



AERODROME SAFETY PUBLICATION

Number: ASP 09

Issue No.: 01

Issued: 08th August 2022

Effective Date: 08th August 2022

Subject: Surface Movement Guidance & Control Systems (SMGCS)

References: Seychelles Technical Standards - Aerodromes
ICAO Annex 14, Volume I
ICAO Doc 9476 – Manual of Surface Movement Guidance & Control Systems

Contents

1. Purpose	2
2. Applicability.....	2
3. Cancellation.....	2
4. Introduction of SMGC system.....	2
5. Visibility and traffic conditions.....	6
6. Basic equipment requirements.....	7
7. Basic procedural / administration requirements.....	8
8. Matching aids to aerodrome conditions.....	8
9. Matching procedures to aerodrome conditions.....	8
10. Review of system and improvement.....	9
11. Queries.....	9
Appendix A – Guidance on selecting SMGC system aids.....	10
Appendix B – Guidance on selecting SMGC system procedures.....	11

Note – Aerodrome Safety Publications are published by the SCAA for purposes of promulgating supplementary guidance materials to the Standards and Recommended Practices (SARPs) in the Seychelles Technical Standards – Aerodromes. The publications are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with SARPs. Aerodrome Safety Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

1. Purpose

- 1.1. The purpose of this Aerodrome Safety Publication (ASP) is to provide supplementary guidance to aerodrome operators on Surface Movement Guidance & Control Systems (SMGCS). It provides guidance on what is acceptable to the Aerodromes Safety & Standards Inspectorate (ASSI) of the Seychelles Civil Aviation Authority (SCAA) to demonstrate compliance with regulatory requirements under STS-ADR13.9.

2. Applicability

- 2.1. This ASP applies to all aerodrome operators certified under Regulation 61 of the Civil Aviation (Safety) Regulations, 2017 and the Seychelles Technical Standard – Aerodromes.

3. Cancellation

- 3.1. Nil.

4. Introduction of SMGC system

- 4.1. What is meant by a surface movement and guidance system?

- 4.1.1. In its broadest sense, a surface movement guidance and control (SMGC) system consists of the provision of guidance to, and control of, all aircraft, ground vehicles and personnel on the movement area of an aerodrome. "Guidance" relates to facilities, information and advice necessary to enable the pilots of aircraft or the drivers of ground vehicles to find their way on the aerodrome and to keep the aircraft or vehicles on the surfaces or within the areas intended for their use. "Control or regulation" means the measures necessary to prevent collisions and to ensure that the traffic flows smoothly and freely.

- 4.1.2. An SMGC system provides guidance to, and control of, an aircraft from the landing runway to the parking position on the apron and back again to take-off runway, as well as other movement on the aerodrome surface such as from a maintenance area to an apron, or from apron to apron. In other words, the SMGC system extends over both the "manoeuvring" and "apron" areas. These two areas are collectively referred to as the "movement area".

- 4.1.3. Normally, the responsibility for regulating the activities and movement of aircraft and vehicles on the manoeuvring area rests with the air traffic control service. In the case of the apron, such responsibility rests with the apron management service.

- 4.1.4. The system also provides guidance to, and control of all ground vehicles on the

movement area. In addition, the system provides guidance to, and control of the personnel authorized to be on the movement area of an aerodrome. Obviously, the provision of such a system plays an important part in guarding against inadvertent or unauthorized entry onto operational runways.

4.1.5. Although the Manual of Surface Movement Guidance and Control Systems was mainly written with controlled aerodromes in mind, it is nevertheless true that many of the procedures, aids and functions in the manual are applicable to all aerodromes whether controlled or uncontrolled.

4.2. What does a surface movement and guidance system comprise?

4.2.1. The term "surface movement guidance and control system" is applied to the system of aids, facilities, procedures and regulations designed to meet the particular requirements for guidance to, and control of, surface traffic consistent with the particular operational needs at an aerodrome.

4.2.2. An SMGC system comprises an appropriate combination of visual aids, non-visual aids, procedures, control, regulation, management and information facilities. Systems range from the very simple at small aerodromes, with light traffic operating in good visibility conditions, to the complex systems necessary at large aerodromes with heavy traffic operating in low visibility conditions. The system selected for an aerodrome will be appropriate to the operational environment in which that aerodrome will operate.

4.3. Whom does a surface movement and guidance system involve?

4.3.1. Because of the multi-disciplinary interests in an SMGC system, there is a need to co-ordinate fully all current and planned use of an SMGC system to ensure compatibility with aerodrome engineering, operations, communications, aerodrome air traffic control service, operators and pilot requirements. Additionally, there is a requirement to maintain compatibility of practices between States. At aerodromes which are jointly used for civil and military operations, co-ordination with the military is necessary.

4.3.2. The aerodrome authority should ensure that there is appropriate consultation and co-ordination during planning of the SMGC system with the appropriate branches of the administration of the State concerned, including aerodrome engineering, the air traffic control unit, communications and operations specialists, operators, pilots and, where appropriate, the military, to ascertain and confirm the requirements of the surface movement guidance and control system.

4.4. Operational conditions

4.4.1. The SMGC system to be provided at an aerodrome depends primarily upon two operational conditions. They are:

- a) the visibility conditions under which the aerodrome authority plans to maintain operations; and
- b) the traffic density.

4.4.2. Each of these conditions has been further defined in Table 2. For the purpose of selecting the appropriate combination of aids and procedures, guidance is provided in Appendix A and B attached hereto.

4.5. Operational requirements

4.5.1. The operational requirements to be met by an SMGC system have been discussed for many years. The current operational requirements are shown in Table 1. The requirements in Table 1 are those appropriate to the movement area. It is recognized that a requirement exists for guidance and control of emergency vehicles outside the movement area, but this is considered to be beyond the area of applicability of the surface movement guidance and control system.

Table 1 - Operational Requirements of Surface Movement Guidance and Control Systems

The system should be appropriate to the visibility and traffic density and should provide:

1. Requirements of a general nature
 - a) communication capability between the appropriate control unit(s), between the appropriate control unit(s) and aircraft and between the appropriate control unit(s) and ground vehicles;
 - b) acceptable work-loads on the users of the SMGC system;
 - c) optimum use of aids and procedures already specified in ICAO regulatory documents;
 - d) compatibility between individual elements of the guidance and control systems; and
 - e) current and forecast meteorological conditions.
2. Requirements of pilots
 - a) orientation, guidance and control beginning at the end of landing roll-out on arrival, to the parking position, and from the parking position up to alignment for take-off on departure;
 - b) information on the route to be followed;
 - c) information on position along the route being followed;
 - d) guidance along the route being followed and parking guidance;
 - e) warning of:
 - i. changes in direction;
 - ii. stops and other speed adjustments;
 - f) identification of areas to be avoided;
 - g) information to prevent collision with other aircraft, ground vehicles or obstacles; and
 - h) information on system failures affecting safety.

3. Requirements of appropriate control units
 - a) information on the identity, position and progress of aircraft including aircraft under tow;
 - b) information on the identity, position and progress of ground vehicles whose movements might conflict with aircraft movements;
 - c) information on the presence of temporary obstacles or other hazards;
 - d) information on the operational status of elements of the system; and
 - e) facilities appropriate to the control to be exercised.

4. Requirements of ground vehicles on the movement area
 - a) emergency vehicles
 - i. information on the route to be followed;
 - ii. guidance along the route being followed;
 - iii. capability to locate the site of an emergency; and
 - iv. information to prevent collision with aircraft and ground vehicles.

 - b) other ground vehicles
 - i. information on the route to be followed;
 - ii. guidance along the route being followed;
 - iii. information to prevent collision with aircraft and ground vehicles.

4.6. Reasons for providing an SMGC system

- 4.6.1. The main reason for providing an SMGC system is to enable an aerodrome to operate safely in the intended conditions. The system should be designed to prevent collisions between aircraft, between aircraft and ground vehicles, between aircraft and obstacles, between vehicles and obstacles, and between vehicles. In the simplest case, i.e. in good visibility and in light traffic conditions, this objective may be achieved by a system of visual signs and a set of aerodrome traffic rules requiring pilots and vehicle drivers to watch out and give way in accordance with specified procedures. In more complex and/or heavy traffic, a more elaborate system will be required.

- 4.6.2. An essential safety function of an SMGC system is to safeguard against unauthorized or inadvertent entry onto operational runways. All the different components of the system aid in accomplishing this aim. However, under poor visibility conditions this may require a means of electronic surveillance to assure air traffic control personnel that an operational runway is indeed clear.

- 4.6.3. Another important safety function of an SMGC system is to provide assistance to rescue and fire fighting vehicles in locating and proceeding to the site of an accident on the movement area.

- 4.6.4. It should be emphasized that an SMGC system should be designed so as to maintain regularity of movement under varying operational conditions. Regularity of operations suffers under heavy traffic conditions and when visibility conditions are reduced. The objective is to have a system which is compatible with the landing and take-off capacity of the runways and with the demands placed on the aerodrome. To this end, the requirements of both landing and take-off operations should be taken into account when designing an SMGC system. At some airports it may be that take off operations occur in

lower visibilities than landing operations.

4.7. Future considerations

- 4.7.1. All aerodromes require an SMGC system. However, each system must be related to the operational conditions under which it is intended that the aerodrome shall operate. Failure to provide a system appropriate to the demands placed on an aerodrome will lead to a restricted movement rate.
- 4.7.2. Complex systems are not required and are uneconomic at aerodromes where visibility and traffic density will not present a problem for the ground movement of aircraft and vehicles.
- 4.7.3. Surface movement guidance and control systems should be developed with a modular concept in mind so that components can be added when traffic requirements justify such expansion.
- 4.7.4. Financial considerations play an important part in the selection of a system: it should, however, be borne in mind that the selection of components in a system and their siting, in the light of planned future development, while initially more expensive can, in the long term, lead to the more advantageous use of financial resources. An example would be the provision for taxiway centre line lights during the construction of a taxiway when it is known that at a later date it is intended to upgrade the associated runway to category II or III. It should further be borne in mind that technical research will continue in this field and new components will be developed which may either complement or replace existing SMGC system components.

5. Visibility and traffic conditions

- 5.1. The visibility conditions under which the aerodrome authority plans to maintain operations and the traffic density are the two most important factors to be considered when selecting components for a surface movement guidance and control (SMGC) system for an airport. Visibility and traffic conditions have been subdivided and defined according to the terms indicated in Table 2.

Table 2 – Visibility and traffic conditions associated with SMGCS – Explanation of terms

VISIBILITY CONDITIONS
1. Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, and for personnel of control units to exercise control over all traffic on the basis of visual surveillance;
2. Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, but insufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance; and
3. Visibility less than 400 m RVR (low visibility operations).

TRAFFIC DENSITY (in the mean busy hour)	
Light	Not greater than 15 movements per runway or typically less than 20 total aerodrome movements;
Medium	Of the order of 16 to 25 movements per runway or typically between 20 to 35 total aerodrome movements; and
Heavy	Of the order of 26 or more movements per runway or typically more than 35 total aerodrome movements.

6. Basic equipment requirements

6.1. The equipment required at a particular aerodrome for provision of an SMGC system will depend both on the density of traffic and the visibility conditions in which the operations should take place. However, the following equipment is fundamental to any SMGC system and should therefore be provided at all aerodromes:

6.1.1. Markings

- Runway centre line
- Taxiway centre line
- Taxi-holding position
- Taxiway intersection
- Apron
- Restricted area use

6.1.2. Lighting

- Runway edge
- Taxiway edge
- Obstacle lights
- Restricted use areas

6.1.3. Signs

- Mandatory signs, e.g. taxi-holding position, NO ENTRY, STOP
- Information signs, e.g. location and destination

6.1.4. Other

- Aerodrome chart
- Aerodrome control service
- Signaling lamp
- Radiotelephony equipment

7. Basic procedural / administration requirements

7.1. Procedures are an important and integral part of an SMGC system and they are implemented partly by the aerodrome authority, partly by the air traffic control unit, and partly by the pilot. As in the case of SMGC aids, the procedures to be employed at a particular aerodrome will be dictated by both traffic density and visibility conditions. However, the following procedures are fundamental to any SMGC system and should therefore be implemented at all aerodromes:

7.1.1. Aerodrome Authority

- Designation of taxiways
- Movement area inspections
- Regulation of ground staff conduct on the movement area
- Regulation of ground staff radiotelephony procedures
- Periodic electrical monitoring of SMGC aids
- Initiation of amendment of aerodrome chart as necessary
- Apron management

7.1.2. Air Traffic Services

- Provision of air traffic control services
- Use of radiotelephony procedures and phraseology
- Use of signaling amp
- Monitoring of SMGC aids

7.1.3. Pilot

- Adherence to ground movement traffic rules and regulations
- Use of radiotelephony procedures and phraseology

8. Matching aids to aerodrome conditions

8.1. Appendix A attached hereto provides guidance on aids considered appropriate for each of the nine possible combinations of traffic and visibility conditions. It will be observed that the table includes not only the basic aids detailed herein but also the additional aids needed to ensure safe and expeditious movement of aircraft under different traffic and density conditions.

9. Matching procedures to aerodrome conditions

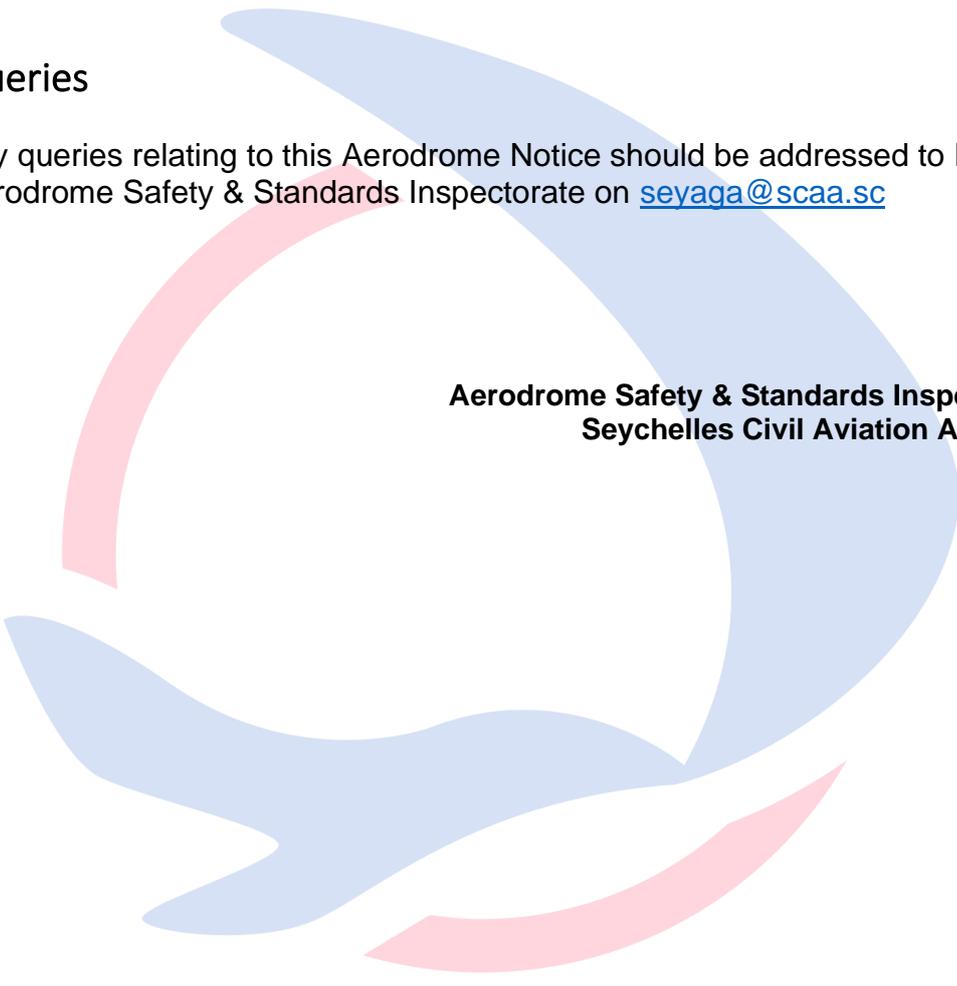
9.1. Appendix B attached hereto provides guidance on the procedures considered appropriate for each of the nine possible combinations of traffic density and visibility conditions. It will be observed that the table includes not only the basic procedures detailed in herein but also the additional procedures needed to ensure safe and expeditious movement of aircraft under different traffic and visibility conditions.

10. Review of system and improvement

- 10.1. Regular reviews of the SMGC system should be carried out to ensure that the system is fulfilling its intended task, and to assist the aerodrome authority in planning ahead for the orderly introduction of a more advanced system and the necessary supporting facilities, as and when warranted. Ideally, a master plan will have been prepared for the aerodrome in the early stages of its development, in which case a review of the system at regular intervals will serve to monitor the development of the aerodrome in relation to the time frame employed in the master plan.

11. Queries

- 11.1. Any queries relating to this Aerodrome Notice should be addressed to Head of Aerodrome Safety & Standards Inspectorate on seyaga@scaa.sc



**Aerodrome Safety & Standards Inspectorate
Seychelles Civil Aviation Authority**

Appendix A – Guidance on selecting SMGC system aids

Aid	Traffic condition — Visibility condition —			Light			Medium			Heavy			ICAO DOCUMENT REFERENCE*
	1	2	3	1	2	3	1	2	3	1	2	3	
Apron markings	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 4, Chapter 2
Runway centre line marking	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5
Taxiway centre line marking	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5
Taxi-holding position marking	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5
Visual aids for denoting restricted use areas	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 7
Runway edge lights	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 5, Chapter 3
Taxiway edge lights	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 5, Chapter 3
Obstacle lighting	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 6; <i>Aerodrome Design Manual</i> , Part 4, Chapter 14
Signs	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 4, Chapter 11
Taxiway intersection marking	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5
Charts (aerodrome, movement, apron)	x	x	x	x	x	x	x	x	x	x	x	x	Annex 4, Chapters 13, 14 and 15
Aerodrome control service	x	x	x	x	x	x	x	x	x	x	x	x	Annex 11, PANS-RAC
Signalling lamp	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 5
Radiotelephony equipment	x	x	x	x	x	x	x	x	x	x	x	x	Annex 11, Chapter 6
Taxi-holding position lights				x		x	x	x	x	x	x	x	Annex 14, Chapter 5
Clearance bars				x		x	x		x	x	x	x	Annex 14, Chapter 5
Electrical monitoring system for lights		x	x		x	x	x	x	x	x	x	x	Annex 14, Chapter 8; <i>Aerodrome Design Manual</i> , Part 5, Chapter 3
Taxiway centre line lights				x			x				x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 5, Chapter 3
Stop bars				x		x	x		x	x	x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 5, Chapter 3
Selective switching capability for taxiway centre line lights							x				x	x	<i>Aerodrome Design Manual</i> , Part 4, Chapter 10 and Part 5, Chapter 3
Selective switching capability for apron taxiway centre line lights							x				x	x	<i>Aerodrome Design Manual</i> , Part 4, Chapter 10 and Part 5, Chapter 3
Surface movement radar (SMR)							x		x	x	x	x	<i>Air Traffic Services Planning Manual</i>
Aircraft stand manoeuvring guidance lights				x			x				x	x	Annex 14, Chapter 5
Runway clearance aid				x			x		x	x	x	x	Annex 14, Chapter 5
Secondary power supply				x		x	x		x	x	x	x	Annex 14, Chapter 8; <i>Aerodrome Design Manual</i> , Part 5, Chapter 2
Visual docking guidance system							x		x	x	x	x	Annex 14, Chapter 5; <i>Aerodrome Design Manual</i> , Part 4, Chapter 12

Appendix B – Guidance on selecting SMGC system procedures

Procedure	Traffic condition — Visibility condition —			Light			Medium			Heavy			ICAO DOCUMENT REFERENCE*
	1	2	3	1	2	3	1	2	3				
Aerodrome authority													
Periodic electrical monitoring of SMGC aids	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 8 and Chapter 3 of this manual
Designation of taxiways	x	x	x	x	x	x	x	x	x	x	x	x	See Chapter 3 of this manual
Movement area inspections and reporting	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 2 and Chapter 3 of this manual
Regulation of ground staff conduct on the movement area	x	x	x	x	x	x	x	x	x	x	x	x	See Chapter 3 of this manual
Initiation of amendment of aerodrome charts as necessary	x	x	x	x	x	x	x	x	x	x	x	x	See Chapter 6 of this manual
Regulation of ground staff radiotelephony procedures	x	x	x	x	x	x	x	x	x	x	x	x	Annex 10, PANS-RAC
Establishment of standard taxi routes			x		x	x	x	x	x	x	x	x	See Chapters 3 and 6 of this manual
Low visibility movement area protection measures			x			x				x	x	x	See Chapter 5 of this manual
Continual electrical monitoring of SMGC aids			x			x				x	x	x	Annex 14, Chapter 8 and Chapter 3 of this manual
ATS													
Visual monitoring of SMGC aids	x	x	x	x	x	x	x	x	x	x	x	x	Annex 11, Chapter 7 and Chapter 3 of this manual
Use of radiotelephony procedures and phraseology	x	x	x	x	x	x	x	x	x	x	x	x	Annex 10, PANS-RAC, Part 9 and the <i>Manual of Radiotelephony</i>
Use of signalling lamp	x	x	x	x	x	x	x	x	x	x	x	x	Annex 2, Appendix A
Control of other than aircraft traffic on the manoeuvring area	x	x	x	x	x	x	x	x	x	x	x	x	PANS-RAC, Part 5
Operation of lighting aids	x	x	x	x	x	x	x	x	x	x	x	x	PANS-RAC, Part 5
Determination of the taxiway route to be followed			x		x	x	x	x	x	x	x	x	PANS-RAC, Part 5 and Chapter 3 of this manual
Application of sequencing procedure			x		x	x	x	x	x	x	x	x	See Chapter 4 of this manual
Initiation and termination of low visibility procedures			x			x				x	x	x	PANS-RAC, Part 5 and Chapter 5 of this manual
Application of separation criteria			x			x				x	x	x	PANS-RAC, Part 5, and Chapter 4 of this manual
Continual electrical monitoring of SMGC aids			x			x				x	x	x	Annex 11, Chapter 7 and Chapter 3 of this manual
Monitoring of surface movement on SMR						x				x	x	x	See Chapter 4 of this manual
Selective switching of taxiway centre line lights						x				x	x	x	<i>Aerodrome Design Manual</i> , Part 4 and PANS-RAC, Part 5
Selective switching of stop bars			x		x	x				x	x	x	<i>Aerodrome Design Manual</i> , Part 4 and PANS-RAC, Part 5

Procedure	Traffic condition — Visibility condition —			Light			Medium			Heavy			ICAO DOCUMENT REFERENCE*
	1	2	3	1	2	3	1	2	3				
Adherence to ground movement traffic rules and regulations	x	x	x	x	x	x	x	x	x	x	x	x	Annex 2, PANS-RAC
Use of radiotelephony procedures and phraseology	x	x	x	x	x	x	x	x	x	x	x	x	Annex 10, PANS-RAC and the <i>Manual of Radiotelephony</i>
Apron management													
Apron regulations and procedures	x	x	x	x	x	x	x	x	x	x	x	x	Annex 14, Chapter 9 and Chapter 8 of this manual
Emergency procedures	x	x	x	x	x	x	x	x	x	x	x	x	Chapters 5 and 8 of this manual
Communication procedures with ATS	x	x	x	x	x	x	x	x	x	x	x	x	Chapters 4 and 8 of this manual
Stand allocation and information	x	x	x	x	x	x	x	x	x	x	x	x	Chapter 8 of this manual
Apron security procedures	x	x	x	x	x	x	x	x	x	x	x	x	Chapter 8 of this manual
Operation of lighting and docking aids			x			x				x	x	x	Chapter 8 of this manual
Provision of discrete RTF channel						x		x	x	x	x	x	Chapter 8 of this manual
Low visibility procedures			x			x				x	x	x	Chapter 5 of this manual