these requirements, aerodrome operators may consider drafting FOD control guidance for all construction projects taking place within the movement area. Standard and project-specific FOD provisions could then be included into the contract documents for construction projects. These items may include:

- a) requiring contractors to cover all loads;
- b) requiring contractors to secure any loose items that could easily blow away or control dust with the spraying of water;
- c) ensuring the proper functioning of storm drains throughout the construction;
- d) specifying whether any mechanical FOD removal devices will be required;
- e) specifying how monitoring for FOD hazards will be accomplished; and
- f) requirements for inspecting and removing FOD from tires prior to traversing operational areas.

*Note.— Procedures on work in progress at aerodromes can be found in Part II, Chapter 4.*

## **6. AERODROME MAINTENANCE OPERATIONS**

6.1 Mowing and other maintenance operations routinely disturb the vegetation and soil in areas adjacent to those travelled by aircraft. Procedures to remove this debris, such as the use of an assigned aerodrome sweeper or personnel on foot using shovels to repair vegetation and soil, should be implemented.

6.2 Aerodrome lighting, pavement, and marking maintenance operations may generate concrete/asphalt debris as well as increase the potential for dropped repair parts, tools, and other items stored on the maintenance vehicles. Corrective procedures may include the use of aerodrome sweepers and the inspection of the worksite after maintenance is completed.

6.3 The areas listed below are typically prone to generating FOD.

### **6.4 Pavements**

6.4.1 Deteriorating pavement can exhibit spalling or cracks. For example, pieces of concrete can break loose from pavements or FOD can develop from fatigue corner cracks.

6.4.2 The service roads which cross taxiways may generate FOD from the vehicles using them, especially in the case of construction operations.

6.4.3 Special attention should be paid to the cleaning of cracks and pavement joints, as tests have shown they are the main sources of foreign object ingestion.

6.4.4 Asphalt and concrete pavements may be the most common source of FOD on an aerodrome, and therefore, effective pavement maintenance practices are important for the prevention of FOD.

### **6.5 Other aerodrome surfaces**

6.5.1 Movement area grass and ditches may collect and hold large amounts of light debris such as paper, cardboard, plastic and various containers that can originate from aprons, cargo ramps and hangar ramps. This debris can blow back into areas used by aircraft, unless collected in a timely manner.

6.5.2 Unpaved areas adjacent to pavements may require stabilization, as appropriate, to prevent FOD from jet wash.

6.5.3 FOD fences may collect debris on windy days. This FOD should be collected before the wind increases or changes direction and the debris blows back on to areas used by aircraft.

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## **Appendix 3 to Chapter 5**

### **FOD DETECTION, REMOVAL AND EVALUATION**

#### **1. FOD DETECTION OPERATIONS**

1.1 While operational areas are inspected as described in Part II, Chapter 3 of this document, additional inspections shall be carried out in construction areas and immediately after any aircraft or ground vehicle accident or incident, as well as following any type of material spill, to ensure that all FOD has been detected and removed.

1.2 In addition to the typical inspections, personnel on the movement area should employ a clean-as-you-go technique, by looking for FOD during the course of their regular duties. When inspections occur at night, after the runway is closed or before the runway is opened, additional lights/lighting systems on vehicles are beneficial to better detect FOD.

1.3 Vehicles should only be driven on clean, paved surfaces, when possible. If a vehicle must be driven on unpaved surfaces, the driver has a responsibility to ensure the vehicle's tires do not transport FOD (e.g. mud or loose stones) back onto the pavement.

#### **2. METHODS AND TECHNIQUES OF FOD DETECTION**

##### **2.1 Manual detection**

2.1.1 When conducting an inspection on a runway, inspection techniques will be determined by runway availability and type of operation. Ongoing construction requires more frequent inspections. It may even be necessary to assign dedicated personnel to continually inspect for FOD during major construction activities. As part of the FOD control programme, the FOD manager may find it appropriate to involve aircraft operators. For example, flight crews should report any FOD they observe on runways and taxiways to the ATS unit and station operations. Aircraft operators and ground handling agents may also be asked to designate individuals to inspect apron areas prior to aircraft movement to and from the gate.

2.1.2 Encouraging the participation of the aerodrome's stakeholders in inspections will reinforce the concept that FOD control is a team effort and demonstrates the aerodrome operator's commitment to a debris-free environment. Aircraft operator personnel, when feasible, may join the aerodrome staff in movement area inspections. This practice helps increase familiarity with local aerodrome conditions, and promotes effective communication between the aerodrome and aircraft operators.

2.1.3 Periodic FOD inspections on foot should be carried out to increase the effectiveness of detection, and to inspect areas inaccessible by vehicle (such as grass areas).

##### **2.2 Detection technologies**

2.2.1 Recent technological developments have expanded the capabilities of FOD detection through automation. Advanced technologies are now available for automated FOD detection, including capabilities for continuous monitoring on runways and other aircraft movement areas to supplement the capabilities of aerodrome personnel.

2.2.2 If an aerodrome chooses to implement these new FOD detection technologies, responsibilities and procedures should be established with the ATS unit to ensure that appropriate and timely action is taken if FOD is detected.

2.2.3 The aerodrome operator should have considerable flexibility in terms of how to implement continuous detection systems at the aerodrome. The user interface may be located in the aerodrome's operation or maintenance centre, and/or in the air traffic control (ATC) tower.

*Note.— Further guidance can be found in EUROCAE document ED-235 entitled, “Minimum Aviation System Performance Specification (MASPS) for Automatic Foreign Object Debris (FOD) Detection Systems”.*

### **3. FOD REMOVAL**

Once FOD is detected, the next step is removing it from the aerodrome environment. For the removal of an isolated item on a runway, the manual approach may be the most efficient. The use of FOD removal equipment may be beneficial however, especially in areas where a greater concentration of FOD may be expected, such as cargo areas and near construction sites.

### **4. FOD REMOVAL EQUIPMENT**

4.1 The FOD removal equipment currently available may be divided into two categories: mechanical and non-mechanical. The equipment varies in size from small push units to large systems that are truck-mounted. FOD containers are also important for the management of FOD.

#### **4.2 Mechanical systems**

4.2.1 *Power sweepers.* The sweeper removes debris from cracks and pavement joints, and is typically used throughout the movement area.

*Note.— For all brush systems, operators are cautioned that bristles can detach from brooms and produce FOD. Brushes made with metal bristles or spines are not recommended to be used for FOD removal purposes. Plastic or a combination of plastic/metal bristles may be appropriate, but the user should consult the equipment manufacturer for specific recommendations.*

4.2.2 *Vacuum systems.* These systems perform FOD removal functions in a manner similar to the power sweepers described above. The systems may also perform in conjunction with mechanical brooms or other recirculation air units.

4.2.3 *Jet air blowers.* These systems move FOD and other debris by directing a stream of high velocity air towards the pavement surface. When used in the aerodrome environment, it is recommended that these systems incorporate a debris collection mechanism so that FOD will not simply be relocated to another area.

### 4.3 Non mechanical systems

4.3.1 *Friction mat sweepers.* A rectangular assembly towed behind a vehicle that employs a series of bristle brushes and friction to sweep FOD into sets of capture scoops, which are covered by a retaining mesh to hold collected debris.

4.3.2 *Magnetic bars (attached to vehicles).* These bars can be suspended beneath tugs and trucks to pick up metallic material. However, the bars should be cleaned regularly to prevent them from dropping the collected debris. Magnetic bars are not able to pick up the following types of common FOD materials: titanium, aluminium alloys and certain stainless steel elements.

4.3.3 *Rumble strips (also known as “FOD shakers”).* While these devices may have been used in the past, they are no longer a widely accepted FOD removal system. Their effectiveness at removing debris from tires or vehicle undercarriages is negligible, and the equipment can generate its own FOD if not cleaned out regularly.

### 4.4 FOD containers

4.4.1 Designated FOD containers should be conspicuously placed on the apron for the storage of debris. The containers should be well marked, properly secured, and frequently emptied to prevent them from overflowing and becoming a source of FOD themselves.

4.4.2 “Closed-type” containers are preferable in order to prevent the wind from dislodging the container’s contents. Aerodrome operators should ensure that FOD containers do not blow over during periods of high winds. FOD containers should also have placards stating that hazardous materials may not be deposited in them, as appropriate.

4.4.3 Suggested locations for FOD containers include: near all entry points to the apron area, in hangars, aircraft maintenance areas, aircraft stands and baggage areas. Clearly identified storage locations increase the likelihood that collected debris will be deposited by personnel.

4.4.4 Other means for containing FOD include: FOD fencing or netting to restrict movement of airborne FOD; fencing to prevent animals from entering the aerodrome.

## 5. REMOVAL OPERATIONS

While the exact actions of FOD removal operations are specific to each aerodrome, the following two examples represent the successful implementation of FOD removal:

- a) assigning an airside sweeper(s) to work with maintenance crews and/or respond as required to reports of FOD;
- b) deploying personnel with garbage bags to pick up potential FOD in grassy areas and along fence-lines. This process is intended to pick up debris before it returns to the pavement areas.

## **6. FOD EVALUATION**

### **6.1 FOD reporting**

FOD may be composed of any material. To record the location of the FODs, a suitable map of the aerodrome should be used. It is important to correctly describe the FOD, to allow for the proper identification of the source areas as well as the appropriate mitigation measures to be taken. FOD may include the following:

- a) aircraft and engine fasteners (nuts, bolts, washers, safety wire, etc.);
- b) aircraft parts (fuel caps, landing gear fragments, oil sticks, metal sheets, trapdoors, and tire fragments);
- c) mechanics' tools;
- d) catering supplies;
- e) personal items (personnel badges, pens, pencils, luggage tags, drink cans, etc.);
- f) apron items (paper and plastic debris from catering and freight pallets, luggage parts, and debris from ramp equipment);
- g) runway and taxiway materials (concrete and asphalt chunks, rubber joint materials, and paint chips);
- h) construction debris (pieces of wood, stones, fasteners and miscellaneous metal objects);
- i) plastic and/or polyethylene materials;
- j) natural materials (plant fragments, inanimate wildlife and volcanic ash); and
- k) contaminants from winter conditions (snow, ice).

## **7. FOD RECORDING**

It is important that the organization maintain a record of the measures taken to fulfil the objectives of the FOD control programme. These records may be required in the event of a formal investigation of an accident or serious incident, and may also be used to identify any trends, repeats, unusual conditions, etc., in order for corrective action to be initiated. Records may also provide quantitative data for future safety risk assessments to support the analysis of operational history and improve operational capabilities.

## **8. CONTINUOUS IMPROVEMENT**

8.1 The FOD control programme should be periodically analysed and reviewed to ensure its effectiveness.

8.2 This review provides a means for systematically assessing how well the organization is meeting its FOD control objectives. The evaluation provides a review of the existing effectiveness of the programme and, if required, results in recommendations for enhanced FOD control. In addition to supporting the aerodrome operator's existing responsibilities for self-inspection and correction of discrepancies, an effective FOD control programme review should:

- a) systematically review the effectiveness of existing FOD control procedures used by aerodrome and aircraft operator personnel, including all available feedback from daily inspections, assessments, reports, and other safety audits;
- b) verify that the aerodrome is meeting identified performance indicators and targets;
- c) communicate all findings to staff and lead to implementation of agreed-upon corrective procedures, mitigation strategies, and enhanced training programmes; and
- d) promote safety in the overall operation of the aerodrome by improving coordination between aerodrome staff, aircraft operator personnel, and other aerodrome stakeholders.

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## **Chapter 6**

### **WILDLIFE HAZARD MANAGEMENT**

#### **6.1 GENERAL**

6.1.1 The presence of wildlife (birds and other animals) on and within the aerodrome vicinity may pose a serious hazard to aircraft operational safety. Therefore, to reduce the risk to aviation safety, active assessments, reporting and management of wildlife are necessary.

6.1.2 A wildlife hazard management programme (WHMP) is a method for aerodrome operators to adopt reasonable wildlife risk control measures, in order to prevent wildlife from colliding with aircraft.

6.1.3 While the roles and tasks of the other stakeholders (State and local authorities, aircraft operators and air navigation services providers) in the State's policy toward wildlife hazard reduction are equally important, they will not be the focus of this document.

6.1.4 Land use around the aerodrome should, wherever possible, not be attractive habitats for wildlife.

## 6.2 OBJECTIVES

6.2.1 A wildlife safety risk assessment shall be conducted, covering the aerodrome and its vicinity.

6.2.2 A WHMP shall be established and tailored to the local environment and be commensurate with the wildlife safety risk assessment.

6.2.3 The WHMP shall include procedures and measures for reducing the wildlife risk at the aerodrome to an acceptable level.

6.2.4 Wildlife hazard reduction measures and procedures shall be integrated into the aerodrome operator's safety management system (SMS).

## 6.3 OPERATIONAL PRACTICES

### 6.3.1 Wildlife hazard management programme (WHMP)

6.3.1.1 An aerodrome operator shall develop, implement and demonstrate an effective WHMP at the aerodrome, and this should be tailored to and commensurate with the size and level of complexity of the aerodrome, and the number of aircraft movements and their type, taking into account the wildlife hazards identified and the risk assessment of those hazards.

6.3.1.2 The WHMP should include, as a minimum:

- a) a description of the organization, roles and tasks in the WHMP;
- b) procedures for collecting, reporting and recording data on wildlife strikes and observed wildlife;
- c) a wildlife safety risk assessment method and procedure, including annual reviews;
- d) procedures, means and staff for habitat and land management;
- e) procedures, means and staff for the expelling and deterring of wildlife;
- f) procedures for coordinating with other stakeholders; and
- g) procedures, means and provisions for the training of staff.

*Note — Provisions on training can be found in Part II, Chapter 1, Chapter 6, 6.3.8 and Appendix 1 to Chapter 6.*

### 6.3.2 Roles and tasks in the wildlife hazard management programme (WHMP)

The WHMP should detail the roles and tasks of all personnel who:

- a) develop and implement the WHMP;
- b) oversee the daily activities (detailed in the sections below), analyse the collected data and carry out safety risk assessments in order to develop and implement the WHMP;

- c) expel and/or deter hazardous wildlife; and
- d) reduce the attractiveness of identified areas, if relevant.

### **6.3.3 Collecting, reporting and recording data on wildlife strikes and observed wildlife**

6.3.3.1 An effective WHMP depends on accurate and reliable data. Reviewing and analysing wildlife strikes and wildlife observations will help identify hazards at the aerodrome and its vicinity and indicate the effectiveness of current wildlife strike prevention methods.

6.3.3.2 The aerodrome operator shall establish procedures to record and report wildlife strikes that have occurred at the aerodrome and its vicinity, in close cooperation with all relevant organizations operating at the aerodrome.

6.3.3.3 Wildlife incident reporting should comply with the criteria included in Appendix 2.

6.3.3.4 The aerodrome operator's reporting system shall contain a requirement for all relevant third parties and all aerodrome personnel to report wildlife strikes, wildlife remains, including findings thereof during aerodrome inspections, and any other relevant identified hazards, to the aerodrome operator.

6.3.3.5 Wildlife activities, including incident reports, should be recorded in a wildlife log. This log should include, as a minimum, the following information:

- a) the name of the person logging the data;
- b) date and time of the observation;
- c) numbers, species and location of the wildlife observations;
- d) proactive and reactive actions taken to decrease the number of present wildlife and the results thereof; and
- e) weather and lighting conditions.

6.3.3.6 The log should be completed by competent wildlife control personnel, at intervals commensurate with the number of aircraft movements and runways in use, and taking into account wildlife behavior and other relevant local circumstances. Data should be analysed to identify which species represent a hazard at specific times of day and/or year, and during different types of meteorological conditions.

6.3.3.7 Aerodrome operators should ensure that the identification of the species involved in any reported wildlife strikes is as accurate as possible, since these reports represent data that will help in the assessment of the level of safety risk that each species of wildlife presents to aircraft operations at the aerodrome. The compilation of precise wildlife observations and strike statistics should facilitate the analysis of data so as to improve wildlife hazard management.

### 6.3.4 Wildlife safety risk assessment

6.3.4.1 Aerodrome operators shall conduct a specific safety risk assessment of the wildlife situation and use the results to help target wildlife management measures and monitor their effectiveness. Safety risk assessments should be updated and repeated at regular intervals, commensurate with assessed risks.

6.3.4.2 The aerodrome operator's wildlife safety risk assessment should, as a minimum:

- a) define the area for the safety risk assessment, which would, in most cases, be the entire aerodrome but may also include the vicinity of the aerodrome;
- b) rate the strike probability using strike data from reports for each species, information on the presence of species, and the number of individuals and their biology, and update the data and probabilities regularly;
- c) rate the severity of damage arising from those strikes for each species;
- d) determine the risk for each species; and
- e) identify the causes (attractants, migration routes) of each wildlife hazard.

*Note 1.— The total number of wildlife strikes is not necessarily a comprehensive measure of safety risk, or indication of the performance of the wildlife control measures, at an aerodrome.*

*Note 2.— Provisions on safety risk evaluation methodology can be found in Part I, Chapter 3.*

6.3.4.3 The aerodrome operator should prioritize its wildlife management measures on those species with the highest frequency (probability) and which may create the greatest damage (severity).

*Note.— Further guidance can be found in the Airport Services Manual (Doc 9137), Part 3 — Wildlife Control and Reduction.*

### 6.3.5 Habitat and land use management

6.3.5.1 Habitat and land use management, including preventive and proactive actions, is intended to reduce the presence of wildlife on the aerodrome by taking appropriate actions.

6.3.5.2 Aerodrome operators should conduct an inventory of sites that attract wildlife within a defined radius around the aerodrome, paying particular attention to sites close to the airside and the approach and departure corridors. The appropriate radius (i.e. aerodrome vicinity) in this context should be 13 km around the aerodrome reference point. However, the radius may be extended or reduced, based on a wildlife evaluation of the aerodrome vicinity.

*Note.— Further guidance can be found in the Airport Services Manual (Doc 9137), Part 3 — Wildlife Control and Reduction.*

6.3.5.3 Aerodrome operators should regularly review features on, and within the vicinity of, the aerodrome that attract wildlife. A management plan should be developed to reduce the attractiveness of these features and to decrease the number of hazardous wildlife present or to deny them physical access to these areas.

6.3.5.4 Aerodrome development should be designed such that it will not be attractive to hazardous wildlife and no attraction will be created during construction. This may include denying resting, roosting and feeding opportunities for hazardous wildlife. In some cases, specific wildlife hazard control may need to be employed during the construction and reinstatement phases, and wildlife hazard management controls implemented as part of any approval process.

6.3.5.5 A complete perimeter fence of adequate height, strength and structure, is the prime method of preventing hazardous wildlife, other than birds, from gaining access to the aerodrome areas. Fences and gates should remain closed and be regularly inspected. Fencing should also be trenched in order to preclude burrowing animals from gaining access to the aerodrome.

6.3.5.6 No food sources should be available to hazardous wildlife on the aerodrome. The aim should be to prevent food sources from being available through management of the aerodrome environment.

6.3.5.7 Where applicable, vegetation should be kept at a height that is considered unattractive to hazardous wildlife. Where applicable, the vegetation composition on the aerodrome should not encourage wildlife.

6.3.5.8 Agricultural crops should be discouraged from the aerodrome environment since agricultural crops and related activities (ploughing, seeding) may provide food for hazardous wildlife.

6.3.5.9 Water bodies such as depressions, open drainage ditches, ponds and lakes may be a particular hazard as they may attract hazardous wildlife. These hazards should be made less attractive by mitigation measures such as drainage, replacement by buried drain pipes, netting and fencing to deny access to wildlife that walk in or by steepening the sides.

*Note.— A list of types of land use that should be prevented, eliminated or mitigated in and around aerodromes is shown in the attachment to Chapter 6.*

## **6.3.6 Expelling and deterring wildlife**

6.3.6.1 Wildlife deterring and expelling techniques should be appropriate to the wildlife situation on the aerodrome and its vicinity and should be based on:

- a) wildlife patrols;
- b) acoustics, such as distress and alarm call simulators, specific signals, natural and synthetic cries;
- c) pyrotechnics, such as medium- and long-range cartridges and shell crackers;
- d) optical and visual deterrents, such as laser devices, flags and streamers, lights, predator models, gull models, hawk kites, balloons; and
- e) other techniques such as firearms, chemical repellents, lethal chemicals, trained predators (dogs and falcons), gas cannons, traps and relocation methods.

*Note.— The effectiveness of the techniques and measures listed above may vary based on the species, location and their application.*

6.3.6.2 Wildlife control personnel should be equipped with devices for deterring, dispersing or removing wildlife appropriate to the species encountered, the numbers of wildlife present, and to the area that they need to control, or obtain the means of calling on expert support at short notice.

6.3.6.3 In case hazardous wildlife are still attracted to the aerodrome after proactive measures have been implemented, it may be necessary to remove them by trapping or using lethal methods.

6.3.6.4 The challenge for wildlife hazard management is that some wildlife may become accustomed to certain dispersal techniques. Therefore, best results may be obtained if aerodrome operators routinely adjust and vary the control and dispersal measures being used. An aerodrome operator should proactively seek different or new effective ways to reduce the wildlife hazard, where or if existing methods prove ineffective.

6.3.6.5 Actions to manage wildlife should be prioritized on the movement area with particular attention given to the runways and approach/departure routes within the aerodrome vicinity.

6.3.6.6 All devices and methods should be used in compliance with national regulations or practices (e.g. in compliance with regulations on the use of firearms, environment, and animal protection).

### **6.3.7 Coordination with stakeholders**

6.3.7.1 Effective wildlife hazard management requires communication, cooperation, and coordination with all relevant stakeholders. Aerodrome operators should identify which stakeholders on and off the aerodrome should be involved and consulted. Such stakeholders may include transportation officials (including government), aerodrome staff, the ATS unit, aircraft operator representatives (including pilots), nature conservation organizations (government and non-government), local municipalities/cities, and organizations responsible for land management and local planning and development approvals in the vicinity of the aerodrome.

6.3.7.2 The WHMP should include a process to hold regular meetings with the stakeholders present at the aerodrome (including aircraft operators, ATS, ground handlers, as appropriate). The aerodrome operator should encourage stakeholders to share data that was collected, reported and recorded on wildlife observations and strikes, in order to improve the WHMP.

6.3.7.3 The aerodrome operator should ensure that there is a process for rapid communication among those involved in wildlife control as well as with ATS. This is necessary when a specific wildlife hazard is present to allow the issuance of appropriate warnings to aircraft operating on, and within the vicinity, of the aerodrome, by the air navigation services provider (ANSP).

6.3.7.4 The aerodrome's WHMP should include a process for liaising with non-aerodrome agencies, local landowners and other relevant stakeholders, to ensure that the aerodrome operator is aware of developments that may contribute to creating additional wildlife hazards in the infrastructure, vegetation, land use and activities within the aerodrome's vicinity (e.g. crop harvesting, seed planting, ploughing, establishment of land or water features, hunting). The aerodrome operators should consider options to influence the land-use within the vicinity of the aerodrome, in order to reduce the hazard from wildlife.

*Note.— Further guidance can be found in the Airport Services Manual (Doc 9137), Part 3 — Wildlife Control and Reduction.*

6.3.7.5 The aerodrome operator should participate in wildlife related meetings with other aerodromes to share experience and discuss common problems.

### **6.3.8 Personnel training**

6.3.8.1 The WHMP should include procedures for the initial and recurrent training of personnel involved in wildlife control. The minimum initial and recurrent training requirements for wildlife control personnel, and a typical training syllabus, are included in Appendix 1.

6.3.8.2 The training of wildlife control personnel should be conducted by competent wildlife control personnel, or specialists with proven experience in this field.

6.3.8.3 Wildlife control personnel should be fully aware of the details pertaining to aerodrome operations, the aerodrome environment and should have received appropriate training, including:

- a) airside driver training, aerodrome familiarization, air traffic control communications (radiotelephony (RTF)), signs and markings, navigational aids, aerodrome operations and safety, and other matters that the aerodrome operator deems appropriate; and
- b) aircraft familiarization, including aircraft identification and effect of wildlife strikes on aircraft systems.

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## **Appendix 1 to Chapter 6**

### **WILDLIFE CONTROL TRAINING**

#### **1. INITIAL TRAINING**

The initial training for wildlife control personnel should, as a minimum, address the following areas:

- a) an understanding of the nature and extent of the aviation wildlife hazard, and local hazard identification;
- b) an understanding of national and local regulations, standards, and guidance material related to the aerodrome wildlife hazards management programme (use of best-practices models);
- c) a broad appreciation of local wildlife ecology and biology;
- d) the importance of accurate wildlife identification and observations, including the use of field guides;
- e) local and national laws and regulations relating to protected species, and species of special concern, and the aerodrome operators' policies relating to them;

- f) high-risk species identified in the wildlife risk assessment;
- g) wildlife strike remains collection procedures, identification and reporting;
- h) active/tactical measures, using well-established effective wildlife removal, dispersal, detection and control techniques;
- i) documentation of wildlife activities, control measures and reporting procedures (the aerodrome wildlife management programme); and
- j) firearms, drones and any other equipment and their use on the aerodrome, including the use of personal protective equipment.

## **2. RECURRENT TRAINING**

In order to maintain the competence of wildlife management personnel, recurrent training should be carried out, including a selection of general topics covered in the wildlife control initial training. This should include:

- a) changes in the local environment;
- b) recent wildlife events at the aerodrome;
- c) changes in active and passive measures; and
- d) any other matters that the aerodrome operator deems appropriate.

## WILDLIFE CONTROL TRAINING SYLLABUS

A typical training syllabus may contain the topics listed below:

<b>Overview</b>	<b>Familiarization</b>	<b>Specification</b>
Theoretical Training	Practical Training	Specific Wildlife Training
<ul style="list-style-type: none"> <li>• Aerodrome overview</li> <li>• Aerodrome certification</li> <li>• Aerodrome procedures</li> <li>• International regulations</li> <li>• National regulations</li> <li>• Environmental regulations</li> <li>• Aerodrome safety management system</li> <li>• Promulgation of information</li> <li>• Health and safety overview</li> <li>• Accident and incident reporting/investigation</li> </ul>	<ul style="list-style-type: none"> <li>• All aerodrome operational procedures and standards</li> <li>• Landside overview</li> <li>• Airside safety</li> <li>• Airside security</li> <li>• Apron driving</li> <li>• Radiotelephony</li> <li>• Runway incursion training</li> <li>• Protection of NAVAIDs</li> <li>• Low/reduced visibility programme</li> <li>• On-the-job training</li> <li>• Recurrent refresher training</li> <li>• Familiarization programme</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed theoretical aspects of wildlife programmes</li> <li>• Integrated approach to all elements of habitat/wildlife programmes</li> <li>• All practical elements required to support programmes</li> <li>• Familiarization programme</li> <li>• Equipment training and procedural use of all equipment</li> <li>• Defined on-the-job training</li> <li>• Recurrent refresher training</li> <li>• Administration programme in respect of specific record-keeping</li> <li>• On/off field programme</li> </ul>

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**Appendix 2 to Chapter 6****1. WILDLIFE INCIDENT REPORTING CRITERIA**

The reporting forms (paper or electronic format) used by the aerodrome operator or other stakeholders at the aerodrome for reporting wildlife strikes, should contain at least the following information:

- a) operator involved;
- b) aircraft make/model;
- c) engine make/model;
- d) aircraft registration;
- e) date (dd/mm/yyyy);
- f) local time;
- g) dawn, day, dusk, night;
- h) aerodrome name;
- i) runway used;
- j) location if en route;
- k) height above ground level (AGL) in ft;
- l) speed (indicated airspeed (IAS)) in kt;
- m) phase of flight:
  - 1) parked;
  - 2) taxi;
  - 3) take off run;
  - 4) climb;
  - 5) en route;
  - 6) descent;
  - 7) approach;
  - 8) landing roll;
- n) part(s) of aircraft struck or damaged:
  - 1) radome;
  - 2) windshield;
  - 3) nose (excluding radome and windshield);
  - 4) engine number (1, 2, 3, 4);
  - 5) propeller;
  - 6) wing/rotor;
  - 7) fuselage;
  - 8) landing gear;

- 9) tail;
  - 10) lights;
  - 11) other (to be specified);
- o) effect on flight:
- 1) none;
  - 2) aborted take-off;
  - 3) precautionary landing;
  - 4) engines shut down;
  - 5) other (to be specified);
- p) sky condition:
- 1) no cloud;
  - 2) some cloud;
  - 3) overcast;
- q) precipitation:
- 1) fog;
  - 2) rain;
  - 3) snow;
- r) wildlife species;
- s) number of wildlife:
- 1) seen
    - i) 1;
    - ii) 2 to 10;
    - iii) 11 to 100;
    - iv) over 100;
  - 2) struck:
    - i) 1;
    - ii) 2 to 10;
    - iii) 11 to 100;
    - iv) over 100;
- t) size of wildlife:
- 1) small;
  - 2) medium;
  - 3) large;
- u) pilot warned of wildlife: yes/no;
- v) remarks (description of damage, injuries and other pertinent information);
- w) reporting person/organization;
- x) address and/or instructions for returning the form to the competent authority; and
- y) address within the State to which any wildlife remains, including feather fragments, should be sent.
-

**Attachment to Chapter 6****LAND USE ON AND AROUND AERODROMES**

The following is a non-exhaustive list of types of land uses which have proven to attract hazardous wildlife and which should, in particular, be prevented, eliminated or mitigated on and in the vicinity of aerodromes:

- a) fish processing;
- b) agriculture;
- c) cattle feed lots;
- d) garbage dumps and landfill sites;
- e) factory roofs and parking lots, or other infrastructure;
- f) theatres and food outlets;
- g) wildlife refuges;
- h) artificial and natural lakes;
- i) golf or polo courses, etc.;
- j) animal farms; and
- k) slaughterhouses.

*Note.— Further guidance on land use on and around aerodromes can be found in the Airport Services Manual (Doc 9137), Part 3 — Wildlife Control and Reduction and in the Airport Planning Manual (Doc 9184), Part 2 — Land use and Environmental Control.*

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## Chapter 7

### APRON SAFETY

#### 7.1 GENERAL

7.1.1 There are a large number of activities taking place on aprons within a congested and time-sensitive environment. Accidents, incidents and occurrences can affect the safety and health of personnel as well as cause aircraft damage.

7.1.2 Ensuring safety on the apron is primarily the responsibility of the aerodrome operator, however, all third parties operating on the apron have a responsibility to ensure the safety of their specific operations.

7.1.3 Apron hazards should be identified and, when necessary, mitigation measures should be developed as part of the aerodrome operator's safety management system (SMS). All staff operating on the apron need to be made aware of its hazards: this may be achieved through general safety introduction training for all staff with unescorted access to the apron areas. Part of this training includes aerodrome operating procedures related to apron management and safety.

*Note.— Further guidance is given in the Manual on Ground Handling (Doc 10121).*

7.1.4 For safe and efficient apron operations there is a need for a close liaison between the aerodrome operator, aircraft operators, air traffic services (ATS) and other third parties. The operational safety and efficiency of apron management depends very largely upon this close cooperation.

#### 7.2 OBJECTIVES

7.2.1 The aerodrome operator, in collaboration with the apron users, shall identify hazards related to activities on the apron and establish and implement mitigation measures, as appropriate.

7.2.2 The aerodrome operator shall establish apron safety procedures, or ensure that such procedures are in place. These shall include, as a minimum, the following:

- a) aircraft stand allocation;
- b) marshalling service;
- c) follow-me (leader vehicle);
- d) blast precautions;
- e) apron cleaning;
- f) aircraft pushbacks;
- g) operation of air bridges;

- h) vehicle movements;
- i) apron discipline; and
- j) dissemination of information.

*Note 1.— The list above contains elements of both operations and safety: this chapter only deals with the safety aspects.*

*Note 2.— Further guidance is given in the Manual on Ground Handling (Doc 10121).*

7.2.3 Procedures to collect, analyse and protect data shall be established by the aerodrome operator in order to understand and improve apron safety performance.

*Note.— Annex 19 – Safety Management, provides further provisions on protection of safety data, safety information and related sources.*

7.2.4 Information that could enhance apron safety, including specific local procedures, shall be communicated by the aerodrome operator to the relevant apron users.

### **7.3 OPERATIONAL PRACTICES**

#### **7.3.1 Aircraft stand allocation**

7.3.1.1 A key element of aircraft stand allocation is ensuring that there is sufficient clearance between the aircraft, equipment and/or buildings.

7.3.1.2. Rules should clearly state which stands may be used by which aircraft types or groups of aircraft. The safety aspects of this involve ensuring that aircraft can only be allocated to stands that are large enough to accommodate them with the required margins.

#### **7.3.2 Marshalling service**

7.3.2.1 A marshalling service should be available to aircraft on request and provided where guidance systems do not exist or are unserviceable. Marshalling guidance may also be required to avoid a temporary safety hazard.

*Note.— Standard marshalling signals for fixed-wing aircraft and helicopters are included in Annex 2 – Rules of the Air (Appendix 1, section 5).*

7.3.2.2 Marshallers shall:

- a) ensure that the stand-to-be used is clear of fixed and mobile obstructions; and
- b) take action in the event of an aircraft incident occurring during marshalling.

7.3.2.3 A distinctive high-visibility jacket or vest should be worn by the marshaller to easily distinguish them from other apron personnel.

### **7.3.3 Follow-me (leader vehicle)**

7.3.3.1 Aerodrome operators should provide a follow-me (leader vehicle) service to lead aircraft when requested. This is especially relevant when operations occur at night or in low visibility conditions.

7.3.3.2 Follow-me vehicles should be easily identified either by a distinct marking and/or colour and be adequately equipped.

### **7.3.4 Blast precautions**

7.3.4.1 The aerodrome operator shall ensure that all apron users are made aware of the hazards arising from jet blast and propeller slipstream.

7.3.4.2 All vehicles and wheeled equipment shall be left properly braked. Where appropriate, equipment should be left on jacks or chocked to minimize the risk of movement when subjected to jet blast or propeller slipstream. Where practicable, equipment should be parked in areas where the risk of jet blast is minimized. Particular care should be exercised with apron equipment having a large flat side surface area.

7.3.4.3 Foreign object debris (FOD) may be moved by jet blast, creating additional hazards and it is thus necessary to ensure that aprons are kept clean.

*Note.— See Part II, Chapter 5 of this document on FOD control.*

7.3.4.4 The responsibility for the safety of passengers walking across aprons, rests with the aircraft operator or its handling agent. The relevant procedures shall be in line with the safety requirements established by the aerodrome operator. All staff operating on the apron shall be aware of the risk to passengers on aprons from jet blast, propeller slipstream and rotor wash and should be prepared to take appropriate action when necessary.

7.3.4.5 When designing or making changes to apron layouts, consideration should be given to jet blast and, if necessary, the installation of blast protection fences.

### **7.3.5 Apron cleaning**

7.3.5.1 The aerodrome operator should ensure that at regular intervals, aircraft stands and adjacent areas should be cleaned in order to remove oil, grease and rubber marks.

7.3.5.2 Spillages may occur involving fuel, oil, hydraulic fluids, water, toilet waste and other contaminants. Aerodrome operators shall ensure that procedures are established to contain, remove and correctly dispose of such spillage.

*Note.— When dealing with spillages, local or national environmental protection guidelines may also apply.*

### **7.3.6 Aircraft pushbacks**

7.3.6.1 Aerodrome operators shall establish procedures or ensure that procedures are in place to ensure aircraft pushbacks are conducted safely. The following shall be included in the procedures:

- a) ensure that conflicts with other pushbacks in progress or with an aircraft that is ready to taxi, as well as with other traffic on the apron, are avoided;
- b) prior to pushback, ensure that the area behind the aircraft is clear of obstacles; and
- c) after pushback, ensure that the aircraft is positioned in such a way as to avoid concentrating break-away blast at buildings, parked or taxiing aircraft, vehicles and/or persons on the apron.

7.3.6.2 In some cases, aircraft operators may request to “power-back” from an aircraft stand. Given the potential hazards created by *power-back operations*, a safety assessment shall be carried out prior to approval of the procedure. The safety assessment shall include the following factors, at the minimum:

- a) jet blast or propwash;
- b) surface conditions;
- c) noise levels;
- d) communication with other apron users that a power-back is about to take place (especially if there is a rear of stand road);
- e) manoeuvring space;
- f) conflict with other traffic (pushback, power-back or taxiing); and
- g) effect on pedestrians, buildings, vehicles, mobile equipment and other aircraft.

### **7.3.7 Operation of air bridges**

7.3.7.1 The area used for the movement of the air bridge should be kept free of vehicles and/or equipment to ensure its safe operation. Operators should do a visual check (camera, mirrors or looking out the window) before moving the air bridge in order to ensure that there are no obstructions.

7.3.7.2 When not in use, the air bridge should be parked with the wheel base in the designated position.

### **7.3.8 Vehicle movements**

7.3.8.1 The aerodrome operator shall ensure that the movement of vehicles on the apron is safely managed through:

- a) the establishment and implementation of driving rules, and the monitoring and enforcement of their application; and
- b) the establishment of vehicle driving routes, as appropriate, and the installation and maintenance of proper signs and markings.

7.3.8.2 An overview of the topics that should be covered in the airside vehicle rules is provided in the Appendix to this chapter.

*Note.— Vehicle condition requirements may be in accordance with requirements established in Part II, Chapter 9 of this document.*

### **7.3.9 Apron discipline**

7.3.9.1 The aerodrome operator, either through its own means or through arrangements with other parties, should monitor activities and take action when deviations from the established rules are observed.

7.3.9.2 If the designated party for monitoring apron discipline is different from the aerodrome operator, the aerodrome operator should be informed of any deviations observed.

7.3.9.3 The aerodrome operator should establish enforcement measures, or ensure that such measures are established and implemented, in order to manage any violation of the apron safety rules.

### **7.3.10 Dissemination of information**

The aerodrome operator shall establish a process to disseminate relevant information in a timely manner on limitations to operations on the apron.

*Note.— Additional information on the dissemination of information to apron users can be found in the attachment to this chapter.*

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## **Appendix to Chapter 7**

### **AIRSIDE VEHICLE RULES**

Airside driving rules should include the following, at the minimum:

- a) speed limits;
  - b) right of way;
  - c) driving routes;
  - d) vehicle condition requirements;
  - e) use of vehicle lights;
  - f) low visibility procedures;
  - g) signs, markings, lights on the apron; and
  - h) procedures for the entry to/exit from the apron areas in which aircraft and vehicle movements are combined.
-

**Attachment to Chapter 7**  
**DISSEMINATION OF INFORMATION**  
**TO APRON USERS**

The information to be provided to apron users may include the following:

- a) the type of operating restriction;
- b) the duration of the operating restriction, if known;
- c) mitigation measures to be applied;
- d) the operational impact of the operating restriction;
- e) availability of aircraft parking stands;
- f) restrictions on aircraft parking stands;
- g) availability of fixed installations at aircraft parking stands;
- h) special parking procedures;
- i) temporary change of driving routes;
- j) work in progress; and
- k) any other information that has operational significance to the apron users.

The dissemination of operational information does not necessarily require a technical system to be developed. The methods and the means to be used will depend on the complexity of the aerodrome, in particular, the number of organizations or apron users needing to be informed.

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## Chapter 8

### RUNWAY SAFETY

#### 8.1 GENERAL

8.1.1 Runway safety is a key priority for aerodrome operators, aircraft operators, and air traffic services (ATS). The prevention of both runway incursions and excursions should be an important part of their programmes and activities for improving runway safety. The aerodrome operator and ATS cannot solely bring about improvements or positively manage runway safety without the coordination and cooperation of other stakeholders.

8.1.2 Improving runway safety on an aerodrome is a collaborative process, with the primary objective being to develop a runway safety action plan that identifies and addresses safety issues through effective hazard identification and risk mitigation.

8.1.3 Gathering, monitoring and analysing data on runway safety performance greatly contributes to understanding and proactively managing the risks related to the operations of a runway.

*Note 1.— The Manual on the Prevention of Runway Incursions (Doc 9870) provides further guidance.*

*Note 2.— See Part II, Chapter 5 of this document for further information on FOD on the runway.*

*Note 3.— See Part II, Chapter 6 of this document for further information on wildlife hazards affecting a runway.*

*Note 4.— The terms “runway undershoot” and “overrun” are included in runway excursion.*

8.1.4 This chapter covers the establishment of a runway safety team at an aerodrome, the identification of hazards related to runway safety, the development and implementation of action plans, collection of data and the promulgation of safety information.

#### 8.2 OBJECTIVES

8.2.1 An aerodrome operator shall establish a runway safety team comprised of relevant organizations operating or providing services on the aerodrome.

8.2.2 The runway safety team shall identify runway related hazards. These may include aerodrome design, markings, signs and lights, as well as relevant aerodrome operations and procedures.

8.2.3 Within the context of the runway safety team, measures shall be taken to mitigate any hazards identified in accordance with the above paragraph and, as appropriate, reduce the safety risk of issues related to runway safety, including but not limited to the following:

- a) runway incursion;
- b) runway excursion;

- c) runway confusion; and
- d) suspension or closure of runway operations.

8.2.4 The runway safety team shall identify hazards and develop mitigation strategies and procedures to maintain runway safety during abnormal operations, including the suspension of runway operations. These strategies and procedures shall be implemented under the responsibility of the aerodrome operator.

8.2.5 Procedures to collect, monitor, analyse and protect safety data and safety information shall be established to understand and improve runway safety performance.

8.2.6 Information that could enhance runway safety, including identified hot spots and specific local procedures shall be communicated to the relevant users.

### **8.3 OPERATIONAL PRACTICES**

#### **8.3.1 Runway safety team (RST)**

8.3.1.1 The terms of reference and composition of the runway safety team (RST) should be established and included in the aerodrome manual. Activities to be included in the terms of reference as well as the proposed composition of an RST are included in the Appendix to this chapter.

8.3.1.2 All organizations involved in the RST should participate in a collaborative process of hazard identification and safety risk assessment, as well as in the development of a robust runway safety action plan.

8.3.1.3 The primary role of the RST should be to develop a runway safety action plan. This action plan should, as a minimum, facilitate the identification of runway safety hazards and the conduct of runway safety risk assessments and recommend measures for hazard removal and mitigation of the residual risk. These measures may be developed based on local occurrences or combined with information collected from external databases.

*Note 1.— The runway safety action plan may be supported by a safety risk management process under the aerodrome safety management system, in accordance with the Safety Management Manual (SMM) (Doc 9859).*

*Note 2.— For more details on the establishment of a runway safety team, see the ICAO — Runway Safety Team Handbook.*

*Note 3.— A list of causal factors to runway safety events is included in Attachment B to this chapter.*

8.3.1.4 The aerodrome operator should have ownership of the runway safety action plan and ensure that it forms an effective element of the aerodrome safety management system, as appropriate.

### 8.3.2 Runway incursion prevention

8.3.2.1 New infrastructure and changes to existing infrastructure should be designed so as to prevent runway incursions.

8.3.2.2 Changes to manoeuvring area practices and procedures, including planned works and work in progress, should take account of runway safety and may require consultation with the RST. A safety assessment should be included for procedural and/or infrastructural changes on the manoeuvring area (see Part I, Chapters 2 and 3 of this document).

8.3.2.3 The aerodrome operator should designate taxiways in order to eliminate ground navigation errors and communication confusion.

*Note.— Annex 14 — Aerodromes, Volume I — Aerodrome Design and Operations, Chapter 5, provides further provisions on taxiway designation.*

8.3.2.4 The aerodrome operator should avoid infringing on the lines of sight from the air traffic control (ATC) tower. The safety risks associated with visibility restrictions from the tower impacting the ability to see the manoeuvring area should be assessed and appropriately mitigated.

8.3.2.5 Procedures for conducting runway inspections should take account of runway incursion prevention.

*Note.— The Appendix to Part II, Chapter 3 of this document provides additional runway inspection procedures.*

8.3.2.6 When relevant, the aerodrome operator should produce aerodrome charts identifying runway incursion hot spots. These charts should be periodically revised as needed, distributed locally to manoeuvring area drivers, and published in the State's Aeronautical Information Publication (AIP).

*Note.— Examples of how hot spots are shown on charts are provided in the Manual on the Prevention of Runway Incursions (Doc 9870).*

8.3.2.7 Safety risks associated with the identified hot spots should be assessed or mitigated at the earliest opportunity.

*Note.— Information on hot spots can be found in Attachment A to this chapter.*

8.3.2.8 Runway incursion prevention should be taken into account if the aerodrome operator develops surface movement guidance and control systems (SMGCS) in cooperation with the aerodrome air traffic services provider.

*Note.— Further information can be found in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).*

8.3.2.9 The RST should review the runway safety action plan when one or more of the following circumstances arise:

- a) the volume and density of aircraft and vehicle traffic increases significantly;
- b) operations in lower visibility conditions than currently permitted are planned;

- c) the aerodrome layout has changed, i.e. new runways, taxiways, or aprons are brought into operation;
- d) occurrences such as unintended entry of aircraft, persons and vehicles into runways and taxiways; and
- e) reports received from pilots, ATC or operations personnel about unclear indication of, inter alia, lights, markers, markings and signs etc., which can potentially lead to confusion.

8.3.2.10 The RST should periodically review the provision and operational use of visual aids aimed at protecting the runway.

8.3.2.11 Aerodrome operators should establish and implement a formal “manoeuvring area vehicle driver training and assessment programme” and periodically review driver guidelines.

8.3.2.12 Aerodrome operators should ensure that all manoeuvring area vehicle drivers are briefed on the operational conditions of the manoeuvring area (runway in use, visibility conditions, etc.) at the start of their shift and also reminded that situational awareness is maintained throughout their shift.

8.3.2.13 Aerodrome operators should ensure that procedures for the control of all vehicles on the manoeuvring area are developed and implemented in cooperation with air traffic control.

8.3.2.14 Runway-holding positions should be clearly marked, signed and, if required, lit.

### **8.3.3 Runway excursion prevention**

8.3.3.1 Where instrument landing systems (ILS) are provided, the aerodrome operator shall ensure that the critical and sensitive areas associated with these navigational aids are protected and not subject to signal disturbances.

8.3.3.2 Aerodrome operators shall ensure that aeronautical ground lighting, signs and markings are suitable for the planned operations on the runway, in particular:

- a) the aiming point and threshold should be clearly visible, contrasting with the surface, and maintained;
- b) runway holding positions should be clearly marked, signed and, if required, lit to prevent departing aircraft commencing take-off roll at the wrong runway entry point;
- c) the use of signs at the runway holding positions used for intersection take-offs to indicate the take-off run available should be considered; and
- d) the use of visual aids to indicate the runway distance remaining should be considered.

8.3.3.3 The timely removal of rubber deposits and other contaminants from the runway should be undertaken to ensure that adequate friction is maintained.

8.3.3.4 The provision of wind information, including direction, strength and gusts, to pilots on approach by ATS reduces the likelihood of an excursion. Wind sensors and wind direction indicators should be sited to give the best practicable indication of conditions along the runway and touchdown zones.

8.3.3.5 Aerodrome operators should ensure that the declared distances notified to the aeronautical information service (AIS) for publication in the AIP are correct.

8.3.3.6 Aerodrome operators shall ensure that procedures are in place for calculating accurate temporarily reduced declared distances (e.g. due to work in progress on the runway). When reduced declared distances are in operation, the aerodrome operator shall ensure that the temporary markings, lighting and signs accurately portray the reduced distances and that they are well-communicated to the AIS for publication. Consideration should also be given to measures taken to restrict access to intermediary runway entry points.

### **8.3.4 Runway confusion**

8.3.4.1 The RST should undertake a safety assessment including the following factors, with the objective of identifying measures to reduce the risk of runway confusion:

- a) night operations;
- b) low visibility operations;
- c) adverse weather;
- d) lack of precision in RTF communications;
- e) inadequate lights, markings and signs;
- f) intersection departures;
- g) work in progress;
- h) parallel taxiway use;
- i) late issue or amendment of departure clearance;
- j) time pressure;
- k) taxiway and runway geometry and configurations; and
- l) use of runways as taxi routes.

8.3.4.2 The manoeuvring area should be clear of situations that may lead to the selection of the incorrect runway. Examples of mitigation measures can take the form of:

- a) proper identification and promulgation of hot spots;
- b) reduction in the size/width of runway entrance taxiways;
- c) closing certain runway entrance taxiways;
- d) covering signs with the potential for confusion during work in progress;
- e) isolating taxiway aerodrome ground lighting routes; and

- f) using enhanced markings.

*Note.— Almost all departure occurrences, where the correct runway was not positively identified, have been due to complacency in visual acquisition. Such failure most frequently occurs when a paved surface, in proximity to the correct runway and with the same or similar orientation, is selected.*

8.3.4.3 The RST should include human factors and performance in the selection of mitigation measures described in 8.3.4.2.

### **8.3.5 Suspension or closure of runway operations**

8.3.5.1 Procedures for the temporary suspension of runway operations or planned runway closures shall be established collaboratively between the aerodrome operator and ATS. These procedures should contain roles and responsibilities, methods of promulgation of information and provisions for recommencement of runway operations. The procedures should be coordinated and regularly reviewed with the relevant stakeholders, and may contain specific local scenarios.

*Note 1.— Examples of scenarios and contents of procedures for the temporary suspension of runway operations or planned runway closures are found in Attachment C to this chapter.*

*Note 2.— Further information on reduced runway distances can be found in the attachment to Part II, Chapter 4 of this document.*

8.3.5.2 When temporarily suspending runway operations or closing a runway, close communication and coordination between the aerodrome operator, ATS, AIS units (when relevant) and runway users should be ensured.

8.3.5.3 The aerodrome operator, in collaboration with ATS, should ensure that the planning of construction works on the runway is, if possible, undertaken during low traffic times of the day or year.

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## **Appendix to Chapter 8**

### **RUNWAY SAFETY TEAM TERMS OF REFERENCE AND COMPOSITION**

1.1 The terms of reference (ToRs) of the runway safety team (RST) should include, at a minimum, the following activities:

- a) analyse the safety data relating to the number, type, and, if available, severity of runway incursions;
- b) consider the outcome of investigation reports in order to identify local hot spots or problem areas at the aerodrome;
- c) work as a cohesive team to better understand the operating difficulties of personnel working in other areas and recommending areas for improvement;

- d) ensure that recommendations for the prevention of runway incursions are implemented;
- e) identify any local problem areas and suggest improvements;
- f) conduct runway safety awareness campaigns that focus on local issues, for example, producing and distributing local hot spot maps or other guidance material as considered necessary; and
- g) regularly review the aerodrome and runway operations to proactively identify any situation that may contribute to runway safety risks.

*Note.*— Further information of RST ToRs can be found in the ICAO — Runway Safety Team Handbook.

1.2 The composition of the RST should include members who are directly involved in runway operations at the given aerodrome, from the following groups:

- a) aerodrome operators;
- b) air traffic services;
- c) commercial air operators;
- d) representatives of flight crew operating at the aerodrome; and
- e) members from the general aviation community (if applicable).

1.3 The RST may also include:

- a) the regulatory authority (as an observer);
  - b) technical experts of controller associations;
  - c) technical experts of pilots associations;
  - d) military operator (if applicable, based on joint use of the aerodrome or other military roles);
  - e) support services (de-icing, catering, ground handling, etc.);
  - f) emergency response service providers;
  - g) subject matter experts (meteorologists, ornithologists, accident investigation authority (AIA), etc.) (upon invitation); and
  - h) consideration may be given to periodically inviting members of other RSTs to promote coordination, learning and the sharing of information.
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## Attachment A to Chapter 8

### BEST PRACTICE GUIDE FOR “HOT SPOTS” IDENTIFICATION, REMOVAL AND PROMULGATION

1.1 Aerodrome operators, air navigation services providers (ANSPs) and other key stakeholders should be especially aware of locations on an aerodrome with a history of, or potential risk for, collisions or runway incursions. Additionally, hot spots may be locations that, although fully compliant, are potentially difficult to navigate due to awkward geometry, or where additional awareness is required, such as at runway crossing locations.

1.2 Ideally, the runway safety team (RST) will ensure that hot spots do not exist. To achieve this objective, aerodrome operators, in conjunction with the RST, should conduct an assessment to determine whether any hot spot currently exists on the aerodrome. The assessment should also address the potential for air traffic procedures (particularly acknowledging runway incursion causal factors, such as the use of conditional clearances and non-standard communications) and other aerodrome operating procedures to create any hot spots. Human factors should also be given due consideration in any hot spot assessment.

1.3 If hot spots are identified, the recommended strategy should be implemented to remove the hazard and, where this is not immediately possible, manage and mitigate the risk. These strategies may include:

- a) construction of new taxiways;
- b) additional visual aids (signs, markings, lights);
- c) use of alternative routings;
- d) mitigating against blind spots in the aerodrome control tower;
- e) awareness campaigns; and
- f) publishing the hot spot in the AIP.

1.4 Some hot spot causal factors may be addressed swiftly but others may take much longer to remove, or it may be impracticable to remove them altogether.

1.5 A new hot spot may occur as a result of a change to the movement area or an operating procedure. An assessment should therefore be conducted before the start of any work, such as new pavement layout on the manoeuvring area, or the introduction of a new or revised operating procedure, to prevent the inadvertent creation of new hot spots.

1.6 The assessment described above should be repeated periodically to ensure its validity and take into account current aerodrome operating practices and design.

1.7 Where the measures to mitigate or remove an identified hot spot will be a lengthy process, or if it is considered that the publication of a hot spot would benefit pilot awareness, the hot spot should be notified by an appropriate means to air traffic services personnel and pilots using the aerodrome. However, if a hot spot is likely to exist for more than one aeronautical information regulation and control (AIRAC) publication cycle, it should be notified on the aerodrome chart in the AIP, as specified in

Annex 4 — *Aeronautical Charts* and as a warning in the specific aerodrome local traffic regulations (refer to Annex 15 — *Aeronautical Information Services*, Appendix 1, section AD 2.20).

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## **Attachment B to Chapter 8**

### **RUNWAY SAFETY EVENT CAUSAL FACTORS**

The following list is provided to identify the most common causes of runway safety events:

- a) weather;
  - b) runway surface conditions (contamination);
  - c) aerodrome design;
  - d) longitudinal runway slopes;
  - e) conditional clearances;
  - f) multiple line-up procedures;
  - g) runway crossing procedures;
  - h) simultaneous use of intersecting runways;
  - i) late issuance or late changes of departure clearances;
  - j) inadequate, improper or non-standard phraseology;
  - k) concurrent use or use of more than one language for ATS communication;
  - l) radio frequency congestion;
  - m) English language competence;
  - n) excessive pilot workload;
  - o) excessive controller workload;
  - p) work in progress; and
  - q) distraction (pilot, controller, driver, etc.).
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**Attachment C to Chapter 8****SUSPENSION OR CLOSURE OF RUNWAY OPERATIONS**

1.1 Planned and unplanned events on an aerodrome can necessitate the temporary suspension of runway operations for a short period of time (counted in hours) or for a longer period of time (counted in days).

1.2 In the majority of cases, reasons for suspending runway operations will be unplanned. Examples may include:

- a) short-term removal of disabled aircraft or vehicle on runway;

*Note.— Guidance on removal of a disabled aircraft, including recovery equipment, is given in the Airport Services Manual (Doc 9137), Part 5 — Removal of Disabled Aircraft.*

- b) significant foreign object debris (FOD) on runway;
- c) significant wildlife strike remains on runway;
- d) significant failure of aeronautical ground lighting or instrument landing system (ILS);
- e) presence of ice/snow/flooding on runway;
- f) aircraft incident, e.g. tail scrape, aborted take-off, tire burst; and
- g) full emergency or local standby.

1.3 If runway operations must be suspended for a longer period of time due to planned circumstances, consideration should be given to closing the runway. Examples for runway closure may include:

- a) removal of disabled aircraft or heavy vehicle on runway which is expected to take significant time;
- b) significant deterioration of runway surface; and
- c) planned maintenance (e.g. rubber removal, repainting of markings, aeronautical ground lighting maintenance/cleaning, surface repairs).

1.4 Aerodrome operators should ensure that all stakeholders are fully aware of the procedures in place in the event of a suspension of runway operations. During such a suspension, the aerodrome operator should maintain a record of all activities.

1.5 The aerodrome operator should augment the testing of the written procedure through regular table-top exercises.

1.6 The following list contains a chronological sequence of actions which should be considered and applied when deciding whether or not to suspend operations:

- a) notify air traffic services (ATS) of a potential suspension of runway operations;
- b) authorized aerodrome personnel to gain access to the runway for assessment purposes following clearance by ATS;
- c) authorized aerodrome personnel to make an initial assessment of the runway condition;
- d) appointed aerodrome representative to decide whether to suspend runway operations;
- e) communication of the decision to ATS;
- f) ATS to promulgate the information to pilots, vehicle drivers and other stakeholders using automatic terminal information service (ATIS) and radiotelephony;
- g) a NOTAM is issued concerning the suspension of runway operations (it may also be necessary to issue a separate NOTAM if the aerodrome is unavailable for planned diversions). If the suspension is expected to be of a short duration, i.e. less than 60 minutes, it may not be necessary to issue a NOTAM;
- h) in the case of an accident, the aerodrome operator should consider whether the State's accident investigation authority (AIA) and/or police should be advised of the situation (in some cases, permission to clear debris may be required from AIA and/or law enforcement);
- i) the aerodrome operator should contact the relevant department, maintenance contractor and aircraft operator if relevant, to facilitate remedial works; and
- j) the aerodrome operator should notify the appropriate national aviation authority (depending on national requirements and arrangements).

1.7 The aerodrome operator should ensure that if runway operations are suspended and ATS maintains authority over the access to the runway, access may only be granted under positive control of ATS as per normal operations. Alternatively, depending on the situation, non-controlled access may be granted to the runway by ATS after coordinating with the aerodrome operator. In this case, a full runway inspection should be carried out before resuming normal operations.

1.8 The aerodrome operator may decide that if the runway is closed due to a planned interruption, positive control may be handed over to another authority, e.g. airside operations department, or non-controlled access may be granted to authorized users. The coordination of runway access permissions should be agreed to and documented.

1.9 Non-controlled access is considered to be a runway which is no longer under ATS control and which may be accessed by appropriately authorized personnel.

1.10 The following list contains a chronological sequence of conditions which should be met or/and applied if runway operations are recommenced following a suspension or closure of runway operations:

- a) remedial works should be completed, e.g. clearance of FOD, wildlife remains, aeronautical ground lighting repair, removal of disabled aircraft;
- b) a runway inspection under the authorization of ATS is conducted;
- c) all vehicles and personnel should have vacated the runway, and should report vacated to the relevant authority;

- d) runway availability is confirmed to ATS and, if applicable, positive control is returned to ATS;
- e) aerodrome operators should cancel NOTAM (if published);
- f) the ANSP should promulgate the availability of the runway using ATIS and radiotelephony (if applicable); and
- g) normal operations may resume.

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## Chapter 9

### AIRSIDE DRIVER PERMIT SCHEME AND VEHICLE/EQUIPMENT SAFETY REQUIREMENTS

#### 9.1 GENERAL

9.1.1 The airside of an aerodrome presents a number of challenges to drivers of vehicles and equipment not normally encountered landside. Vehicles operating around manoeuvring aircraft also create a risk which should be managed by the aerodrome operator. As such, a number of formal control measures should be in place to manage such risks. A driver training programme is one of the many control measures that may be implemented and should be a part of the aerodrome's overall safety management system (SMS).

9.1.2 The objective of a driver training programme is to set out requirements and guidance to minimize the risk of accidents and injury to persons as well as damage to aircraft and property, arising from the use of vehicles in airside areas. Additionally, the requirements relating to permits for the manoeuvring areas are directly aimed at reducing runway incursions. Numerous incidents occur involving vehicles and their drivers on aerodromes, including runway incursions and aircraft damage, by vehicle contact.

9.1.3 The programme describes what may be considered as “good practice” guidance for airside vehicle driver training, with special attention given to a separate framework for radiotelephony training, when required. This guidance should ensure consistency and a high degree of standardization, when drivers qualify for their airside driver permit.

9.1.4 The effectiveness of the driver training programme will depend on the support it receives and the intensity of its application by all stakeholders including the ANSP, ground handling service providers, aircraft operators and other airside service providers. The success of the driver training programme will depend on the cooperation and compliance of these stakeholders.

9.1.5 Numerous vehicles and equipment operate on the airside in close proximity to aircraft. Regular inspection and maintenance of vehicles and equipment intended to be used on the airside is therefore important to reduce the risk of incidents and accidents caused by defective vehicles and equipment.

*Note 1.— A vehicle is considered to be any motorized self-propelled means of transportation such as a car, pushback tractor, belt loader, baggage tug, trucks, etc.*

*Note 2.— Mobile equipment is considered to be non-motorized.*

## **9.2 OBJECTIVES**

9.2.1 The aerodrome operator shall establish and implement a formal driver training assessment and permit scheme for all drivers operating on the airside.

9.2.2 An aerodrome operator shall establish a system for issuing and revoking airside driver permits. Airside driver permits shall have a defined validity period and the aerodrome operator shall specify the conditions for their renewal.

9.2.3 The training programme shall include the following, as a minimum;

- a) a generic airside vehicle driver training programme which covers the safety of operating vehicles and equipment on the airside area, such as runways, taxiways, aprons, stands, airside roads and areas adjacent to the movement area;
- b) additional training on the hazards associated with runways and taxiways; and
- c) the correct use of RTF and standard phraseology for drivers required to operate on the manoeuvring area.

9.2.4 The aerodrome operator shall establish requirements for the periodic inspection and maintenance of vehicles and equipment intended to operate on the airside.

9.2.5 The aerodrome operator shall establish minimum safety requirements for vehicle use on the airside.

## **9.3 OPERATIONAL PRACTICES**

9.3.1 The airside driver permit (ADP) scheme covers three specific areas of the aerodrome. The areas have been identified separately, in recognition of the increased level of risk on:

- a) the airside roads and aprons;
- b) the manoeuvring area excluding runways; and
- c) the manoeuvring area including runways.

*Note.— An airside driver permit does not confer a general right-of-entry to airside areas which may require a security access authorization.*

9.3.2 The aerodrome operator shall ensure that drivers of vehicles on the airside are properly trained. This may include, as appropriate to the driver's function, knowledge of:

- a) the geography of the aerodrome;
- b) aerodrome signs, markings and lights;
- c) RTF operating procedures;
- d) terms and phrases used in aerodrome control including the ICAO Radiotelephony Spelling Alphabet;
- e) rules of air traffic services as they relate to ground operations;
- f) aerodrome rules and procedures;
- g) hazards which may be encountered while driving on the movement area;
- h) emergency procedures, e.g. vehicle accident or breakdown; and
- i) rights of way.

*Note.— Hazards encountered while driving on the movement area may include apron taxiway crossings, danger zones around aircraft, staff and passengers walking across aprons.*

9.3.3 The framework for an airside vehicle driver training programme, including airside roads and aprons, the manoeuvring area and radiotelephony, can be found in Appendices 1, 2 and 3. Provisions on airside driver permit record keeping can be found in Appendix 4 to this chapter.

9.3.4 Depending on the scale and complexity of the aerodrome and the individual requirements of the driver, the training programme may be adjusted for local application.

9.3.5 The driver shall be able to demonstrate competence, as appropriate, in:

- a) the operation or use of vehicle radio communication devices;
- b) understanding and complying with ATS and local procedures; and
- c) vehicle navigation on the aerodrome.

9.3.6 The driver shall hold a State authorized driver's licence, and any other required specific licences, as a prerequisite to an ADP (refer to 9.3.13 for further detail).

9.3.7 The airside roads and aprons permit is the initial permit awarded to a new driver who has successfully completed a local training course and assessment. The permit allows a driver to operate on airside roads and aprons, which may include controlled and uncontrolled taxiway crossings. The awarding of the permit allows the holder to progress their training to operate on the manoeuvring area, excluding runways.

9.3.8 The manoeuvring area (excluding runways) permit allows a driver to operate on the manoeuvring area but excludes operation on the runway. It is a pre-requisite for the candidate to successfully complete a radiotelephony course, prior to obtaining this permit. The holder of the permit

should maintain competence in RTF throughout the validity period of the permit. RTF competence checks should be completed by persons approved by the aerodrome operator: this may be a training provider, their employer or the aerodrome operator itself.

9.3.9 The manoeuvring area (including runways) permit allows a driver to operate on runway(s) once the RTF training course is successfully completed.

9.3.10 All three training programmes should consist of two main parts – classroom/theoretical aspects, which should include the use of prepared presentations, maps, diagrams, videos, booklets and checklists, as appropriate; and practical training and visual familiarization on the aerodrome with a suitably trained person. The time required for the practical training part will vary depending on the complexity of the aerodrome. Following the initial training, a refresher training should be organized after an agreed period of time.

9.3.11 The aerodrome operator shall establish a procedure for the issuance of an ADP. The procedure should ensure that a permit is not issued unless the individual meets the minimum required driving standards; additionally, the individual should hold a current State or other recognized driving licence.

### **9.3.12 Medical requirements**

9.3.12.1 An ADP procedure should include the requirements for a driver to disclose to their employer any change to their State's driving licence.

9.3.12.2 The aerodrome operator may require that certain additional medical checks and/or assessments are carried out as part of the ADP application process. This should be based on a local safety risk assessment by the aerodrome operator and appropriate stakeholders.

### **9.3.13 Managing driving standards**

9.3.13.1 Notwithstanding the value of SMS processes, aerodrome operators should implement rules and procedures to manage driving behaviour of personnel involved in aerodrome operations at the aerodrome. These actions should include recording of offences (e.g. speeding, bad parking, driving without lights, unsecured load) and implementation and enforcement of disciplinary measures such as the use of a points and/or fines system and the revocation of a driver's Airside Driver Permit (ADP).

*Note.— Consequences for poor driving behaviour are not contradictory to an open reporting culture.*

9.3.13.2 The ADP procedure should include a period of validity for each category of permit and conditions for their renewal. Additional provisions on this subject can be found in Appendix 3 to this chapter. Provisions on airside driver permit record keeping can be found in Appendix 4 to this chapter.

### **9.3.14 Work equipment**

9.3.14.1 Most airside vehicles are operated by drivers holding a valid State driving licence (cars, vans, etc.). However, many specialist vehicles are used airside, for example with aircraft and baggage tugs, specialist aircraft loading equipment and ground service equipment.

9.3.14.2 The State's work equipment regulations, where applicable, may apply to all work equipment, including vehicles, tugs, luggage moving equipment, pushback vehicles, ground service equipment and most other moveable plant equipment found at an aerodrome. The ADP procedure may include recognition of a "Certificate of Competence" for specialist vehicles, instead of the State's driving licence.

*Note.— “Certificates of Competence” may form part of the ADP procedure established by aerodrome operators for driving specialist vehicles where a State licence is not appropriate, e.g. aircraft tug.*

### **9.3.15 Vehicle requirements**

The aerodrome operator should develop, maintain and ensure that specific requirements for the condition and maintenance of vehicles operating airside are in place. The requirements should include:

- a) specifications for vehicles to be marked and, if they are used at night or in conditions of low visibility, lighted with obstruction lights;
- b) specifications for regular vehicle safety inspections; and
- c) specifications for the rectification of faults.

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## **Appendix 1 to Chapter 9**

### **FRAMEWORK FOR AN AIRSIDE VEHICLE DRIVER TRAINING PROGRAMME**

The airside vehicle driver training programme is key to the safety and efficiency of airside operations. To ensure that procedures are respected and the level of competence of all personnel is appropriate, the elements listed below should be considered for the establishment of the airside vehicle training programme.

#### **1.1 AIRSIDE ROADS AND APRONS – ADP**

##### **1.1.1 The airside driver permit (ADP)**

- The issuing authority (normally the aerodrome operator), its validity in terms of time, conditions of use, non-transferability of ownership of the permit, control and audit of permit issue.
- Local enforcement and driving offence procedures.
- Relationship to State driver licensing system.

##### **1.1.2 National legislation and regulation**

- Government/State regulations related to general vehicle driving licences.
- State/regional/local government requirements.
- Regulatory requirements/guidance for driving airside.
- Local organizations’ rules/procedures.

### **1.1.3 Aerodrome regulations and requirements**

- Rules of Air Traffic Control, rights of way of aircraft.
- Specific aerodrome regulations, requirements and local instructions.
- Local methods used to disseminate general information and instructions to drivers.
- Local methods used to disseminate information regarding work in progress.

### **1.1.4 Aerodrome topography**

- The general geography of the local aerodrome.
- Surface markings and signs (for both vehicles and aircraft).
- Speed limits.
- Aviation terminology used such as taxiway, apron, roads, crossings, etc.
- Parking areas and restrictions, hot spots and local requirements.

### **1.1.5 Personal responsibilities**

- Reporting of incidents.
- Fitness to drive (medical/health standards) aligned to national requirements.
- Issue and use of personal protective equipment, such as high visibility clothing and hearing protection.
- General driving standards.
- No smoking requirements airside.
- Responsibilities with respect to FOD and fuel/oil/de-icer/anti-icer spillages.
- Responsibility of individuals to ensure that their vehicle is suitable for the task and used correctly.
- Following drugs and alcohol policy.
- No use of mobile phones while driving.
- Wearing of seat belts if fitted in the vehicle.

### **1.1.6 Vehicle safety standards**

- Agreed condition and maintenance standards at the aerodrome and/or national level.
- The requirements to display obstruction lights and company insignia.
- Requirements and content of daily vehicle inspections.
- Agreed standards of aerodrome and company vehicle fault reporting and rectification.
- Local requirements for the issue and display of airside vehicle permits (AVPs).

### **1.1.7 Airside traffic rules**

- General rules.
- Local rules.
- Rules for operating in low visibility.
- Speed limits, prohibited areas and no parking regulations.
- Reversing procedures.

### **1.1.8 Hazards and safety-related issues**

- Aircraft movements.
- Taxiway crossings.
- The danger zones around aircraft.
- Engine suction/ingestion and blast, propellers and helicopters.
- Aircraft refuelling.
- FOD and spillages.
- Vehicle reversing.
- Staff and passengers walking across aprons.
- Air bridges and other services, such as fixed electrical ground power.
- The general aircraft turnaround process.
- Aircraft emergency stop and fuel cut-off procedures.
- Hazardous cargo.
- Local vehicle towing requirements.
- Driving at night.
- Specialist vehicles.
- Low visibility procedures.
- Security of loads.
- Escorting procedures and briefings.

### **1.1.9 The role of:**

- The regulator.
- Local law enforcement.
- The airport operator.
- The local ATS unit.

### **1.1.10 Security procedures**

- Personal requirements (identification cards) and exemptions where applicable.
- Vehicle security permits.
- Security restricted areas.
- Security critical areas.

### **1.1.11 Emergency procedures**

- Action in the event of a vehicle accident.
- Specific action to be taken in the event of a vehicle striking an aircraft.
- Action in the event of a fire.
- Action in the event of an aircraft accident or incident.
- FOD.
- Reporting procedures.
- Mandatory incident reporting.
- Local emergency telephone numbers.

### **1.1.12 Penalties for non-compliance**

- General penalties.
- Local penalties.

### **1.1.13 Practical training (visual familiarization)**

- Airside service roads, taxiway crossings and any restrictions during low visibility, standard taxiways used.
- Aprons and stands.
- Surface paint markings for vehicles and aircraft.
- Surface paint markings delineating the boundary between aprons and taxiways.
- Signs, markings and lights used on the taxiway that help indicate runways ahead.
- Parking areas and restrictions.
- Speed limits and regulations.
- Hazards during aircraft turnarounds and aircraft movements.

## **1.2 MANOEUVRING AREA – ADP**

### **1.2.1 Air traffic services**

- Function of aerodrome control and its area of responsibility.
- Function of ground movement control and its area of responsibility.
- Normal and emergency procedures used by ATS relating to aircraft.
- ATS frequencies used and normal handover/transfer points for vehicles.
- ATS call signs, vehicle call signs, phonetic alphabet, standard phraseology.
- Demarcation of responsibilities between ATS and apron control, if applicable.

### **1.2.2 Aerodrome topography**

- Emphasis on standard ICAO signs, markings and lights used on the manoeuvring area.
- Special emphasis on those signs, markings and lights used to protect the runway.
- Description of equipment used in non-visual aids to navigation, i.e. ILS.
- Description of protection zones related to non-visual aids to navigation.
- Description of ILS-protected areas and their relation to runway holding points.
- Description of runway instrument/visual strip, cleared and graded area.

### **1.2.3 Hazards and safety-related issues pertaining to manoeuvring area driving**

- Engine suction/ingestion and blast, vortex, propellers and helicopter operations.
- Procedures for vehicle and or radio becoming unserviceable while on manoeuvring area.
- Rights of way for aircraft, towed aircraft and RFFS vehicles in emergency.
- Runway incursions.
- Procedures for vacating the runway, including upon ATC instruction, in order to ensure the safety of aircraft operations and taking into account relevant local runway and taxiway safety-related

factors such as locations of runway-holding positions, protected zones, and runway strip dimensions.

#### **1.2.4 Emergency procedures**

- Actions to be taken if FOD is found on runways and/or taxiways.
- Procedures to be used by drivers if lost or unsure of position.
- Local emergency telephone numbers.

#### **1.2.5 Aircraft familiarization**

- Knowledge of aircraft types and ability to identify all types normally operating at the aerodrome.
- Knowledge of aircraft operator call signs.
- Knowledge of aircraft terminology relating to engines, fuselage, control surfaces, undercarriage, lights, vents, helicopters, etc.

#### **1.2.6 Practical training**

- All runways (including access and exit routes), holding areas, taxiways and aprons.
- All signs, surface markings and lights associated with runways, holding positions, Category I/II/III operations.
- All signs, surface markings and lights associated with taxiways.
- Hazards of operating around aircraft landing, taking off or taxiing.
- Identification of hazardous situations and assessment of mitigation techniques.
- Navigation aids, such as ILS-protected areas, antennas, RVR equipment and other meteorological equipment.
- Knowledge of standard taxi routes, primarily intended for aircraft.
- Any locally used naming convention for particular areas or routes.
- Local procedure for vacating runways and taxiways, while ensuring safety of aircraft operations.

### **1.3 RADIOTELEPHONY**

#### **1.3.1 Hierarchy of message priority**

- Message priorities, understanding of distress, alerting, control and information messages.

#### **1.3.2 Phonetic alphabet**

- Correct pronunciation of letters, words and numbers.
- Emphasis on drivers using standard phraseology similar to pilots.

### 1.3.3 Aircraft, ATS and vehicle call signs

- Understanding the terminology and acronyms used by ATS and pilots.
- Knowledge of the aircraft operator call signs used at the aerodrome.

### 1.3.4 Read-back of clearances and safety-related information

- Vehicle drivers shall use standard read-back in the same manner as pilots for instructions, such as “enter/cross the runway”, and if conditional clearances are used.

*Note 1.— Provisions on read-back of clearances and safety-related information by vehicle drivers operating on the manoeuvring area are contained in Annex 11.*

*Note 2.— Provisions on voice communications are contained in Annex 10, Volume II, Chapter 5, and phraseologies to be used by pilots, ATS personnel and other ground personnel are contained in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444), Chapter 12.*

### 1.3.5 Readability scale

- Understanding the use of the readability scale from 1 – 5.

### 1.3.6 Vehicle breakdown procedure

- Local procedure for vehicle breakdown on runways or taxiways.
- Procedure for indicating vehicle failure to the ANSP.

### 1.3.7 Radio failure procedure

- Understanding of the local procedure if radio failure occurs while on the runway or taxiway.
- Understanding of light signals that may be used by ATS to pass instructions to vehicles.

### 1.3.8 Transmitting techniques

- Understanding the reasons for listening prior to transmitting.
- Use of aviation English.
- Words and sounds to be avoided.
- Correct positioning of microphones to avoid distortion.
- Avoidance of “clipped” transmissions.
- Awareness of regional accents and variations of speech.
- Speed of delivery of RTF phraseology.

### 1.3.9 Portable radios

- Correct use of radios.
- Effective range and battery life.

- Screening/shielding effects on the aerodrome.
- Use of correct call signs, either relating to vehicle or an individual.

### **1.3.10 Legal requirements (local to issuing aerodromes)**

- Local instructions regarding use of portable radios and hand-held microphones while driving a vehicle.
- Local instructions on the use of mobile/cellular telephones while operating airside.

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## **Appendix 2 to Chapter 9**

### **AIRSIDE ROADS AND APRONS – ADP**

#### **1.1 REQUIREMENTS**

1.1.1 It is a requirement for the issue of an ADP that the applicant is:

- a) employed with an organization authorized to operate at the aerodrome;
- b) the holder of a current full State, or foreign equivalent driving licence which permits the holder to drive a motor vehicle on public roads within the State;
- c) in possession of an operational requirement to drive a vehicle on the airside;
- d) medically fit to drive to State-equivalent standards;
- e) able to demonstrate the required driving competence; and
- f) able to demonstrate adequate language proficiency in the language normally used for airside operations at the aerodrome.

1.1.2 The aerodrome operator shall set out the circumstances under which a permit will cease to be valid and must be surrendered for cancellation. Such circumstances may include:

- a) cessation of the purpose for which the permit was issued;
- b) change of the holder's employer;
- c) loss of driving licence for offences under the State's road traffic regulations;
- d) any defacing, alteration, or misuse of a permit;
- e) proof of disregard of aerodrome traffic rules; and

- f) any use of a permit in relation to a customs or immigration offence.

## **1.2 REVALIDATION REQUIREMENTS**

1.2.1 The airside roads and aprons permit may be valid for up to five years and falls due for revalidation at the anniversary of the date of issue. In order to be revalidated, the competence of the permit holder must be demonstrated, and employers must check that the driver still holds the necessary current State, or foreign equivalent driving licence.

1.2.2 Records of training and assessments for the airside roads and aprons permit should be retained. Third-party trainers/assessors must ensure that records are available for audit by the aerodrome operator.

## **1.3 COMMUNICATIONS SKILLS**

1.3.1 It is the responsibility of the employer to ensure that the driver is proficient in the language normally used for airside operations at the aerodrome in order to complete the required training, competence assessments and designated activities on the aerodrome. Such proficiency may include:

- a) the ability to complete the requisite driver training/familiarization;
- b) the ability to undertake successfully the operational communication requirements that may be required of airside drivers, e.g. reporting an accident or incident on the airside;
- c) the ability to read and understand relevant local safety information, e.g. information and mandatory aerodrome signs; and
- d) the ability to understand verbal instructions or notifications given by the police or aerodrome operations staff.

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### **Appendix 3 to Chapter 9**

## **MANOEUVRING AREA PERMIT**

### **1.1 REQUIREMENTS**

1.1.1 The applicant shall fulfil the following requirements for the issue of a manoeuvring area permit:

- a) Excluding runway:
  - 1) as per an apron and airside roads permit, and demonstrate competence in RTF (see below, radiotelephony); and
  - 2) require access to the manoeuvring area.

- b) Including runway:
  - 1) as per above (excluding runway); and
  - 2) require access to the runway.

## **1.2 REVALIDATION REQUIREMENTS**

1.2.1 Aerodrome operators shall ensure that drivers still hold the correct categories of licence for the public roads before renewing the ADP. This check should be carried out annually.

- a) Excluding runway:
  - 1) duration: up to five years; and
  - 2) revalidation: competence should be maintained. This may be confirmed/assessed by a maintenance of competence scheme or refresher training, but in either case, must include appropriate assessments.
- b) Including runway:
  - 1) duration: up to three years; and
  - 2) revalidation: competence should be maintained. This may be confirmed/assessed by a maintenance of competence scheme or refresher training, but in either case, must include appropriate assessments.

## **1.3 MAINTENANCE OF COMPETENCE**

1.3.1 The aerodrome operator should establish a system ensuring that drivers maintain competence in their driving rules, duties and procedures in those areas where they are permitted to drive. The aerodrome operator may delegate these functions to third-party driver trainers, vehicle operators or other parties, but in such circumstances, will need to conduct regular audits in order to assess the effectiveness of the training and assessment of drivers and the assessment and record-keeping of maintenance of competence of drivers. Such competence is additional to the continuing maintenance of competence to operate the vehicle/piece of equipment.

1.3.2 Examples of the areas to be assessed include, but are not limited to:

- a) pushback procedures;
- b) towing (on the apron and on the manoeuvring area);
- c) runway access;
- d) radiotelephony;
- e) aerodrome topography;
- f) general airside driving;

- g) vehicle check; and
- h) table-top discussions.

## **1.4 RADIOTELEPHONY**

1.4.1 The movement of vehicles on the manoeuvring area is ordinarily subject to authorization by air traffic services (ATS). Depending on the complexity of the aerodrome, ATS may operate a number of radio frequencies. Typically in these cases, the aerodrome ground controller will be responsible for all vehicles operating on the taxiways, and the air controller will be responsible for all vehicles wishing to enter or cross the runway(s). It is essential that all vehicles required to be under positive control on the manoeuvring area are equipped with the appropriate radio communication devices tuned to the appropriate frequencies.

1.4.2 All drivers of vehicles operating on the manoeuvring area shall have an appropriate level of competence with respect to the use of RTF phraseology.

1.4.3 The aerodrome operator shall establish a system of allocating RTF call signs to be used by vehicles, so that the potential for confusion between vehicles and aircraft is minimized. This is particularly important at aerodromes where the RTF frequency used by vehicles is the same as that used by aircraft, or where the RTF frequency used by vehicles is re-broadcast on the RTF frequency used by aircraft.

1.4.4 The ANSP shall be made aware of all radio call signs used at the aerodrome, whether or not they are used for communication with ATS.

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### **Appendix 4 to Chapter 9**

## **AIRSIDE DRIVER PERMIT RECORDS**

### **1. RECORD KEEPING**

1.1 A suitable means should be provided for the secure storage of information relating to ADPs. The information should include:

- a) identification number;
- b) name;
- c) date of birth;
- d) employer;
- e) name of training organization;
- f) name of trainer;

- g) date of completion of training;
- h) date of validation;
- i) assessment results;
- j) date of revalidation;
- k) infringement notices;
- l) type of permit held;
- m) driving history (accidents/incidents);
- n) State licence checks;
- o) any required medical evidence; and
- p) copies of self-declarations of fitness or approved declarations by an occupational health practitioner.

1.2 The information described above may be kept in any suitable format and made available for audit.

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*Editorial Note.*— End of new text.

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