REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION

Sir Seewoosagur Ramgoolam International, Plaine Magnien

AERODROME LICENSING MANUAL

Aerodrome

Seventh Edition
14 April 2025

FOREWORD

1. The Civil Aviation Regulations require that public flights in Mauritius may take off and land only at a licensed Aerodrome. The legislation makes provision for an applicant to be granted an aerodrome licence subject to such conditions as the Authority thinks fit;

2. The purpose of this manual is to give guidance to applicants on the procedures for the issue or variation of an aerodrome licence, indicate the criteria adopted by the Authority for assessing the application and to provide a reference for the aerodrome operators so that they may ensure compliance with the Authority's requirements as they relate to the operational management of aerodromes and the planning of aerodrome developments;

3. The International Civil Aviation Organisation (ICAO) Standards and recommended Practices (SARPs) for the Aerodrome Design and Operations and Heliports are included in the Mauritius Civil Aviation Requirements MCAR manuals which have been developed pursuant to Section 4 of the Civil Aviation Act 1974 and Part X of the Civil Aviation Regulations and is issued under the authority conferred upon the Director of Civil Aviation pursuant to Regulation 135 of the Civil Aviation Regulations;

4. The requirements which are given herein incorporate the standards of the above MCARs in so far as these have been adopted by the Republic of Mauritius. In applying the requirement and making its judgment, the Authority will endeavour to adopt as flexible an approach as is consistent with the achievement and maintenance of a satisfactory level of safety, and with the observance of the Republic of Mauritius international obligations under the ICAO Convention;

5. Prior to the grant of a licence, the Authority's designated personnel will visit the aerodrome and determine the extent to which the aerodrome, its facilities and its operational procedures meet the requirements herein. Where there are shortcomings which cannot reasonably be rectified, consideration will be given to the introduction of particular limiting conditions which will compensate for these shortcomings and achieve a satisfactory level of safety. From time to time, the Authority's designated personnel will visit each licensed aerodrome to ensure the continued compliance with the published requirement;

6. The Authority may supplement the guidance or requirements given in this publication to the aerodrome operator licence and this will be done in the form of 'Notices to Aerodrome Operators'. Where appropriate, such material will be included in this publication by amendment;

7. The methodologies and specifications contained in the Design Manuals, Service Manuals and other relevant ICAO Documents shall be considered to represent an acceptable form of compliance unless otherwise indicated by the Authority;

8. This Aerodrome Licensing Manual, Seventh Edition, issued on 09 April 2025, is issued following introduction of requirements for Surface Movement Guidance Control System, Apron Management Services, Information Security Management Services and Competence of Personnel at Certified Aerodromes.

9. This manual has been developed pursuant to Section 4 of the Civil Aviation Act 1974 and Part X of the Civil Aviation Regulations and is issued under the authority conferred upon the Director of Civil Aviation pursuant to Regulation 135 of the Civil Aviation Regulations.

10. Applicable date: This manual shall be applicable as from 14 April 2025.

Date: 14 April 2025

I POKHUN
Director of Civil Aviation

IMPORTANT NOTICE

- This manual has been developed pursuant to Section 4 of the Civil Aviation Act 1974 and Part X of the Civil Aviation Regulations and is issued under the authority conferred upon the Director of Civil Aviation pursuant to Regulation 135 of the Civil Aviation Regulations.

- Any correspondence concerning this document shall be addressed to the:

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- As and when appropriate, the Director of Civil Aviation will supplement the manual by way of "Notices to Aerodrome Operators".

- This Aerodrome Licensing Manual, Seventh Edition, supersedes the previous edition and contains updated information regarding aerodrome licensing procedures and requirements.

- This manual consists of seven chapters:

Chapter One	:	General
Chapter Two	:	Licensing Procedures
Chapter Three	:	Licensing Requirements
Chapter Four	:	Operating Requirements
Chapter Five	:	Aerodrome Security
Chapter Six	:	Heliports
Chapter Seven	:	Appendices

RECORD OF AMENDMENTS

The space below is provided to keep a record of amendments.

NUMBER	APPLICABLE DATE	DATE ENTERED	ENTERED BY
First Edition	12 January 1996	12 January 1996	Y BAURHOO
Second Edition	01 October 2008	12 September 2008	Y BAURHOO
Third Edition	19 November 2009	11 November 2009	Y BAURHOO
Fourth Edition	20 July 2015	17 July 2015	Y BAURHOO
Fifth Edition	08 November 2018	06 November 2018	Y BAURHOO
Sixth Edition	20 August 2021	04 November 2021	Y BAURHOO
Seventh Edition	14 April 2025	14 April 2025	Y BAURHOO

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Chapter 1

General

CHAPTER: 1: GENERAL

1.1 GLOSSARY OF TERMS:

In this manual, the terms used conform to those in the Civil Aviation Regulations and MCAR Aerodrome Design and Operations and Heliports. However, some of the frequently used terms are given below for a quick reference of the users:-

Acceptable Level of Safety Performance (ALoSP). The minimum level of safety performance of an aerodrome operator, as defined in its safety management system, expressed in terms of safety performance targets and safety performance indicators.

Accountable Executive. A single, identifiable person having responsibility for the effective and efficient performance of the aerodrome operator's SMS.

Advanced surface movement guidance and control system (A-SMGCS) A system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required level of safety

Aerodrome: Aerodrome means a defined area on land or water (including any buildings, installations and equipment) intended or designed to be used either wholly or partly for the arrival, departure and surface movement of aircraft.

Aerodrome infrastructure. Physical elements and related facilities of the aerodrome.

Aerodrome Inspector: Aerodrome inspector means any person designated by the Authority to inspect an aerodrome.

Aerodrome Licence: Aerodrome licence means a licence issued by the Authority in connection with the licensing provisions under the current Civil Aviation Regulations.

Aerodrome Facilities and Equipment: Facilities and equipment, inside or outside the boundaries of an aerodrome, that are constructed or installed and maintained for the arrival, departure and surface movement of aircraft.

Aerodrome Manual: The manual that forms part of the application for an aerodrome licence pursuant to the requirements of this Aerodrome Licensing Manual including any amendments thereto accepted/approved by the Authority.

Aerodrome Operator: Any person or legal entity authorized by the Authority to manage and operate an aerodrome by means of issuance of an aerodrome licence.

Aircraft: Aircraft means any machine that can derive support in the atmosphere from the reactions of the air, otherwise than by the reactions of the air against the surface of the earth.

Air Traffic Service: Air traffic service includes (a) aerodrome control service; (b) approach control service; (c) area control service; (d) flight information service; (e) alerting service and (f) any other air traffic service considered by the Authority to be necessary or desirable for the safe and efficient operation of the civil aviation system.

Applicable regulation. Regulations applicable to the aerodrome and to the aerodrome operator that are transposed from international specifications and other relevant regulations.

Applicant: Applicant means any person or legal entity which has submitted an application for an aerodrome licence

Apron: A defined area, on a land aerodrome, intended to accommodate aircraft for the purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

Apron Management Service: Apron management service means a service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

Authority: Authority means the Director of Civil Aviation.

Authorized Person: In this manual 'Authorized' means a person authorized by the Authority.

Bearing Strength: The measure of the ability of a pavement to sustain the applied load.

Change management. A formal process to manage changes within an organization in a systematic manner, so that changes which may impact identified hazards and risk mitigation strategies are accounted for, before the implementation of such changes.

Clearway: A defined rectangular area on the ground or water under the control of the aerodrome operator, selected or prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height.

Compatibility study. A study undertaken by the aerodrome operator to address the impact of introducing an aeroplane type/model new to the aerodrome. A compatibility study may include one or several safety assessments.

Composite Pavement: A pavement consisting of both flexible and rigid layers with or without separating granular layers.

Contaminant: Material that collects on a surface, including standing water.

Contaminated runway: A runway is contaminated when a significant portion of the runway surface area (whether in isolated areas or not) within the length and width being used is covered by standing water.

Critical aeroplane. The type of aeroplane which is the most demanding for the relevant elements of the physical infrastructure and the facilities for which the aerodrome is intended.

Domestic Aerodrome: Domestic aerodrome means any aerodrome other than a designated international aerodrome.

Dry: A surface condition that is free of visible moisture, and has no observed contaminants.

Flexible Pavement: A pavement structure that maintains intimate contact with and distributes load to the subgrade and depends on aggregate interlock, particle friction, and cohesion for stability

Frangible Object: An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

Heliport: Heliport means an aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

High-consequence indicators. Safety performance indicators pertaining to the monitoring and measurement of high- consequence occurrences, such as accidents or serious incidents. High-consequence indicators are sometimes referred to as reactive indicators.

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.

Instrument Runway: A runway intended for the operation of aircraft using instrument approach procedures.

International Aerodrome: International aerodrome means any aerodrome designated as an aerodrome of entry and departure of international air traffic where the formalities of customs, immigration, public health, animal and plant quarantine, and similar procedures are carried out.

Landing Area: That part of the manoeuvring area primarily intended for the landing or take-off of aircraft.

Lower-consequence indicators. Safety performance indicators pertaining to the monitoring and measurement of lower-consequence occurrences, events or activities such as incidents, non-conformance findings or deviations. Lower-consequence indicators are sometimes referred to as proactive/predictive indicators.

Licensed Aerodrome: An aerodrome where the operator has been granted an aerodrome licence.

Light Failure: A light is considered to have failed when for any reason the average intensity determined using the specified angles of beam elevation, toe-in and spread, falls below 50 percent of the specified average intensity of a new light.

Manoeuvring Area: That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Marker: An object displayed above ground level in order to indicate an obstacle or delineate a boundary.

Marking: A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

Maximum Carrying Capacity: In relation to an aircraft, means the maximum passenger-seating capacity or the maximum payload, permitted under the aircraft's licence of type approval.

Maximum Passenger-Seating Capacity: In relation to an aircraft, means the maximum number of seats for passengers permitted under the aircraft licence of type approval.

Mobile object. A movable device moving under the control of an operator, driver or pilot.

Movement Area: That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft consisting of the manoeuvring area and the apron(s).

Non-Instrument Runway: A runway intended for the operation of aircraft using visual approach procedures.

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

a) are located on an area intended for the surface movement of aircraft; or

b) extend above a defined surface intended to protect aircraft in flight; or

c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Obstacle Limitation Surfaces: A series of surfaces that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aerodrome operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.

Obstacle Free Zone (OFZ): The airspace above the inner approach surface, inner transitional surface, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

Overlay: An additional surface course placed on existing pavement either with or without intermediate base or sub-base courses, usually to strengthen the pavement or restore the profile of the surface.

Paved surface: A surface of asphaltic concrete (flexible) or Portland cement concrete (rigid).

Percent coverage of contaminant: The estimated amount of contaminant present on the surface of the runway and reported as percentage of the assessed surface.

Promulgation. The act of formally notifying official information to the aviation community.

Risk mitigation. The process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard's projected consequence.

Runway: A defined rectangular area on a land aerodrome prepared for landing and take-off of aircraft.

Runway Condition Assessment Matrix (RCAM): A matrix allowing the assessment of the runway condition code, using associated procedures, from a set of observed runway surface condition(s) and pilot report of braking action.

Runway Condition Code (RWYCC): A number describing the runway surface condition to be used in the runway condition report.

Note.— The purpose of the runway condition code is to permit an operational aeroplane performance calculation by the flight crew.

Runway Surface Condition: A description of the condition(s) of the runway surface used in the runway condition report which establishes the basis for the determination of the runway condition code for aeroplane performance purposes.

Note 1.— The runway surface conditions used in the runway condition report establish the performance requirements between the aerodrome operator, aeroplane manufacturer and aeroplane operator.

Runway Incursion: Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

Runway/taxiway excursion. Any occurrence at any aerodrome involving the departure, wholly or partly, of an aircraft from the runway/taxiway in use during take-off, a landing run, taxiing or manoeuvring.

Runway strip: A defined area including the runway and stopway, if provided, intended to

(a) reduce the risk of damage to aircraft running off the runway and

(b) to protect aircraft flying over it during take-off or landing operations.

Stopway: A defined rectangular area on the ground at the end of the take-off run available prepared as a suitable area in which an aircraft can be stopped in case of an abandoned take-off.

Shoulder: An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

Significant change: A change in the magnitude of a hazard, which leads to a change in the safe operation of the aircraft.

Safety assessment. An element of the risk management process of an SMS that is used to assess safety concerns arising from, inter alia, deviations from standards and applicable regulations, identified changes at an aerodrome or when any other safety concerns arise.

Safety management system (SMS). A systematic approach to managing safety including the necessary organizational structure, accountabilities, policies and procedures.

Safety manager. The responsible individual and focal point for the implementation and maintenance of an effective SMS. The safety manager directly reports to the accountable executive.

Safety performance. An aerodrome operator´s safety achievement as defined by its safety performance targets and safety performance indicators.

Safety performance indicator. A data-based safety parameter used for monitoring and assessing safety performance.

Safety risk. The predicted probability and severity of the consequences or outcomes of a hazard.

Slippery (when) wet runway: A wet runway where the surface friction characteristics of the runway have been determined to be degraded.

Standing water: Water of depth greater than 3 mm.

State safety programme (SSP). An integrated set of regulations and activities aimed at improving safety

Taxiway: A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another including aircraft stand taxilane, apron taxiway and rapid exit taxiway.

Taxiway Strip: An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

Technical inspection. Visual and/or instrumental verification of compliance with technical specifications related to aerodrome infrastructure and operations.

Threshold: The beginning of that portion of the runway usable for landing. The threshold not located at the extremity of the runway is known as displaced threshold.

Usability Factor: The percentage of time during which the use of runway or system of runway is not restricted because of the cross wind component.

Unserviceable Area: A part of the movement area that is unfit and unavailable for use by aircraft.

Wet: A surface condition where there is any visible dampness or water up to and including 3 mm deep.

Work Area: A part of an aerodrome in which maintenance or construction works are in progress.

1.2 AIM OF THE MANUAL:

1.2.1 The aim of this manual is to provide guidance to the applicants and the aerodrome operators, on the following:-

(a) civil aviation environment in Mauritius;

(b) aerodrome licensing procedures;

(c) aerodrome licensing requirements;

(d) aerodrome operating requirements; and

(e) aerodrome security requirements and the use of aerodrome/heliports.

1.2.2 The Authority endeavours to adopt as flexible an approach as is consistent with the observance of the Government's international obligations under the ICAO convention, in applying the criteria and making its judgment for issue of an aerodrome licence.

1.2.3 The Authority intends to bring out advisory circulars which shall contain information about standards, practices and procedures that the Authority has found to be acceptable for compliance with the associated rule of this manual. However, until these advisory circulars are published and implemented the standards, practices and procedures prescribed in respective manuals of the International Civil Aviation Organization shall be applicable.

1.3 USE OF THE MANUAL:

1.3.1 The manual is flexible in use and is organized in such a way to cover primarily the requirements and procedures to be met by the applicant or aerodrome operator who wishes to obtain an aerodrome licence.

1.3.2 The manual is organized in various chapters to facilitate easy reference to the users. There are seven chapters discussing civil aviation environment in Mauritius and the responsibilities of Authority/aerodrome operator, Aerodrome licensing procedures, Aerodrome licensing requirements, Aerodrome operating requirements, Aerodrome security, the use of aerodromes and appendices of various specimen format.

1.3.3 From time to time, the Authority will or may supplement the guidance or requirements given in this manual.

1.4 LICENSING RESPONSIBILITIES

1.4.1 Licensing Responsibilities of the Authority:

The Civil Aviation Act 1974 vide section 4 and the Civil Aviation Regulations vide regulation 103, provide that the Minister may issue a licence to operate an aerodrome in Mauritius subject to such conditions as he thinks fit to impose. Further, as the responsibility of the Authority is implicit in its acceptance of the standards and recommended practices of International Civil Aviation Organization for safety of air navigation in Mauritius, the Director of Civil Aviation on behalf of the Minister, referred to as Authority in this manual, shall be responsible for:

(a) assessment of aerodrome licence application;

(b) ensuring technical investigation and operational competence of the applicant is satisfactory; and

(c) ensuring maintenance of specified standards and recommended practices of various facilities on the licensed aerodrome by means of surveillance, inspections and audits.

1.4.2 Licensing Responsibilities of the Aerodrome Operator:

The aerodrome operator shall be responsible for the safe, efficient and regular conduct of operations on the licensed aerodrome. The aerodrome operator shall also be responsible for compliance with any regulations and instructions, in addition to the provisions and conditions of the licence, which the Authority may promulgate and issue. The aerodrome operator shall be responsible for developing and maintaining the Aerodrome Manual as prescribed in Chapter 3.

The details of various functional responsibilities that shall form part of Aerodrome Manual, are given hereunder -

(i) Functional responsibilities of the aerodrome operator:

(a) comprehensive and routine surface inspections of the movement area including adjacent unpaved areas, fencing etc and submission of status to air traffic control; maintenance of the areas inspected, and need for sweeping, painting, markings, grass cutting and surface maintenance;

(b) comprehensive and routine inspection of visual lighting aids, obstruction and apron lighting, and submission of status to the air traffic control, maintenance and operation of any lamp failure, circuit failure, broken or misaligned fittings and other malfunctions;

(c) bird hazard control, wild life hazard control and dispersal measures;

(d) measurement of friction co-efficient at runway, taxiway etc;

(e) allocation of aircraft stands and in the controlling of vehicles/persons movement on the airside;

(f) carrying out maintenance to surfaces of aerodrome such as paved areas, grass areas, damage, fire mains, boundary fencing, paint markings etc including terminal facilities;

(g) maintenance of aerodrome visual lighting aids, associated guidance signs, obstruction lighting, apron lighting, general lighting and standby power supply system including maintenance of all such other services required for safe and efficient aircraft operation on the aerodrome;

(h) provision of essential services (electricity, water etc) to other agencies working at the aerodrome such as the Control Tower, Police, Custom, Meteorology, Health, Immigration, Airlines and Fuel Agencies etc;

(i) establishment of an office to receive and distribute information relating to operation of the aerodrome. The office shall be equipped with adequate communication facilities to communicate with other operating agencies, such as ATC, MET, RFFS, AIS, Police and Airlines;

(j) establishment of a system for the prompt notification of changes in the status of essential facilities affecting aerodrome operation, throughout the aerodrome's published hours of operation and forward same to the Department of Civil Aviation for NOTAM action;

(k) to maintain tools and equipment for maintenance and repair of aerodrome equipment; and

(l) establishment of medical and other passenger handling (support) services at the aerodrome in accordance with the requirements of MCAR documents.

(ii) Functional Responsibilities of Aerodrome Rescue and Fire Fighting Services

(a) dealing with all emergencies, fires and related incidents on the aerodrome;

(b) maintenance of an effective liaison with air traffic control, local fire department, ambulance, police and other agencies who provide assistance in dealing with aircraft rescue and fire fighting operations;

(c) other duties as necessary which do not interfere with primary duties in meeting the recognized response time and maintaining the rescue and fire fighting services to the aerodrome prescribed category; and

(d) fire prevention duties, both planning and practical aspects, regular training to enhance system efficiency, and training on non-rescue and fire fighting personnel in fire prevention duties.

1.5 GENERAL RESPONSIBILITIES

1.5.1 Department of Civil Aviation

The Authority for civil aviation in Mauritius is the Department of Civil Aviation represented by the Director of Civil Aviation (DCA). The Department of Civil Aviation is the regulatory body for civil aviation activities in Mauritius and is also the provider of Air Traffic Services in the Mauritius Flight Information Region.

1.5.2 Airports of Mauritius Co Ltd (AML)

AML is a company incorporated and registered under the Companies Act 1984 and is the licensed aerodrome operator of SSR International Airport and mainly responsible for the management of the SSR International Airport.

1.5.3 Airport of Rodrigues Ltd (ARL)

ARL is the licensed aerodrome operator of Plaine Corail Airport and mainly responsible for the management of Plaine Corail Airport.

Chapter 2

Licensing Procedures

CHAPTER 2: AERODROME LICENSING PROCEDURES

2.1 APPLICABILITY

2.1.1 The licensing of an aerodrome in Mauritius is governed by Regulation 103 of the Civil Aviation Regulations.

Regulation 103 of the Civil Aviation Regulations provides that an application for a licence to operate an aerodrome in Mauritius shall be made to the Minister.

2.1.1.1 On receipt of an application, the Minister may:-

(a) direct the applicant to furnish any additional information that he may require; and

(b) where he is satisfied, having regard to:

(i) the applicant's previous conduct and experience;

(ii) his equipment, organization and staffing;

(iii) the arrangement that he proposes to make to ensure that the aerodrome and its aerodrome traffic zone are properly maintained and safe for use by aircraft; and

(iv) the physical characteristics of the aerodrome and its surroundings;

that the applicant is competent and the aerodrome safe for use by aircraft, grant the licence subject to such conditions as he thinks fit to impose.

2.1.1.2 A licence under this regulation shall remain in force for the period specified in the licence and may be renewed for such further period as the Minister thinks fit.

2.1.1.3 The Minister may, under this regulation issue a licence for public use in respect of any aerodrome.

2.1.1.4 Where a licence for public use is issued under this regulation in respect of an aerodrome, the aerodrome shall be made available, at all times when it is available for take off and landing of aircraft, to all users on equal terms and conditions.

2.1.1.5 The holder of a licence issued under this regulation shall :-

(a) at the request of any interested person, furnish information concerning the terms of the licence; and

(b) in the case of a licence for public use, cause to be notified the times during which the aerodrome will be available for take-off and landing of aircraft engaged on flights for the purpose of public transport of passengers or instruction in flying.

2.1.1.6 No person shall operate an aerodrome in Mauritius unless:

(a) he holds a licence to that effect; and

(b) he operates the aerodrome in accordance with terms and conditions of the licence

2.1.2 **Initial Licensing of Aerodrome**

An aerodrome operator who does not, under paragraph 2.1.1.6, hold an aerodrome licence may apply for an aerodrome licence under procedures prescribed in this chapter.

The procedures adopted by the Authority for issue of an aerodrome licence shall normally take the following sequence:

(a) **dealing with the expression of interest by an intending applicant for the aerodrome licence**;

(b) **receipt and registration of the application**;

(c) **technical inspections of the aerodrome by the Authority**;

The technical inspections of the aerodrome shall include, as a minimum:

a) an inspection of the infrastructure, obstacle limitation surfaces (OLS), visual and non-visual aids and aerodrome equipment for the use of aeroplanes;

b) an inspection of the RFF services; and

c) an inspection of wildlife hazard management.

Option 1: full inspections by the Authority

At aerodromes where an SMS is not fully operational, full inspections shall be conducted by the Authority. Those inspections shall be conducted using checklists developed by the Authority.

If technical inspections have previously been conducted, and depending on the changes that occurred at the aerodrome since the last inspection, the Authority can undertake a follow-up inspection instead of a full inspection, which shall consist of:

a) assessing that the conditions prevailing at the aerodrome that led to the conclusions of the previous technical inspections are still valid;

b) reviewing any new applicable regulation; and

c) reviewing the implementation of the previously accepted corrective action plan.

A report of the follow-up inspection shall be produced, including any deviations or observations made during the follow-up inspection. Any immediate and corrective action can be taken, if needed, during follow-up inspections.

Option 2: demonstration of compliance by the operator

At aerodromes where an SMS has been fully implemented, the aerodrome operator shall ensure that the requirements in the checklists provided by the Authority have been complied with. The Authority shall then analyse the documents completed by the applicant and conduct sample on-site checks according to this analysis.

Technical Inspections

(a) Infrastructure and ground aids

Initial licensing of the infrastructure and ground aids includes:

a) Obstacle restrictions:

1) OLS:

i) the surfaces are defined;

ii) as few objects as possible penetrate the OLS;

iii) any obstacles that do penetrate the OLS are appropriately marked and lit. Operational restrictions may apply as appropriate;

2) Obstacle Free Zone (OFZ):

i) these surfaces are defined when required;

ii) no object penetrates the OFZ unless essential for the safety of air navigation and is frangible;

3) Objects on the areas near the runway or the taxiways (runway strips, clearway, stop way, runway end safety area, taxiway strips, radio altimeter operating area, pre-threshold area) comply with the requirements;

b) Physical characteristics:

1) in order to facilitate the verification of compliance of the physical characteristics of the aerodrome, Authority may use the reference code method developed in Annex 14, Volume I. The reference code provides a simple method for interrelating the numerous specifications concerning the characteristics of aerodromes so as to provide a series of aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome;

2) the aerodrome operator may indicate in its aerodrome manual the reference code chosen for each element of the movement area so that the Authority can check compliance of the runways and taxiways and their associated characteristics against the requirements of the reference code as well as other specifications (bearing strength, surface characteristics, slopes);

3) runways:

   i) the physical characteristics:

      — are compliant with the applicable regulation and the reference code;
      — characteristics are adequately and regularly measured;

   ii) the published declared distances are in accordance with the situation on site;

   iii) the areas near the runway (runway shoulders, runway strips, clearway, stopway, runway end safety area, radio altimeter operating area, pre-threshold area) are compliant with the applicable regulation and the reference code in terms of width, length, type of surface, resistance, slopes, grading and objects on them;

   iv) the relevant separation distances are compliant with the applicable regulation and the reference code;

4) taxiways:

   i) the physical characteristics (width, curve radius, extra taxiway width, longitudinal and transverse slopes, radius of turn-off curve for rapid exit taxiways, surface type, bearing strength) are compliant with the published reference code for each taxiway;

   ii) the taxiway shoulders and strips are compliant with their reference code in terms of width, type of surface, slopes and objects on them;

   iii) the taxiways on bridges are compliant with their reference code in terms of width; and

   iv) the relevant separation distances are compliant with applicable regulations and the reference code;

5) service roads:

   i) road-holding positions are established at the intersection of a road and a runway at a distance compliant with the reference code;

6) holding bays, runway-holding positions and intermediate holding positions:

   i) the holding bays, runway-holding positions and intermediate holding positions are located in accordance with the applicable reference code;

c) Electrical systems:

1) adequate primary power supply is available;

2) the switch-over time meets the requirements;

3) when required, a secondary power supply is available;

4) the air traffic service (ATS) has feedback on the status of ground aids when required;

d) Visual aids:

1) markings:

   i) all the markings:

      — are in place where required;
      — are located as required and in the required number;
      — have the dimensions and colours required;

   ii) this includes, when required:

      — the runway markings (runway designation marking, threshold marking, runway centre line marking, runway side stripe marking, aiming point marking, touchdown zone marking, runway turn pad marking);

      — the taxiway markings (taxiway centre line and enhanced taxiway centre line marking, taxiway side stripe marking, runway-holding position marking, intermediate holding position marking);

— the apron markings;

— the mandatory instruction markings;

— the information markings (that do not have to be displayed but are to be compliant when displayed);

— a road-holding position marking (that is compliant with the applicable regulation);

— a VOR aerodrome checkpoint marking;

— a non-load bearing surface marking;

2) signs:

i) all the signs:

— are in place where required;

— are located as required;

— have the dimensions and colours required;

— have an adequate lighting system when required;

— are frangible when required;

ii) this includes when required;

— mandatory instruction signs (runway designation signs, runway-holding position signs, Category I, II and III holding position signs, no entry signs);

— information signs (direction signs, location signs, runway vacated signs, runway exit signs, intersection take-off signs, destination signs, road-holding position signs, VOR checkpoint signs, aerodrome identification sign);

3) lights:

i) there shall not be any non-aeronautical lights that might endanger the safety of an aeroplane;

ii) all the aeronautical lights:

— are displayed when required;
— located as required and in the required number;
— have the required colours and intensity levels;
— comply with their serviceability levels or maintenance objectives;
— are frangible when elevated as required;

iii) this includes, when required:

— the approach lighting system;

— the runway lead-in lighting systems;

— the visual approach slope indicator system (PAPI);

— the runway lights (runway centre line lights, runway edge lights, runway threshold identification lights, runway end lights, runway threshold and wing bar lights, runway touchdown zone lights, stopway lights, runway turn pad lights);

— the taxiway lights (taxiway centre line lights, taxiway edge lights, stop bars, no-entry bars, intermediate holding position lights, rapid exit taxiway indicator lights);

— runway guard lights;

— road-holding position lights;

— unserviceability lights;

— aeronautical beacons;

— obstacle lights;

4) markers:

i) all the markers:

— are in place where required;
— are located as required and in the required number;
— have the required colours;
— are frangible;

ii) this includes, when required:

— the taxiway markers (taxiway edge markers, taxiway centre line markers);
— the unpaved runway edge markers;
— the boundary markers;
— the stopway edge markers;
— unserviceability markers;

5) indicators:

i) a wind direction indicator:

— is provided in the correct location;
— complies with the location and characteristics requirements;
— is illuminated at an aerodrome intended for use at night.

(b) RFF services

Initial licensing of RFF services includes:

a) Level of protection:

1) the level of protection is promulgated in the AIP;

2) the aerodrome operator has a procedure to regularly reassess the traffic and update the level of protection including unavailability;

3) the aerodrome operator has made arrangements with the aeronautical information services, including ATS, to provide up-to-date information in case of any change in the level of protection;

b) RFF personnel:

1) the number of RFF personnel is consistent with the level of protection appropriate to the aerodrome RFF category;

2) the training of all RFF personnel is adequate and monitored;

3) the training facilities, which may include simulation equipment for training on aeroplane fires, are available;

4) the procedures that RFF personnel follow are kept up to date;

c) Response:

1) the RFF service is provided with an up-to-date map of its response area, including the access roads;

2) the response time complies with the applicable regulation and is regularly tested. This check shall be formalized in the RFF procedures;

3) the RFF service has procedures that describe this response and ensure that in case of an incident/accident a report is written and filed;

4) a communication and alerting system is provided between the fire station, the control tower and the RFF vehicles;

d) Rescue equipment

1) the number of RFF vehicles is consistent with the applicable regulation;

2) the RFF service has a procedure describing the maintenance of the RFF vehicles and ensuring that this maintenance is formally monitored;

3) the types and quantities of the extinguishing agents, including the reserve supply, are consistent with the applicable regulation;

4) the protective clothing and respiratory equipment provided are consistent in quality and quantity in accordance with the applicable regulation, and the respiratory equipment is properly checked and their quantities formally monitored;

5) specific rescue equipment is provided in adequate number and type when the area to be covered by the RFF service includes water;

6) any other equipment required by the applicable regulation is provided in sufficient number.

(c) Wildlife hazard management

The following checks on wildlife hazard management can either be a technical inspection or included in the audit of the aerodrome operator's procedures:

a) The required equipment is provided;

b) Fences are provided as required;

c) The aerodrome operator has a procedure describing the actions taken for discouraging the presence of wildlife, including:

1) who is in charge of those actions and what their training is;

2) how and when these actions are carried out, including reporting and filing of these actions;

3) what equipment is used to conduct these actions;

4) analyses of the aerodrome vicinity and the preventive actions to be taken subsequently to discourage wildlife;

5) monitoring of these actions, including, where applicable, the conduct of appropriate wildlife assessments;

6) coordination with ATS;

d) The aerodrome operator has a procedure to:

1) record and analyse the incidents involving wildlife;

2) collect the wildlife's remains;

3) monitor the corrective actions to be taken subsequently; and

4) report to the Authority incidents involving wildlife.

(d) **assessment of application by the Authority and approval of the aerodrome manual;**

a) prior to on-site verification of the aerodrome (including procedures and SMS), the aerodrome manual is reviewed by the Authority;

b) prior to the approval of the aerodrome manual, the Authority shall verify that:

1. the operator has submitted an application;

2. the aerodrome manual submitted by the aerodrome operator contains all the required information; and

3. all the procedures related to aerodrome licensing that will be assessed by the on-site verification team are provided in the aerodrome manual.

c) The Authority formally informs the aerodrome operator when the aerodrome manual is acceptable; and

d) The aerodrome operator shall inform the Authority of any changes to the approved aerodrome manual between the time of the application for a licence and the end of the on-site verification.

(e) **on-site verification**

a) The scope of the on-site verification covers the subjects included in the aerodrome manual;

b) The on-site verification confirms that the aerodrome operations are carried out effectively in accordance with the applicable regulation and procedures described in the manual;

c) The on-site verification of the SMS is normally included at this stage of initial licensing, but depending on the implementation status of the SMS at the aerodrome, a specific verification of the SMS can be conducted separately;

d) On-site verification of the SMS focuses explicitly on the components required for granting the licence and, when applicable, covers all other requirements for an SMS;

e) When technical inspections have been previously conducted by the Authority, the on-site verification takes into account the results of the previous technical inspections and the associated corrective actions, if relevant;

f) If the on-site verification team notices any deviations from the technical inspection reports, they are included in the team's report;

g) If the aerodrome operator is not directly responsible for some of the activities within the scope of licensing, the on-site verification ensures that there is appropriate coordination between the aerodrome operator and the other stakeholders;

h) At the end of an on-site verification, a preliminary list of findings is given to the aerodrome operator; and

i) An on-site verification report is also sent to the aerodrome operator after the classification of findings by the Authority.

On-Site Verification of the Operator's Procedures and SMS

On-site verification of the aerodrome operator's procedures shall include the following:

a) Aerodrome data and reporting:

1) completeness, correctness and integrity of the data reported in accordance with the AIP including:

i) data collection, including the status of the movement area and its facilities;
ii) data validity checks;
iii) data transmission;
iv) changes to published data, whether permanent or not;
v) checks of the information once published;
vi) information update after construction works;

2) formal coordination with ATS;

3) formal coordination with the aeronautical information services;

4) publication of the required information in the aeronautical publication;

5) information published in accordance with the situation on site;

b) Access to the movement area

1) an up-to-date plan clearly showing all the access points to the movement area;

2) a procedure describing the inspection of access points and fences;

c) Aerodrome emergency plan

1) an up-to-date aerodrome emergency plan;

2) regular exercises in relation to the emergency plan;

3) a procedure describing the tasks in the emergency plan;

4) the aerodrome operator regularly verifies the information in the emergency plan, including keeping an up-to-date list of the persons and contact details in the emergency plan;

5) a procedure describing its roles and responsibilities during emergencies;

6) a procedure describing the involvement of, and coordination with, other agencies during emergencies;

7) the required minimum emergency equipment is available, including an adequately equipped emergency operation centre and mobile command post;

d) RFF

1) a technical inspection of the various elements of the RFF services is held prior to the audit;

2) the checks that are to be done during the aerodrome operator’s on-site verification consist only of verifying the timely implementation of the corrective action plan subsequent to the technical inspection;

3) if on-site verification reveals new deviations, they shall be included in the on-site verification report;

e) Inspection of the movement area

1) a procedure to ensure there is coordination with ATS for the inspection of the movement area;

2) describe the inspections, if performed by the aerodrome operator, including:

i) frequency and scope;
ii) reporting, transmission and filing;
iii) actions to be taken and their monitoring;

3) assess, measure and report runway surface characteristics when the runway is wet or contaminated and their subsequent promulgation to ATS;

f) Maintenance of the movement area

1) a procedure to periodically measure the runway surface friction characteristics, assessing their adequacy and any action required;

2) ensure there is a long-term maintenance plan, including the management of the runway surface friction characteristics, pavement, visual aids, fencing, drainage systems and electrical systems and buildings;

g) hazardous meteorological conditions

For hazardous meteorological situations that may occur at the aerodrome (such as thunderstorms, strong surface winds and gusts), the aerodrome operator shall have procedures describing the actions that have to be taken and defining the responsibilities and criteria for suspension of operations on the runway.

The aerodrome operator shall have formal coordination with the meteorological service provider in order to be advised of any significant meteorological conditions;

h) Visual aids and aerodrome electrical systems

1) if the aerodrome operator is responsible for the maintenance of visual aids and electrical systems, procedures exist describing:

i) the tasks — routine and emergency ones, including inspections of luminous and non-luminous aids and their frequency and power supply maintenance;

ii) reporting, transmission and filing of reports;

iii) monitoring of subsequent actions;

iv) coordination with ATS.

2) if the aerodrome operator is not in charge of maintenance of visual aids and electrical systems, the organization in charge needs to be clearly identified, ensuring there are formal coordination procedures with the aerodrome operator, including agreed objectives;

3) obstacle marking is taken into account;

i) Operational safety during aerodrome work:

1) when executing work on the aerodrome:

i) a procedure describing the necessary notification to the different stakeholders;

ii) risk assessment of the aerodrome work;

iii) roles and responsibilities of the various parties, including their relationship and the enforcement of safety measures;

iv) safety monitoring during the work;

v) reopening of facilities, where relevant;

vi) necessary coordination with ATS;

j) Apron management

When an apron management service is provided:

1) a procedure to ensure coordination with ATS;

2) the use of acceptable aeroplanes for each parking stand formally identified;

3) a compliant apron safety line is provided;

4) general safety instructions for all the agents on the apron area;

5) the placement and pushback of the aeroplane;

k) Apron safety management:

1) a procedure for the inspection of the apron area; and

2) there is coordination with other parties accessing the apron, such as fuelling companies and other ground handling agencies;

l) Vehicles on the movement area

1) a procedure to ensure the vehicles on the movement area are adequately equipped;

2) the drivers have followed the appropriate training;

3) if the aerodrome operator is responsible for the training of vehicular drivers on the manoeuvring area, an appropriate training plan, including recurrent training and awareness actions, is available; and

4) if the aerodrome operator is not in charge of this training or some of this training, the service provider is clearly identified and there is formal coordination between them.

m) Wildlife hazard management

Checks on wildlife hazard management can either be a technical inspection or included in the on-site verification of the operator's procedures:

1) if the domain has not been inspected during the technical inspections, the on-site verification team shall check the points;

2) if a technical inspection has been carried out prior to the on-site verification, the latter consists in checking the timely implementation of the corrective action plan subsequent to the technical inspection;

3) if the on-site verification reveals new deviations, these have to be included in the on-site verification report;

n) Obstacles

1) a procedure to ensure that there is an obstacle chart;

2) a procedure for obstacle monitoring describing the checks, their frequency, filing and follow-up actions;

3) a procedure to ensure that the obstacles do not represent a danger for safety and that appropriate action is taken when required;

o) Removal of a disabled aeroplane

There is a plan for the removal of a disabled aeroplane describing the role and responsibility of the aerodrome operator and airline, including the necessary coordination with other agencies and the means available or that can be made available.

p) Low visibility operations:

1) there is coordination between the aerodrome operator and ATS, including awareness of the status of both low visibility procedures (LVP) and the deterioration of visual aids; and

2) a procedure describing the actions to be taken when LVP is in process (vehicle control, visual range measurement if necessary);

On-site verification of the SMS

a) As a minimum, the items to be in place when granting the initial licensing are:

1) safety policy: a safety policy has been endorsed by the accountable executive to reflect the organization’s commitments regarding safety;

2) operator’s organizational structure: the aerodrome operator has appointed an accountable executive and a safety manager;

b) The safety manager shall be independent from any operational task regarding aerodrome safety. The criteria for assessing the operator’s SMS structure might be tailored to the size of the operator, notably concerning the independence of the safety manager;

c) The capability and competence of the aerodrome operator shall be assessed so as to ensure sufficient management commitment to and responsibility for safety at the aerodrome. This is usually achieved through the competence of the accountable executive;

1) responsibilities and assignments: the aerodrome operator has formally defined the responsibilities of each staff member regarding safety as well as the lines of responsibility;

2) training: the aerodrome operator formally monitors the staff’s and subcontractors’ training, ensuring that it is adequate, and takes action when necessary;

3) accident and incident reporting: the aerodrome operator has a procedure ensuring that:

i) incidents are reported by staff and subcontractors, including a description of the actions in place in order to be able to report them;

ii) incidents are promptly analysed and the actions to be subsequently taken are monitored;

iii) the reports and analyses of the incidents are filed;

iv) incidents are reported to the Authority;

v) coordination is in place with other stakeholders;

4) existing hazards at the aerodrome: a procedure in order to identify, analyse and assess hazards to the safe operation of aeroplanes and to put in place suitable mitigating measures;

5) risk assessment and mitigation of changes: a procedure ensuring that for any change at the aerodrome, its impact on safety is analysed, listing the subsequent hazards that could be generated. This procedure describes who conducts the analysis, when and how the hazards are monitored, what actions are subsequently taken, and the criteria leading to the analysis. These assessments are filed;

6) safety indicators: the aerodrome operator sets and monitors its own safety indicators that illustrate its safety criteria, in order to be able to analyse the potential deficiencies;

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7) safety audits: the aerodrome operator has a safety audit programme in place which includes a training programme for those involved;

8) safety promotion: the aerodrome operator shall have a process to promote safety-related information.

(f) **analysis of the findings and monitoring of the related corrective action plans**

(i) In case of findings, the Authority shall require the operator to develop a corrective action plan proposing ways to eliminate or mitigate the findings, with deadlines for each subsequent action; and

(ii) The Authority may impose immediate appropriate measures on the aerodrome operator, if necessary, until actions have been taken to remove or mitigate the findings.

(g) **grant/refuse the aerodrome licence; and**

When no findings are reported or once the corrective action plans are accepted, and mitigation measures are agreed upon, the Authority grants the aerodrome licence to the applicant. An appendix may be attached to the licence describing the essential conditions prevailing at the aerodrome, which may include:

a) the aerodrome reference code;
b) critical aeroplane type;
c) the operational conditions for the accommodation of critical aeroplanes for which the facility is provided;
d) RFF category;
e) the operational restrictions at the aerodrome; and
f) the authorized deviations, their inherent operational conditions/restrictions and validity.

The Authority may accept a deviation on the basis of a safety assessment. As long as the granting conditions are maintained, the validity of the licence is either limited in time or unlimited. During the period of validity of the licence, the Authority monitors the timely implementation of the corrective action plans within the continued oversight.

(h) **promulgation of the status of licensing**

The Authority shall promulgate the status of licensing of aerodromes in the aeronautical information publication, including:

a) aerodrome name and ICAO location indicator;

b) date of licensing and, if applicable, validity of licensing; and

c) remarks, if any.

Where safety concerns have been observed on the aerodrome, special conditions or operational restrictions may be attached to the licence and published in the aeronautical information publication (AIP) or by NOTAM until completion of the corrective action plan. In this case, validity may be shortened to be consistent with the duration and content of the corrective action plan. Other possible measures that may be taken by the Authority include suspension and revocation of the licence.

2.1.3 Before granting an aerodrome licence, the Authority shall be satisfied that:

(a) the applicant and the staff have the necessary competence and experience to operate and maintain the aerodrome properly;

(b) the Aerodrome Manual prepared for the applicant’s aerodrome and submitted with the application contains all the relevant information. The aerodrome manual describes all the information, for each licensed aerodrome, pertaining to the scope of licensing concerning the aerodrome site, facilities, services, equipment, operating procedures, organization and management, including its SMS. ;

c) the aerodrome physical characteristics, facilities, services and equipment are in accordance with the requirements;

d) the aerodrome operating procedures make satisfactory provision for the safety of aircraft;

e) an acceptable Safety Management System and Emergency Plan are in place at the aerodrome;

(f) the applicant will be able to operate and maintain the aerodrome properly; and

(g) the applicant shall implement a programme to maintain the competence of the safety critical personnel.

2.1.4 Scope of licensing process

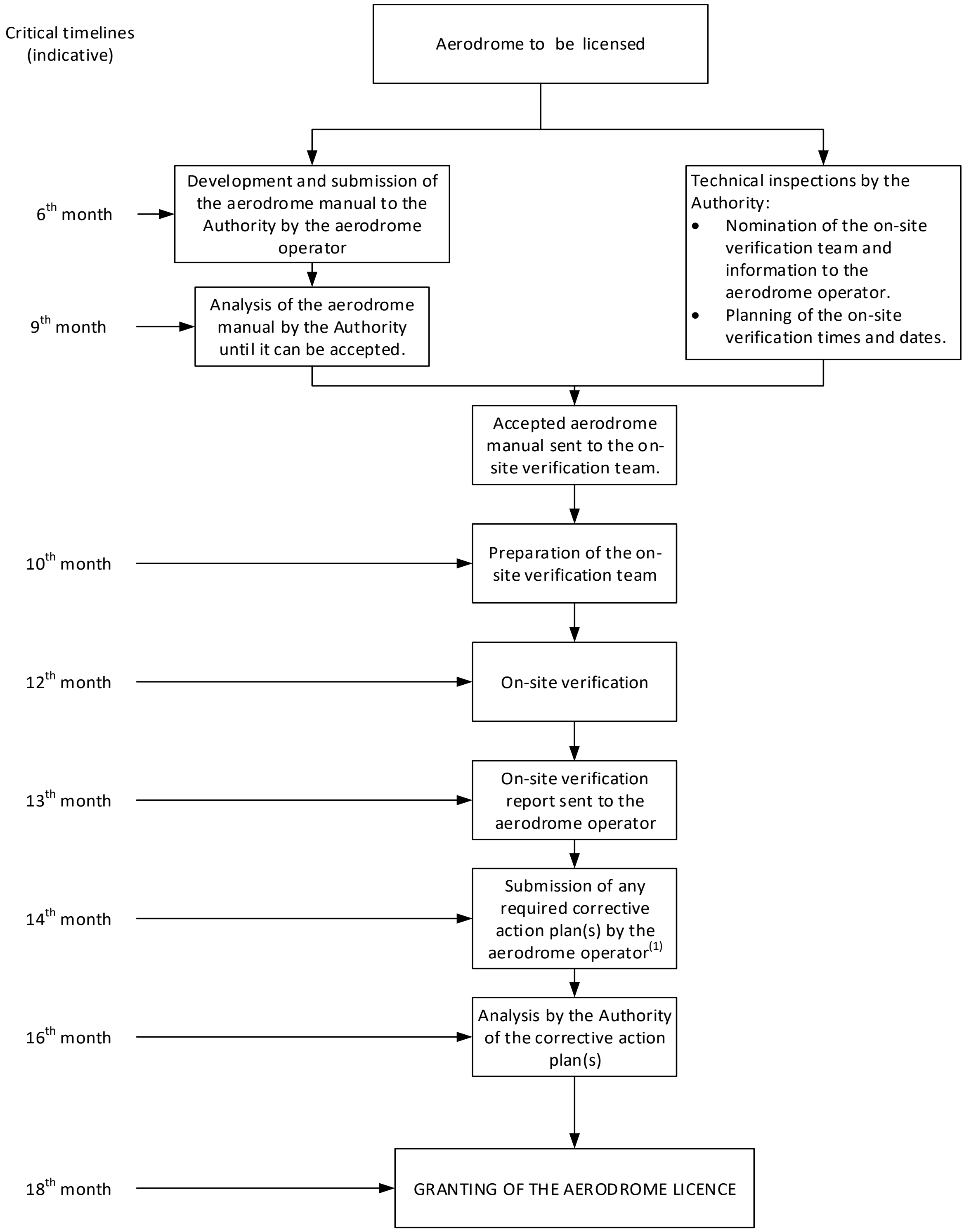
The scope of licensing covers all relevant specifications established through the regulatory framework applicable to the aerodrome. The scope of licensing includes at least the subjects below:

a) compliance of the aerodrome infrastructure with the applicable regulations for the operations the aerodrome is intended to serve;

b) the operational procedures and their day-to-day application, when applicable, concerning:

1) aerodrome data and reporting;
2) access to the movement area;
3) aerodrome emergency plan;
4) rescue and firefighting (RFF);
5) inspection of the movement area;
6) maintenance of the movement area;
7) hazardous meteorological conditions;
8) visual aids and aerodrome electrical systems;
9) safety during aerodrome works;
10) apron management;
11) apron safety;
12) vehicles on the movement area;
13) wildlife hazard management;
14) obstacles;
15) removal of a disabled aeroplane;
16) low visibility operations; and
17) compliance of the safety management system (SMS).

2.1.5 A flow chart on the licensing process for an aerodrome that is already operational can be summarized as follows:



(1) This corrective action plan covers the on-site verification of the operator's licencing and can be combined with the corrective action plans related to the technical inspections and initial SMS on-site verification that follow the same methodology and which could have been sent before.

2.2 APPLICATION GRANT/RENEWAL FOR AN AERODROME LICENCE

2.2.1 The application for the grant/renewal of an aerodrome licence shall be made in writing on prescribed form, specimen given as per appendix 1(A) for an aerodrome licence (public use) or appendix 1(B) for an aerodrome licence (ordinary use) and the Aerodrome Licensee Report as per Appendix 1(C), to the Authority by the prospective aerodrome operator. The application shall include –

(a) A copy of the Aerodrome Manual, Emergency Plan and Safety Management System;

(b) A plan of the aerodrome and its facilities (A3 size);

(c) Report of recent calibration report for PAPI units;

(d) Report of recent ground check of PAPI units;

(e) Report of last Runway Friction test;

(f) Evidence of lawful entitlement to use the land and operate the aerodrome;

(g) Recent Quality Fuel Certificate; and

(h) Proof that the fuel storage facilities have been certified by a recognised agency.

2.2.2 The applicant shall pay the applicable licence fees or aerodrome licensing charges prescribed by the Authority under the licensing regulations.

2.2.3 The applicant shall submit the application in sufficient time to allow for detailed consideration and facilities inspection before issue of the licence. The minimum time required is 30 days from the date of submission of the application.

2.2.4 The applicant shall either be the owner of the aerodrome/land or have obtained the legal authorization to manage and use the land as an aerodrome.

2.2.5 The applicant shall provide full information of facilities, technical data and operation procedures concerning the requirement of the licence.

2.2.6 The applicant shall inform the Authority of any significant changes in his operational activities, staff management and aerodrome data.

2.2.7 It is essential that applicants are aware of the specific requirements, regulations, and rules applicable to the management and operation of the proposed aerodrome and are prepared to show all documents and methods of compliance.

2.2.8 Aerodrome licence application forms are obtainable from the Director of Civil Aviation.

2.3 ASSESSMENT OF APPLICATION

2.3.1 On receipt of the application the Authority may -

(a) direct the applicant to furnish any additional information that it may require;

(b) conduct inspection of the facilities or parameters and maintenance standards to ensure that the proposed aerodrome shall be safe for use by aircraft operations; and

(c) when satisfied with regard to the applicant's competence to ensure safe operation, issue the aerodrome licence.

2.3.2 The Authority shall be satisfied that the applicant is able to ensure effective management control of all activities which are essential for safe operations. These include:

(a) a level of service that meets the licence requirements;

(b) the ability to execute effective emergency procedures;

(c) suitable personnel, equipment, facilities, manuals, buildings and service agreements;

(d) sufficient financial resources; and

(e) proper and efficient maintenance of the aerodrome facilities

2.3.3 In those cases where an applicant's organisation is in the formative stage and has little or no aerodrome management experience, the applicant shall be advised that it may require to submit more details to judge his ability and competence and the overall period, required to reach a final decision on this application may be protracted.

2.4 AERODROME SURVEILLANCE INSPECTIONS AND AUDITS

2.4.1 The holder or applicant for an aerodrome licence shall permit the Authority or its authorized representatives to carry out inspections and audits to enable the Authority to be satisfied that -

(a) the physical conditions on the manoeuvring area, apron and in the environment of the aerodrome are adequate;

(b) the scale of equipment and facilities provided are adequate for the flying activities which are expected to take place; and

(c) the licence holder or applicant is able to ensure an effective aerodrome management organization.

2.4.2 **Continued oversight**

Once the Authority has completed a thorough review of the compliance of an aerodrome with the applicable licensing requirements, leading to the granting of the licence to the aerodrome operator, continued oversight shall be established by the Authority in order to ensure that compliance with regard to licensing conditions and ongoing additional requirements is maintained.

Normally prior notice will be given to the holder of the licence, but inspections may also take place without such prior notice.

Continued oversight principles

a) The Authority shall plan continued oversight actions in such a way as to ensure that each subject covered by the scope of licensing is subject to oversight;

b) The development and operation of an aerodrome's SMS shall ensure that the aerodrome operator takes appropriate actions regarding the safety on the aerodrome;

c) Sample checks of the aerodrome's compliance with licensing requirements and specifications shall be carried out in order to ensure the SMS has identified all deviations, if any, and adequately managed them. This also provides an indication on the level of maturity of the SMS. Consequently, a periodic audit cycle shall be developed which consists of:

a) at least one audit of the SMS; and

b) sample checks on specific subjects.

d) If the SMS of the aerodrome operator is not fully implemented, specific oversight actions shall target the SMS to ensure it is developing adequately and at a normal pace. In this case, the SMS shall be audited as appropriate until it is considered to be sufficiently mature.

Audit of selected items

a) After initial licensing has taken place, continued oversight actions of a subject may not require complete audit of all subject items and may instead be on the basis of sample assessment of selected items based on risk profile;

b) An aerodrome can be assessed through an analysis of the safety occurrences at the aerodrome, including any significant development, change or other known information that may highlight subjects of concern;

c) The audit of the selected items shall consist of:

   i) a desk-based review of the appropriate documents; and

   ii) an on-site verification.

d) The same checklists as those used for initial licensing of the subject items shall be used, but if a sampling item selection is made, only the selected checklist items shall be audited.

Influence of aerodrome safety performance and risk exposure

a) The number of audits of the SMS during the period shall be determined taking into account the following criteria:

   i) the regulator’s confidence in the operator’s SMS. This confidence is evaluated using the results of the SMS audits or other oversight actions. For example, feedback on the operator’s occurrence reporting and management system might indicate that the analyses of the safety occurrences are not carried out as adequately as desired, or that a significant number of incidents have arisen on the aerodrome; and

   ii) other factors contributing to the level of risk at the aerodrome, for example, the complexity of the aerodrome, the aerodrome's infrastructure or organization, the density of traffic, type of operations and other specific conditions.

b) For aerodromes with a fully implemented SMS, in addition to the audit of the SMS, some sample subjects shall be checked to ensure that the SMS has identified all safety-critical issues. This also helps to ensure that the SMS is operating adequately. The selection of these subjects shall be determined taking into account:

i) an analysis of the safety occurrences on the aerodrome;
ii) known information related to safety at the aerodrome that may highlight subjects of concern;
iii) specific subjects most significant for safety;
iv) the complexity of the aerodrome;
v) any significant development or change to aerodrome infrastructure; and
vi) the subjects previously selected in order to cover all within a certain number of oversight cycles.

Continued oversight plans and programmes

a) Following the above principles, an oversight plan shall be determined by the Authority, for each licensed aerodrome and communicated to the aerodrome operator. This plan shall ensure that:

i) for aerodromes where an SMS is not fully functional:

1) each subject within the scope of licensing appears at least once and is subject to specified oversight actions; and

2) the SMS is audited as appropriate. The development of an SMS may be phased. During a phased implementation, only the elements under development within a specific phase will be assessed and reviewed.

ii) for the aerodromes with a fully functional SMS:

1) the SMS is audited at least once a year; and

2) other oversight actions on selected subjects are conducted as appropriate.

b) The plan and programme shall be updated annually to show the oversight actions that have actually been carried out, including observations on certain actions that have not been undertaken as planned.

Unannounced inspections

a) Planning of the aerodrome audit is intended to assist the regulator and aerodrome in planning resources and manpower and in ensuring a consistent and adequate level of oversight. However, it does not prevent the Authority from carrying out unannounced inspections, if deemed necessary; and

b) These inspections follow the same methodology as the scheduled audit or technical inspection as appropriate and may be carried out using the same checklists or could be aimed at a specific subject of concern.

Evaluation of Results

The auditor shall evaluate the audit results to establish which findings are reportable. A finding shall be valid if it can be cross-referenced to the Regulations, Regulatory Requirements, guidance materials or any documents approved or accepted by the Authority such as the Aerodrome Manual and attached procedures. A finding shall be categorised as Level 1, Level 2 or Level 3.

Level 1 Finding

a) Level 1 findings are those which pose a hazard to aircraft operational safety or which contravenes a legal requirement or which lowers safety standards. This non-compliance might be with the:

- applicable provisions of the Civil Aviation Regulations and Regulatory Requirements;
- the aerodrome operator’s licensing requirements;
- conditions of an existing aerodrome licence; or
- the aerodrome operator’s procedures or systems.

In determining whether a Level 1 shall be assigned to a particular finding, the auditor shall exercise sound judgement and seek management concurrence, prior to formally reporting the finding.

Consequence

b) Aerodrome Licensing Verification Audit for aerodromes not yet in operation: This category of finding, if not rectified by the aerodrome operator will result in restrictive conditions on the proposed aerodrome licence or result in the refusal of the Authority to grant an aerodrome licence.

c) Aerodrome Licensing Verification Audit for operating aerodromes or Periodic Surveillance Audits: This category requires immediate corrective or containment action by the aerodrome operator, failure of which shall result in limitation or suspension of operations as well as limitation, suspension revocation of any existing aerodrome licence.

Timeframe for Corrective Actions

d) Depending on the seriousness of the finding, its impact on the safety and if necessary a risk assessment by the audit, the auditor may give the aerodrome operator, up to seven days to provide the appropriate corrective action plan.

e) Where a particular Level 1 finding requires an immediate action, such as grounding an aircraft, the auditor shall notify verbally, followed by email to the organisation pending formal notification from the Authority.

f) However, some corrective actions may require a longer time than the time set by the auditor. It is up to the auditor to extend the timeline based on the corrective action plan provided by the aerodrome operator further to management approval.

Other Condisiderations

g) If the Level 1 is confirmed, the auditor shall decide if the situation require enforcement action in the case of violation against national laws, demonstration of gross negligence, incompetence, or evidence of wilful act, sabotage, failure to give the Authority access to the aerodrome operator's facilities or record, falsification of documentary evidence, malpractice or fraudulent use of the aerodrome licence or absence of an accountable manager.

Level 2 Finding

a) A Level 2 finding non-compliance with Civil Aviation Regulation. Regulatory Requirements or a finding against the aerodrome operator's procedures, which could possibly jeopardise the aircraft operational safety or which could lower safety standards.

Consequence

b) Licensing Verification Audit for aerodromes not yet in operation: This category of finding, if not rectified by the aerodrome operator, shall be supported by a corrective action plan which remediates the deficiency and is acceptable to the Authority.

Time Frame for Corrective Action

c) For Level 2 finding, the auditor, based on his/her judgment, may grant thirty (30) days for the corrective actions to be implemented. However, it is up to the auditor to extend the timeline based on the corrective action plan provided by the organisation.

Other Considerations

d) Repeated or multiple Level 2 findings in a particular area could be an indication of deterioration of the aerodrome operator's standards and controls. In this case the auditor may decide to raise it to Level 1 and potentially place a restriction on operations.

Level 3 Finding

a) A level 3 finding is an observations or recommendation to improve safety standards and/or achieve a better practice by addressing:
• opportunities for improvements; or
• deficiencies that may lead to potential findings.

Timeframe for Corrective Actions

b) For Level 3, the auditor may grant up to three months for the corrective actions to be implemented however, not all Level 3 finding will necessarily warrant corrective actions and therefore may be closed based on the aerodrome operator's acknowledgement.

Other Considerations

c) It is important when reviewing non-compliances to ensure that the statements made are factual, supported by objective evidence and are clear, concise and understandable. If there is any doubt as to the ability to support the conclusion made, then the finding shall be discarded.

d) In addition to the above, the auditor shall always analyse the audit report and establish the following before presenting the final report:

• Is the deficiency an isolated error or a system breakdown?
• Is the aerodrome operator already aware of the problem?
• Has the deficiency been reported during previous audits?
• Can the corrective action rectify the problem before the report is prepared? If this is the case, it shall still be raised as a finding.

Monitoring of corrective actions plans

a) Corrective actions plans resulting either from initial licensing or from continued oversight audits or technical inspections shall be monitored by the Authority until all items are closed to ensure that mitigating actions are carried out to the standard and timescale agreed;

b) The Authority shall regularly review the status of each pending action;

c) When a deadline has been reached, the Authority shall verify that the related corrective actions have been adequately implemented; and

d) Where a corrective action plan does not result in appropriate action being taken within acceptable timelines, increased oversight shall be carried out by the Authority.

2.4.3 Inspections are an important element of an aerodrome licensing process and will be conducted to determine that the applicant for a licence is able to ensure an effective aerodrome management and those activities which are related to the safe operation of the aerodrome, aircraft and staff. Renewal or continuance of the aerodrome licence will depend on the satisfactory outcome of these surveillance inspections/audits.

2.4.4 During the licensing process, the applicant shall satisfy the Authority of his eligibility for the award of an Aerodrome Licence, his ability and competence to conduct safe and efficient management of the aerodrome and to comply with applicable regulations and rules.

2.4.5 The inspection is an important phase of aerodrome licensing and shall be conducted precisely to determine that the applicant for licence is able to ensure an effective aerodrome management and those activities which are related to the safe operation of the aerodrome, aircraft and staff.

2.4.6 The inspection of Aerodrome Medical Services will be carried out by the Government’s medical/health authority.

2.4.7 Shared responsibilities and interfaces

The aerodrome operator may not be responsible for some of the subjects detailed in the scope of licensing. In this case, the aerodrome manual shall clearly define, for each of these items, which coordination and procedures have been put into place in the case of multiple responsible stakeholders.

2.5 GRANT OF AN AERODROME LICENCE

2.5.1 Following the completion of the preliminary assessment of the application or inspection programme, the case will be recommended to the Authority by the inspector that the applicant is either:

(a) properly equipped and capable in all respects of managing and operating the proposed aerodrome safely in accordance with the specified conditions or limitations; or

(b) is not, or is not yet capable for managing and operating the proposed aerodrome in an acceptable manner.

2.5.2 On receipt of the assessment report or inspector's recommendations, provided the Authority is satisfied with the assessment report and inspection's recommendations, the Minister will issue an aerodrome licence for public use or ordinary use as the case may be, as per specimen in appendix 2(A) and 2(B), to the applicant subjected to the associated conditions as the Authority thinks fit to impose to ensure safe aircraft operation on the licensed aerodrome.

2.5.3 Aerodrome licence holders are required to maintain the aerodrome in conformity with prescribed standard, physical characteristics and procedures given in the Aerodrome Manual.

2.6 TYPES OF AERODROME LICENCE:

The applicant may be granted an aerodrome licence for public use (Appendix 2A) or ordinary use (Appendix 2B). In the case of an aerodrome licence for public use, the time of aerodrome operations shall be notified to the Director of Civil Aviation and same will be published in the Mauritius AIP.

2.7 RENEWAL OF AN AERODROME LICENCE

An application for the renewal of an existing Aerodrome Licence shall be made in the prescribed format, not less than 30 days before the licence expires. The same procedure as required by Section 2.2, shall be followed for the renewal of the aerodrome licence.

2.8 CONDITIONS OF AN AERODROME LICENCE

2.8.1 The Civil Aviation Regulations provide that the Authority may grant a licence subject to such conditions as it thinks fit.

2.8.2 The standard conditions of the licence are shown in the specimen format at Appendix 2(A) and 2(B). Additional conditions may be added to take account of the conditions at a particular aerodrome.

2.8.3 The Authority may issue an interim aerodrome licence to an applicant or a proposed transferee of the aerodrome licence authorising the applicant or transferee to operate an aerodrome if the Authority is satisfied that:

(a) an aerodrome licence in respect of the aerodrome will be issued to the applicant or transferred to the transferee as soon as the application procedure in respect of the grant or transfer is completed;

(b) the grant of the interim licence is in public interest and not detrimental to aviation security;

(c) the interim aerodrome licence shall expire on the earlier of:

(i) the date on which the aerodrome licence is issued or transferred: or

(ii) the expiry date specified in the interim aerodrome licence.

(d) the current Civil Aviation Regulations and the requirements of the Aerodrome Licensing Manual apply to an interim aerodrome licence in the same manner as they apply to an aerodrome licence.

2.9 LICENCE FEE

(a) The licence fee is indicated in the Civil Aviation (Amendment) Regulations 2010; and

(b) The application fee for an aerodrome licence shall accompany the prescribed licence fee, without which the application is liable for rejection.

2.10 DURATION AND VALIDITY OF LICENCE

2.10.1 An aerodrome licence shall remain in force until it expires, or is suspended or revoked in accordance with regulation 103 of the Civil Aviation Regulations;

2.10.2 An aerodrome licensed for public use, shall be made available to all persons on equal terms and conditions, and will normally be applicable for the use by helicopters also if or otherwise specially specified;

2.10.3 The holder of an aerodrome licence that expires or is revoked shall forthwith surrender the licence to the Authority;

2.10.4 The aerodrome licence shall remain valid:

(a) subject to the payment of charges at aerodromes, the amount as specified by the Authority; and

(b) subject to the periodic surveillance audits conducted at the discretion of the Authority confirming ongoing compliance with the current Civil Aviation Regulations and requirements of the Aerodrome Licensing Manual.

2.10.5 Where it is proposed to revoke, suspend, or vary a licence otherwise than on the request of the holder, the Authority shall serve a notice of the proposal, together with reasons, on the holder who may, within 14 days from the date of service of the notice, request that the case be reviewed by the Authority; and

2.10.6 The first issue aerodrome licence shall be valid for a period of not more than 1 year and can be renewed every year.

2.11 AERODROME LICENSING CHARGES

The aerodrome licensing charges are indicated in the Civil Aviation (Amendment) Regulations 2010

2.12 DEVIATIONS

2.12.1 The holder of an aerodrome licence shall not contravene or cause/permit to be contravened any condition of their Aerodrome licence at any time, but the licence shall not cease to be valid by reason only of such a contravention;

2.12.2 It shall be lawful for the conditions of the licence to be departed from to the extent necessary for avoiding immediate danger;

2.12.3 If any departure from the licence condition is made for the purpose of avoiding immediate danger, the holder of the licence shall, within 10 days thereafter, submit a written report of the departure to the Authority; and

2.12.4 In any case where the holder of an aerodrome licence finds that it is not reasonable or practicable to comply with condition of the licence or with any international standards applicable to the aerodrome, he shall notify the Authority in writing of the circumstances of the non-compliance.

2.13 OPERATING RESTRICTIONS AND REFUSAL OF A LICENSE

2.13.1 The Authority may refuse to grant an aerodrome licence to the applicant. In such cases, the Authority will notify the applicant, in writing, of its reasons.

(a) Based on the results of the assessment of the formal application for the renewal of a licence and audits carried out, the Authority shall notify the applicant whether the application was successful or unsuccessful and will submit an inspection report;

(b) If the application was unsuccessful, the applicant shall be advised of the additional steps that need to be taken to attend to the non-compliant conditions;

(c) An action plan of the remedial actions and an acceptable time frame shall be submitted to the Authority by the licence holder for consideration within 3 weeks of issue of the inspection report;

(d) Non-complying conditions shall be addressed by the aerodrome operator as soon as possible;

(e) Findings and deficiencies will be removed from the audit list when the Authority is satisfied that the remedial actions are satisfactory. The Authority shall have a close follow-up on the action plan and ensure that the deficiencies and findings are attended to within the time frame mentioned in the action plan; and

(f) On site inspections/verification will be carried out by the Authority to ensure that the deficiencies and findings have been properly addressed before removing the findings from the inspection list.

2.13.2 If the licence holder is still not able to satisfy the requirements of the regulations, the Authority may refuse to renew the licence or impose operating restrictions. The refusal or operating restrictions may be based on one or more of the following determinations:

(a) the inspection of aerodrome facilities and equipment revealed that they do not make satisfactory provision for the safety of aircraft operations;

(b) the assessment of the aerodrome operating procedures revealed that they do not make satisfactory provision for the safety of aircraft operations;

(c) the assessment of the Aerodrome Manual revealed that it does not contain the particulars set out in the Civil Aviation Regulations and Aerodrome Licensing Manual; and

(d) the assessment of the above facts and that the applicant will not be able to properly operate and maintain the aerodrome as required in the Civil Aviation Regulations.

2.14 EXEMPTIONS

(a) The Authority may wholly or partly exempt the applicant or holder of an aerodrome licence from any non-compliance to this manual and the provisions of the Civil Aviation Act 1974, Civil Aviation Regulations, Mauritius Civil Aviation Requirements (MCAR) and any other requirements prescribed by the Authority;

(b) The licence holder shall carry out a risk assessment/aeronautical study of the non-compliance condition on the safety of aircraft operation and submit a report to the Authority;

(c) The Authority shall examine the risk assessment report and will accordingly decide whether to exempt the holder or applicant of an aerodrome licence from any non-compliance;

(d) The aerodrome licensee shall submit separate application for each non-compliance;

(e) The application for exemption shall be supported with the reasons for non compliance, aeronautical studies, means of mitigation and indication as to when compliance can be expected;

(f) An application for a standard exemption shall include:

(i) the applicant’s name and address;

(ii) the relevant provisions of MCAR/ Civil Aviation Regulations/Licensing Requirements;

(iii) the category under which exemption sought (temporary/ permanent) and justifiable reasons why the applicant needs the exemption. The reasons provided shall be detailed and self-explanatory;

(iv) the period for which the exemption is required;

(v) risk assessment report and aeronautical study report;

(vi) whether the exemption will affect a particular kind of aerodrome operation, the details thereof;

(vii) the action plan for rectification and review of non-compliance for temporary exemption, including the mitigation measures adopted for ensuring the safety during the exemption period;

(viii) in case permanent exemption is sought, the applicant has to indicate the mitigation measures adopted to reduce the risk arising due to non-compliance after carrying out a safety assessment; and

(ix) undertaking by the licensee that he shall annually review the conditions or mitigation measures and any other resultant non-compliance in particular when any significant changes in the activity or aerodrome development are proposed.

(g) The applicant shall provide adequate information for consideration for granting exemptions with supporting documents. Failure to provide adequate information may delay processing / refusal of the application;

(h) The Authority after examining the applications for exemptions may exempt, in writing, an aerodrome operator from complying with specific provisions of the MCAR/Civil Aviation Regulations/Licensing Requirements and may impose conditions for such exemptions to ensure the safety and regularity of aircraft operation;

(i) on approval of the exemption, it shall be included in the Aerodrome Manual and in AIP and NOTAM action initiated if necessary;

(j) On removal of the exemption, the license holder shall notify the same to the Authority and after approval of the Authority, the same shall be deleted from Aerodrome manual and AIP; and

(k) The exemption granted shall be reviewed during renewal of the license.

2.15 AMENDMENT OF AN AERODROME LICENCE

2.15.1 Consent to amend an aerodrome licence shall be given by the Authority only if he is satisfied that the proposed amendment will not affect the safety of aircraft operations.

2.15.2 If the aerodrome operator requests an amendment to the aerodrome licence or the endorsed conditions such request shall be accompanied by:

(a) a detailed account of the proposed amendment including the reasons for the amendment;

(b) an assessment of the safety risks associated with any change in use or operation of the aerodrome including, where appropriate, the findings of any aeronautical study undertaken on behalf of the aerodrome operator; and

(c) particulars of any consequential changes to the AIP, aerodrome manual, aerodrome emergency plan, safety management system and safety operating procedures.

2.15.3 The Authority may give its consent to and issue an amendment of an aerodrome licence when:

(a) the current holder of the aerodrome licence notifies the Authority, in writing, at least 90 days of any proposal for carrying out an amendment of the aerodrome licence; and

(b) the Authority believes that the amendment of the aerodrome licence will not have any serious impact on the safety of aircraft operations.

2.15.4 The Authority may amend the Aerodrome Licence when:

(a) there is a change in the ownership or management of the aerodrome;

(b) there is a change in the use or operation of the aerodrome;

(c) there is a change in the boundaries of the aerodrome; or

(d) the holder of the aerodrome licence requests an amendment.

2.15.5 If the Authority does not consent to the amendment of the aerodrome licence, he shall notify the licence holder, in writing, of its reasons no later than 60 days after receipt of notice from the applicant.

2.16 TRANSFER OF AN AERODROME LICENCE

2.16.1 Consent to transfer an aerodrome licence shall be given by the Authority only if he is satisfied that the proposed transferee will be able to operate and maintain the aerodrome properly and that no significant variation will occur in the day to day operations of the aerodrome.

2.16.2 The Authority may give its consent to and issue an instrument of transfer of an aerodrome licence to a transferee when:

(a) the current holder of the aerodrome licence notifies the Authority, in writing, at least 90 days before ceasing to operate the aerodrome, that the current holder will cease to operate the aerodrome as of the date specified in the notice;

(b) the current holder of the aerodrome licence notifies the Authority, in writing, of the name of the transferee;

(c) the transferee applies to the Authority, in writing, within 90 days before the current holder of the aerodrome licence ceases to operate the aerodrome for the aerodrome licence to be transferred to the transferee; and

(d) the requirements set out in Section 2.1.3 are met in respect of the transferee.

2.16.3 If the Authority does not consent to the transfer of an aerodrome licence, it shall notify the transferee, in writing, of its reasons no later than 60 days after receipt of notice from the applicant.

2.17 ACCESS TO THE AERODROME FOR INSPECTION

2.17.1 Personnel so authorized by the Authority may inspect and carry out tests on the aerodrome facilities, services and equipment, inspect the aerodrome's documents and records and verify the aerodrome operator's safety management system before the aerodrome licence is granted or renewed and, subsequently, at any other time, for the purpose of ensuring safety at the aerodrome.

2.17.2 An aerodrome operator shall, at the request of the person referred in 2.17.1, allow access to any part of the aerodrome or any aerodrome facility, including equipment, records, documents and operator personnel, for the purpose referred to in 2.17.1; and

2.17.3 The aerodrome operator shall co-operate in conducting the activities referred to in 2.17.1.

2.18 AERODROME SAFETY COORDINATION

2.18.1 This section specifies the role of the Authority in the coordination process and the interaction between the aerodrome operator and other stakeholders which is necessary for the safety of operations at the aerodrome;

2.18.2 **Coordination affecting aerodrome safety**

a) The Authority shall verify that coordination exists between the aerodrome operator, aeroplane operators, air navigation service providers and all other relevant stakeholders to ensure the safety of operations; and

b) The aerodrome operator shall ensure that all users of the aerodrome, including ground-handling agencies and other organizations that perform activities independently at the aerodrome in relation to flight or aircraft handling, comply with the safety requirements of the aerodrome operator. The aerodrome operator monitors such compliance.

2.18.3 **Authority's feedback on occurrences**

a) Aerodrome operators are required to report safety occurrences at their aerodromes to the Authority;

b) Aerodrome operators shall report accidents and serious incidents, including:

1) runway excursions;
2) undershoots;
3) runway incursions;
4) landing or take-off on a taxiway; and
5) wildlife strike-related events.

c) In addition to accidents and serious incidents, aerodrome operators shall report safety occurrences of the following types:

1) foreign object debris/damage- (FOD) related event;
2) other excursions (i.e. from a taxiway or apron);
3) other incursions (i.e. on taxiway or apron); and
4) ground collisions.

d) Aerodrome operators shall ensure that analysis of safety occurrences at the aerodrome is performed by competent personnel who have been trained to perform these tasks;

e) Aerodrome operators shall coordinate with all users of the aerodrome, including aircraft operators, ground-handling agencies, air navigation service providers and other stakeholders to improve the completeness and accuracy of the collection of safety occurrences and their related critical data;

f) The Authority shall review and analyse the information provided by the operator in the occurrences reports to ensure that:

1) all occurrences are adequately analysed by the aerodrome operator;

2) significant trends are identified. Further in-depth analysis on the subject shall be carried out if required so that the appropriate actions can be taken; and

3) the most serious/significant occurrences shall be carefully followed up by the Authority.

g) The output of these analyses can be used as input for the planning of continued oversight.

2.18.4 **Management of change**

a) As part of their SMS, aerodrome operators shall have in place procedures to identify changes and to examine the impact of those changes on aerodrome operations;

b) A safety assessment shall be carried out to identify hazards and propose mitigation actions for all changes that are found to have an impact on the aerodrome operations;

c) Need for a safety assessment according to the category of changes

1) *Routine tasks*. Changes related to routine tasks do not have to be assessed using the safety assessment methodology because these tasks are established and managed through specific procedures, training, feedback and reviews.

Routine tasks can be described as the actions related to an activity or service that are detailed in formal procedures, which are subject to periodic review, and for which the personnel in charge are adequately trained. These tasks may include movement area inspections, grass cutting on runway strips, sweeping of apron areas, regular and minor maintenance of runways, taxiways, visual aids, radio navigation and electrical systems.

The actions resulting from the regular assessment, feedback and review process related to these tasks shall ensure that any changes related to them are managed, thus ensuring the safety of the specific task. However, a change related to a routine task for which feedback is not yet sufficient cannot be considered as sufficiently mature. Therefore, a safety assessment using the methodology shall be carried out.

2) *Specific changes*. Impact on the safety of aerodrome operations may result from:

a) changes in the characteristics of infrastructures or the equipment;
b) changes in the characteristics of the facilities and systems located in the movement area;
c) changes in runway operations (e.g. type of approach, runway infrastructure, holding positions);
d) changes to the aerodrome networks (e.g. electrical and telecommunication);
e) changes that affect conditions as specified in the aerodrome's licence;
f) long-term changes related to contracted third parties;
g) changes to the organizational structure of the aerodrome; and
h) changes to the operating procedures of the aerodrome.

For any change in aerodrome operations as defined above, a safety assessment shall be conducted.

2.18.5 Obstacle control

a) Regarding obstacle control, the responsibilities of each potential party Involved shall be clearly defined as follows:

1) who is responsible for obstacle surveys;

2) who is responsible for the surveillance of the emergence of new obstacles; and

3) when obstacles are identified, who is responsible for taking action (i.e. removal, marking, lighting, displacement, instrument procedures) and enforcing that action.

b) Once the responsibilities have been defined, appropriate authority shall be given to the entity responsible for the enforcement action required.

2.18.6 Oversight of third parties

Compliance of third parties with the safety provisions established by the aerodrome operator shall be monitored using the appropriate means.

Chapter 3

Licensing Requirements

CHAPTER 3: LICENSING REQUIREMENTS

3.1 AERODROME DESIGN REQUIREMENTS:

3.1.1 The aerodrome operator shall ensure that the aerodrome is provided with -

(a) aerodrome physical characteristics;

(b) obstacle limitation surfaces;

(c) visual aids for -
  (i) navigation;

  (ii) denoting obstacles; and

  (iii) denoting restricted use areas.

(d) equipment and installations

that commensurate with the characteristics of the aircraft it intends to serve and are according to the civil aviation regulation in force, this manual and the requirements of MCAR Aerodrome Design and Operations.

3.1.2 The physical characteristics, obstacle limitation surfaces, visual aids, and equipment and installation provided at the aerodrome shall be acceptable to the Authority.

3.2 AERODROME LIMITATIONS:

An aerodrome operator shall, when necessary for the safety of aircraft operations at their aerodrome, inform the Authority of any limitations on the use of the aerodrome that arise from the aerodrome design or the facilities or services provided at the aerodrome.

3.3 PERSONNEL REQUIREMENTS:

3.3.1 The aerodrome operator shall engage, employ or contract:

(a) a senior person identified as the Chief Executive Officer who is acceptable to the Authority, and who has the responsibility within the applicant’s organization to ensure that all activities undertaken by the organization can be financed and carried out in accordance with the requirements prescribed by this aerodrome licensing manual;

(b) management personnel who are responsible for ensuring that the aerodrome and its operation comply with the requirements of this aerodrome licensing manual. Such nominated person or persons shall be ultimately responsible to the Chief Executive Officer; and

(c) sufficient number of qualified and skilled personnel to perform all critical activities for aerodrome operation and maintenance.

3.3.2 The aerodrome operator shall implement a training programme to upgrade the competency of the personnel mentioned in paragraph 3.3.1(c) and (b).

3.4 AERODROME EMERGENCY PLAN

3.4.1 Introduction

3.4.1.1 The aerodrome operator shall develop and maintain an aerodrome emergency plan designed to minimize the possibility and extent of personal injury and property damage at, or in the vicinity of, their aerodrome in an emergency including accidents/incidents at sea. The aerodrome emergency plan shall be approved by the Authority.

3.4.1.2 Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity. The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations. The aerodrome emergency plan sets forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency.

3.4.1.3 Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at or near the aerodrome, or an accident at a location away from the aerodrome.

3.4.1.4 The aerodrome emergency plan shall provide for the coordination of actions to be taken in an emergency occurring at an aerodrome or in its vicinity.

3.4.2 Objectives

The principal objectives of an emergency plan include:

(a) To save and protect life;

(b) To define predetermined and predicted response;

(c) To provide responders with a framework and information about the role and the requirements;

(d) To identify the limitations of the response capability; and

(e) To ensure compliance.

3.4.3 Contents of an Aerodrome Emergency Plan

The aerodrome emergency plan shall include the following:

1. Procedures to deal with the following types of emergencies including actions of each responding agency:

(a) Emergencies involving aircraft

(i) accident – aircraft on aerodrome
(ii) accident – aircraft off aerodrome (land and water)
(iii) incident – aircraft in flight, Full Emergency or Local Standby (severe air turbulence, decompression and structural failure)
(iv) incident – aircraft on ground
(v) incident – sabotage including bomb threat
(vi) incident – unlawful seizure

(b) Emergencies not involving aircraft

(i) fire – structural
(ii) sabotage including bomb threat
(iii) natural disaster
(iv) dangerous goods
(v) medical emergencies and public health emergencies

(c) Incidents on the aerodrome including

(i) fuel spills at the ramp
(ii) fuel storage area
(iii) dangerous goods occurrences at freight handling area
(iv) collapse of structure
(v) vehicle/aircraft collision

(d) Accidents/Incidents at sea.

2. Types of aircraft emergencies

The aerodrome operator shall ensure that procedures are available for the following aircraft emergencies:

a) "aircraft accident": an aircraft accident which has occurred on or in the vicinity of the aerodrome. Declaration of the AIRCRAFT ACCIDENT PHASE or CRASH can occur at any location. The actual response to the accident from the aerodrome will differ depending upon the location (on and off);

b) "full emergency": an aircraft approaching the aerodrome is, or is suspected to be, in such trouble that there is imminent danger of an accident. Declaration of a FULL EMERGENCY PHASE will bring all facilities, both on the aerodrome and in the area or community, such as medical and ambulance services, police and fire services, to a rendezvous point on the aerodrome. It will also alert the hospital to prepare for a possible reception of injured people, and for the road traffic control to be instituted to clear the way for emergency vehicles; and

c) "local standby": an aircraft approaching the aerodrome is known or is suspected to have developed some defect, but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing. Declaration of the LOCAL STANDBY PHASE will bring all aerodrome-based emergency services to a state of readiness but in general, although off-aerodrome components are notified, they will remain at their posts.

3. A list of emergency responding agencies, both on- and off-, their telephone and facsimile numbers, e-mail and radio frequencies of their offices. The list shall include, amongst others, the following:

1. Aerodrome and Terminal Operator
2. Rescue and Fire Fighting Services
3. Air Traffic Services
4. Police and Security Services
5. Medical Services
6. Hospitals
7. Aircraft Operators
8. Government Authorities
9. Customs
10. Mental Health Agencies
11. Veterinary Services
12. Aircraft Accident Investigation Team
13. National Coast Guard
14. Meteorological Department
15. Passport and Immigration
16. Forensic Science Laboratory
17. Ground handlers
18. Mauritius Fire Rescue Services
19. Fuel Companies
20. Embassies
21. Clergy
22. Coroner

4. Aerodrome Emergency Planning Committee

The establishment of an aerodrome emergency planning committee which shall:

(a) organise training and other preparations for dealing with emergencies;
(b) discuss, determine and implement emergency planning arrangements;
(c) ensure the ready availability of and coordination with appropriate specialist rescue services to be able to respond to emergencies; and
(d) have a terms of reference and established members.

It is important that all of the responding services, together with agencies from both on and off the aerodrome, shall be involved in the aerodrome emergency planning committee. The aerodrome emergency planning committee accountabilities/responsibilities shall be to ensure effective planning, preparing, training and testing/exercising are conducted for all likely scenarios. The aerodrome emergency planning committee shall have written terms of reference, they shall meet at regular intervals and minute notes shall be taken and improvement action plans produced.

5. Roles and responsibilities of the emergency response agencies

Each agency involved in the AEP shall have detailed procedures and processes that they control in regard to AEP actions. The roles and responsibilities of agencies shall be clearly defined providing certainty of emergency response. The aerodrome operator shall co-ordinate the aerodrome emergency plan with all agencies involved in any aerodrome emergency.

6. Communication

(a) Communications are the most critical aspect of aerodrome emergency planning. The aerodrome operator is responsible for ensuring a prompt response to emergency incidents/accidents that are governed by the AEP. A key aspect to achieving this is the rapid alerting of all necessary responding agencies and individuals to the emergency phase (activating the AEP);

(b) The AEP shall clearly define the activation sequence for calling out the agencies or individuals required to respond. Additionally, there shall be a sequence and process for cancelling the emergency phase and standing down agencies involved;

(c) It is important to identify in the AEP who is the initiator of the emergency alerting system for each type of emergency. This is often the Air Traffic Control Tower, Rescue Fire Service, or Aerodrome Operator;

(e) The Emergency Alerting System shall be tested regularly to ensure it is working and that telephone numbers are correct, and to highlight any errors or weakness in the alerting aspects of the AEP. Testing at irregular intervals allows the system to be tested with different operators and at differing times of the day; and

(f) The AEP shall make provision for lines of communication and adequate communication facilities, including the use of two-way radio communication, to identify a “cascade” call system and to include persons/agencies responsible for “cascade” information

7. Coordination

(a) The AEP shall ensure the effective coordination of agencies and individuals responding to an aerodrome emergency. For each emergency, phase specific agencies and individuals shall provide a critical component of the overall response to that emergency. The agencies and individuals along with their general roles shall be established and documented in the AEP; and

(b) The AEP shall detail the coordination and communication links among the emergency operations centre, mobile command post, reception centres and other centres in the event of an emergency.

8. Grid map

(a) **A** detailed grid map of the aerodrome and its immediate vicinity with the date of revision shall be provided. Similar grid maps shall be made available in the control tower, fire station, RFF vehicles and other supporting vehicles/agencies;

(b) Two types of grid maps are required, one map shall depict the confines of the aerodrome facilities, access roads, RFF station, rendezvous points, location of water supplies, staging areas, emergency gates etc. The other map shall include surrounding communities and depict appropriate medical facilities, access points, rendezvous points, Government Fire Stations etc within a distance of 8 km from the centre of the ;

(c) The grid map which shows the available medical facilities, shall contain information on potential bed availability and medical specialities at the different hospitals; and

(d) It is essential that whenever the grid map is updated, an updated copy shall be provided to all participating agencies and the old map destroyed.

9. Emergency Operations Centre

Provision for an adequately equipped emergency operations centre. The Emergency Operations Centre shall:

(a) have a fixed location;

(b) act in support of the on-scene commander in the mobile command post for aircraft incidents/accidents;

(c) be the command, co-ordination and communication centre for on/off aerodrome accidents/incidents;

(d) be operationally available 24 hours a day;

(e) be located in order to provide a clear view of the movement area and isolated aircraft parking position;

(f) have the necessary equipment (telephone, fax, internet, radio equipment, mobile phones) and personnel to communicate with the appropriate agencies involved in the emergency. The communication and electronic devices shall be checked daily for serviceability and checklists/records maintained;

(g) be used during aerodrome emergency exercises;

(h) be a part of the aerodrome facilities and shall be responsible for the overall co-ordination and general direction of the response to an emergency;

(i) provide the location for the overall response coordinator to an emergency; and

(j) be chaired by a designated person.

10. Mobile Command Post

Provision for an adequately equipped Mobile Command Post. The Mobile Command Post shall:

(a) be a facility that can be rapidly deployed;

(b) serve as command, co-ordination and communication centre for aircraft accidents/incidents;

(c) be operational during aircraft accidents/incidents;

(d) correctly located with respect to wind and terrain conditions and clearly visible;

(e) be established as quickly as possible. All agencies reporting to the mobile command post shall be adequately briefed on the situation before assuming control of its individual responsibilities;

(f) have maps, charts and other relevant equipment and information readily available. Adequate communication systems linking the mobile command post and the emergency operations centre with each other and with the participating agencies shall be provided;

(g) shall be easily recognizable by provision of an elevated distinguishing marker, such as chequered flag, coloured traffic cone or rotating beacon light;

(h) undertake the local coordination of those agencies responding to the emergency; and

(i) be controlled by an On Scene Commander.

11. Triage and Medical Care at Crash Site

Procedures and arrangements for triage and medical care as follows:

(a) survivors shall be triaged, given available emergency medical aid as required and then promptly evacuated to appropriate medical facilities;

(b) casualties shall be classified into four categories:

(i) **Priority I**: immediate care, Red tag, Roman Numeral I, Rabbit symbol.

(ii) **Priority II**: delayed care, Yellow tag, Roman Numeral II, Turtle symbol.

(iii) **Priority III**: minor care, Green tag, Roman Numeral III, ambulance with X symbol.

(iv) **Priority IV**: deceased, Black

(c) priority I casualties shall be treated first and receive ambulance transportation priority;

(d) as shown in Appendix 4(A), triage shall include the use of casualty identification tags to aid in the sorting of the injured and shall be standardized through colour coding and symbols to make the tags as simple as possible;

(e) where tags are not available, casualties shall be classified by using roman numerals on adhesive tape or by placing marks directly on the forehead or any other exposed body part;

(f) actions taken during the first few minutes of medical treatment shall stabilize the casualties until more qualified medical care is available;

(g) triage procedure and subsequent medical care shall be placed under the command of one designated medical co-ordinator;

(h) as a means to easily identify and distinguish the medical co-ordinator, a white hard hat and highly visible white coat with 'MEDICAL CO-ORDINATOR' displaced front and back in reflective white colouring shall be used;

(i) first response rescue vehicles shall carry initial supplies of casualty care equipment;

(j) the following areas shall also be set up;

(a) **Collection Area:** location where initial collection of the seriously injured from the debris is accomplished;

(b) **Triage Area:** shall be located at least 90m upwind of the accident site;

(c) **Care Area:** initially there will be only one care area which would then be subdivided into three subareas for Category I, II and III casualties. The different care areas shall be clearly demarcated with respective coloured cones, flags etc; and

(d) **Transportation Area:** a transportation area for the recording, dispatching, and evacuation of survivors shall be located between the care centre and the egress road.

The set up of the following areas is illustrated in Appendix 4(B).

(k) mobile facilities for the stabilisation and treatment of Priorities I and II casualties are required. These facilities shall be operational within 30 minutes. These facilities shall include conventional or resuscitation ambulance, red tents to accommodate serious or extremely urgent cases and yellow tents for Priority II casualties.

12. Care of Ambulatory Survivors

Arrangements shall be made by the aerodrome operator/aircraft operator for the ambulatory survivors as follows:

(a) select a Survivors Reception Centre for the survivors;

(b) provide for the transportation of the uninjured from the accident site to the designated holding area;

(c) arrange for doctors and nurses or teams qualified in first aid to treat and examine the supposedly uninjured, especially for nervous traumatism/shock;

(d) furnish a full passenger and crew manifest for accountability purposes;

(e) interview the uninjured and record their names, addresses, phone numbers and where they can be reached for the next 72 hours;

(f) notify relatives or next of kin;

(g) prevent interference by unauthorized persons or those not officially connected with the operation in progress;

(h) arrange for food, drinks, warm clothing and other required assistance. The designated area shall have telephone, email, fax, toilet, bathroom and kitchen facilities;

(i) ensure that the aircraft operator's personnel are well trained to carry out the abovementioned tasks and that such scenario is exercised at least once yearly. Also, the aircraft operator shall have standard operating procedures for dealing with such scenario and these procedures shall be submitted to the aerodrome operator;

(j) the aircraft operator emergency plan shall be co-ordinated with the aerodrome emergency plan to know their responsibility;

(k) all emergency workers shall be familiar with common responses by passengers to unusual stress and apprehension and to be able to cope effectively with disturbed persons;

(l) aircraft operator personnel shall participate in simulated emergency drills to establish patterns of behaviour under emergency conditions and practice the basic principles of 'psychological first aid';

(m) aircraft operator involved shall make arrangements to adequately handle incoming emergency telephone inquiries;

(n) upon notification of an accident, designated aircraft operator shall immediately report to the designated holding area to receive passengers evacuated from the scene;

(o) each aircraft operator shall prepare an emergency kit which shall be readily available to all aircraft operator personnel during hours of operation. The kit shall contain writing pads or forms which include the following: name, address and home telephone number of passengers, name and telephone number of person to be notified of passenger's condition, arrangement requests of passenger (future flight, hotel, transportation within the local area etc), where the person can be contacted during the next 72 hours;

(p) the kit shall also contain telephone numbers of doctors to attend minor injuries and for psychological/traumatic support/counselling, hotels where passengers can be billeted, linguists, caterer, all local aircraft operator reservation offices, ambulance companies in case a passenger unexpectedly requires transportation, taxi companies and emergency telephone numbers to be disseminated on radio and television so that families of the casualties may telephone and receive information. Each aircraft operator shall have a letter of agreement with a physician who will respond to the designated holding area;

(q) a current copy of the recognized airline guide shall be available in the emergency kit. (Local airline schedules would be most helpful for registrars who will be making arrangements on future flights); and

(r) following an accident, the aircraft operator shall arrange for the following at the staging area: person in command for controlling the whole situation, receptionist(s) for bringing the passengers from the bus to the registrars, registrars (teams of 2 persons) for processing the passengers and welfare coordinators for the psychological first aid.

13. Care of Fatalities

Arrangements shall be made for the deceased passengers/fatalities as follows;

(a) provision of a temporary mortuary area with refrigeration facilities. The post mortem examination area shall be near to the refrigerated storage area. The mortuary/body holding area shall be isolated and in an area remote from places where relatives or the general public have access;

(b) forensic doctors shall be contacted in case of emergency;

(c) temporary mortuary area shall have electricity and running water;

(d) body bags shall be available in sufficient quantities;

(e) fatalities shall be extricated and personal effects removed from the wreckage before the arrival of the forensic doctor;

(f) plastic/leather gloves shall be available in enough quantities;

(g) after identification has been made of the fatality, efforts to contact next of kin shall be made;

(h) the Aircraft Accident Investigation Team has the authority and the need to require autopsies and toxicological analyses of flight crew members and passengers; and

(i) the forensic officer in charge shall wear a dark brown hard hat with ‘FORENSIC CHIEF’ displayed front and back in distinctive lettering.

14. Handling the meeters and greeters

(a) Responding to an aircraft accident includes dealing with relatives, friends or business colleagues who are at the aerodrome to meet the arriving passengers or farewell those on departing flights. These people are known generally known as “meeters and greeters”. The handling of meeters and greeters is an important component of any emergency and shall be carefully planned for;

(b) The meeters and greeters may be traumatised by an accident and therefore need to be managed appropriately. Additionally, they may be able to provide valuable identification information about passengers involved in the accident. This information is usually obtained from direct questioning and the completion of a form;

(c) The aerodrome operator has the responsibility to designate a secure location (Relatives Reception Centre) where meeters and greeters can be taken for questioning and counselling. While the aerodrome operator can provide these facilities it shall be included in the AEP which agency will take responsibility for the segregation of the bone-fide meeters and greeters from the general public and the location (Profiling Centre) for segregating them;

(d) Consideration shall be given to making medical and psychological support available to these persons as well as refreshments and communication equipment if necessary;

(e) The location shall have direct access to separate rooms where private discussions can be held with counsellors. The location shall be secured from the public and media interests, and preferably shielded from views of the accident scene;

(f) The provision of the correct timely information to these people is vital; therefore, items such as radios and televisions shall not be available in the room; and

(g) The provision of a location for the reunification of survivors and bonafide next to kin.

15. Media and Information Management Plan

(a) Aerodrome emergencies, particularly aircraft accidents, draw a great deal of public attention particularly from the media. In addition, meeters and greeters also require information concerning the emergency. These information requirements shall be carefully managed and factual information provided in a controlled manner;

(b) The media will normally approach anyone who might be able to provide an inside perspective on the emergency. Therefore, the AEP shall include a supporting media plan for dealing with information requests, the protocol for releasing information and the assigned media liaison person;

(c) Media briefings shall be held throughout the period of the emergency; and

(d) All enquiries shall be directed to the agreed media liaison point as listed in the AEP. It is important to provide brief, factual information to satisfy the immediate requirements of the media.

16. Preservation of Evidence for Accident Investigation

Regarding the preservation of evidence for aircraft investigation, the licensed aerodrome operator shall ensure that:

(a) all evidence shall be preserved and the wreckage shall remain undisturbed as far as possible;

(b) bodies of the deceased shall not be moved. If it becomes necessary to remove the bodies, a sketch plan of their respective positions prior to removal and photographs from four separate angles are required. A tag shall be affixed to each body and the corresponding tag placed where the body was found;

(c) special precautions shall be taken to prevent disturbance of anything in the cockpit area. Shall any control be displaced voluntarily or accidentally, the occurrence shall be recorded and brought to the attention of the Aircraft Accident Investigation Team;

(d) isolation of and security measures within the wreckage area shall be established as soon as possible;

(e) in the presence of dangerous goods and fuel, necessary precautions shall be taken and safety equipment/protective clothing shall be worn;

(f) as soon as practical after the emergency, all participants in the fire fighting and rescue efforts shall be debriefed. Sketches, diagrams, photographs, movie films, and tape and video recording films made on the accident site as well as appropriate details on the tagging of bodies and parts removed from their locations shall be handed over to the Aircraft Accident Investigation Team; and

(g) all the RFF personnel and other organisations shall be aware of the abovementioned precautions to preserve evidence.

17. Medical Services

The AEP shall include a description of available equipment including medical equipment and the location of the equipment.

17.1 Emergency Medical Services at Aerodromes

The aerodrome operator shall ensure that adequate emergency medical facilities (medical personnel (doctors and first aid workers), facilities and supplies) are available at the aerodrome and that mutual aid emergency agreements have been developed with nearby hospitals to cater for emergencies at the aerodrome. The following shall be available:

(a) all personnel including rescue and fire fighters assigned to rescue duties shall be given first aid and cardiopulmonary resuscitation training. Regular exercises and drills in cardiopulmonary resuscitation techniques are required to maintain proficiency. A training schedule shall be set up by the aerodrome operator and all exercises recorded for each personnel;

(b) rescue and fire fighting personnel shall have the ability to stabilize seriously injured casualties. At least two full-time members per shift of the rescue and fire fighting service or other on- personnel shall be trained to an emergency medical treatment level as determined by the Authority. The rescue and fire fighting personnel shall receive training to meet the minimum standards of medical proficiency and to the level of personnel highly qualified in first aid as determined by the Authority. The rescue and fire fighting personnel shall have sufficient medical equipment at their disposal to initiate stabilization until full medical services are available at the site or until transportation of casualties to adequate medical facilities is provided;

(c) the aerodrome operator may enlist volunteers from the employees other than the rescue and fire fighting personnel to provide an immediate response to assist casualties resulting from emergencies. Volunteers shall be trained by accredited agencies in first aid and rescue response duties;

(d) the aerodrome operator shall arrange to have sufficient medical supplies, available on or in the vicinity of the, to treat the passenger and crew capacity of the largest aircraft normally using the aerodrome. Experience has shown however, that more than one aircraft can be involved in an aircraft accident and medical supplies to handle this possibility shall be considered. The type and quantity of such supplies shall be determined using the table below:

Aircraft occupants	***Number of casualties***	***20 per cent casualties Immediate care Priority I***	***30 per cent casualties Delayed care Priority II***	***50 per cent casualties Minor care Priority III***
500	375	75	113	187
450	338	68	101	169
400	300	60	90	150
350	263	53	79	131
300	225	45	68	112
250	188	38	56	94
200	150	30	45	75
150	113	23	34	56
100	75	15	23	37
50	38	8	11	19

These figures are based on the assumption that the maximum number of surviving casualties at an aircraft accident occurring on or in the vicinity of an aerodrome is estimated to be about 75 percent of the aircraft occupants.

(e) the aerodrome operator shall ensure that the following medical equipment, amongst others, are available:

1. stretchers, blankets, backboards, immobilizing mattresses stored on a suitable vehicle;
2. blankets and backboards with suitable restraining straps and cleat;
3. sufficient emergency oxygen and respiratory equipment for smoke inhalation victims;
4. advanced life support systems for coronary difficulties;
5. mobile emergency hospitals or tents for immediate care casualties, preferably of different colours for each priority type. Inflatable tents shall be appropriate in number. A resuscitation type ambulance may be used as an ideal shelter for Priority I casualty;
6. triage tags;
7. stretchers, adaptable to the most commonly used ambulances;
8. immobilizing mattresses for backbone fractures, quantity;
9. backboards for backbone fractures;
10. splints, either conventional or inflatable, for the various types of fractures, quantity;
11. first aid kits, each containing a set of 10 tags, haemostatic pads, tourniquets, respiratory tubes, scissors, dressings, sterile burn packs;
12. resuscitation chests containing material for on-site intubation, infusion and oxygenation for 20 casualties;
13. electrocardiographic or electrocardioscopic apparatus;
14. manual or mechanical respirators;
15. intravenous infusion packs (normal saline or haemacell) with giving sets;
16. suction devices ;
17. entonox analgesic cylinders ; and
18. plastic bags for the deceased.

Note : The quantity of medical equipment shall be determined by the aerodrome medical services.

(f) the medical communication system shall ensure adequate communication during emergencies to disseminate warning information and obtain support operations. The participating hospitals shall have the capability of communicating with one another by means of a two-way communication. The medical co-ordinator shall be able to communicate with participating hospitals directly;

(g) enough transport facilities shall be available for the dispatch of casualties to hospitals from the accident site. Each shall have at least one ambulance. Written agreements with off- based ambulances shall be prepared to provide for emergency transportation services;

(h) helicopters shall be considered for emergency evacuation from the hospitals to the accident site and vice-versa; and

(i) all off- medical facilities arriving on the scene shall report to the rendezvous point.

17.2 Medical Clinic/First Aid Facilities At The Aerodrome

The aerodrome operator shall arrange for an aerodrome medical clinic or first aid room as follows:

(a) the clinic/first aid shall be readily accessible to the terminal building and to emergency transportation equipment. Site selection shall avoid the problem of having to move injured persons through congested areas of the terminal building, while providing access to the facility by emergency vehicles. This suggests that the clinic/first aid shall be located so that access can be gained from the airside of the terminal building;

(b) the personnel shall consist of at least one medical doctor and adequate highly qualified first-aid workers, well trained and with the required degree of expertise, and shall form part of the nucleus for the medical services planning for the aerodrome emergency plan;

(c) the following cases shall be taken care of at the clinic/first aid:

(i) cardiopulmonary resuscitation(CPR);
(ii) bleeding from a traumatic source;
(iii) Heimlich manoeuvre (choking);
(iv) fractures and splinting;
(v) burns;
(vi) shock;
(vii) emergency childbirth and immediate care of newborn, including premature;
(viii) common medical conditions which may influence the outcome of injury (allergies, high blood pressure, diabetes, pace-maker etc);
(ix) basic measures for treatment and protection subsequent to spills or leaks of radioactive materials, toxic or poisonous substances;
(x) treatment of emotionally disturbed passengers;
(xi) recognition and first aid for poisons, bites, and anaphylactic shock;
(xii) transportation techniques for injured persons; and

(xiii) cardiac arrest and other types of injuries and illnesses associated with industrial medicine. If drugs are maintained, provision shall be made for full security.

(d) the medical clinic equipment and the medical supplies shall be determined by the doctor in charge of the clinic/first aid;

(e) sufficient emergency oxygen and respiratory equipment shall be available to treat smoke inhalation victims;

(f) advance life support systems including oxygen, oxygen regulators, and other elements for cardiopulmonary care shall be readily available; and

(g) first aid kits (containing drugs, a wide selection of bandages and splints, blood transfusion equipment, and burn and maternity kits), chains, ropes, crow-bars, and metal cutters shall be available.

17.3 Aerodrome Without A Medical Care Facility

17.3.1 At an aerodrome without a medical care facility (medical clinic or first aid room), the aerodrome operator shall make arrangements to have available sufficient personnel trained in advanced first aid to cover all active hours of aerodrome operation. Also, arrangements and memorandum of understandings shall be available to have support (medical staff and equipment) from nearby hospitals.

17.3.2 Equipment for first aid at these aerodromes shall consist, at minimum, of an emergency medical care bag. This bag shall be readily available to be carried on a designated emergency vehicle and shall contain at least the following:

1. one plastic sheet (1.80 m x 1.80 m) with four spikes;
2. seven haemostats (one package of three, one package of four);
3. two field dressings (one 45 cm x 56 cm, one 56 cm x 91 cm);
4. ten abdominal pads (five packages of two);
5. forty 10 cm x 10 cm gauze pads (four packages of ten);
6. two tourniquets;
7. one artificial airway;
8. three disposable airways (one each No. 2, No. 4, No 5);
9. one bulb syringe with two catheters (No. 12, No. 14 FR);
10. two large bandage scissors;
11. twenty disposable syringes with No. 25 GA 1.6 cm needle;
12. twelve ace bandages (two 15 cm, four 7.5 cm, six 5 cm);
13. twelve alcohol sponge packages;
14. four rolls of gauze bandage (two 7.5 cm, two 5 cm);
15. two rolls of adhesive tape;
16. four vaseline gauze dressings (15 cm x 91 cm);
17. box of 100 band-aids;

18. one blood pressure cuff and gauge;
19. two clipboards (22 cm x 28 cm);
20. six pencils;
21. sufficient supply of casualty identification tags;
22. one set of inflatable splints;
23. one resuscitube;
24. one short spine board;
25. one flashlight;
26. two cervical collars;
27. one bite-stick wedge;
28. one disposable obstetric kit; and
29. one immobilizing mattress

18.0 Aerodrome Emergency Exercises

The holder of an aerodrome licence shall establish procedures such that:

(a) all aerodrome personnel having duties and aerodrome emergency responsibilities under the holder's aerodrome emergency plan, are familiar with their assignments and are properly trained; and

(b) The aerodrome emergency plan shall be tested by conducting:

(i) a full-scale aerodrome emergency exercise at intervals not exceeding two years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; or

a series of modular tests commencing in the first year and concluding in a full-scale aerodrome emergency exercise at intervals not exceeding three years;

(ii) a tabletop exercise at least once each six months, except during that six-month period when a full scale exercise is held; and

(iii) a partial passenger terminal building evacuation exercise at least once a year.

(c) Full Scale Exercises

The aerodrome operator shall ensure that

(i) the first step is to have the support of all stakeholders involved in aerodrome operations. Letter of Emergency Agreement shall be signed by all the stakeholders before the exercise and submitted to the Authority;

(ii) the objective(s) of the exercise shall be clearly set i.e. exercise to be held during the day/night, at sea/land or both, in the runway end safety area or in the surrounding community, to test the ability of local emergency response teams to react to the discovery of hazardous/toxic/chemical/radioactive/bacterialmaterials in the cargo of the aircraft and the presence of aircraft fuel. Various scenarios can be used. Since 80% of all aircraft accidents occur on the runway, the runway end safety areas or the approach/take off areas, the majority of exercises shall be held in the aforementioned locations;

(iii) more than one objective could be accomplished during an exercise. The license holder shall limit the scope of the problems that will be explored or the risk of confusion and frustration will crop up;

(iv) all agency heads of all stakeholders shall be thoroughly familiar with the aerodrome emergency plan and shall develop a plan for their individual departments in-coordination with the general plan. The agency heads shall meet regularly to develop an understanding of their agencies' responsibilities and requirements in co-operation with other agencies;

(v) a large passenger aircraft shall be sought for the full-scale emergency exercise to add realism to the exercise and to familiarise participants with the problems of removing casualties from aircraft. If an aircraft is not available, a bus or similar large vehicle shall be used;

(vi) aerodrome emergency exercises shall be held in locations which shall provide maximum realism while ensuring minimum disruption of the aerodrome operations. Close co-ordination shall be carried out with Air Traffic Services before and after the exercise regarding location of exercise and its impact on aircraft operations, timing of the exercise etc. NOTAM action will be required;

(vii) volunteer casualties shall be moulaged in order to provide realism for the medical responders;

(viii) at least 120 days prior to the scheduled full-scale emergency exercise, the aerodrome operator shall hold a meeting with all key supervisory personnel of all stakeholders. At this time, the aims of the exercise shall be outlined, a scenario formulated, work tasks assigned and duties of all agencies and personnel defined;

(ix) the planning of the exercise and time frame for preparation are outlined in Appendix 4(D);

(x) in preparing the scenario, real names of aircraft operators and types of aircrafts shall not be used;

(xi) the exercise shall be followed by a full debriefing, critique and analysis. Representatives of all organizations which participate in the exercise, shall also actively participate in the critique. An observer critique team shall be organized, comprised of members who are familiar with mass casualty accident proceedings;

(xii) each member of the critique team shall observe the entire exercise and complete the appropriate Emergency Exercise Critique Form as in Appendix 4(E);

(xiii) a critique meeting following the exercise within 1-7 days, shall be carried out so that all participants can hear the observers' report;

(xiv) a critique meeting (after 30 days of exercise) shall be held so that members of the team can present their observations and recommendations for improvement of the aerodrome emergency plan procedures and associated aerodrome emergency plan document;

(xv) after the emergency exercises and critics meetings, the effectiveness and efficiency of the aerodrome emergency plan shall be reviewed and corrective actions taken accordingly. All loopholes and lack of procedures shall be immediately reviewed and tabletop and partial emergency exercises carried out accordingly.

(d) Modular Tests

(i) The modular approach provides an alternative to the established method of preparing, training and testing the emergency plan at aerodromes;

(ii) It comprises a series of modules, which, if completed over a time period agreed with the Authority, will at least equal the current arrangement and in most cases exceed the arrangement for testing the plan;

(iii) The modular system will result in the conducting of a number of smaller, more detailed exercises with a shorter time scale between each module. The period between modules shall be organised locally and be agreed with the Authority;

(iv) It is suggested that a programme of approximately 5 modular exercises culminating in the full emergency exercise would be acceptable to adopt such a programme. However, the programme shall adequately test all key areas of the aerodrome emergency plan within the agreed period;

(v) All modules and the full exercise shall be completed within a maximum 3-year period and the programme shall provide a comprehensive cycle of testing of all key elements of the emergency plan;

(vi) The modular tests may include:

(a) Call-out System/Alerting procedures;
(b) Operation of the Rendezvous Point;
(c) Command and Control including co-ordination between agencies;
(d) Medical Response and Triage;
(e) Reception Centres;
(f) Post Disaster Management/Operational re-start;
(g) Emergency at sea;
(h) Business Continuity leading to re-start of operations;
(i) Rescue and fire fighting operations;
(j) Emergency Operations Centre;
(k) Crisis Management; and
(l) Interfaces: ATC/Airfield/ARFFS/Police/Medical/Mauritius Rescue Fire Services

(e) Tabletop Exercises

Tabletop exercises shall be carried out in the following ways:

(i) as a test of the integration and capability of emergency response resources without the expense and disruption of services incurred by a full scale exercise;

(ii) as a co-ordination exercise prior to the full scale exercise or can be held at intervening times in order to reconfirm procedures, policy, telephone numbers, radio frequencies and changes in key personnel;

(iii) the tabletop exercise will require a meeting room, a large scale map of the aerodrome and a senior representative of each participating unit;

(iv) a probable accident location is selected on the map and each participant describes what action their unit would take to respond;

(v) this exercise will reveal operational problems such as conflicting communications frequencies, lack of equipment, confusing terminology and areas of jurisdiction. All problems shall be addressed as soon as possible and rehearsed in the next table top exercise; and

(vi) these exercises shall be carried out to maintain a high standard of proficiency amongst those personnel (on shift RFF officer in charge, on shift airfield officer in charge etc) who will be directly involved in manning the Emergency Operations Centre, Mobile Command Post, staging areas for triage and medical care, care of ambulatory survivors, care of fatalities, relatives and control of the press and passenger terminal evacuation.

(f) Partial Emergency Exercises

Partial emergency exercises shall be carried in the following ways:

(i) required for participating units in order to train new personnel, evaluate new equipment or techniques or to comply with mandatory recurrent training requirements;

(ii) these exercises shall be carried out to maintain a high standard of proficiency amongst those personnel (on shift RFF officer in charge, on shift airfield officer in charge etc) who will be directly involved in manning the Emergency Operations Centre, Mobile Command Post, staging areas for triage and medical care, care of ambulatory survivors, care of fatalities, relatives and control of the press and passenger terminal evacuation;

(iii) they may involve one unit such as RFF services or medical or a combination of several exercises as desired; and

(iv) the exercise shall ensure that any deficiency found during the full-scale aerodrome emergency exercise has been corrected.

19.0 Accident at Sea

Special provisions shall be made for rescue and fire fighting operations in the event of an aircraft accident/incident at sea. Specialized equipment for rescue and fire fighting shall include fire/rescue boats, helicopters, coastal patrol boats and inflatable life rafts. The following arrangements shall be made by the aerodrome operator:

(i) arrangements with public marine rescue services and private rescue services that may be available and are capable of rendering service;

(ii) a signal system for alerting private or public services in time of emergency shall be prearranged;

(iii) provision of flotation devices, e.g. life rafts sufficient in numbers to meet the needs of the maximum passenger capacity of the largest aircraft normally using the aerodrome;

(iv) in a situation where fire is present, control and extinguishment will require the availability of specialized equipment;

(v) where fire is present, approach shall be made after considering wind direction and velocity and water current. Fire may be moved away from the area by using a sweeping technique with hose streams;

(vi) wind and water currents shall be considered to deal effectively with floating fuel and to prevent it from moving into areas where it would be hazardous to rescue operations;

(vii) as soon as possible, pockets of fuel shall be broken up or moved with high volume nozzles, neutralized by covering them with foam or a special inert material or boomed to contain the fuel in a safe area prior to absorption, dilution or removal;

(viii) rescue boats shall be capable of both shallow and deep water operations. Boats powered by jet-type propulsion eliminate the dangers of propellers puncturing inflatable equipment or injuring survivors during rescue operations. Boats powered by conventional propellers may prevent the hazards of puncture and injury by being equipped with fan-type guards or cowls. Inflatable boats may be punctured by wreckage or barnacles;

(ix) boats and other rescue equipment shall be located such that they can be brought into action in minimum time. Special boathouses or launching ramps shall be provided in order to reduce response time. The boathouses shall have an appropriate jetty for loading/unloading of survivors;

(x) boats shall be of such size as to effectively carry the flotation equipment with adequate space for the crew. Sufficient working space shall be provided to permit rapid dispersal of the flotation devices;

(xi) inflatable life rafts shall be the prime flotation equipment carried, there shall be a sufficient quantity on hand to accommodate the maximum passenger load of the aircraft normally using the aerodrome. Once this flotation equipment has been distributed, there shall be sufficient space to accommodate a limited number of litter cases brought aboard in the rescue process;

(xii) adequate two-way radio equipment shall be provided in all rescue boats/boathouses in order to permit communications with other rescue units. An alerting/communication system shall be available between the boathouse and RFF station;

(xiii) a minimum of two floodlights for night operations and a GPS are required for each rescue boat;

(xiv) diving units shall be dispatched on the scene for rescuing possible trapped passengers. Helicopters/rescue boats can be used to expedite the transportation of divers to the actual area of crash;

(xv) all divers who may be called for this type of service shall be highly trained in underwater search and recovery techniques;

(xvi) in all operations where divers are in water, standard diving flags shall be flown and boats operating in the area shall be warned to exercise extreme precautions;

(xvii) where only the approximate location of the crash is established upon arrival, divers shall use standard underwater search patterns and mark the locations of the major parts of the aircraft with marker buoys. If sufficient divers are not available, dragging operations shall be conducted from surface craft. In no instance shall dragging and diving operations be conducted simultaneously;

(xviii) a command post shall be established at the most feasible location on an adjacent shore. This shall be located in a position to facilitate implementing the aerodrome emergency plan;

(xix) all rescue equipment (rescue boats, life rafts, floodlights, GPS, radio equipment) at the boathouse shall be regularly inspected/maintained and shall be at all times serviceable. A checklist shall be used for weekly maintenance/inspection. All equipment shall be tested on a regular basis both on land and at sea; and

(xx) the boathouse shall have the appropriate number of personnel both during the day and at night. The minimum level of staff required at any time shall be defined.

20.0 Terminal Evacuation Plan

The terminal evacuation plan shall include the following elements:

(a) Role of Aerodrome Emergency Planning Committee to establish, review and test the terminal evacuation plan;

(b) Set up of crisis committee in case of emergency;

(c) Testing of terminal evacuation plan with one table top exercise and a partial evacuation exercise every year;

(d) Details of different zones of the terminal;

(e) Emergency cascade call out procedure;

(f) Details of operational response;

(g) Terminal evacuation procedure;

(h) Responsibilities and duties of different agencies in case of an evacuation;

(i) Set up of Assembly Points;

(j) Designation of evacuation routes and emergency gates;

(k) Setup of mobile command post and emergency operations centre;

(l) Actions of medical services and Mauritius Rescue Fire Services;

(m) Setup of collection area, triage area, care area, transportation area, temporary mortuary area and media centre;

(n) Procedure for re-occupation of the passenger terminal;

(o) Training of responding agencies and terminal occupants; and

(p) Contact details of all agencies,

21.0 Cyclone procedure

The aerodrome operator shall ensure that appropriate procedures are available in case of cyclones and other natural disasters including tsunami. The cyclone procedures shall include at least the following:

(a) Cyclone warning system and implication of different warning levels;

(b) Setup of crisis committee in case of cyclone;

(c) Actions to be taken for different cyclone warning levels;

(d) procedures for securing the aerodrome facilities and equipment and buildings and aircrafts if any;

(e) roles of personnel at different levels;

(f) impact on aircraft operations and operation of the aerodrome for different cyclone warnings;

(g) procedures for closing/opening of the aerodrome and initiation of NOTAM actions;

(h) procedures to inform the Authority of the closing of the aerodrome; and

(i) procedures to inform the Authority on the reopening of the aerodrome and of the serviceability of the physical characteristics, aerodrome facilities and equipment and of any operational restrictions applicable. NOTAM action will be required accordingly.

22.0 Returning to normal operations – Recovery Phase

22.1 One objective of an AEP is to minimize the disruption to aircraft operations that might occur as a result of an aerodrome emergency. Most aircraft accidents that occur on the aerodrome are likely to close the aerodrome temporarily;

22.2 The AEP shall include a recovery phase incorporating procedures to bring the aerodrome back to full operational status safely, efficiently and orderly;

22.3 Depending on the circumstances of the emergency, recovery may occur in a staged manner with restricted aircraft operations before a complete recovery with unrestricted operations;

22.4 A return to restricted aircraft operations means re-commencing aircraft operations that use aerodrome maneuvering areas not affected by the emergency or recovery operations. This activity is undertaken with extreme care so as not to endanger any emergency personnel or hinder recovery operations; and

22.5 The aerodrome operator will need to consider the following before returning the aerodrome to normal operations:

(a) Assess damage to determine whether facilities are operational, safe, and functional. These facilities include navigation aid facilities, movement areas used by aircraft, aerodrome lighting and approach aids, fuel facilities and other facilities used for the processing of aircraft, baggage/cargo and passengers;

(b) Pay particular attention to foreign object debris (FOD) on the movement areas. Make sure grassed runway and taxiway surfaces are free of significant depressions or surface gouging that may cause damage to other aircraft. Surface areas next to the runway or taxiway that might require rehabilitation, can be repaired at a later stage during a period of quiet operations, subject to the level of threat posed to other aircraft;

(c) Close off and mark areas that are unsafe due to defect or obstructions. This includes areas with ongoing aircraft recovery operations or that are transport routes for vehicles involved in the recovery process;

(d) Consider whether recovery equipment or an immobilised aircraft infringe obstacle limitation surfaces (OLS), will affect radio navigation aids, or obstruct visual aids necessary to approaching aircraft. If there have been infringements of the OLS, calculate and instigate reduced effective operating lengths (EOL) to ensure appropriate clearances are maintained;

(e) Reassess the Rescue Fire capability prior to commencement of operations and issue a NOTAM if required;

(f) Cancel any NOTAMs regarding the closure of the aerodrome due to the emergency before continuing operations. Issue a new NOTAM about areas closed to aircraft traffic, any new or if aircraft traffic is otherwise restricted due to the emergency; and

(g) After an emergency at the aerodrome, the aerodrome operator shall inform the Authority of the serviceability of the physical characteristics, aerodrome facilities, buildings and equipment and of any operational restriction applicable. NOTAM action will be required accordingly.

23.0 Mutual Aid Emergency Agreement

The aerodrome operator shall ensure that all agencies involved in the aerodrome emergency plan shall sign the ‘letter of emergency agreement’, sample attached as Appendix 4(C). The mutual aid emergency agreements shall be prearranged, duly authorized and shall specify initial notification and response assignments. All ‘letter of emergency agreement’ of all agencies involved in the aerodrome emergency plan shall be submitted to the Authority.

24.0 Review of plan

A critical component of aerodrome emergency planning is the review of response plans. AEP review can occur as a result of annual programmed task, after an emergency exercise, debriefing of an actual emergency or research of initiatives taken elsewhere which if implemented locally will improve the effectiveness of the plan.

25.0 Human factor

Application of human factor principles by aerodrome operator when developing aerodrome emergency plan and to ensure optimum response by all existing agencies participating in emergency operations. Refer to paragraph 4.32 for further guidance on human factors.

26.0 Stakeholders Emergency Standard Operating Procedures

The aerodrome operator shall maintain procedures for synchronising the contents of the stakeholders' emergency standard operating procedures and contents of Aerodrome Emergency Plan.

27.0 Rendez-vous points and emergency gates

The aerodrome operator shall make provisions for rendez- vous points and emergency gates along the aerodrome perimeter fence at strategic locations for emergency entry/exit. In case of emergency, the entry/exit of vehicles and staff involved in the emergency, shall be controlled by Police and only authorized vehicles/staff will be permitted to enter through the rendez-vous points/emergency gates to the emergency site. Access permits for emergencies can be pre-issued by the Authority on demand and access permits will also be issued by the Authority at rendez-vous points.

28.0 Routings

Unidirectional routings shall be defined in the aerodrome emergency plan for easy and quick access to different parts of the aerodrome.

29.0 Crowd Control

The aerodrome operator shall ensure that procedures are set up for crowd control at rendez-vous points, around crash site and different rescue centres.

30.0 Audit and testing of emergency facilities and centres

The aerodrome operator shall ensure that procedures are set up for the audit and testing of emergency facilities and centres.

31.0 Disabled Aircraft Removal Plan

The aerodrome operator shall have a plan for the removal of a disabled aircraft on or adjacent to the movement area. Refer to paragraph 4.15.

32.0 Crew Reception Area

The aerodrome operator shall provide a location for the crew members for care, assistance and inquiries. The Crew Reception Centre shall be segregated from public and passengers.

33.0 Exibit area

The aerodrome operator shall provide a location for safeguarding aircraft wreckage for investigation purposes.

34.0 Storage of Baggage and Personal Belongings

The aerodrome operator shall provide a location for the storage of baggage and personal belongings.

35.0 Family Assistance Centre

The aircraft operators shall make provision for assistance to family members and next to kins. Arrangement shall be made for hotels etc outside the aerodrome.

36.0 Review of AEP

The AEP shall be reviewed on a yearly basis, after exercises and change in infrastructure used for emergency purposes and personnel/organisations.

37.0 Training

The aerodrome operator shall ensure that training on AEP is provided to all concerned personnel. The training programme and training materials shall be approved by the Authority. The trainer shall have followed a recognised Aerodrome Emergency Planning training course and shall possess instruction, teaching and assessing skills.

3.5 AERODROME RESCUE AND FIRE FIGHTING SERVICES:

3.5.1 An aerodrome operator shall ensure that:

(i) the level of protection provided at an aerodrome for rescue and fire fighting shall be appropriate to the aerodrome category as per paragraph 3.5 of the Aerodrome Licensing Manual and paragraph 9.2 of the Mauritius Civil Aviation Requirements (MCAR) – Aerodrome Design and Operations;

(ii) rescue and firefighting services are organized, equipped, staffed, trained and operated as per paragraph 3.5 of the Aerodrome Licensing Manual and paragraph 9.2 of the Mauritius Civil Aviation Requirements (MCAR) – Aerodrome Design and Operations;

(iii) where an aerodrome is located close to water, or difficult terrain, and where there is significant portion of approach or departure operations takes place over these areas, specialist rescue services and fire fighting equipment for rescue at sea shall be available;

(iv) any change to the aerodrome category and availability of the RFFS as promulgated for an aerodrome shall be notified to the appropriate ATS and AIS units;

(v) Policies and procedures relating to the provision and management of the RFFS shall be described in the RFFS Manual as detailed at paragraph 3.5.2.

3.5.2 RFFS Manual

3.5.2.1 Requirement for an RFFS manual

(a) The RFFS provider shall ensure that there is an RFFS Manual which shall:

1. be typewritten or printed, and signed by the officer responsible of RFFS;

2. be in a format that is easy to revise;

3. have a system for recording the currency of pages and amendments, including a page for logging revisions;

4. be organised in a manner that will facilitate preparation, review and amendment processes; and

5. be in accordance with paragraph 3.5.2.2

(b) The RFFS manual shall be approved by the Authority;

(c) The aerodrome operator shall make available sufficient copies of the RFFS Manual for one to be readily accessible by all personnel who may need to refer to it;

(d) The aerodrome operator shall take all reasonable steps to ensure that each member of the RFFS staff:

1. is aware of the contents of every part of the RFFS Manual which is relevant to his duties as such; and

2. undertakes his duties in conformity with the relevant provisions of the manual.

(e) The aerodrome operator shall include any deviation/non compliance and any conditions or procedures under which the deviation was granted;

(f) The aerodrome operator shall alter or amend the RFFS Manual, whenever necessary, in order to maintain the accuracy of the information in it;

(g) The ARFFS at an aerodrome shall normally be under the administrative control of the aerodrome operator, which shall also be responsible for ensuring that the service provided is organized, equipped, staffed, trained and operated in such a manner as to achieve its principle objective of saving lives in the event of an aircraft accident or incident;

(h) The aerodrome operator shall seek approval of the Authority before making any change to the RFFS manual; and

(i) The aerodrome operator shall comply with any directive issued by the Authority requiring any alteration or amendment of the RFFS Manual.

3.5.2.2 Contents of the RFFS manual:

The RFFS manual shall describe the following:

(a) compliance of the procedures, operations, equipment and personnel with paragraph 3.5 of the Aerodrome Licensing Manual and paragraph 9.2 of the Mauritius Civil Aviation Requirements (MCAR) – Aerodrome Design and Operations and reference to regulatory requirements;

(b) policy, organisation, capability, facilities, equipment and operational procedures of the RFFS and shall include:

1. a statement signed by the officer in charge of RFFS on behalf of the organisation confirming that the manual:

(i) defines the organisation and demonstrates its means and methods for ensuring continuing compliance with paragraph 3.5 of the Aerodrome Licensing Manual and paragraph 9.2 of the Mauritius Civil Aviation Requirements (MCAR) – Aerodrome Design and Operations this and any other applicable Part; and

(ii) is required to be complied with by its personnel at all times;

(c) an organisation chart showing lines of responsibility; and

(d) the establishment of RFFS, any transitional arrangements, and where a higher category is available by prior arrangement, the procedure necessary to upgrade the facility including, where necessary, actions to be taken by other departments.

(e) Level of protection to be provided

The level of protection to be provided at an airport shall be based on the dimensions of the aeroplanes normally using the airport as adjusted for their frequency of operations.

(i) The aerodrome operator shall establish systems and procedures to ensure that:

1. the level of protection provided at an aerodrome for rescue and fire-fighting shall be appropriate to the aerodrome category as determined from the table below and based on the longest aircraft planned to use the aerodrome and its fuselage width, except that, where the number of movements of the aeroplanes in the highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the level of protection provided shall be not less than one category below the determined category;

Aerodrome Category	Aeroplane over-all length			Maximum Fuselage width
(1)	(2)			(3)
1	0	up to but not including	9m	2m
2	9m	up to but not including	12m	2m
3	12m	up to but not including	18m	3m
4	18m	up to but not including	24m	4m
5	24m	up to but not including	28m	4m
6	28m	up to but not including	39m	5m
7	39m	up to but not including	49m	5m
8	49m	up to but not including	61m	7m
9	61m	up to but not including	76m	7m
10	76m	up to but not including	90m	8m

2. if, after selecting the category appropriate to the longest aeroplane’s overall length, that aeroplane’s fuselage width is greater than the maximum width in the above table for that category, then the category for that aeroplane shall actually be one category higher; and

3. during anticipated periods of reduced activity, the level of protection available shall be no less than that needed for the highest category of aeroplane planned to use the aerodrome during that time irrespective of the number of movements.

(ii) For any heliport RFFS provision shall be in accordance with Mauritius Civil Aviation Requirements (MCAR) - Heliports and as indicated below:

Heliport fire fighting category

Category	Helicopter overall length[a]
H1	up to but not including 15 m
H2	from 15 m up to but not including 24 m
H3	from 24 m up to but not including 35 m

a. Helicopter length, including the tail boom and the rotors.

Minimum usable amounts of extinguishing agents for surface-level heliports

Category	Foam meeting performance level B: Water (L)	Foam meeting performance level B: Discharge rate foam solution (L/min)	Complementary agents: Dry chemical powders (kg)	or	Complementary agents: Halons (kg)	or	Complementary agents: CO_2 (kg)
(1)	(2)	(3)	(4)		(5)		(6)
H1	500	250	23		23		45
H2	1 000	500	45		45		90
H3	1 600	800	90		90		180

Minimum usable amounts of extinguishing agents for elevated heliports

Category	Foam meeting performance level B: Water (L)	Foam meeting performance level B: Discharge rate foam solution (L/min)	Complementary agents: Dry chemical powders (kg)	or	Complementary agents: Halons (kg)	or	Complementary agents: CO_2 (kg)
(1)	(2)	(3)	(4)		(5)		(6)
H1	2 500	250	45		45		90
H2	5 000	500	45		45		90
H3	8 000	800	45		45		90

(iii) All Cargo Operations

The level of protection at aerodromes used for all-cargo aeroplane operations may be reduced in accordance with table below.

Aerodrome category	*Reclassification of aerodrome category for all-cargo aeroplanes*
1	1
2	2
3	3
4	4
5	5
6	5
7	6
8	6
9	7
10	7

Note : An all-cargo aeroplane is an aeroplane operated for the transportation of goods, without fare paying passengers.

(f) Notification of facility status

(i) The aerodrome operator shall establish systems and procedures to notify changes in the operational status or availability of each facility or service listed in the RFFS manual;

(ii) The procedures shall ensure that:

1. operational information of the RFFS is forwarded to the aeronautical information service responsible for the AIP; and

2. Air Traffic Services are notified without delay of any change in operational status of the facility or service that may affect the RFF category and information concerning any change in operational status is forwarded to the aeronautical information service for promulgation by NOTAM.

4. a policy and procedures indicating how depletion of the RFFS is to be managed including the extent to which operations are to be restricted, how Air Traffic Services/pilots are to be notified and the maximum duration of any depletion.

5. objectives for each RFF category provided, including a description of:

   (i) amounts and type of extinguishing media provided;

   (ii) discharge rates;

   (iii) number of foam producing appliances;

   (iv) staffing levels; and

   (v) levels of supervision.

(g) Objectives of RFFS

The objectives of the RFFS shall be to:

1. save lives during an aircraft accident or incident occurring at, or in the immediate vicinity of an aerodrome (as applicable). The RFF service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid;

2. respond to the aircraft accident or incident within the required response time;

3. assume command and control of the crash site in an effective and efficient manner;

4. preserve the accident or incident site for aircraft investigation;

5. the service shall assume at all times the possibility of and need for extinguishing a fire which may:

   a) exist at the time an aircraft is landing, taking off, taxiing, parked, etc.; or

   b) occur immediately following an aircraft accident or incident; or

   c) occur at any time during rescue operations.

(h) Response time

An aerodrome operator shall establish systems and procedures to ensure that:

1. The operational objective of the rescue and firefighting service shall be to achieve a response time not exceeding three minutes to any point of each operational runway, in optimum visibility and surface conditions;

2. The operational objective of the rescue and firefighting service shall be to achieve a response time not exceeding two minutes to any point of each operational runway, in optimum visibility and surface conditions;

3. The operational objective of the rescue and firefighting service shall be to achieve a response time not exceeding three minutes to any other part of the movement area, in optimum visibility and surface conditions;

4. Response time is considered to be the time between the initial call to the rescue and firefighting service, and the time when the first responding vehicle(s) is (are)in position to apply foam at a rate of at least 50 per cent of the discharge rate;

5. Any vehicles, other than the first responding vehicle(s), required to deliver the amounts of extinguishing agents shall ensure continuous agent application and shall arrive no more than four minutes from the initial call;

6. Any vehicles, other than the first responding vehicles(s), required to deliver the amounts of extinguishing agents shall ensure continuous agent application and shall arrive no more than three minutes from the initial call;

7. To meet the operational objective as nearly as possible in less than optimum conditions of visibility, especially during low visibility operations, suitable guidance, equipment, access routes and/or procedures for rescue and fire fighting services shall be provided. These may include navigation equipment installed in the vehicles; and

8. The procedures for the RFFS to respond to areas outside the movement area to reach all areas of the Rescue and Fire-fighting response area shall be tested and the achieved response time documented.

(i) a statement describing the process by which the provider initially selects RFF personnel;

(j) the process by which RFF personnel selected for operational duties are assessed as medically fit and capable of their duties on a continuous basis;

(k) the processes by which the aerodrome operator ensures initial and recurrent training of their RFF personnel according to role and task, including First-Aid training, drills, exercise etc. The aerodrome operator shall submit a Training Manual to the Authority for approval. Content of the Training Manual is detailed at 3.5.2.5;

(l) **Personnel**

Personnel recruited for RFF services shall be resolute, possess initiative, competent to form an intelligent assessment of a fire situation and, above all, shall be well trained and fully qualified.

The aerodrome operator shall establish systems and procedures to ensure that:

(a) all personnel involved in rescue and fire-fighting duties receive appropriate initial and recurrent comprehensive training to maintain their competence in skills, knowledge and understanding commensurate with the types of aircraft and type of rescue and fire-fighting equipment in use at the aerodrome. Training requirements are detailed at paragraph 3.5.2.3. The training programme and the training materials shall be approved by the Authority. The instructor delivering the course shall be approved by the Authority. Requirements for approval of instructors are detailed at paragraph 3.5.2.4;

(b) all rescue and fire-fighting personnel participate in live fire drills commensurate with their role and task, types of aircraft and type of rescue and fire-fighting equipment in use at the aerodrome, including pressure-fed fuel fires (fires associated with fuel discharged under very high pressure from a ruptured fuel tank are defined as “pressure-fed fuel fires”);

(c) the rescue and fire-fighting personnel training programme includes training in human performance, including team co-ordination;

(d) training records for all staff are kept up to date and, on request, made available to the aerodrome operator and any authorised person;

(e) an element of the RFFS training programme, in addition to the aerodrome operator’s obligation for regular emergency exercises, shall include exercises to practice the initial emergency response;

(f) in addition to testing the RFFS internal responses, some exercise shall also be planned to involve external agencies, such as domestic fire service, ambulance service and police to ensure the adequacy of the following:

1. co-ordination and communication;

2. response of all personnel involved;

3. emergency plans and procedures;

4. inter-agency co-ordination; and

5. emergency equipment.

(g) during flight operations, sufficient trained and competent personnel shall be designated to be readily available to ride the rescue and fire fighting vehicles and to operate the equipment at maximum capacity. These personnel shall be deployed in a way that ensures that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained. Consideration shall also be given for personnel to use hand lines, ladders and other rescue and firefighting equipment normally associated with aircraft rescue and firefighting operations.

The remainder of the vehicles may be staffed by personnel not necessarily employed in close proximity to their vehicles but able to respond when the alarm sounds so as to reach the scene of the accident no morethan one minute after the first responding vehicle(s) so as to provide continuous foam application;

(h) The total number of personnel, whether regular or auxiliary, required to deploy and operate the RFF service shall be determined so as to meet the following criteria:

a) the RFF vehicles shall be staffed so as to ensure their ability to discharge at their maximum designed capability extinguishing agents, principal or complementary, both effectively and simultaneously, at an aircraft accident/incident; and

b) any control room or communications facility operated by, and serving, the RFF service can continue to provide this service until alternative arrangements to undertake this function are initiated by the airport emergency plan.

In determining the minimum number of rescue and fire fighting personnel required, a task resource analysis shall be completed and the level of staffing documented in the Aerodrome Manual. The promulgated minimum staffing level shall not be reduced without an assessment being conducted and approval of the Authority.

The task resource analysis shall be established to justify as to the minimum number of qualified/competent personnel required to deliver an effective airport RFF service (RFFS) to deal with an aircraft incident/accident.

(i) all ARFFS personnel shall be assessed for physical and medical fitness including the following:

1. Aerobic fitness;
2. Anaerobic fitness;
3. Flexibility; and
4. Medical fitness.

(j) all responding rescue and fire fighting personnel shall be provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

(m) Personnel Protective Equipment (PPE)

All personnel operating at an aircraft fire shall be provided with protective clothing which will ensure the wearer is able to perform the assigned duties. This clothing shall be provided, maintained and readily available for instant use.

The aerodrome operator shall include details of the specific requirements and assessment to determine the provision of personal and respiratory protective equipment.

The aerodrome operator shall establish systems and procedures to ensure that all responding rescue and fire-fighting personnel are provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

The protective clothing shall include:

1. *Helmets:* Helmets shall provide adequate protection from impact, be resistant to penetration and electrical conductivity and shall not be susceptible to deformation due to heat absorption. A moveable visor, resistant to abrasion, impact, and radiant heat shall offer a wide angle of vision. Adequate protection to the neck and chest may also form part of the helmet if not otherwise provided by the protective suit. The helmet shall not give the wearer a sense of isolation and shall permit both speech and the reception of audible signals or words of command. Ideally, the helmet shall be capable of use in conjunction with respiratory protection equipment and of incorporating radiotelephone receiver installations. Where helmets incorporate radiotelephone receivers, the helmet shall carry a distinctive number to identify the wearer, applied in a contrasting colour and reflective medium.;

2. *Protective Suits:* proximity suits shall be provided. They shall provide thermal insulation, be lightweight, comfortable, provide freedom of movement, easy to wear without assistance, resist radiant heat and occasional direct flame contact and be water resistant, have fastenings capable of being easily secured by the wearer, have waterproof seams and pockets with drainage holes in the lower corners and be capable of being cleaned without reducing it protective qualities. The back shall be lined with reflective materials;

3. *Boots:* uppers shall be of tough, flexible, heat-resistant material and extend to the mid-calf or knee level. Soles shall be of a non-slip material which may include synthetic materials, resistant to heat, oil, aircraft fuels and acids. Toes caps and soles may be reinforced with steel. Rubber boots shall not be used;

4. *Gloves:* they shall be of the gauntlet type to provide wrist protection and their construction shall permit the wearer to operate switches, fastenings and hand tools. The back of the glove shall have a reflective surface and the palm and fingers shall be provided in a material resistant to abrasion and penetration by sharp objects. All seams shall be resistant to penetration to liquids; and

5. *Protection requirements:* As a general guide, the protective clothing, when correctly worn, shall offer at least the same level of protection as a structural firefighting suit. The exact level of protection shall be decided with regard to operational considerations and risk assessment. Guidance relative to firefighting suits is as follows:

a) ISO 11613: Protective clothing for firefighters — Laboratory test methods and performance requirements;

b) EN 469: Protective clothing for firefighters — Requirements and test methods for protective clothing for firefighting;

c) NFPA 1971 Standard on protective clothing for structural firefighting; and

d) ISO 15538:2001 Protective clothing for firefighters — Laboratory test methods and performance requirements for protective clothing with a reflective outer surface.

6. Respiratory Equipment

a) Firefighters entering any environment in which fire is present during an aircraft incident, as well as during overhaul operations, shall be protected with self-contained respiratory equipment. This applies equally to aircraft that comprise aluminium and composite fibre materials;

b) The respiratory equipment selected is adequate in terms of its basic function, and its operational duration for the tasks involved. Industrial smoke masks and certain types of limited capacity compressed air equipment are unlikely to meet the stringent requirements of these operations;

c) It is essential to develop and maintain a high level of competence in those firefighters appointed to wear respiratory equipment. This competence shall include the most stringent procedures for the inspection, testing and maintenance of the equipment; and

d) Adequate arrangements shall be made for the recharging of air cylinders with pure air and a quantity of spare parts shall be hand-held to ensure the continuous availability of the service.

(n) details of the practical training facilities available for initial and recurrent maintenance of competence on the aerodrome or sourced externally. Practical training facilities shall be documented.

(o) the RFF officer in charge safety accountabilities which shall also be promulgated or referred to in the Aerodrome Manual.

An aerodrome operator shall nominate a RFF officer in charge senior who has the authority within the organisation to ensure that the RFFS:

(a) can be adequately financed and resourced;

(b) is provided in accordance with the requirements of paragraph 3.5 of the Aerodrome Licensing Manual and paragraph 9.2 of the Mauritius Civil Aviation Requirements (MCAR) – Aerodrome Design and Operations;

(c) the organisation complies with the requirements of paragraph 3.5 of the Aerodrome Licensing Manual and paragraph 9.2 of the Mauritius Civil Aviation Requirements (MCAR) – Aerodrome Design and Operations; and

(d) has sufficient personnel to manage, support and provide the RFFS with any associated training or assessment listed in the RFFS Manual.

(p) details of the type and operational capability of the fire vehicles employed for each RFF category required.

(a) An RFFS provider shall establish systems and procedures to ensure that the minimum number of rescue and fire-fighting vehicles provided at an aerodrome are in accordance with the following table:

Aerodrome category	**Rescue and Fire Fighting vehicles**
1	1
2	1
3	1
4	1
5	1
6	2
7	2
8	3
9	3
10	3

(b) All rescue and fire-fighting vehicles shall be operationally fit for purpose. Each vehicle shall have the following minimum characteristics for rescue and firefighting.

	RFF vehicles up to 4 500 L	*RFF vehicles over 4 500 L*
Monitor	Optional for categories 1 and 2 Required for categories 3 to 9	Required
Design feature	High discharge capacity	High and low discharge capacity
Range	Appropriate to longest aeroplane	Appropriate to longest aeroplane
Handlines	Required	Required
Under truck nozzles	Optional	Required
Bumper turret	Optional	Optional
Acceleration	80 km/h within 25 s at the normal operating temperature	80 km/h within 40 s at the normal operating temperature
Top speed	At least 105 km/h	At least 100 km/h
All-wheel drive capability	Required	Required
Automatic or semi-automatic transmission	Required	Required
Single rear-wheel configuration	Preferable for categories 1 and 2 Required for categories 3 to 9	Required
Minimum angle of approach and departure	30°	30°
Minimum angle of tilt (static)	30°	28°

(c) vehicles shall be fitted with portable/fixed lighting equipment sufficient to illuminate the incident/accident site;

(d) All rescue and fire-fighting vehicles shall normally be housed in a fire station. Satellite fire stations shall be provided whenever the response time cannot be achieved from a single fire station;

(e) The fire station shall be located so that the access for RFF vehicles into the runway area is direct and clear, requiring a minimum number of turns; and

(f) All rescue and fire-fighting vehicles shall have a flashing or rotating beacon and be marked in a single conspicuous colour of red or yellowish green.

(q) details of specialist equipment such as rescue craft, emergency appliances, hose layers, appliances with aerial capability, etc., where the RFFS provides these, and procedures to be followed if these facilities are temporarily unavailable.

The aerodrome operator shall establish systems and procedures to ensure that rescue equipment and medical supplies commensurate with the level of aircraft operations is provided on the rescue and fire-fighting vehicle. The requirement for medical supplies is detailed at paragraph 3.4.3 (17).

The rescue and fire fighting station shall be equipped with the following minimum rescue tools:

Equipment scope	*Equipment item*	*Airport category*			
		1-2	3-5	6-7	8-10
Forcible entry tools	Prying tool (hooligan, biel type)	1	1	1	2
	Crowbar 95 cm	1	1	1	2
	Crowbar 1.65 m	1	1	1	2
	Axe, rescue large non wedge type	1	1	1	2
	Axe, rescue small non wedge or aircraft type	1	2	2	4
	Cutter bolt 61 cm	1	1	2	2
	Hammer 1.8 kg – lump or club type	1	1	2	2
	Chisel cold 2.5 cm	1	1	2	2
A suitable range of rescue/cut-in equipment including powered rescue tools	Hydraulic/electrical (or combination) portable rescue equipment	1	1	1	2
	Powered rescue saw complete with minimum 406 mm diameter spare blades	1	1	1	2
	Reciprocating/oscillating saw	1	1	1	2
A range of equipment for the delivery of firefighting agent	Delivery hoses 30 m lengths x 50 and 64 mm diameters	6	10	16	22
	Foam branches (nozzles)	1	1	2	3
	Water branches (nozzles)	1	2	4	6
	Coupling adaptors	1	1	2	3
	Portable fire extinguishers				
	CO^2	1	1	2	3
	DCP	1	1	2	3
Self-contained breathing apparatus – *sufficient to maintain prolonged internal operations* *Note: Ideally one BA set per crew member.*	Breathing apparatus (BA) set complete with facemask and air cylinder				
	BA spare air cylinder				
	BA spare facemask				
Respirators	Full faced respirators complete with filters	One per responding firefighter			

Equipment scope	Equipment item	Airport category			
		1-2	3-5	6-7	8-10
A range of ladders	Extension ladder, rescue and suitable for critical aircraft	-	1	2	3
	Ladder general purpose – rescue capable	1	1	1	2
Protective clothing	Firefighting helmet, coats, over trousers (complete with braces), boots and gloves as a minimum	One set per operational firefighter plus a percentage of reserve stock			
Additional items for personal protection	Protective goggles	1	1	2	3
	Flash hoods	One per operational firefighter			
	Surgical gloves	1 box	1 box	1 box	1 box
	Blanket fire resisting	1	1	2	2
Rope lines	Rope line rescue 45 m	1	1	2	2
	Rope line general use 30 m	1	1	2	2
	Rope line pocket 6 m	One per operational firefighter			
Communication equipment	Portable transceivers (hand held and intrinsically safe)	1	2	2	3
	Mobile transceivers (vehicle)	One for each fire vehicle			
A range of hand-held/portable lighting equipment	Hand-held flashlight (intrinsically safe)	1	2	4	4
	Portable lighting – spot or flood (intrinsically safe)	1	1	2	3
A range of general hand tools	Shovel overhaul	1	1	2	2
Rescue tool box and contents		1	1	2	3
	Hammer, claw 0.6 kg				
	Cutters, cable 1.6 cm				
	Socket set				
	Hacksaw, heavy duty complete with spare blades				
	Wrecking bar 30 cm				
	Screwdriver set – slotted and Phillips heads				
	Pliers, insulated Combination 20 cm Side cutting 20 cm Slip joint – multi-grip 25 cm				
	Seat belt/harness cutting tool				
	Wrench, adjustable 30 cm				

Equipment scope	*Equipment item*	*Airport category*			
		1-2	3-5	6-7	8-10
	Spanners, combination 10 mm – 21 mm				
First aid equipment	Medical first-aid kit	1	1	2	3
	Automated External Defibrillator (AED)	1	1	2	3
	Oxygen Resuscitation Equipment (ORE)	1	1	2	3
Miscellaneous equipment	Chocks and wedges – various sizes				
	Tarpaulin – lightweight	1	1	2	3
	Thermal imaging camera	-	-	1	2

Rescue equipment

	Heliport HF category	
Equipment	*H1 and H2*	*H3*
Adjustable wrench	1	1
Axe, rescue, non-wedge or aircraft type	1	1
Cutters, bolt, 60 cm	1	1
Crowbar, 105 cm	1	1
Hook, grab or salving	1	1
Hacksaw, heavy duty complete with 6 spare blades	1	1
Blanket, fire resistant	1	1
Ladder, length appropriate to helicopters in use	–	1
Lifeline, 5 cm, 15 m in length	1	1
Pliers, side cutting	1	1
Set of assorted screwdrivers	1	1
Harness knife complete with sheath	1	1
Gloves, fire resistant	2 pairs	3 pairs
Power cutting tool	–	1

(r) policies or letters of agreement, where the RFFS is reliant upon other organisations to provide equipment which is essential for ensuring safe operation of the aerodrome (such as government fire agencies and water rescue) and contingency plans in the event of non-availability shall be described.

(s) details of the rescue and medical equipment to be stowed on the fire vehicles and where rescue and medical equipment is held other than on the RFF vehicles a statement indicating its location and how it is to be transported to an incident site.

(t) details of both the principal and complementary extinguishing agent to be provided.

(a) Both principal and complementary agents shall be provided at an aerodrome. Principal agents produce a permanent control, i.e. for a period of several minutes or longer. Complementary agents have rapid fire suppression capability but offer a "transient" control which is usually only available during application;

(b) The principal extinguishing agent shall be:

(i) a foam meeting the minimum performance level A; or

(ii) a foam meeting the minimum performance level B; or

(iii) a foam meeting the minimum performance level C; or

(iv) a combination of these agents;

except that the principal extinguishing agent for aerodromes in categories 1 to 3 shall preferably a performance level B or C foam;

(c) The complementary extinguishing agent shall be a dry chemical powder suitable for extinguishing hydrocarbon fires;

(d) The amounts of water for foam production and the complementary agents to be provided on the rescue and fire fighting vehicles shall be in accordance with the aerodrome category as per the table below, except that for aerodrome categories 1 and 2 up to 100 per cent of the water may be substituted with complementary agent;

	Foam meeting performance level A		Foam meeting performance level B		Foam meeting performance level C		Complementary agents	
Aerodrome category	Water (L)	Discharge rate foam solution/ minute (L)	Water (L)	Discharge rate foam solution/ minute (L)	Water (L)	Discharge rate foam solution/ minute (L)	Dry chemical powders (kg)	Discharge Rate (kg/second)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	350	350	230	230	160	160	145	2.25
2	1 000	800	670	550	460	360	190	2.25
3	1 800	1 300	1 200	900	820	630	135	2.25
4	3 600	2 600	2 400	1 800	1 700	1 100	135	2.25
5	8 100	4 500	5 400	3 000	3 900	2 200	180	2.25
6	11 800	6 000	7 900	4 000	5 800	2 900	225	2.25
7	18 200	7 900	12 100	5 300	8 800	3 800	225	2.25
8	27 300	10 800	18 200	7 200	12 800	5 100	450	4.5
9	36 400	13 500	24 300	9 000	17 100	6 300	450	4.5
10	48 200	16 600	32 300	11 200	22 800	7 900	450	4.5

Note.— The quantities of water shown in columns 2, 4 and 6 are based on the average overall length of aeroplanes in a given category.

For the purpose of agent substitution, 1 kg of complementary agent shall be taken as equivalent to 1.0L of water for production of a foam meeting performance level A.

(e) At aerodromes where operations by aeroplanes larger than the average size in a given category are planned, the quantities of water shall be recalculated and the amount of water for foam production and the discharge rates for foam solution shall be increased accordingly;

(f) At aerodromes where operations by aeroplanes larger than the average size in a given category are planned, the quantities of water shall be recalculated and the amount of water for foam production and the discharge rates for foam solution shall be increased accordingly;

(g) The quantity of foam concentrates separately provided on vehicles for foam production shall be in proportion to the quantity of water provided and the foam concentrate selected;

(h) The amount of foam concentrate provided on a vehicle shall be sufficient to produce at least two loads of foam solution;

(i) Supplementary water supplies, for the expeditious replenishment of rescue and fire fighting vehicles at the scene of an aircraft accident, shall be provided;

(j) When a combination of different performance level foams is provided at an aerodrome, the total amount of water to be provided for foam production shall be calculated for each foam type and the distribution of these quantities shall be documented for each vehicle and applied to the overall rescue and fire fighting requirement;

(k) The discharge rate of the foam solution shall not be less than the rates shown in table at section (d) above;

(l) The complementary agents shall comply with the appropriate specifications of the International Organization for Standardization (ISO). *;

(m) The discharge rate of complementary agents shall be no less than the values shown in table at section (d) above;

(n) Dry chemical powders shall only be substituted with an agent that has equivalent or better fire fighting capabilities for all types of fires where complementary agent is expected to be used;

(o) A reserve supply of foam concentrate, equivalent to 200 per cent of the quantities identified in table at section (d) above shall be maintained on the aerodrome for vehicle replenishment purposes;

Note : Foam concentrate carried on fire vehicles in excess of the quantity identified in table at section (d) above can contribute to the reserve;

(p) A reserve supply of complementary agent, equivalent to 100 per cent of the quantity identified in table at section (d) above, shall be maintained on the aerodrome for vehicle replenishment purposes. Sufficient propellant gas shall be included to utilize this reserve complementary agent;

(q) Category 1 and 2 aerodromes that have replaced up to 100 per cent of the water with complementary agent shall hold a reserve supply of complementary agent of 200 percent;

(r) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply in shall be increased as determined by a risk assessment;

(s) The reserve foam and complementary agent shall be stored in an easy accessible room with proper ventilation. The reserve of foam and complementary agents shall be stored in the fire station. For foam concentrate and dry chemical powder, extremes of temperature shall be avoided and partly used containers shall be well sealed. Stocks shall be used in order of receipt. Conditions of storage shall be specified by the manufacturer.

Foam concentrate Avoid extremes of temperature. Use stocks in order of receipt. Keep concentrate in manufacturers’ containers or a suitable on-site bulk storage facility until required for use, where applicable. Where either foam concentrate drums, bladders or large above-ground tanks are used, they shall be suitably contained in case of a spill. Where more than one type of foam concentrate is in use, foam concentrate containers shall be suitably marked.

Dry chemical powders Use stocks in order of receipt. Replace and seal the lids of any partly used containers ensuring the powder is kept dry and free from contaminates.

(t) The expiry date of the foam and complementary agent shall be indicated on the different containers for the different stocks available;

(u) Evidence of certification of the qualification of a concentrate and certification of the foam meeting the performance level, shall be obtained from the supplier and shall be maintained at the RFF station;

(v) The water used for foam production shall be of good quality;

(w) Complementary agents shall be used mainly as a medium when fires are in an incipient stage, particularly fires involving undercarriage assemblies. They are also effective against fires in concealed or inaccessible locations and for running fuel fires, where foams are largely ineffective. Due regards shall be made to the problems that may arise when large quantities of complementary agents are discharged rapidly. A dense cloud of the agent may impede aircraft evacuation or rescue operations by limiting the visibility and affecting the respiration of those exposed to the effects.

They are particularly effective on concealed fires (e.g. engine fires) in aircraft freight holds and beneath wings, where foams may not penetrate and on running fuel fire situations, on which foams are ineffective. They are known as complementary agents because while they may have the capability of rapid fire suppression (when applied at a sufficient rate), it is generally necessary to apply a principal agent simultaneously or at least before flashback can occur in order to achieve permanent control;

(x) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply in above shall be increased as determined by, among others, the following considerations:

a) location of RFF service (may be remote);
b) availability of supplies;
c) delivery times; and
d) customs considerations.

(y) Vehicle foam tanks shall be kept full at all times when the vehicle is in operational service because partially filled tanks will create stability problems when the vehicle is cornering at speed. Furthermore, serious sludging problems can occur where protein foam is carried through oxidation and agitation if there is an air space above the surface of the foam. Where protein foam concentrates are used, the entire contents shall be periodically discharged and the entire system washed through to ensure that the tank does not contain stale protein foam.

(u) the availability of additional water supplies following an aircraft accident and details of the policy and procedures to be followed in the event of circumstances that requires isolation or depletion of supplies.

An aerodrome operator shall establish systems and procedures to ensure that additional water supplies at adequate pressure and flow are provided to ensure rapid replenishment of RFFS vehicles. The objective shall be to support the principle of continuous application of principal fire extinguishing agent (foam) to maintain a survivable environment around the immediate vicinity of an aircraft accident for longer than that provided for by the minimum quantities of water for foam production.

(v) details of the radio communication system to be provided.

The efficiency of an RFF service is significantly dependent on the reliability and effectiveness of its communication and alarm system. In addition, the successful conduct of the total firefighting and related rescue operation will be facilitated by the system for alerting and mobilizing other participating emergency support personnel. The importance of prompt and clear communications cannot be over-emphasized.

The aerodrome operator shall establish systems and procedures to ensure that:

(a) radio communication is provided with adequate and effective communication equipment;

(b) systems and equipment have an effective range which will ensure reception within all areas that the fire service may be required to operate;

(c) the following communication links shall be made available for ARFFS response:

1) direct communication between air traffic control (or other activating authority provided by the airport authority) and the airport fire station(s) to ensure the prompt dispatch of RFF vehicles in the event of an aircraft emergency;

2) communication between air traffic control and the RFF crews en route to, or in attendance at, an aircraft accident/incident;

3) communication between the fire station, or the main station, where more than one is provided, and the RFF vehicles;

4) communication between the RFF vehicles, including where necessary, a system to provide intercommunication between the crew members of an RFF vehicle; and

5) emergency alarm systems to alert auxiliary personnel and appropriate organizations located on or off the airport.

(d) Fire Station Communications

1) Air traffic control shall be linked with the main fire station by a direct telephone line not passing through any intermediate switchboard so as to avoid delays. This line is usually provided with a distinctive buzzer in the watchroom and is safeguarded against buzzer defects by a warning light. This line can be linked to the alarm system in the main and satellite fire station(s) so that the initiation of a call by air traffic control simultaneously alerts all personnel. The alarm system may also be used to activate RFF vehicle room doors. A separate switch for activating the alarm system shall be provided in each fire station watchroom;

2) Fire stations shall be provided with a public address system so that details of the emergency, giving location, type of aircraft involved, preferential routing for RFF vehicles, can be conveyed to crew members. Control of this system would normally be located in the master watchroom, which would also have a switch for silencing the alarm system to avoid any interference with the effective use of the broadcast facility;

3) A separate telephone circuit, for calls of a non-emergency nature, shall also be provided in each watchroom;

4) All telephone and radio equipment in each watchroom shall be regularly monitored for its serviceability and arrangements shall exist for emergency repair and maintenance of this equipment. The continuity of electrical supplies to fire stations shall be ensured by connection to secondary power supplies.

(e) RFF Vehicle Communications

1) RFF vehicles shall be equipped with two-way radio communications equipment, through which their movements can at all times be subject to direction by air traffic control;

2) The radio equipment on RFF vehicles shall accommodate communication between vehicles, en route to, and in operation at, an aircraft accident;

3) Standard operating procedures (SOP) explaining the use of the dedicated radio frequency shall be developed outlining why, when and how it shall be used;

4) Rescue boats or other specialized vehicles intended for use in water, swampy areas or other difficult terrain shall also be provided with two-way radio equipment. Special attention shall be given to the selection of units intended for use in marine applications, particularly to their protective containment systems; and

5) Direct communication between the RFF personnel and the flight crew during an emergency shall also consider use of hand signals.

(w) a statement describing the process for the testing, inspecting and maintenance of extinguishing media, rescue and medical equipment, specialist equipment, vehicles and radio communication systems.

(a) **Commissioning, maintenance, test and inspection**

The aerodrome operator shall establish systems and procedures to ensure that:

(i) immediately prior to, or on receipt of new or replacement vehicles, equipment, facility, plant or untested supplies, appropriate commissioning is carried out to ensure compliance with specification, and to verify function according to the design objectives or specifications;

(ii) in order to ensure that foam production by an RFFS vehicle is of an acceptable standard a Foam Production Performance Test (i.e. an “Acceptance Test”) is carried out:

1. when an RFFS vehicle is first acquired by the aerodrome operator for operational use at an aerodrome;

Note: Acquisition may mean the new or second-hand purchase, leasing or hire or donation of a RFFS Vehicle.

2. when significant maintenance, refurbishment or component replacement has been undertaken on an RFFS vehicle that could cause a change in the foam quality or production performance of the foam-making system. This includes a change of foam-making branches, nozzles or monitors. Only those parts of the system that could have been affected by the work undertaken or the component change need to be tested.

(iii) a system of preventive maintenance of rescue and fire-fighting vehicles is employed to ensure effectiveness of the equipment and compliance with the specified response time throughout the life of the vehicle. A preventive maintenance plan shall be derived to ensure maximum mechanical efficiency of the RFF vehicles. In this connection, due regard shall be made to the possible need to provide reserve vehicles to take the place of those which become temporarily unserviceable;

1. To ensure that the maintenance can be conducted correctly, the following shall be provided:

a) maintenance personnel;

b) maintenance procedures;

c) defect reporting system;

d) designated maintenance work areas;

e) tools;

f) spare parts; and

g) storage of maintenance records.

2. A maintenance programme shall take into account the following activities:

a) original equipment manufacturer (OEM) maintenance recommendations;

b) local environmental conditions, for example tropical heat versus cold winters;

c) national or local regulatory requirements — for example certification of pressure vessels, hoses, roadworthiness licences; and

d) regular performance testing.

3. All personnel conducting maintenance activities shall be appropriately skilled, trained and equipped to undertake the designated and required maintenance activities and shall the following skills:

a) heavy vehicle mechanical trade qualifications;

b) fire pumps and foam systems;

c) complementary agent systems;

d) hydraulics/pneumatics;

e) automotive electrical training;

f) self-contained breathing apparatus (SCBA)systems/breathing air compressors;

g) knowledge of regulatory requirements pertaining to the provision of RFF; and

h) knowledge of national or local regulations pertaining to maintenance activities.

Specialist training shall be initially provided by the manufacturer with the delivery of the first type of fire vehicle or item(s) of rescue equipment.

4. Maintenance procedures shall be implemented to ensure a standardized manner in which fire vehicles are maintained. Maintenance procedures shall cover:

a) activities to be undertaken to ensure that disruption to RFF services are minimized. For example; bringing reserve fire vehicles into operational service to maintain category levels, or conducting maintenance during breaks in aircraft movements where a vehicle may be taken out of service without affecting category levels;

b) the frequency of maintenance services;

c) activities to be undertaken at each type of maintenance service as recommended by the original equipment manufacturer (OEM). For example, visual check, inspections & measurements;

d) activities to be undertaken at each type of maintenance service as recommended by national or local regulations;

e) arrangements for technical support from the OEM or the OEM’s local agent;

f) spare parts that shall be held on site to enable regular maintenance to be conducted, for example, filters, belts, drier cartridges, lubricants, coolants, wiper blades;

g) generically common spare parts shall be held on site to minimize downtime, such as switches, light globes, relays, circuit breakers, bolts, nuts, washers, O-rings and seals;

h) arrangements with OEM and local suppliers for all other parts to ensure downtime is kept to a minimum;

i) tire replacement requirements;

j) environmental procedures including appropriate disposal procedures for old parts as well as used lubricants and coolants;

k) any special measures to ensure safety of maintenance personnel such as procedures for working at heights, confined space entry and working with high pressure liquids/gases; and

l) the method of reporting and documenting any defects that have been identified with the fire vehicles or rescue equipment by operational and maintenance personnel.

5. Maintenance Work Areas / Special Tools

Provision of a work area for maintaining RFF fire vehicles shall have due consideration to the following:

a) a sufficiently large enough area to work on and around the vehicle;

b) environmental protection such as trade waste interceptor pits or bunding;

c) lifting/jacking equipment;

d) wheel lifters/tire changing cages;

e) storage areas for lubricants, spare parts and tools;

f) storage of technical documentation; and

g) storage of maintenance records.

6. Performance Testing — Fire Vehicles

Regular performance testing shall be undertaken including quantitative checks of:

a) 0-80 km/h acceleration;
b) braking;
c) flow rate from high and low flow deliveries;
d) foam admixing percentages;
e) monitor throw; and
f) compressed air foam systems.

7. Rescue Equipment Requirement

a) all items — regular daily or weekly checks to ensure functionality;
b) breathing apparatus sets — maintained after every use and checked regularly when not used for safe operation;
c) BA air quality — regularly checked (there may be national or local standards that the air quality shall meet);
d) short lines/long lines (rescue lines) — not frayed and are in good repair;
e) portable fire extinguishers — full and charged with pressure;
f) fire hoses — inspected and pressure checked on an annual or six monthly basis to ensure that the hoses do not leak and the couplings are functioning and securely fitted;
g) nozzles/foam branches — inspected for damage;
h) rescue tools — inspected to ensure that there is no damage to components. Under high forcing loads, damaged components can be very dangerous if they fail;
i) general tools — inspected to ensure handles are not broken or damaged;
j) first-aid kits — inspected at least weekly to ensure that items are maintained at the correct stock levels; and
k) rescue tool box — checked to ensure all tools are present.

8. Maintenance Documentation

A complete set of maintenance documentation shall be delivered with the fire vehicle and rescue equipment during the procurement process. As a minimum this shall include:

a) operating procedures;
b) maintenance procedures;
c) fault diagnosis and troubleshooting;
d) adjustment procedures;
e) removal/replacement of parts and repairable assemblies;
f) instructions for disassembly and reassembly of repairable components;
g) tolerances, specifications and capacities;
h) illustrations and exploded views;
i) schematic drawings, for example, electrical wiring circuits, pneumatic circuits, chassis air circuits or hydraulic circuits;
j) special tools needed for repairing and adjusting;
k) spare parts catalogue providing exploded views of the entire fire vehicle; and
l) maintenance record keeping.

9. Inspection, maintenance and storage of protective clothing.

(iv) all equipment and supplies are regularly inspected, tested and undergo structured maintenance to assure reliability;

(v) consequential action is taken where an inspection has revealed a defect or deficiency;

(vi) all RFF vehicles equipped with foam-making equipment are formally tested at least once a year to ensure that the quality of foam production is maintained; and

(vii) foam proportioning systems are subjected to regular quality testing based on a recognised standard and checked for induction accuracy.

(b) **Foam production performance testing**

(i) The foam produced by an RFFS vehicle, or other such appliance, shall be of an acceptable quality and the delivery parameters such as monitor jet range and pattern are met and are maintained to the appropriate operational requirement;

(ii) Once the Foam Production System has been fully tested, and assuming no changes have been made, the in-service testing shall consist of periodic checks (as per maintenance manual) to ensure proportioning accuracy;

(iii) The Foam Production Performance Test shall confirm the following:

1. the induction percentage for all foam-making devices;

2. the foam solution discharge rates for all foam-making and complementary agent devices;

3 the ongoing capability of the foam production system;

4. the jet range of the main monitor; and

5. the spray pattern of the main monitor.

(iv) The following specifications of the foam concentrate shall be tested on a regular basis (as recommended by manufacturer):

1. *pH value:* neutral, between 6 and 8.5;

2. *viscosity:* shall not exceed 200 mm/s at its lowest temperature; and

3. *sedimentation:* when tested by sedimentation method, foam shall contain no greater that 0.5% of sediment.

(v) The different stocks of foam available shall be tested regularly using the Fire Test Method as indicated below and records maintained;

Fire tests	*Performance level A*	*Performance level B*	*Performance level C*
Nozzle (air aspirated)			
a) Branch pipe	*"Uni 86" Foam nozzle (See Appendix 3)*	*"Uni 86" Foam nozzle (See Appendix 3)*	*"Uni 86" Foam nozzle (See Appendix 3)*
b) Nozzle pressure	700 kPa	700 kPa	700 kPa
c) Application rate	4.1 L/min/m^2	2.5 L/min/m^2	1.56 L/min/m^2
d) Nozzle discharge rate	11.4 L/min	11.4 L/min	11.4 L/min
Fire size	≈ 2.8 m^2 (circular)	≈ 4.5 m^2 (circular)	≈ 7.32 m^2 (circular)
Fuel (on water substrate)	Kerosene	Kerosene	Kerosene
Preburn time	60 s	60 s	60 s
Fire performance			
a) extinguishing time	≤ 60 s	≤ 60 s	≤ 60 s
b) total application time	120 s	120 s	120 s
c) 25% reignition time	≥ 5 min	≥ 5 min	≥ 5 min

(vi) The frequency of the in-service tests shall be determined and conducted in conjunction with the vehicle maintenance provider. The foam specimen for checking the proportioning percentage can be collected during normal procedural "spot" tests or training; and

(vii) For vehicles equipped with foam monitors capable of producing foam whilst on the move, the tests shall include an assessment of this capability. Where both a high and low discharge capability has been provided on larger monitors, this provision shall be tested in line with manufacturer's guidance.

(x) details of the fire station(s) facilities and location.

(a) Facility requirements

The aerodrome operator shall establish suitable facilities, including training and assessment facilities, appropriate to the RFFS; and

(b) Fire station

(i) The aerodrome operator shall establish and ensure that the location of the fire station and vehicle positioning are based on minimising response times to areas where aircraft accidents and incidents may occur and have a maximum opportunity for monitoring the movement area. The location shall be free of obstructions or interference from facilities or uses, such as access roads, fuelling areas, and aircraft taxiing operations/parking areas;

(ii) The fire station shall be located so that the access for rescue and fire-fighting vehicles into the runway area is direct and clear, requiring a minimum number of turns;

(iii) All rescue and fire fighting vehicles shall normally be housed in a fire station. Satellite fire stations shall be provided whenever the response time cannot be achieved from a single fire station;

(iv) The location shall ensure that the vehicle running distances are as short as possible in relation to the runway the station is intended primarily to serve;

(v) The fire station shall be located such that the required response times can be achieved;

(vi) When a new station is to be provided, vehicle response trials shall be run to determine the optimum location in relation to potential accident sites. Due consideration shall be given to the future development plans of the aerodrome as these may increase the distances over which responses shall be made;

(vii) The placement of the watchroom in each fire station shall ensure the widest possible view of the movement area. In all fire stations there shall be a central point for the reception of emergency calls, from which fire vehicles may be dispatched for responses of all kinds and resources can be mobilized and directed. This shall be in the form of a watchroom, which shall be sited in a position which overlooks as much of the movement area as possible.; and

(viii) The fire station shall include at least the following:

1. adequate accommodation for the housing of vehicles as per the aerodrome category and for the conduct of in service (minor) maintenance. As a general rule a minimum clearance of 1.2 m shall be provided around each fire vehicle.;

2. domestic and administrative facilities for the personnel required to operate and direct these vehicles including locker room, mess room, washroom, drying room, with consideration to administrative rooms (offices), training facilities, and fitness facilities.

3. communications and alarm systems which will ensure the immediate and effective deployment of vehicles in any emergency;

4. facilities which can contribute to the efficiency of RFF services by preserving equipment and extinguishing media, ensuring its prompt availability and in providing test, inspection, maintenance and training opportunities. Storage space shall be required for fire hoses, with suitable racking and ventilation and may include hose repair equipment and the hose record board. Drying facilities for fire hose shall be required in certain climates and may be in the form of a drying tower or rack or an enclosed heating installation. Storage shall be required for extinguishing media, such as foam concentrate and complementary agents, and particular attention shall be given to ensuring that temperatures are kept within the levels specified for each agent. Suitable facilities for containment shall also be provided for stored foam concentrates in the event of spillage or leakage. Advice in respect of appropriate storage temperatures shall be obtained from suppliers. A general workshop, where maintenance and repairs can be performed, will make a valuable contribution towards the efficient and economical operation of the service. Ideally, a fire station shall be provided with a hydrant capable of delivering water at an appropriate rate to minimize replenishment times. Appropriate facilities for the testing of fire hose and vehicles, for the rapid replenishment of vehicles after use and for training purposes shall be readily available. Pumping facilities for transferring foam concentrates from containers to fire vehicles expeditiously shall be made available. Facilities for the expeditious replenishment of complementary agents for fire vehicles shall be made available; and

5. The forecourt shall be of sufficient size to permit fire vehicles to manoeuvre and shall be provided with floodlighting for night-time activities.

(y) details of the grid maps to be used by the RFFS, external emergency services and ATS in the event of an aircraft accident or incident on or in the vicinity of the aerodrome. Refer to paragraph 3.4.3 (8).

(z) Alerting system

1. The aerodrome operator shall establish a procedure for monitoring the aircraft movement areas for the purpose of alerting RFF personnel including how RFF personnel are alerted throughout the range of functions (training, extraneous duties, etc.) and geographical locations from where they may be expected to respond;

2. The aerodrome operator shall establish:

(i) an audible alerting system for rescue and fire-fighting personnel, capable of being operated from that station, is provided at the fire station, any other fire station on the aerodrome and the aerodrome control tower; and

(ii) a discrete communication system is provided linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and fire-fighting vehicles.

(iii) how the adequacy of the response time capability throughout their functions and locations is tested, monitored and maintained. Refer to paragraph 3.5.2.2(b)(5)(b); and

(iv) how RFF personnel engaged in extraneous duties are managed to ensure that response capability is not affected.

(aa) Extraneous duties

(i) No extraneous duty shall create conditions likely to compromise individual or crew performance or introduce additional hazards;

(ii) RFFS personnel designated as part of the minimum level for response, and who are engaged on extraneous duties, shall be capable of meeting the response time objective whilst carrying out those duties; and

(iii) Other than routine refuelling of fire-fighting equipment, personnel designated as part of the minimum riding strength shall not be engaged on duties involving the handling of fuel.

(ab) where the aerodrome operator expects the RFFS to respond to aircraft accidents landside, the policy and procedures which shall include management of the effects on continued aircraft operations.

(ac) procedures indicating how accidents within 1000 m of the threshold of each runway and other difficult environs in the vicinity of the aerodrome, are to be accessed.

(ad) where the aerodrome operator expects the RFFS to respond to structural fires or domestic fires or special services, procedures for managing the impact of this upon the normal aircraft RFF response.

(ae) the provider's arrangements for ensuring the adequacy of responses in abnormal conditions i.e. Low Visibility Procedures including the following:

a) enable fire station personnel to remain informed on current visibility conditions at the airport;

b) determine the response times of ARFFS during adverse weather conditions and, where possible, seek to improve them;

c) encompass in the training programme a thorough knowledge of the airport and its immediate vicinity; and

d) place the RFF personnel on standby alert status when the airport visibility has deteriorated below a predetermined level established by the airport authority.

(af) procedures to notify changes in operational status with the aeronautical information services responsible for the AIP and the Authority.

Notification of facility status

(a) the aerodrome operator shall establish systems and procedures to notify changes in the operational status or availability of each facility or service listed in the RFFS manual; and

(b) The procedures shall ensure that:

(i) operational information for each of the RFFS is forwarded to the aeronautical information service responsible for the AIP; and

(ii) the Air Traffic Services are notified without delay of any change in operational status of the facility or service that may affect the RFF category and information concerning any change in operational status is forwarded to the aeronautical information service for promulgation by NOTAM.

(ag) the procedures regarding the keeping of a watchroom log.

Watchroom log

(a) An aerodrome operator shall ensure that a logbook, with sequentially numbered pages, is kept at each RFFS station;

(b) The procedure shall ensure that:

(i) the logbook is maintained by the senior person on duty, or the person on watch at a nominated operating position;

(ii) the logbook is maintained throughout the hours of watch of the station;

(iii) all entries include the time of entry;

(iv) the person responsible for maintaining the logbook signs On Watch, and effects transfer of responsibility by successive On Watch entries;

(v) logbook entries are:

1. in chronological sequence and in ink;

2. without erasure, defacement, or obliteration; and

3. corrected by drawing a single line through the erroneous information and initialing the correction.

(vi) actual times of opening and closing watch are recorded in the logbook, together with the reason for every variation from published hours of service;

(vii) the operational scale of service is stated at the beginning of each watch and any changes in the operational status recorded and that the operational status and any changes to it is confirmed by the officer in-charge of the watch signing the log; and

(viii) logbooks are retained for a period of 5 years from the date of final entry.

(ah) details of the emergency access roads and gates provided.

Emergency access roads

(a) Emergency access roads shall be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times. Particular attention shall be given to the provision of ready access to approach areas up to 1 000 m from the threshold, or at least within the aerodrome boundary. Where a fence is provided, the need for convenient access to outside areas shall be taken into account.

Note. Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed;

(b) Emergency access roads shall be capable of supporting the heaviest vehicles which will use them, and be usable in all weather conditions. Roads within 90 m of a runway shall be surfaced to prevent surface erosion and the transfer of debris to the runway. Sufficient vertical clearance shall be provided from overhead obstructions for the largest vehicles;

(c) When the surface of the road is indistinguishable from the surrounding area, edge markers shall be placed at intervals of about 10 m;

(d) Where an emergency access road, normally provided with a gate or frangible barrier, leads emergency vehicles on to a public road, the exterior face of the gate or barrier shall be marked to indicate its purpose, with a prohibition of vehicle parking in its immediate vicinity. Suitably designed corners, with adequate radii for the manoeuvring of RFF vehicles, shall be provided to facilitate the departure of responding vehicles through the airport fence emergency gates or barriers;

(e) The combined facilities of emergency access road and gate or barrier shall be subject to regular inspection and physical tests where necessary to prove the proper functioning of any mechanical element, to ensure their availability in an emergency; and

(f) If any gates are non-frangible and secured by other mechanical means, access through the gate(s) shall be readily available, such as, but not limited to, the provision of keys to the gates to be kept in the RFF vehicles.

(ai) details of the procedures regarding the control of documentation.

Documentation

(a) RFFS personnel shall have immediate access to current copies of the relevant technical manuals and any other document necessary for the provision and operation of the services listed in its RFFS Manual.

Note: Documents may be in hardcopy or electronic. Electronic documents shall be accessible to all staff requiring access.

(b) The aerodrome operator shall establish a procedure to control all the documentation required by paragraph (a) which shall ensure that:

(i) all incoming documentation, including amendments, is reviewed and actioned as required by authorised personnel;

(ii) all documentation is reviewed and authorised before issue;

(iii) current issues of all relevant documentation are available to personnel at all locations where they need access to such documentation for the provision and operation of RFFS;

(iv) all obsolete documentation is removed promptly from all points of issue or use;

(v) any obsolete documents retained as archives are suitably identified as obsolete;

(vi) changes to documentation are reviewed and approved by authorised personnel who shall have access to pertinent background information upon which to base their review and approval;

(vii) safety-significant changes are assessed in accordance with the safety management system; and

(viii) the current version of each item of documentation can be identified to preclude the use of out-of-date editions.

(aj) details of the procedures regarding the maintenance of records.

Records

(a) An aerodrome operator shall establish systems and procedures to identify, collect, file, store securely, maintain for at least 5 years, access and dispose of records necessary for:

(i) the operational provision of RFFS; and

(ii) the purpose of assisting with any accident or incident investigation.

(b) the aerodrome operator shall compile, maintain and retain records in the following areas, but not limited to:

(i) RFFS personnel:

1. training received; and

2. competency and performance evaluations.

(ii) RFFS vehicle(s):

1. commissioning/initial performance testing;

2. initial certification and recurrent foam system testing;

3. initial certification and recurrent complementary agent system testing;

4. regular inspection; and

5. maintenance.

(iii) Ancillary equipment:

1. maintenance;

2. inspections; and

3. tests.

(iv) Fire-fighting agents.

1. foam certification of conformity to requirements; and

2. complementary agent conformity to ISO,

(v) Watchroom log;

(vi) Incidents/accidents reports;

(vii) Safety Management reports/assessments;

(viii) Faulty equipment reporting and corrective action report forms; and

(ix) Any other record required by the RFFS.

(ak) details and procedures for reporting faulty equipment and remedial actions.

(al) details of the systems, procedures, and programmes regarding the safety management system. Refer to paragraph 3.10.

The safety management system shall be described in relevant documentation and shall be approved by the Authority.

(am) procedures to control, amend and distribute the manual.

(an) description of facilities and systems for rescue at sea. Procedures shall include, amongst others:

(a) arrangement with National Coast Guard;

(b) alerting procedures;

(c) radio communication systems;

(d) facilities available for rescue at sea; and

(e) maintenance and inspection procedures.

Where airports are situated adjacent to large bodies of water such as rivers or lakes, or where they are located on coastlines, special provisions shall be made to expedite rescue.

(ao) Aerodrome Water Supply

(a) Supplementary water supplies, for the expeditious replenishment of RFF vehicles, shall be prearranged. The objective of providing additional water supplies at adequate pressure and flow is to ensure rapid replenishment of aerodrome RFF service (RFFS) vehicles;

(b) Additional water to replenish vehicles may be required in as little as five minutes after an accident, therefore an analysis shall be conducted to determine the extent to which the replenishing vehicles and their associated storage and delivery facilities, shall be provided. When conducting the analysis, the following factors are items which shall be considered but not limited to:

a) sizes and types of aircraft using the aerodrome;
b) the capacities and discharge rates of aerodrome fire vehicles;
c) the provision of strategically located hydrants;
d) the provision of strategically located static water supplies;
e) utilization of existing natural water supplies for firefighting purposes;
f) vehicle response times;
g) historical data of water used during aircraft accidents;
h) the need and availability of supplementary pumping capacity;
i) the provision of additional vehicle-borne supplies;
j) the level of support provided by local authority emergency services;
k) the pre-determined response of local authority emergency services;
l) fixed pumps where these may provide a rapid and less resource-intensive method of replenishment;
m) additional water supplies adjacent to airport fire service training areas; and
n) overhead static water supplies.

(ap) Standby positions

One or more standby positions on the movement area shall be designated. The purpose of standby positions is to pre-position the RFF vehicles on selected locations of the movement area so as to minimize the response time in case of full emergency, local standby or when the response time is seriously affected by the location of the fire station or other physical characteristics of the airport. Location of the RFF vehicles on the standby positions shall not:

a) interfere with or disrupt the operation of the electronic navigational equipment;

b) penetrate the obstacle clearance surfaces or interfere with normal aircraft taxiway routes; and

c) increase response time to any part of the movement area.

The standby positions shall be indicated on the Grid Map.

(aq) Aerodrome Emergency Planning

(a) Aircraft accident

ARFFS shall be provided information on the location of the accident and all other essential details. These details shall as a minimum include:

— type of aircraft;
— type of accident/incident; and
— time and (grid) location of the accident/incident.

Subsequent calls may expand this information by providing details on the number of occupants, fuel on board, aircraft operator, if appropriate, and any dangerous goods on board, including quantity and location, if known.

(b) Full emergency

ARFFS shall be notified to stand by at the predetermined standby positions. These details shall ideally include:

— type of accident/incident;
— type of aircraft;
— fuel on board;
— number of occupants, including special occupants: handicapped, immobilized, blind, deaf;
— nature of trouble;
— runway to be used;
— estimated time of landing; and
— any dangerous goods on board, including quantity and location, if known.

(c) *Local standby*

ARFFS shall be called to stand by at the predetermined standby positions and shall be provided with all essential details. These details shall include:

— type of accident/incident;
— type of aircraft;
— fuel on board;
— number of occupants, including special occupants
— handicapped, immobilized, blind, deaf;
— runway to be used;
— estimated time of landing;
— aircraft operator, if appropriate; and
— any dangerous goods on board, including quantity and location, if known.

(ar) Aircraft Firefighting and Rescue Procedures

(a) *Features Common to All Emergencies*

1. Upon notification from air traffic control announcing an aircraft emergency, the required equipment is dispatched to the scene of the accident or to the predetermined standby positions. Once the call has been received, all subsequent RFF action will be the responsibility of the airport RFF service officer-in-charge;

2. Runway standby positions for RFF vehicles in anticipation of an emergency may be predetermined, and documented to provide the best possible coverage;

3. For emergencies involving gear malfunction or tire difficulty, there is always a possibility of the aircraft veering off the runway and possibly hitting emergency equipment. In such cases, it is preferable for the emergency equipment to be located near the point of touchdown and then to follow the aircraft down the runway after ground contact;

4. Response by RFF equipment to off-aerodrome accident(s) shall be done in accordance with off aerodrome response procedures and existing mutual aid agreement(s). Communication shall be maintained between RFF vehicles, the fire station and air traffic control. Wherever possible, mutual aid resources shall monitor predetermined frequencies;

5. Additional resources shall be dispatched when the accident site is known to be beyond normal fire protected zones (underground water mains and hydrants) or where water relays may be required. Prearrangements shall be made to assure that additional supplies of extinguishing agents are brought to the accident scene;

6. Pre-incident planning of off-aerodrome conditions shall be made to prevent delays at time of emergency. Significant factors shall be charted on the grid maps carried in RFF vehicles;

7. All personnel operating directly in the involved area of the crash shall be provided with adequate protective clothing. The training of rescue personnel shall stress the value and the limitations of their protective equipment to avoid a false sense of security and to recognize that they could unwittingly lead the occupants of the aircraft through a dangerous atmosphere;

8. Lines to be used in fire attack shall be charged after equipment is properly positioned. If no fire is visible, all equipment shall be staged for immediate response if necessary;

9. In case any spill of a flammable liquid occurs without fire breaking out, it is important to eliminate as many ignition sources as possible while the spill is being neutralized or covered with foam. Engine ignition sources shall be made inert or cooled. There may be enough residual heat in turbine aircraft engines to ignite fuel vapours up to 30 minutes after shutdown or 10 minutes on piston engines;

10. A continuous water supply is essential and is usually not available at all points. Provisions shall be in place to ensure that the required fire flow be maintained. It is important that prearrangements also include additional emergency resources;

11. Rescue operations shall be accomplished through regular doors and hatches wherever possible but RFF personnel shall be trained in forcible entry procedures and be provided with the necessary tools.

Note. — In a number of cases, misuse of forcible entry tools has resulted in unnecessary fuel spills increasing the fire hazard;

12 Rescue of aircraft occupants is a priority and shall proceed with the greatest possible speed. Evacuation of injured occupants from a dangerous environment in the fire-threatened area shall be done with care so as not to aggravate their injuries;

13. Broken fuel, hydraulic fluid (flammable type), alcohol and oil lines shall be plugged or crimped when possible to reduce the amount of spill and extent of fire;

14. If the source of heat and fire cannot be controlled, fuel tanks exposed but not involved shall be protected by appropriate agents to prevent involvement or explosion;

15. Aircraft windows maybe used for rescue or for ventilation. Some are designed to be used as emergency exits. On all aircraft these exits are identified and have latch release facilities on both the outside and inside of the cabin. Cabin doors may be used as emergency exits except when they are not operationally available. With some exceptions these doors open outwards. When exits are used for ventilation they shall be opened on the downwind side; and

16. The “No Smoking” rule shall be rigidly enforced at the scene of the accident and in the immediate vicinity.

(b) *Fighting Aircraft Fires*

The prime mission of the airport RFF service is to control the fire in the critical area to be protected in any post-accident fire situation with a view to permitting the evacuation of the aircraft occupants. Equipment and techniques recommended are generally directed toward this goal.

1. *Class A fires*

Fires involving upholstery and similar solid combustibles are Class A materials, which require cooling and quenching for extinguishing. It is advantageous to use water, preferably a water fog, on fires of this type;

2. *Hot brakes and wheel fires*

The heating of aircraft wheels and tires presents a potential explosion hazard, greatly increased when fire is present. In order not to endanger the members of the airport RFF service needlessly, it is important to distinguish between hot brakes and brake fires. Hot brakes will normally cool by themselves without the use of an extinguishing agent. Most aircraft operating manuals for propeller-driven aircraft recommend that flight crew members keep the propeller forward of the wheel turning fast enough to provide an ample cooling airflow. Most wheels of jet aircraft have fusible plugs, which may melt and deflate the tire before dangerous pressures are reached. When responding to a wheel fire, RFF members shall approach the wheels with extreme caution in a fore or aft direction angle and never from the side in line with the axle. Since the heat is transferred to the wheel from the brake it is essential that the extinguishing agent be applied to this area.

Too rapid cooling of a hot wheel, especially if localized, may cause explosive failure of the wheel. Solid streams of water may be used as a last resort. Water fog or indirect solid stream can be used to cool hot brakes. Dry chemical is an effective extinguishing agent but is not recommended as an effective agent on this type of fire.

3. *Rocket engine fires*

Some civil and military aircraft are equipped with auxiliary rocket engines to provide standby thrust from emergency or for jet assisted take-off (JATO) use. These are usually mounted in the nacelles, in the fuselage tail cone, in the belly of the fuselage, or on the sides or bottom of the fuselage.

If a fire surrounds the rocket engines, caution shall be used in approaching the area. No attempt shall be made to extinguish the engines if they shall ignite. Water or foam may be used effectively to control the fire around the rocket motors, but they cannot be extinguished because of the self-contained oxidizer in the propellant. They burn very intensely for a short duration; however, they will normally not contribute significantly to the damage, since their chambers are so well insulated that it takes several minutes of very intense heat to ignite them. This heat will normally have done irreparable damage or caused fatalities before ignition of the rocket engines occurs.

If fire does not occur, igniters and ignition cables shall be removed from unexpended rocket engines on the crashed aeroplanes by appropriately trained personnel as soon as possible to reduce the possibility of inadvertent ignition from stray voltage entering the ignition wiring.

4. *Confined engine fires (piston)*

When engine fires are confined within the nacelle, but cannot be controlled by the aircraft extinguishing system, clean agents shall be applied first as these agents are more effective than water or foam inside the nacelle. Dry chemical may be used but may cause further damage to the aeroplane. Foam or water spray shall be used externally to keep adjacent aircraft structures cool. The propellers shall be approached with caution and never be touched, even when at rest.

5. *Confined turbine engine fires (jet)*

Fires confined to the combustion chambers of turbine engines are best controlled when the flight crew is in a position to keep the engine turning over and it is safe to do so from the viewpoint of aircraft evacuation and other safety considerations. Firefighters will have to stand clear of the exhaust but may have to protect combustibles from exhaust flames. Fires outside the combustion chambers of turbine engines but confined within the nacelle are best controlled with the aircraft built-in extinguishing system. If the fire persists after the built-in system has been expended and the turbine has shut down, a clean agent may be used to attempt extinguishment. Dry chemicals may be used but may cause further damage to the aeroplane.

Foam or water spray shall be used externally to keep adjacent aircraft structures cool. Foam shall not be used in the intake or exhaust of turbine engines unless control cannot be secured with the other agents and the fire appears to be in danger of spreading.

RFF personnel shall stay at least 10 m from the front and side intake of a turbine engine to avoid being ingested.

Remain up to 500 m from the rear depending on the size of the aeroplane to avoid the jet blast danger area.

6. *Titanium fire control*

Some engines have titanium parts which, if ignited, cannot be extinguished with the conventional extinguishing agents available to most RFF crews. If these fires are contained within the nacelle, it shall be possible to allow them to burn out without seriously threatening the aircraft itself as long as:

a) there are no external flammable vapour-air mixtures which could be ignited by the flames or hot engine surfaces; and

b) foam or water spray is available to maintain the integrity of the nacelle and surrounding exposed aircraft structures.

7. Fire situations involving rear mounted aeroplane engines

Engines mounted on the rear fuselage areas of aircraft or in association with the vertical stabilizer present special firefighting problems. In some cases, where the engines are mounted on the sides of the fuselage, they may have fire access panels which are so situated as to preclude the complete entry of the nozzles on extending applicators on fire extinguishing apparatus.

Another problem arises due to the height of these engines above ground level. Heights of up to 10.5 m may be encountered and these will require the provision of ladders, elevated working platforms on fire appliances and extensible applicators for delivering suitable extinguishing agents. One further aspect to be considered is that personnel and vehicles operating at an engine fire, shall not position themselves immediately below the engine where they may be at risk from running fuel, melted metal or ground fire situations. Operating positions outboard, in front, or to the rear, of engines will permit extinguishing agents to be delivered provided that there is a suitable applicator or the range and pattern of the discharge can deliver the chosen agent effectively.

The choice of the extinguishing agent to be used will be a matter for local decision but, as with all firefighting, the operational objective shall be for rapid fire control and for the minimum amount of consequential damage as a result of firefighting activities. Some agents, notably clean agents, dry chemical powder and, to a lesser extent, CO_2, can achieve fire control in the screened areas within an engine without any contamination of the various components and ancillary systems. They are effective on fires involving fuels and electrical equipment as well as on running fuel situations which may produce fires at ground level. Where an engine fire situation has developed, priority will be given to exposures. It is important to inform aircraft operators of the nature of the agent used when the incident is concluded so that they may take preventive action against corrosion or other effects as the situation may require.

8. *Magnesium fire control*

The presence of magnesium alloys in aircraft structures introduces an additional problem to fire extinguishment in situations where this metal becomes involved in an aircraft fire. The form and mass of magnesium-based components in normal airframes is such that ignition does not occur until there has been considerable exposure to flame but exceptions occur in the thin forms of magnesium found in some aircraft power plant and landing gear components.

Magnesium fires may be attacked in their incipient stages by extinguishing agents specifically designed for combustible metal fires, but where a large mass of magnesium becomes involved the application of large volumes of coarse water streams provides the best ultimate control method. Attack by water streams is undesirable where the primary fire control technique is with foam as the water streams would damage the foam blanket. Following completion of rescue and all possible salvage of effects, it is advisable to apply coarse water streams to still-burning magnesium components even if the immediate result might be a localized intensification of flame and considerable sparking.

(c) Rescue Tactics and Associated Equipment Requirements

1. Rescue Tactics

Before attempting to specify the tactics and equipment to be used in rescue operations following an aircraft accident, it will be necessary to identify the tasks to be performed.

First, the term *rescue* shall be taken to include protection of the routes followed by occupants of the aircraft who are able to escape from the aircraft.

The activities external to the aircraft may include firefighting, the blanketing of fuel wetted areas adjacent to the aircraft, the assistance in the effective use of the emergency escape equipment deployed from the aircraft and the provision of lighting where this would expedite the evacuation of the aircraft and the assembly of its occupants in a safe area. It will be obvious that entry to the aircraft at this time shall not be attempted by any of the routes which are in use by escaping occupants. It will also be obvious that evacuation from the aircraft and any operations within the fuselage cannot be conducted effectively if a fire situation exists which imperils the occupants or the rescue forces. While the rescue of all occupants may be considered as the primary objective, the overall requirement is to create conditions in which survival is possible and in which rescue operations may be conducted. For this reason, it may be essential to commence firefighting operations before attempting to rescue any one of the occupants, as failure to suppress the fire or render a fuel wetted area safe from fire may preclude the survival of everyone aboard.

Second, the saving of those occupants unable to make their escape without direct aid may be a long and arduous task, involving the use of specialized equipment and personnel other than those primarily provided for RFF purposes. The support for the primary rescue element may come from medical teams, from the aircraft operator's sources and from externally based emergency services who respond to aircraft emergencies. During this phase, it will be imperative to maintain fire security inside and outside the aircraft and this may entail the periodic reapplication of the foam blanket. Additionally, there may be a requirement to ventilate the fuselage to remove smoke and other toxic material providing a more survivable atmosphere and for rescue operations. Activities in the area shall be coordinated by the on-scene commander.

A precautionary blanketing of the fuel covered area will be a priority task for the first arriving RFF vehicle(s).

Protection shall be available when opening doors and windows of aircraft for evacuation to guard against and maintain escape paths in the event there is a sudden outbreak of fire.
Consideration shall be given to the tools and specialized equipment that shall be carried on the RFF vehicle(s).

With the arrival of additional vehicles, the crew of the first vehicle will become available to assist in other duties. Operational experience indicates that there are three main requirements once the major fire situation has been controlled or the critical area around the aircraft has been secured. These are:

a) Entry of rescue teams. Each team usually consisting of two firefighters to assist occupants from the aircraft. As no two accidents present the same problems, members of a rescue team shall be trained to operate both singly and as a team. They shall be equipped to extricate trapped persons and to conduct all of their operations with due regard to the preservation of evidence which may be of significance in any post-accident investigation. It may be necessary to provide respiratory protection and communications equipment in the initial stages of the rescue operation;

b) to provide firefighting equipment within the aeroplane capable of extinguishing or cooling cabin trim and furnishing materials which may have become involved. Water-spray equipment has been found to be the most effective medium for this task; and

c) to provide lighting and ventilation equipment within the aircraft.

These three tasks are not specified in order of priority and if a fire situation exists within the aircraft it will be essential to control this before any other operation can commence. Similarly, if there is no fire but trim and upholstery materials are decomposing because of residual heat, the decomposition shall be stopped by the use of water-spray and the environment made habitable by natural or induced ventilation.

2. *Post-accident ventilation*

In aircraft accident situations, where a fire situation has been controlled or extinguished, the interior of the aircraft may be filled with smoke or the bi-products of decomposing materials. It is important to create a survivable atmosphere within the aircraft as soon as is practicable, to protect any occupants who may be unable to escape and to facilitate search and rescue operations by RFF personnel. Smoke and fumes will impair vision, make movement difficult and may rapidly prove fatal to all occupants. If making entry into the aircraft, self-contained breathing apparatus (SCBA) shall be worn; ventilation of the aircraft is the only satisfactory means of creating a survivable atmosphere.

Ventilation can be achieved by removing the smoke or fumes which are unacceptable or by admitting fresh air which will displace the smoke or fumes to progressively improve the environment. For either of these methods, it would, in suitable circumstances, be possible to use natural ventilation, by opening the doors and windows of the aircraft on the upwind and downwind sides, thus permitting a flow of air through the aircraft. The moveable portions of flight deck windows can also be used provided that the door to the flight deck is kept open.

The limitations of natural ventilation are that there may be smouldering materials outside the aircraft on the upwind side which will contaminate the airflow to the aircraft. A similar situation may arise where there are fuel-contaminated surfaces on the upwind side or where concurrent fire suppression activities are employing dry chemical powder or vaporizing liquid agents.

Mechanically-induced ventilation can overcome these problems in most cases. A suitably designed unit can be sited at a point where it receives clean air which is then delivered to the aircraft. Portable fans (smoke ejectors) may be carried on RFF vehicles. There are several types of equipment which may be used for mechanically-induced ventilation, including exhaust or ejector devices, some driven by electric motors or gasoline-powered engines. Some of these have to be suspended in doorways or at windows by means of an adjustable bar.

Whenever ventilation is introduced, there will be the risk of promoting fire in any smouldering materials within the aircraft or at any point external to the aircraft where there is an accelerated airflow. Personnel equipped with charged hose lines terminating in hand-controlled water-spray nozzles shall be available to meet any sudden outbreak of fire.

3. Rescue equipment requirements.

In reviewing the equipment required for use by rescue personnel, based on the operational duties discussed above, the following items shall be available:

a) Lighting equipment, preferably operating from a portable generator and serving one or more pieces of lighting apparatus. The requirement for illumination will include both area lighting (flood lights) and smaller units to be employed at working locations. Caution shall be used when operating portable power sources in a fuel vapour atmosphere and when operating with electricity in a wet environment;

b) Power-operated tools, capable of being operated from a portable power source. The form of power to be used is a matter for local determination but ideally a common source shall serve all powered tools, including a rotary saw for major cutting and a reciprocating saw or percussion operated chisel for more precise cuts, including those which may be made close to a trapped person. The provision of alternative cutting devices or the use of a vehicle-mounted power source is not excluded provided any alternative offers equivalent operational facilities. There is an array of battery-powered hand tools available today;

c) Hand tools, including wire and bolt cutters, screw-drivers of appropriate sizes and designs, crowbars, hammers and axes. The full extent of hand tool requirements shall be related to the types of aircraft operating and the availability of trained support personnel;

d) Forcing equipment, usually hydraulically operated, for bending, lifting or cutting operations. It is usual to employ adapted industrial kits which can be assembled from a selection of components to provide a variety of lengths of tubular shaft on which the hydraulic ram attachment may exert a force;

e) Respiratory protection, which may consist of an SCBA;

f) Communication equipment, telephones and radios operating on the frequency allocated to the airport RFF service;
g) Miscellaneous items, including wedges, plugs for fuel lines, shovels, grab-hook or pike-pole, lines (cordage), and ladders of appropriate type and length, related to the aircraft;

h) Charged hand-line;

i) Equipment capable of delivering a fresh air supply; and

j) Medical first-aid equipment, ideally consisting of pre-packaged wound dressings in protective containers, scissors, adhesive dressings and burn dressings. Included in this category may be foil blankets and carrying sheets. Stretchers are difficult to handle in confined spaces but the provision of spine boards may be of value in handling seriously injured persons.

4. *Coordination of flight crew members and RFF personnel*

Where regular means of radio communication cannot be established, it is advisable that the RFF personnel report to the left side of the aircraft nose and establish direct voice communication with the pilot or flight crew. It may be necessary to resort to hand and arm signals to relay the information;

5. *Aircraft fire warnings*

Since it is often impossible for the crew members to make an accurate appraisal of aircraft fire warning indicators, it is advisable to bring the aircraft to a complete stop and allow the RFF personnel to inspect the area involved, prior to parking. This inspection can usually be greatly enhanced by the use of thermal imaging equipment without having to open aircraft compartment doors;

6. *Engines running*

It may be necessary to keep at least one engine running after the aircraft has come to a stop in order to provide lighting and communications aboard the aircraft. This will hamper rescue operations to some extent and consideration shall be given to this problem. On reciprocating and turbo propeller engines, extreme care shall be exercised by personnel on the ground to remain clear of the propeller arc. On turbo-jet engines, extreme care shall be exercised in the immediate area ahead and for a considerable distance behind the engine;

7. *Equipment positioning*

Wind conditions, terrain, type of aircraft, cabin configurations and other factors dictate approaches. For this reason, it is necessary for flight crew members to inform ARFFS personnel regarding the particular aircraft in question. On combined cargo-passenger aircraft, the airport emergency crews shall be notified of cabin configurations, since some cargo areas extend as far aft as the over-wing exists, making them unavailable for emergency evacuation.

8. *Tactical decision-making*

Tactical decision-making starts at the time when the alert tone is sounded and continues to be made both while en route and during initial approach to the scene. Size-up (what is happening / what is about to happen / what needs to be done) and correct tactics will need to be implemented without delays. A tactical plan for positioning RFF vehicles for various aircraft applicable to that aerodrome shall be documented, known to RFF personnel and practiced as part of an ongoing training programme. As part of the size-up process the incident commander would decide whether the tactical plan needs changing. RFF apparatus and other responding vehicles shall be positioned correctly if RFF operations are to be successful. Because RFF apparatus often respond single file, the first fire apparatus to the accident site often establishes the route for other vehicles and may dictate the approach into their ultimate positions. In positioning apparatus, first-arriving crews and the incident commander shall follow certain guidelines:

a) Approach the scene with extreme caution. Watch for evacuating occupants, wreckage debris, fuel ponding, and other hazards. Avoid driving through any smoke which obscures your vision and potential evacuee’s. Avoid driving over any aircraft wreckage;

b) Terrain and slope of the ground shall be considered, direction of the wind prior to entering a crash site. You shall attempt to position vehicles uphill and upwind to avoid fuel and vapours which tend to gather in low-lying areas;

c) Do not block the entry or exit areas which emergency vehicles may need to use;

d) Initial position of vehicles shall be to protect egress routes of evacuating aircraft occupants;

e) Ideally, vehicles shall be positioned so they can be repositioned in the event of reflash or on direction of the incident commander;

f) Vehicles shall be positioned so turrets can cover a maximum amount of the aircraft fuselage;

g) The incident commander shall consider what is happening, what is about to happen and what to do to preserve life and property; and

h) Consideration shall be given to preserving the accident site.

9. *Evacuation*

The final determination regarding evacuation from the aircraft shall be made by the pilot-in-command with input from the RFF incident commander.

An unnecessary evacuation may be prevented by RFF personnel communicating with the flight crew and giving the flight crew a report on exterior conditions. It is important to remember, once an evacuation is initiated it cannot be stopped. Most engines, wheel assembly, and other minor exterior emergencies, can be controlled by RFF personnel without requiring an evacuation endangering the aircraft occupants. An unnecessary evacuation can endanger and injure the evacuees. The decision to evacuate is always ultimately the call of the pilot-in command. RFF personnel shall not impede the evacuation and shall not attempt to enter the fuselage but instead provide assistance and be prepared to assist those not capable of self-evacuation.

Nearly all aircraft are equipped with emergency evacuation equipment and the crew members shall be competent in the use of this equipment. Some of the RFF personnel carry emergency aircraft evacuation stairs and in such cases, the crew members shall be informed of the availability of these stairs.

Where evacuation slides are in use, they shall not be disturbed unless they are damaged. If they have not been activated, or if they have been damaged, evacuation stairs shall be placed in use. These stairs could also prove beneficial in evacuation off wing surfaces where the distance from the wing to the ground is excessive.

Normal evacuation routes may include both over-wing window exits and accessible doors. The use of overwing exits presents hazards if the aircraft is in the normal position with gear extended or collapsed. The distance to the ground from the wing surfaces may be excessive and cause serious injury to those evacuating from the aircraft. Leading edge wing evacuation shall be considered where fire may block the normal evacuation off the trailing edge of the wings. It is recommended that only the aircraft doors equipped with stairs or slides be used where immediate life safety is not a factor.

(d) Accidents Involving Dangerous Goods

1. If an in-flight emergency occurs, the pilot-in-command shall inform the appropriate air traffic services unit, for the information of aerodrome authorities and RFF services, of any dangerous goods on board;

2. As a condition for transporting dangerous goods by air, the Technical Instructions prescribe certain actions that shall be taken to advise transport workers and emergency response personnel of the hazards presented by the dangerous goods transported. These hazards are communicated principally through markings and labels applied to the package of dangerous goods and through the provision of certain information in transport documents that accompany a shipment.

3. Fires involving radioactive materials shall be handled in the same manner as fires involving toxic materials. Standard protective clothing and respiratory protection provides some protection against radioactive contamination but not, however, from some direct radiation effects. Fires and the air currents they create, and the use of foam, water or chemicals to suppress fire, can spread radioactive materials around the accident site. RFF personnel working at an aircraft incident scene or impact area shall be utilizing the appropriate personal protective equipment (PPE) and receive the appropriate level of decontamination immediately after their duties are completed. In the event radioactive materials are suspected, the following general procedures shall be followed:

a) the nearest authority concerned with atomic/radioactive energy to the accident site shall be notified immediately. They may be able to respond to the accident with a radiological team;

b) injured persons shall be wrapped in blankets or other available covering (to reduce the possible spread of contamination) and immediately transported to medical facilities with instructions to the drivers or attendants that the injured persons may be radioactively contaminated and that they shall so inform medical facility personnel to administer to them;

c) other persons who might have had possible contact with radioactive material shall be sequestered until they have been examined by radiological teams;

d) suspected material shall be identified but not handled until it has been monitored and released by radiological emergency teams. Clothing and tools used at the accident scene shall be retained in isolation until they can be checked by a radiological emergency team;

e) food or drinking water that may have been in contact with material from the accident shall not be used;

f) only properly attired RFF personnel shall remain on the scene; all other persons shall be kept as far away from the scene as possible;

g) all hospitals shall be notified immediately that radioactive materials are involved so that appropriate radioactive decontamination areas may be established; and

h) packages of radioactive material shall be cordoned off; any loose materials shall be covered with plastic sheets or tarpaulins to minimize dispersion by wind or rain.

(e) Post-Accident Procedures

Rescue units shall familiarize themselves with all regulations, national and local, regarding movements of wreckage and disposal of human remains and the preservation of evidence. It is also important to understand the techniques and procedures used in aircraft accident investigation. After fire suppression and survivor rescue have been completed, the following procedures shall be observed;

1. Removal of bodies of fatality injured occupants remaining in the wreckage after the fire has been extinguished or controlled shall be accomplished only by or under the direction of responsible medical authorities. Premature body removal has, in many cases, interfered with identification and destroyed pathological evidence required by the medical examiner, coroner or authority having investigational jurisdiction;

2. If extrication of casualties from aircraft wreckage is necessary, the position and seat number in which the survivors were located in the aircraft shall be recorded at the earliest opportunity. Where casualties are located at positions away from the wreckage, the positions shall be marked by a stake with a label identifying the victim and the seat. In all cases, the casualties shall have an identifying label attached to them stating where they were found and in which seat. Similarly, personal belongings shall remain attached. Apart from gaining information which may assist in the accident investigation, the careful recording of all these data may assist in the identification of casualties;

3. If circumstances permit, the area shall be photographed for future reference prior to any body removal activity. Photographs are advantageous tools to aid investigators and shall be given as soon as practicable to the appropriate agency having responsibility for the accident investigation. To this end, it may be desirable to appoint an RFF photographer so that the scene can be photographed for future accident investigation purposes;

4. The wreckage of an aircraft involved in an accident, including controls, shall not be disturbed (moved) until released for removal by the investigational authority having jurisdiction. If the aircraft, parts, or controls shall be moved because they directly present a hazard to human life, efforts shall be made to record their original condition, positions, and locations, and due care shall be afforded to preserve all physical evidence. If circumstances permit, photographs shall be taken showing the location and position of all major components marked on the ground;

5. On completion of the initial rescue operation, it is important that the RFF personnel exercise as much care as possible to ensure their movements do not destroy evidence which may be of value in the investigation. For example, movement of ambulance and RFF vehicles shall not be made along the wreckage trail if alternative access is possible;

6. The location of mail sacks and pouches shall be observed and this information given to postal authorities. If necessary, the mail shall be protected from further damage; and

7. Aviation fuels and hydraulic fluids may cause dermatitis by contact with the skin. RFF personnel who have had these fluids spilled on them shall be washed thoroughly with soap and water as soon as possible. Wet clothing and uniforms shall be changed and decontaminated promptly.

(as) Assessments for Accidents Beyond Runway Thresholds

An assessment of the approach and departure areas within 1 000 m of the runway threshold shall be carried out to determine the options available for rescue, including suitable resources that shall be provided. In considering the need for any specialist rescue and access routes, the following shall be considered:

a) the environment, in particular the topography and composition of the surface;

b) physical hazards and associated risks that exist within the area;

c) options for access and for RFF purposes;

d) hazards, risks and control measures of the options for rescue;

e) use of external services;

f) an analysis of the advantages and disadvantages of the options;

g) policies and procedures to define and implement practices;

h) competence standards to match the above; and

i) monitoring testing and review of the capability.

3.5.2.3 Training Programme

(a) The aerodrome operator shall ensure that rescue and firefighting personnel are properly trained to perform their duties. Only by means of a most carefully planned and rigorously followed programme of training can there be any assurance that both personnel and equipment will be capable in dealing with a major aircraft fire shall the necessity arise. The core training programme can be organized into nine faculties as follows:

a) fire dynamics, toxicity and basic first aid;
b) extinguishing agents and firefighting techniques;
c) handling of vehicles, vessels and equipment;
d) airfield layout and aircraft construction;
e) operational tactics and manoeuvres;
f) emergency communication;
g) leadership performance;
h) physical fitness; and
i) auxiliary modules (e.g. rescue in difficult terrain, response to biological/chemical threats, etc.).;

(b) The training programme shall include initial and recurrent training in at least the areas listed at sections 3.5.2.3 (d), (e) and (f) below. Initial training is defined as that training provided to a new or relief employee to enable him/her to identify and interpret advanced theories, facts, concepts, principles, requirements, procedures, equipment, and components of ARFF as applied to the aircraft serving the and to demonstrate all required tasks safely and accurately and in accordance with established procedures while functioning independently. Recurrent training is defined as that training provided to an employee on a regular basis as often as necessary but not less than 12 consecutive calendar months to enable him/her to maintain a satisfactory level of proficiency;

(c) The training programme shall be categorised as follows:

(i) Basic Firemanship Training;

The Basic Firemanship Training course is designed to equip entry level of ARFF personnel with the necessary knowledge and skills to perform their tasks. Majority of the training shall be devoted to practical exercises involving pressure-fed fuel fires to give ARFF personnel adequate exposure related to aircraft fire fighting.

(ii) Intermediate Firemanship Training; and

The Intermediate Firemanship Training course is designed to equip experienced ARFF personnel with the theory, principles and practice of fire station management, tactical fire-fighting involving various emergencies and fireground command to prepare them for their roles as fire officers. Majority of the training shall be devoted to practical exercises.

(iii) Advanced Firemanship Training.

The Advanced Firemanship Training course is designed to equip senior fire officers with the theory, principles and practice of fire station management, facilities and fire safety planning, as well as command and control at aircraft crash site to prepare them for their roles as senior fire officers.

(d) Basic Firemanship Training

The Basic Firemanship Training programme of fire fighter course shall include at least the following areas:

1. Aerodrome familiarization

A thorough knowledge of the aerodrome and its immediate vicinity is essential. The training shall encompass those areas of operation dealing with:

(i) describe the movement area so that fire fighters can demonstrate their ability to:

(a) select the best routes to any point on the aerodrome;
(b) select alternative routes to any point on the movement area when normal routes are blocked;
(c) recognize landmarks which may be indistinctly seen;
(d) use detailed grid maps as an aid to respond to an aircraft accident or incident;
(e) recognise signs, marking and lighting;

(f) know the existence of ground which may become from time to time impassable in any part of the area to be covered by the service; and
(g) operate vehicles over all types of terrain during all kinds of weather. The training programme may be conducted using vehicles other than the RFF vehicles provided they are radio controlled and have similar operating characteristics.

(ii) describe the airfield lighting color code/marking system (i.e. center line, edge, threshold, etc.);

(iii) describe the airfield pavement marking and signing system;

(iv) identify and locate the various aircraft navigation aids located on the aerodrome;

(v) cite rules and regulations concerning vehicle movement and access;

(vi) cite rules and regulations governing security;

(vii) locate a given point on a grid map or other standard map used at the aerodrome;

(viii) identify terrain features;

(ix) identify installations and features in the critical response areas that present a hazard to vehicle response;

(x) identify installations and terrain features in the critical response areas that limit vehicle response capability;

(xi) identify the probable direction of travel of fuel in a simulated leak in the fuel distribution system;

(xii) demonstrate the operation of fuel system valves and pumps to control the flow of fuel within the system; and

(xiii) identify hazardous materials and their locations which are frequently stored or used on the property.

2. Aircraft familiarisation

It is essential that all fire fighters have an intimate knowledge of all types of aircraft using the aerodrome. Information about the following design features is of special importance to fire fighters to ensure effective use of their equipment:

(i) identify all types of aircraft (passenger, cargo) operating at the aerodrome;

(ii) identify the categories of aircraft propulsion systems;

(iii) locate normal entry doors, emergency exit openings, and evacuation slides for a given aircraft;

(iv) demonstrate the opening of all doors and compartments for a given aircraft (passenger and cargo);

(v) identify aircrew and passenger capacities and locations for a given aircraft;

(vi) indicate the type of fuel used, location of fuel tanks, and capacity of fuel tanks for a given aircraft;

(vii) identify and locate components of the fuel, oxygen, hydraulic, electrical, fire protection, aircraft power unit, brake, wheel, and egress systems for a given aircraft;

(viii) identify and locate the flight data recorder and cockpit voice recorder;

(ix) identify and locate the opening and operation of doors, compartments and hatches for a given cargo aircraft:

(x) identify normal and emergency shutdown procedures for aircraft engines and auxiliary power units;

(xi) identify and locate the flight data recorders;

(xii) seating configuration;

(xiii) location of batteries; and

(xiv) position of break-in points.

3. Rescue and Fire Fighting Personnel Safety

The programme shall train personnel such that they are able to do the following:

(i) identify the hazards associated with aircraft firefighting/rescue;

(ii) identify the hazards to personnel associated with aircraft and aircraft systems;

(iii) identify the potential stress effects on emergency services personnel involved in a mass casualty situation;

(iv) identify the purpose and limitations of approved personal protective clothing used locally;

(v) demonstrate donning personal protective approved clothing within 1 minute;

(vi) identify the purpose of self-contained breathing apparatus (SCBA);

(vii) identify the components and operation of SCBA;

(viii) identify the limitations of SCBA;

(ix) demonstrate the donning within 1 minute and use of an approved SCBA;

(x) demonstrate changing the air supply cylinder of a team member with an exhausted air supply cylinder;

(xi) while wearing a SCBA, demonstrate the actions to be taken when the following emergency situations occur: low air alarm activates, air supply is exhausted, regulator malfunctions, face piece is damaged, low pressure hose is damaged, and high pressure hose is damaged;

(xii) while wearing a SCBA, demonstrate the actions to be taken to assist a team member experiencing the following emergency situations: low air alarm activates, air supply is exhausted, regulator malfunctions, facepiece is damaged, low pressure hose is damaged, and high pressure hose is damaged;

(xiii) identify techniques for protection from communicable disease hazards; and

(ix) Fire Dynamics, Toxicity and First Aid

All RFF personnel shall have a general knowledge of the cause of fire, the factors contributing to the spread of fire and the principles of fire extinction. Only when armed with this knowledge can they be expected to react effectively when confronted with a serious fire situation. It shall be known, for instance, that certain types of fire require a cooling agent while others need a blanketing or smothering action. RFF training shall also touch on the toxicity of thermal decomposition products. This will enable firefighters to better understand the importance and limitations of their protective equipment. In doing so, firefighters will avoid a false sense of security and take extra precautions when leading the occupants of the aircraft through a dangerous atmosphere. In addition, every member of the rescue team shall, if at all possible, be trained and periodically recertified in basic medical first aid, as a minimum. The prime reason for this qualification is to ensure that casualties are well handled so as to avoid the infliction of additional suffering and/or injury in the removal of the occupants from a crashed aircraft.

4. Emergency communications system

The program shall train personnel such that they are able to do the following:

(a) identify the procedures for receiving an emergency alarm;

(b) identify radio frequencies and channels used by his/her organization and mutual aid organisations;

(c) identify procedures concerning multiple alarms and mutual aid;

(d) demonstrate knowledge of the phonetic alphabet;

(e) demonstrate the use of all communication equipment used by his/her organisation;

(f) demonstrate the proper procedure for obtaining clearance from the control tower or other responsible authority for apparatus movement;

(g) give an initial status report for a simulated aircraft accident;

(h) demonstrate the use of standard aircraft fire rescue hand signals;

(i) identify standard hand signals to be used to communicate with aircrew personnel: and

(j) identify emergency light signals used by the air traffic control tower (ACTC).

5. Handling of equipment

All fire fighters shall be trained in the use of fire hoses, nozzles, turrets and other appliances. All fire fighters shall also be trained in the operation and maintenance of the range of basic rescue equipment. They shall be capable of handling their equipment, not only under drill ground conditions, but also in rapidly changing conditions. The aim is to ensure that every individual is so well versed in the handling of all types of equipment that he can perform automatically under stress conditions.

This can be accomplished in the initial stage of training by employing the snap “change-round” technique during standard drills, and later by training involving the use of two or more fire vehicles simultaneously. Particular attention shall be paid to pump operations, high-reach extendable turrets, and other specialized rescue equipment. RFF crew shall also be adequately trained in handling complex instrumental panels on board vehicles and vessels. This form of training is, of course, a continuing commitment.

The program shall train personnel such that they are able to do the following:

(i) identify the purpose of each tool and item of equipment used locally;

(ii) identify the location of each tool and item of equipment used locally;

(iii) identify the hazards associated with each tool and item of equipment used locally;

(iv) identify the proper procedures for use and maintenance of each tool and item of equipment used locally;

(v) identify the purpose of each hose, nozzle, and adapter used locally;

(vi) identify the location of each hose, nozzle, and adapter used locally;

(vii) identify the size and amount of each hose carried on each local vehicle;

(viii) identify the proper procedures for use and maintenance of each hose, nozzle, and adapter used locally;

(ix) identify the proper procedure to be used when advancing hose for fire attack;

(x) identify the proper procedure to be used when laying hose to establish a resupply of water;

(xi) identify the primary purpose, agent capacity, water capacity, type of agent carried, agent discharge rate/range, personnel requirements, and response limitations for each vehicle used locally;

(xii) demonstrate the proper methods of operation of all handlines and vehicle-mounted discharge devices;

(xiii) identify the procedures for maintenance of each vehicle used locally; and

(xiv) identify the procedures for resupply, using a hydrant, structural vehicles, tank trucks and other vehicles, for each vehicle used locally.

6. Application of extinguishing agents

The program shall train personnel such that they are able to:

(i) identify the extinguishing properties of each agent, including advantages and disadvantages;

(ii) identify which agents used by the local organization are compatible and which are not;

(iii) identify the locations and quantities of each agent that is kept in inventory for vehicle resupply;

(iv) identify the quantity of each type of agent that is carried on each vehicle used at the local;

(v) identify the preferred agent to be used in suppression and extinguishment for various fire scenarios;

(vi) demonstrate agent application techniques;

(vii) identify each type of portable fire extinguisher by classification and rating;

(viii) identify the limitations and operating characteristics of each type of portable fire extinguisher;

(ix) identify the location of each portable fire extinguisher provided on local vehicles; and

(x) identify the general location of portable fire extinguishers provided on aircraft.

(xi) a thorough knowledge shall be acquired of the agents employed. In particular, every opportunity shall be taken to practice the application of agents on fires in order to understand by experience not only the virtues but also the limitations of each agent. Each occasion of a routine equipment test shall be used for a training exercise in the proper handling of equipment and the correct application of the particular agent involved. The combination of routine test procedures with training periods will minimize the costs involved in the discharge of extinguishing agents.

7. Emergency aircraft evacuation

The program shall train personnel such that they are able to do the following:

(i) identify the priorities of openings to be used to gain entry to aircraft;

(ii) identify which opening shall be used to gain entry for a given aircraft and situation;

(iii) select the necessary tools and equipment to gain entry for a given aircraft and situation;

(iv) while wearing full protective clothing, demonstrate, from inside and outside the aircraft, opening normal entry doors and emergency exit points for a given aircraft;

(v) identify potential locations for cut-in entry, using reference materials, aircraft markings, or general guidelines for a given aircraft;

(vi) identify the hazards associated with cut-in entry;

(vii) identify procedures followed during an emergency situation by crews of air carriers and cargo aircraft operating at the local aerodrome; and

(viii) identify the procedures to be used to protect evacuation points.

8. Fire fighting operations

All fire fighters shall have a general knowledge of the causes of fire, factors contributing to its spread and the principles of fire extinction. They shall also possess knowledge of fire prevention. All fire fighters are required to be trained in combating various types of fires. The program shall train personnel such that they are able to do the following:

(i) describe the standard operating procedure plans for various emergency scenarios;

(a) aircraft fires;

1. engine fire
2. internal fire
3. fuel line fire
4. helicopter fire

(b) building fire;

(c) liquefied petroleum gas fire; and

(d) bulk fuel fire.

(ii) select a strategy and tactics for incident control and termination;

(iii) identify the procedures for securing and maintaining a rescue path;

(iv) identify the proper procedure to use when protecting an aircraft fuselage from fire exposure;

(v) identify the procedures to be used when providing protective streams for personnel;

(vi) identify procedures for controlling runoff from fire control operations and fuel spills;

(vii) identify the procedures to be used to stabilize aircraft wreckage; and

(viii) a thorough knowledge shall be acquired of the agents employed. In particular, every opportunity shall be taken to practice the application of agents on fires in order to understand by experience not only the virtues but also the limitations of each agent. Each occasion of a routine equipment test shall be used for a training exercise in the proper handling of equipment and the correct application of the particular agent involved. The combination of routine test procedures with training periods will minimize the costs involved in the discharge of extinguishing agents.

(ix) **Firefighting Techniques, Operational Tactics and Manoeuvres**

Firefighting Techniques

To carry out fire suppression at different phases of combustion, RFF personnel shall be well versed in three types of extinguishment;

(i) Direct straight stream firefighting method using a straight stream or solid hose stream to deliver water directly onto the base of the fire;

(ii) Indirect firefighting method; used in situations where the temperature is increasing and it appears that the cabin or fire area is ready to flash over. Attack is made from small fuselage openings such as slightly opened exits or openings made in cabin windows. An indirect method is based on the conversion of water spray into steam as it contacts the super-heated atmosphere. Firefighters direct the stream in short bursts of water at the ceiling to cool super-heated gases in the upper levels of the cabin or compartment. This method can prevent or delay flashover and allow the firefighters time to apply a direct stream to the base or seat of the fire; and

(iii) The three-dimensional method is deployed in the event that the fire is fuel fed, as in the case of an engine fire. Firefighter one directs semi-fog at the fire while firefighter two discharges a dry chemical or clean agent into the semi-fog stream starting at ground level and moving upward to the source of the fire. In cases of deep-seated aircraft fires, penetrating nozzles could be used. Penetrating nozzles could be in the form of vehicle turrets (monitors) or handlines capable of injecting extinguishing agents that provide wide angle coverage.

Operational Tactics and Manoeuvres

Operational tactics training is designed to deploy personnel and equipment to advantage in order to establish conditions in which aircraft occupants may be rescued from an aircraft which is involved in, or liable to become involved in, fire. The objective is to isolate the fuselage from the fire, cool the fuselage, establish and maintain an escape route and achieve the degree of fire control necessary to permit rescue operations to proceed. This is fundamental and shall be stressed in the training programme. The service to be provided is primarily a lifesaving organization, one, however, that shall be trained in firefighting because aircraft involved in a serious accident are frequently involved in fire. The firefighting operations shall be directed to those measures which are necessary to permit rescue to be carried out until all the occupants of the aircraft are accounted for. This includes precautionary measures at those incidents where no fire has broken out. When the life saving commitment has been met it is necessary, of course, to utilize all available resources to secure protection of property.

The main attack on the fire shall usually be by means of mass application of foam in an endeavour to achieve maximum cooling and the rapid suppression of the fire. Since, however, foam, like every other agent, has limitations, a suitable back-up agent shall be available to deal with those pockets of fire which are inaccessible to direct foam application. This will generally be provided in the form of dry chemical powder. The use of these shall be confined to running liquid fuel fires, fires in enclosed spaces such as wing voids, or for dealing with a special fire such as a fire in an engine nacelle or undercarriage well.

Points which shall be covered in the operational tactics training programme are described below:

1. Approach

Equipment shall approach the accident site by way of the fastest route in order to reach the site in the shortest possible time. This is quite frequently not the shortest route because, in general, it is preferable, where possible, to travel on a man-made surface than to approach over rough ground or grassland. The essence is to ensure that RFF vehicles get there and are not subjected to unnecessary hazards en route. When nearing the scene of the accident a careful watch shall be maintained for occupants who may be dashing away from the aircraft or who may have been flung clear and are lying injured in the approaches. This applies particularly at night and calls for competent use of spot or search lights; and

2. Positioning of equipment

Positioning of equipment. The positioning of equipment both from the airport and from any supporting local fire department is important in many respects and regard shall be given to several factors. Correct positioning of equipment shall permit the equipment operator an overall view of the fire area. The equipment shall not be placed in a position of hazard due to fuel spills or ground slope or wind direction. It shall not be positioned too close to the fire or to other equipment and thus restrict working space (this applies particularly to foam tenders and their attendant auxiliary water tenders). Other factors which shall be taken into account are the location of aircraft occupants relative to the fire, the impact of wind, fire, locations of personnel and fuel tanks and the location of emergency exits

3. Application techniques of foam streams; and

4. The main objective of the firefighting activity shall be to extinguish the fire and secure it against reignition in the shortest possible time. It is also pertinent that RFF crew maintain a good sense of situational awareness at all times during an emergency. This demands skill, teamwork and understanding by all those involved. The first responding fire vehicle may carry agents which can achieve some rapid knockdown of an area of the fire, but this will in most cases require the early support of any other vehicle to continue the effort and secure the entire area against reignition and to promote the necessary cooling effect in the vicinity of the passenger compartment.

The entire effort shall be concentrated on this area since the misapplication of foam or other agents is wasteful and could mean the difference between the success or failure of the operation. Where foam production through a monitor/turret is undertaken with the vehicle in motion (i.e. pump and roll mode), considerable skill is required to achieve maximum effect.

9. Adapting and using structural rescue and firefighting equipment for aircraft rescue and firefighting.

For any structural rescue and firefighting equipment available and intended for use in aircraft firefighting, the program shall train personnel such that they are able to identify the procedures used to adapt the equipment for aircraft rescue and firefighting.

All fire fighters shall be conversant with the proper usage and operation of various types of specialized rescue tools and fire fighting equipment for structural and aircraft rescue and fire fighting purposes.

10. Dangerous goods

All fire fighters may be called upon to respond to an incident or accident involving hazardous materials. As such, they will require basic knowledge on detection methods and containment measures. The program shall train personnel such that they are able to do the following:

(i) classification of dangerous goods and UN numbers as per ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air;

(ii) identify the hazards indicated by each dangerous good label;

(iii) identify the limitation of the classifications and labeling system;

(iv) use ICAO Emergency Response Guidebook to obtain information on hazardous materials for a given situation;

(v) identify the procedures and other resources to obtain information concerning a hazardous material; and

(vi) using the information obtained from ICAO Emergency Response Guidebook, identify the appropriate response, including risk assessment and rescue or evacuation requirements, to a given situation involving hazardous materials.

11. Familiarisation with Fire Fighters' Duties under the Aerodrome Emergency Plan

Under the Aerodrome Emergency Plan, fire fighters are assigned to perform specific roles and responsibilities such as rescue operation, fire fighting, emergency medical care, casualty evacuation, ambulance service and logistics support in an aircraft accident or incident.

The program shall train personnel such that they are able to do the following:

(i) identify pre-fire and emergency plans;

(ii) identify the various types of aircraft-related emergencies;

(iii) identify and understand the incident command system to be utilized in an emergency;

(iv) identify the procedures to be used to size-up a given aircraft accident; and

(v) identify the other duties of his/her organization under the aerodrome emergency plan.

12. Protective Clothing and Respiratory Protection

All fire fighters may be called upon to effect a rescue from an aircraft cabin in conditions of great stress working in an atmosphere heavily laden with smoke and fumes. As such, they shall be carefully trained to use self contained breathing apparatus. Simulators to train fire fighters to operate in such environments are recommended.

13. Medical First Aid and Casualty Handling

Every fire fighter of the rescue team shall be trained in first aid so that they can provide medical assistance when necessary and casualties are intelligently handled so as to avoid the infliction of additional suffering and/or injury in the removal of occupants in an aircraft accident or incident. The training shall include at least the following areas:

(i) primary patient survey;
(ii) triage;
(iii) cardiopulmonary resuscitation;
(iv) bleeding;
(v) shock;
(vi) injuries to the skull, spine, chest, and extremities;
(vii) internal injuries;
(viii) moving patients; and
(ix) burns.

14. Search and Rescue

The training programme shall provide instruction in search procedures, not only in the enclosed spaces of an aircraft but also for procedures for systematic searching of the area in the immediate vicinity of an aircraft accident and also in the path of the aircraft. Rescue operations shall be accomplished through regular doors and hatches wherever possible but fire fighters shall be trained in forcible entry procedures with the necessary tools.

15. Care of Equipment

A thorough knowledge of all equipment is essential in order to ensure its correct handling and to ensure thorough maintenance which is essential to guarantee operational efficiency under all circumstances. It is vitally important that every fire fighter be satisfied that any piece of equipment which may be used will work properly and in the case if ancillary equipment, that it is in its correct stowage position.

16. Live-Fire Drills.

All rescue and firefighting personnel shall participate in at least one live-fire drill every 12 months. This drill shall include a pit fire with an aircraft mock-up or similar device, using enough fuel to provide a fire intensity that simulates realistic firefighting conditions. The conditions would simulate the type of fire that could be encountered on an air carrier aircraft at the aerodrome. It is intended that the drill provides an opportunity for the firefighting team to become familiar with the use of all fire extinguishment equipment they will use in the event of an accident. If possible, a simulated rescue of aircraft occupants will help in creating a realistic simulation. During the drill, each fire fighter shall demonstrate the following:

(i) the control and extinguishment of a simulated aircraft fire using handlines and turrets, given an -type foam firefighting vehicle.

The decision to train on handline or turret shall be based on whether the trainee is assigned a handline or whether the trainee is a driver/operator who would normally operate the turrets. Many training programs may have all the participants working the handlines, and it would be acceptable for the driver/operator to meet the annual requirement in this fashion. However, it would not be acceptable for a handline firefighter to use training on the turrets to meet the annual requirement;

(ii) the control and extinguishing of a simulated aircraft fire using handlines and turrets, given each type, other than foam-type, firefighting vehicle; and

(iii) using fire streams to protect fire fighters and aircraft occupants, given an aerodrome firefighting vehicle.

17. Hands-On Training

All fire fighters shall receive hands-on training, on an annual basis, on the aircraft that regularly serve the aerodrome.

18. On-Job Training

Personnel who have completed the Basic Firemanship Training shall receive the following on-job training in the fire station.

19. Human factors

Training programme shall include knowledge and skills related to human performance including team coordination. Refer to paragraph 4.32.

20. Physical Fitness

During protracted rescue operations, the ability of RFF personnel to perform strenuous activities over an extended period of time influences the overall operational effectiveness. Therefore, firefighters shall be aerobically and anaerobically fit to withstand the rigours of a variety of operations. Clearly, physical fitness training requirements shall be designed to be commensurate with the equivalent fitness intensity generated in the performance of RFF operations, which include the use of breathing apparatus, hand-lines, ladders, heavy equipment and other associated rescue operations such as casualty handling.

(e) Intermediate Firemanship Training

Intermediate Firemanship Training programme shall be designed to equip experienced aerodrome fire fighters with the theory, principles and practice of fire station management, tactical fire-fighting involving various emergencies and fire-ground command to prepare them for their roles as aerodrome fire officers. Majority of the training shall be devoted to practical exercises. The Intermediate Firemanship Training programme shall include at least the following areas:

1. Proficiency Test and Rating System

This lesson provides general guidelines on the subjects to be covered in the operational rating system. It is also a reference for organizing and standardizing the proficiency rating and revalidation system to maintain the proficiency standards of all fire-fighters. The documentation and proficiency rating records to facilitate audit checks will be discussed.

2. Critical Area Concept and Response Time

The training programme shall enable participants to determine the theoretical and practical critical area for a given aircraft type and calculate the quantity of water to be provided at an aerodrome. They will also need to be able to calculate response time based on certain assumptions and recognize factors affecting response time.

3. Aircraft Internal Fire (Passenger and Freighter Aircraft)

Participants shall acquire a thorough knowledge on aircraft internal fire. They shall be able to explain differences between post crash fires and inflight fires, know the types of cabin furnishings and toxic gases produced. The participants shall also know the causes of internal fires, flashover and backdraft. The training programme shall also include rescue and firefighting procedures during an aircraft internal fire.

4. Breathing Apparatus Application

Fire fighters may be called upon to effect a rescue from an aircraft cabin in conditions of great stress working in an atmosphere heavily laden with smoke and fumes. As such, they shall be carefully trained to use selfcontained breathing apparatus. Simulators to train personnel to operate in such environments are recommended.

5. Fireground Control at Crash Site

It is important that the fireground be managed by using all resources of men, equipment, water supply and associated agencies. Being capable of assimilating all available information about the actual scene is paramount to safe action. The training programme shall equip participants with the necessary skills to undertake the position of Office-in-Charge during an emergency. They shall be taught on the various types of stand-by positions taken by the ARFFS for various declared aircraft emergencies and be able to explain the overall strategy of Fireground Leadership during aircraft fire fighting and rescue operations. The course shall also include Aerodrome Emergency Planning.

6. Rescue and Fire Fighting Equipment

Participants shall be able to determine the quantity and types of equipment to be carried on fire vehicle(s) and recommend suitable personal protective equipment for rescue and fire fighting operations.

7. Water Supply

The training programme shall provide a basic guidance in master planning and overall water supply system for aerodrome fire protection, taking into consideration domestic water usage where a combined fire protection and domestic water system is utilized. It shall also include basic selection criteria for water supply source and standards for a water distribution system designed to support aircraft and fire-fighting operations in s.

8. Aerodrome Categorization and Levels of Protection

Participants shall be able to determine the category of an aerodrome and understand the level of protection to be provided. They shall also be able to state the minimum quantities of water, level A, B and C foams and other complementary extinguishing agents required for protection. The participants shall be taught the basic need and number of vehicles required at an aerodrome to effectively deliver and deploy the agents specified for the aerodrome category.

9. Leadership in the Fire Service

As the fire service evolves and becomes an increasingly diverse and dynamic industry, the need for competent leadership also grows. The training programme shall include the three theories of leadership and the relationship between leadership style and the decision making process.

10. Building Fire-Fighting and Rescue

The training programme shall include the significance and importance of the various basic divisions of fire-fighting strategy. The participants shall be able to demonstrate effective execution on fire fighting tactics and techniques in combating building fires.

11. Fireground Hydraulics

Hydraulics is a critical element in fire fighting. As soon as movement of water through a hose line is attempted, knowledge of hydraulics is required. The training programme shall include the principles, variables and calculations concerned with the practical application of water as utilised in the fire service. An overview of fire characteristics, properties of water, apparatus and appliances, fire streams and hydraulic calculations shall be addressed to establish a functional understanding of fireground hydraulics.

12. Fire Pumps and Primers

Water-based fire-suppression systems rely on an adequate water supply for proper operation, and fire pumps are often required to increase available water pressure. Training shall be given to equip personnel with the necessary knowledge to understand and effectively operate the pumps.

13. Handling of Uncommon Emergencies

Fire fighters may be called upon to respond to an incident or accident involving hazardous materials. The training programme shall provide instructions on operational procedures and tactical concepts of water rescue operations for aircraft accidents in the water. Participants shall also be informed about the types of radio-active materials, radio-active hazards and the strategic procedures of combating an aircraft fire involving radio-active materials.

14. Foaming Agents

A major aircraft accident typically involves a fuel-spill fire and the main extinguishing agent is foam. Significant quantities of a foam/water agent be available to support aircraft fire fighting and rescue operations. Training shall be given to participants to enable them to understand the type of foams used in relation to aircraft fire fighting.

15. Communication Procedures and System

Knowledge of operating radio communication equipment, proper procedures of radiotelephony communications and basic hand signals is essential to fire fighters in their operations. Participants shall be trained to have a thorough knowledge in radiotelephony procedures.

16. Fire in Aircraft Hangars

The extremely high value of aircraft, hangars, and their ancillary facilities requires the thoughtful application of knowledge of the hazards involved. The training programme shall present to the participants the various hazards, restriction of movement, needs for evacuation, structural vulnerability and various other factors to be considered when dealing with such fires.

17. Post Crash Incident Report

Participants shall be taught on how to write reports to give relevant information to improve methods of saving lives.

18. Techniques of Instruction

An aerodrome fire officer may be tasked to conduct lessons or give presentations to fellow fire fighting personnel. The training programme shall equip the officer with the necessary skills.

19. Principles of Supervision

An aerodrome fire officer will need to exercise direct supervision over assigned staff. Training shall cover this aspect as well.

20. Fire Prevention Inspection

Participants shall be taught on the objectives of fire prevention and the fire protection system to prevent fire from spreading and further endangering life and property.

21. Aircraft Involved in Unlawful Act

The training programme shall examine the risks involved and the ways to deal with a situation where an aircraft is subjected to unlawful interference namely hijack bomb threat and chemical/biological sabotage.

22. Smoke Hazards

The training programme shall cover hazards of gases and smoke. It will also cover the 3 phases of fire, procedures when working in smoke-filled atmosphere and case studies of aircraft incidents with smoke impact.

(f) Advanced Firemanship Training

Advanced Firemanship Training programme shall be designed to equip senior fire officers with the theory, principles and practice of fire station management, facilities and fire safety planning, as well as command and control at aircraft crash site to prepare them for their roles as senior fire officers. The Advanced Firemanship Training programme shall include at least the following areas:

1. Aerodrome Safety Management System

Related closely to safety policy (and safety culture) is how an organization sets its objectives. Clearly stated objectives can lead to a commitment to action that will enhance the safety of the organization, clearly enunciating their vision, defining desired outcomes, spelling out the attainable steps for meeting the objectives, and documenting the process. They have agreed to relevant safety indicators and have adopted realistic safety targets.

2. Fire Safety

The key to successful fire safety is not just aerodrome fire and rescue services, but a holistic approach to the whole aerodrome environment. Participants shall be taught on fire safety measures for terminal buildings and hangars. Fire prevention and fire safety practices in s shall also need to be covered. The course shall equip participants with the knowledge to advise on the formation of emergency control organisations.

3. ARFF Vehicles' Standards

The ability to respond to aerodrome emergencies with adequate and appropriate equipment is paramount to ARFF personnel. The course shall enable participants to:

(i) state requirements for ARFF vehicles;

(ii) stipulate requirements of ARFF vehicles for an aerodrome;

(iii) select from options available for ARFF vehicles;

(iv) specify the performance of ARFF vehicles for the purpose of procurement; and

(v) informed on the latest technology and advanced ARFF vehicles that are used in major s around the world.

4. Budgeting in Aerodrome Fire Service

Estimates of expenditure are a projection of the fiscal records of a particular department to operate off efficiently. Participants shall at least appreciate the need for budgeting and be able to differentiate between the two estimates submission. The course shall briefly cover the various headings for budgetary allocations of the station.

5. Design and Siting of Fire Station

The primary focus of fire station design is to provide rapid response for fire fighters and vehicles responding to an alert. Station configuration shall incorporate maximum views of the airfield and direct access from the apparatus bays to the road and runway system. The training programme shall provide standards and guidance for planning, sitting, designing and construction of fire stations.

6. Emergency On-line Communication System

Each level of the fire ground organisation has a different need and capability to communicate. Those differences will necessarily affect the entire communications process as fire operations continue. The Fire Ground Commander is on the command level and deals with decisions making, assignments, coordination, revision and control as he determines the overall strategy and manages the attack plan.

7. Fire Precaution in Buildings

Fire precautions are the measures taken and the fire protection provided in a building or other fire risk to minimize the risk to the occupants, contents and structure from an outbreak of fire. The advanced firemanship course shall include the aims for taking fire precautions in buildings and the concepts in building construction relevant to fire precaution.

8. Fire Service Administration

Participants shall be taught on the managerial role of a senior fire officer and the seven basic functions of management in the fire service. They shall be able to distinguish between management and leadership.

9. Fire Vehicle Performance Test

The training programme shall cover the standard for aircraft fire vehicle six-monthly performance test for water/foam aircraft rescue and fire fighting vehicles.

10. Hangar Fire Protection

The extremely high value of aircraft, hangars, and their ancillary facilities requires the thoughtful application of knowledge of the hazards involved. Participants shall be taught on fire protection recommended for aircraft hangars.

11. Hazards of Aircraft Fuelling Operations

The aerodrome operator, aircraft operator and the fuel supplier each has responsibilities in respect of the safety measures to be taken during fuelling operations. Training shall be able to cover this aspect.

12. Services Manual

The training programme shall cover parts of the Aerodrome Licensing Manual that are related to aerodrome rescue and fire fighting.

13. Mass Casualty Evacuation

A mass casualty incident would significantly stress resources and would require fatality management capabilities and a surge in emergency medical services and hospital response. The training programme shall equip participants with the skills and knowledge to manage this.

3.5.2.4 Training Instructor

(a) It is imperative that the instructors are able to accommodate a broad range of training needs. Besides good knowledge of ARFFS requirements, instructors shall be able to meet a set of entry requirements;

(b) The following set of requirements applies to instructors providing training for Basic Firemanship Training and Intermediate Firemanship Training:

- (i) shall have a minimum of 5 years' experience with an ARFF aerodrome operator;
- (ii) leadership exposure in operations with an ARFF aerodrome operator;
- (iii) pass the Intermediate Firemanship Training course;
- (iv) pass the Breathing Apparatus Operations Training Course;
- (v) shall possess relevant instructional and assessment techniques;
- (vi) shall possess effective communication skills;
- (vii) shall be able to conduct theoretical and practical assessments; and
- (viii) shall possess a valid Medical First Aid certification.

(c) As for instructors providing training for the Advanced Firemanship Training course, he shall, in addition to the set of requirements listed above, pass the Advanced Firemanship Training course.

3.5.2.5 Training Manual

The aerodrome operator shall provide a training and procedures manual for the use and guidance of personnel concerned. This manual shall contain at least the following information:

(i) a general description of the scope of training required in line with requirements 3.5.2.3;

(ii) the content of the training programmes offered including the training materials and equipment to be used for training;

(iii) a description of the organisation's quality assurance system;

(iv) a description of the organisation's training facilities;

(v) the name, duties and qualification of the person designated as instructor in line with requirement 3.5.2.4;

(vi) a description of the duties and qualification of the personnel designated as responsible for planning and supervising the training;

(vii) a description of the procedures used to establish and maintain the competence of instructors;

(viii) a description of the method used for the completion and retention of the training records;

(ix) a description, when applicable, of additional training needed to comply with an operator's procedures and requirements;

(x) a description of the standard operating procedure (SOP) for safety when training is conducted;

(xi) an organisational structure chart of the RFFS training organization; and

(xii) procedure for amending Training Manual. All changes incorporated and the reasons for them shall be recorded and kept by the RFFS training organisation so that the history of its development could be traced. Copies of all amendments to the Training Manual shall be furnished promptly to all organisations or persons to whom the manual has been issued.

3.6 ACCESS TO THE AERODROME MOVEMENT AREA/PUBLIC PROTECTION

3.6.1 An aerodrome operator shall provide -

(a) safeguards in coordination with the agency responsible for preventing unlawful interference in the civil aviation at the aerodrome and for preventing unauthorized entry of persons, vehicles, equipment and animals to the movement area. The following measures are required:

(i) Fencing around the aerodrome;

(ii) Gates in the perimeter fencing shall be kept closed and locked except during authorized use;

(iii) Surveillance of all unauthorized entry into the by security and police;

(iv) All areas to be restricted or prohibited for public use shall be posted with appropriate signs; and

(v) Floodlighting shall be used in appropriate areas and on buildings to prevent unauthorized entry into operational areas and for public safety during the hours of darkness and for lighting of security fences and barriers.

(b) reasonable protection of persons and property from aircraft blast.

3.6.2 The safeguards required shall:

(a) in areas adjacent to the aerodrome operational areas to which the public has direct vehicle or pedestrian access, constitute of continuous barriers that may include existing structures, gates and doors with controlled access; and

(b) in other areas, the safeguard shall be of a construction and height appropriate to prevent incursion by animals likely to endanger aircraft operations.

3.7 WILDLIFE HAZARD MANAGEMENT

Wildlife Hazard Management Programme

1. Introduction

a) An aerodrome operator shall implement a Wildlife Hazard Management Programme in order to reduce the risks presented by wildlife at the aerodrome and in its vicinity. The scale and details of this programme will vary from aerodrome to aerodrome, but all programmes shall contain basic information as described below. The Wildlife Hazard Management Programme shall be approved by the Authority;

b) The presence of wildlife 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;

c) 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;

d) Land use around the aerodrome shall, wherever possible, not be attractive habitats for wildlife;

e) A wildlife safety risk assessment shall be conducted, covering the aerodrome and its vicinity;

f) A WHMP shall be established and tailored to the local environment and be commensurate with the wildlife safety risk assessment;

g) The WHMP shall include procedures and measures for reducing the wildlife risk at the aerodrome to an acceptable level; and

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

2. Wildlife Hazard Management Programme

An aerodrome operator shall develop, implement and demonstrate an effective WHMP at the aerodrome, and this shall 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.

A Wildlife Hazard Management Programme shall describe the following elements:

(a) Roles and tasks in the Wildlife Hazard Management Programme

1. a manager who is accountable for developing and implementing the Wildlife Hazard Management Programme ;

2. a coordinator who shall oversee the daily activities, analyse the collected data and carry out risk assessments in order to develop and implement the Wildlife Hazard Management Programme ;

3. trained and competent staff who shall detect and record the presence of wildlife and assess the wildlife hazard and expel and/or deter hazardous wildlife. It is recommended that the training of staff engaged in bird control activities include an element of ornithological knowledge, to enable aerodrome bird control staff to make reliable and accurate identifications of birds both from observations and post bird strike during the collection and analysis of bird remains; and

4. trained and competent staff to reduce the attractiveness of identified areas, if relevant.

(b) Collecting, reporting and recording data on wildlife strikes and observed wildlife

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

2. Wildlife incident reporting shall comply with the criteria included in Appendix 3;

3. 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;

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;

5. Wildlife activities, including incident reports, shall be recorded in a wildlife log. This log shall 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. The log shall 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 shall be analysed to identify which species represent a hazard at specific times of day and/or year, and during different types of meteorological conditions;

7. Aerodrome operators shall 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 shall facilitate the analysis of data so as to improve wildlife hazard management; and

8. wildlife detection is necessary and this is best done using mobile patrols with trained, competent and well equipped staff who are dedicated to the task. Portable equipment is less prone to habituation and shall be chosen to deal with the species being targeted.

(c) Wildlife safety risk assessment

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 shall be updated and repeated at regular intervals, commensurate with assessed risks;

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

3. The aerodrome operator's wildlife safety risk assessment shall, 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.

(d) Habitat and land use management

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;

2. Aerodrome operators shall 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 shall 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.

3. Aerodrome operators shall regularly review features on, and within the vicinity of, the aerodrome that attract wildlife. A management plan shall 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.

4. Aerodrome development shall be designed such that it will not be attractive to hazardous wildlife and no attraction shall 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.

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

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

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

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

9. Water bodies such as depressions, open drainage ditches, ponds and lakes may be a particular hazard asthey may attract hazardous wildlife. These hazards shall 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.

10. The following is a non-exhaustive list of the types of land uses which have proven to attract hazardous wildlife and which shall, 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.

11. Vegetation composition (grass) shall be kept at a height that is considered unattractive to hazardous wildlife, while accepting that this may not be applicable in arid locations. The attractiveness of vegetation is a balance between food presence, food accessibility and protection against predators.

    (i) earthworms, insects, rodents and other animals are present in and on the soil and in the vegetation. The vegetation itself and its seed are food for plant and seed eaters;

    (ii) food accessibility depends on vegetation height and density. Long, dense vegetation will inhibit most hazardous wildlife from moving around, detecting and accessing the food;

(iii) wildlife safeguard themselves from predators by hiding and/or fleeing. Long, dense vegetation is preferred as a hiding place by agoraphobian species. These species avoid the open space of the runway and short vegetation. On the other hand, claustrophobic species avoid long, dense vegetation and prefer to stay in the open space of the runway and short vegetation where they have a wide view to see predators well in advance to enable them to flee on time; and

(iv) wildlife feeding on seeds will avoid the aerodrome if its vegetation is mowed during the flowering season. When these flowers attract insects that are attracting aerial feeders (for example swallows, swifts and bee-eaters), the vegetation shall be cut before the flowering season in order to maximize deterrence of local wildlife species, and the height and species composition of the vegetation shall be managed to minimize food sources.

(e) Expelling and deterring wildlife

1. Wildlife deterring and expelling techniques shall be appropriate to the wildlife situation on the aerodrome and its vicinity and shall 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.

2. Wildlife control personnel shall 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.

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.

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 shall proactively seek different or new effective ways to reduce the wildlife hazard, where or if existing methods prove ineffective.

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

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

(f) Coordination with stakeholders

1. Effective wildlife hazard management requires communication, cooperation and coordination with all relevant stakeholders. Aerodrome operators shall identify which stakeholders on and off the aerodrome shall 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.

2. The WHMP shall 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 shall encourage stakeholders to share data that was collected, reported and recorded on wildlife observations and strikes, in order to improve the WHMP.

3. The aerodrome operator shall 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).

4. The aerodrome's WHMP shall 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 shall consider options to influence the land-use within the vicinity of the aerodrome, in order to reduce the hazard from wildlife.

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

(g) Personnel training

1. The WHMP shall 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.

2. Training administered to any person for the purpose of conducting wildlife control shall be documented and records retained for periodic reviews, internal audits and competence checks.

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

4. Initial training shall be provided followed by refresher training every 3 years. The training programme together with the training materials and trainer, shall be approved by the Authority.

5. Training of wildlife control personnel shall be conducted by qualified wildlife control personnel or specialists with proven experience in this field. The minimum qualifications for personnel appointed to provide training in wildlife management at the aerodrome shall include “train the trainer”, relevant experience in the field and a formal course in wildlife hazard management or equivalent.

6. The initial training for wildlife control personnel shall, 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.

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

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

i. 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

ii. aircraft familiarization, including aircraft identification and effect of wildlife strikes on aircraft systems.

(h) Aircraft Operators

(a) Aircraft operators shall be given specific, timely and reliable information which will allow them to adapt their flight schedules in order to ensure the safety of their aircraft, just as they would do to mitigate other hazards such as wind shear and volcanic ash.

(b) Aircraft operators shall inform air traffic control about observed wildlife, either struck or living. If wildlife are observed in the flight path, aircraft operators may choose to request wildlife dispersal and consider adapting their flight operations by changing the route, timing and/or speed where this is possible within the parameters dictated by the air traffic control authorities. Aircraft operations personnel shall also coordinate with aerodrome operators and air traffic control to offer alternative departure and arrival options on unaffected runways shall a wildlife threat be present on the aerodrome.

(c) It is recommended that all aircraft operators be required to file the appropriate bird strike report form in the event that they experience a wildlife strike. Wildlife hazards observed (both in the air and on the ground) by aircraft operators shall also be reported on the appropriate safety form, including near- miss occurrences.

(i) Evaluation of the wildlife control programme

The following questions are designed to assist in determining if there is an effective wildlife control programme at the aerodrome:

Local risk assessment

1. Has a wildlife strike reporting procedure been implemented at the aerodrome?

2. What is the wildlife strike rate at the aerodrome over the last five years (with or without damage to the aircraft)?

3. Is there a procedure to collect regularly information about wildlife, both dead (carcasses) and living?

4. Has a means for positively identifying carcass remains been established?

5. How many reports from pilots are related to intrusions of wildlife, other than birds, over the last five years? and

6. Has a list wildlife attractants at and surrounding the aerodrome been completed?

Wildlife control programme

1. Is there a wildlife control officer responsible for the management of wildlife on the aerodrome?

2. Has a land-use plan been established with regard to effective land use on and off the aerodrome as it pertains to the wildlife control programme?

3. What ecological measures are implemented to reduce wildlife attractiveness at the aerodrome and in the vicinity of the aerodrome?

4. Is there a habitat management programme on the aerodrome?

5. Are garbage dumps forbidden around the aerodrome? If yes, within what distance are they forbidden?

6. Is the fence suitable to prevent hazardous animal incursions?

7. Which scaring methods are implemented at the aerodrome? and

8. Have staff been employed and trained specifically to scare off wildlife at the aerodrome?

(j) The following measures shall be used to control wildlife on and around the aerodrome:

(a) maintain fences around the aerodrome to prevent the entry of domesticated and feral animals;

(b) cover or eliminate/alterate food sources;

(c) cutting and keeping grass height at approximately 20 cm;

(d) trimming shrubs, bushes, and trees to prevent or discourage birds from nesting or animals from building dens;

(e) avoid nesting of birds in waste water treatment plants, hangars and roofs of buildings;

(f) avoid collection of water in drains and use of garbage disposal dumps in the vicinity of the aerodrome;

(g) posting signs along roadways to discourage the feeding of wildlife;

(h) use of distress signals, auditory and visual deterrents to disperse wildlife;

(i) it is recommended that aerodrome lands are not used for agriculture;

(j) aerodrome operator shall require wildlife-proof storage of food waste, prohibit wildlife feeding and promote good sanitation;

(k) prohibition of waste management facilities (refuse collection, land fill sites and garbage dumps) within 13 km of the Aerodrome Reference Point;

(l) pits and depressions that can be filled with rain water, shall be levelled and drained;

(m) clearing of water ditches at regular intervals to avoid clogging with vegetation and soil;

(n) structures (buildings and hangars) shall be so designed to minimize exposed areas that birds can use for perching and nesting;

(o) all unnecessary or abandoned posts, fences and other structures that can be used as perches by raptors and other birds shall be removed from aerodrome property;

(p) Avoid trees that produce fruits and seeds, at the aerodrome; and

(q) Use of repellent (audio and visual) harassment techniques to be used to keep hazardous wildlife away from specific areas on or near the aerodrome;

3.8 AERODROME INTERNAL SAFETY ASSURANCE:

3.8.1 The aerodrome operator shall establish an internal safety assurance system to ensure compliance with, and the adequacy of, the aerodrome manual and procedures required as per the Aerodrome Licensing Manual, and for the continuance in improvement of safety levels.

3.8.2 The internal safety assurance system shall include:

(a) a safety policy and safety policy procedures that are relevant to the aerodrome operator's organisational goals and the expectations and needs of its customers;

(b) procedures to ensure that aeronautical data at any moment is traceable to its origin so as to allow any data anomalies or errors, detected during production/maintenance phases or in operational use, to be corrected;

(c) a procedure to ensure safety indicators, including defect and incident reports, and personnel and customer feedback, are monitored to identify existing problems or potential causes of problems within the system;

(d) a procedure for corrective action to ensure existing problems that have been identified within the system, are corrected;

(e) a procedure for preventive action to ensure that potential causes of problems that have been identified within the system are remedied;

(f) an internal safety audit programme to audit the aerodrome operator's organisation for conformity with the procedures in its Aerodrome Manual and associated documentation and achievement of the goals set in its safety; and

(g) management review procedures that may, where appropriate, include the use of statistical analysis, to ensure the continuing suitability and effectiveness of the internal safety assurance system in satisfying the requirements of this regulation.

3.8.3 The safety policy procedures shall ensure that the safety policy is understood, implemented, and maintained at all levels of the organization.

3.8.4 The procedure for corrective action shall specify how:

(a) to correct an existing problem;

(b) to follow up a corrective action to ensure the action is effective; and

(c) management will measure the effectiveness of any corrective action taken.

3.8.5 The procedure for preventive action shall specify how:

(a) to correct a potential problem;

(b) to follow up a preventive action to ensure the action is effective;

(c) to amend any procedure as a result of a preventive action; and

(d) management will measure the effectiveness of any preventive action taken.

3.8.6 The internal safety audit programme shall:

(a) specify the frequency and location of the audits taking into account the nature of the activity to be audited;

(b) ensure audits are carried out by trained auditing personnel who are independent of those having direct responsibility for the activity being audited;

(c) ensure the results of audits are reported to the personnel responsible for the activity being audited and the manager responsible for internal audits;

(d) require preventive or corrective action to be taken by the personnel responsible for the activity being audited if problems are found by the audit; and

(e) ensure follow up audits to review the effectiveness of any preventive or corrective action taken.

Note: All audit findings and observations shall be evidenced and properly recorded.

3.9 AERODROME MANUAL

(i) The Aerodrome Manual is a fundamental requirement of the licensing process. It shall contain all the pertinent information concerning aerodrome site, facilities, services, equipment, operating procedures, organization, aerodrome emergency plan and management including Safety Management System. The information presented in the Aerodrome Manual shall demonstrate that the aerodrome conforms to the licensing standards and practices and that there are no apparent shortcomings that would adversely affect the safety of aircraft operations;

(ii) An applicant for an aerodrome licence shall provide the Authority with an aerodrome manual which shall provide clear, complete and detailed instructions, policies and procedures to its users so that they are fully informed of what is required of them.

An application for an aerodrome licence shall be accompanied by an aerodrome manual produced in accordance with chapter 3.9 of the Aerodrome Licensing Manual. Once granted a licence, the aerodrome operator is required to maintain the aerodrome manual in conformity with the applicable regulations and enable all aerodrome operating staff to have access to the relevant parts of the manual.

(iii) The Aerodrome Manual shall be produced by the Aerodrome Operator and shall be approved by the Authority.

(a) The aerodrome operator shall be responsible for developing and maintaining the aerodrome manual, as well as providing appropriate personnel access to it; and

(b) It shall be the responsibility of the aerodrome operator to be satisfied with the appropriateness of each provision of the aerodrome manual to a particular operation and to make amendments and additions as necessary.

(iv) The aerodrome manual shall:

(a) be typewritten or printed and signed by the Chief Executive Officer;

(b) be in a format that is easy to revise;

(c) have a system for recording the currency of pages and amendments thereto, including a page for logging revisions; and

(d) be organized in a manner that will facilitate the preparation, review and acceptance/approval process.

(v) The aerodrome operator shall provide the Authority with a complete and current copy of the aerodrome manual and the aerodrome operator shall keep at least one complete set and current copy of the aerodrome manual at the aerodrome;

(vi) The Aerodrome Operator shall make the Aerodrome Manual available to all relevant aerodrome personnel and for inspection by the Authority;

(vii) If the Authority exempts the aerodrome operator from complying with any requirement set out in the Civil Aviation Regulations, Aerodrome Licensing Manual and MCAR, the Aerodrome Manual shall show the identifying number given to that exemption by the Authority and the date the exemption came into effect and any conditions or procedures subject to which the exemption was granted;

(viii) If a particular is not included in the aerodrome manual because it is not applicable to the aerodrome, the aerodrome operator shall state in the manual the reason for non-applicability of the particular;

(ix) The aerodrome operator shall make such amendments to the manual as the Authority may require for the purpose of ensuring that the aerodrome is safe for use by aircraft or for the safety, efficiency or regularity of air navigation and to maintain accuracy of the information in the manual. The aerodrome operator is responsible for submitting amendments to the Authority for acceptance. The aerodrome operator shall notify the Authority, as soon as practicable, of any changes that the licence holder wishes to make to the aerodrome manual;

(x) The Authority may issue a written directive to the Aerodrome Operator requiring the operator to alter or amend the manual in accordance with that directive. All amendments shall be submitted to the Authority for scrutiny and approval. The Authority may require revision of its any or all contents as necessary to achieve compliance with safety requirements and Civil Aviation Regulations;

(xi) The Authority shall approve the Aerodrome Manual and any amendments thereto, provided these meet the requirements of the Civil Aviation Regulations, Aerodrome Licensing Manual and MCAR; and

(xii) The aerodrome operator shall;

1. submit, for approval by the Authority, an aerodrome manual containing, inter alia, information on how operational procedures and their safe management will be delivered;

2. ensure that the aerodrome manual accurately reflects the aerodrome's SMS and shows, in particular, how the aerodrome intends to measure its performance against safety targets and objectives;

3. ensure that all aerodrome safety policies, operational procedures and instructions are contained in detail or cross referenced to other formally accepted or recognized publications;

4. keep the aerodrome manual current at all times;

5. provide copy of the approved aerodrome manual all the concerned units;

6. ensure that the numbering of the pages and paragraphs shall be systematic and in order to facilitate reference;

7. ensure that the standard of printing, binding and duplication shall be such that the aerodrome manual remain intact and legible during normal use and amendments can be inserted easily;

8. be responsible for accuracy and updating of the information contained in the aerodrome manual;

9. ensure that the manual is updated using a defined process and includes a record of all amendments, effective dates and amendment approvals;

10. ensure that the method of enabling all aerodrome operating staff to have access to the relevant parts of the manual is defined and can be demonstrated;

11. ensure that any amendments or additions shall be communicated to the Authority in accordance with the continued oversight requirements established by the Authority; and

12. Aerodrome Manual be reviewed on a regular basis, as least once a year.

The Aerodrome Manual shall include information and instructions in respect of the following matters:

3.9.1 A statement signed by the Chief Executive officer, on behalf of the applicant's organization, confirming that the aerodrome manual:

(a) defines the organization and demonstrates its means and methods for ensuring ongoing compliance of the aerodrome licensing manual; and

(b) will be complied with at all times

3.9.2 **Part 1 -General**

General information, including the following:

(a) purpose and scope of the manual;

The aim and objectives of the aerodrome manual and how it is to be used by operating staff and other stakeholders shall be stated in the Aerodrome Manual.

The aerodrome manual contains all the relevant information to describe the management and operational structure. It is the means by which all aerodrome operating staff are fully informed as to their duties and responsibilities with regard to safety, including information and instructions related to those matters specified in the applicable regulation. It describes the aerodrome services and facilities, all operating procedures, and any restrictions in place.

(b) legal requirements for an aerodrome license and aerodrome manual as prescribed in the national regulations;

(c) Conditions for use of the aerodrome - a statement to indicate that the category under which the aerodrome shall be used i.e. Public use or Private use;

(d) the system of aeronautical information available and the procedure for their promulgation;

(e) the system for recording aircraft movement;

(f) obligations of the Aerodrome Operator;

(g) a statement of the Aerodrome Reference Code, indicating the largest aircraft type the aerodrome intends to serve;

(h) any limitations on the operation of the aerodrome, including areas excluded from use by commercial aircrafts as per paragraph 3.2;

(i) the procedures to control, amend and distribute the aerodrome manual and the circumstances in which amendments may be required;

(j) preface by the licence holder;

(k) table of contents;

(l) glossary of terms;

(m) distribution list; and

(n) amendment sheet/checklist of pages.

3.9.3 **Part 2 -Particulars of the Aerodrome Site**

General information including the following:

(a) Aerodrome Plan: plans of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, the location of each wind direction indicator. Plans shall indicate the position of the aerodrome reference point, layout of the runways, taxiways and aprons; the aerodrome markings and lighting and the siting of navigation aids within the runway strips;

(b) Boundary Plan: plan of the aerodrome showing the aerodrome boundaries;

(c) Location Plan: plan showing the distance of the aerodrome from the nearest city, town or other populous area, and the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome;

(d) Apron Plan: plan showing parking stands, markings and associated equipment;

(e) Lighting Plan: Plan showing all runway, taxiway and apron lights;

(f) List of authorised deviations; and

(g) Particulars of the title of :

(i) the aerodrome site or

(ii) if the boundaries of the aerodrome are not defined in the documents of the title particulars of title of, or interest in, the property on which the aerodrome is located and a plan showing the boundaries and position of the aerodrome.

3.9.4 **Part 3 -Particulars of the Aerodrome Required to be Reported to Aeronautical Information Service (AIS)**

3.9.4.1 General Information

(a) the name and address of the aerodrome, aerodrome operator and accountable executive;

(b) the geographical co-ordinates of the Aerodrome Reference Point determined in terms of World Geodetic System - 1984 (WGS-84) reference datum, aerodrome elevation and geoid undulation, the elevation of each threshold and geoid undulation, the elevation of the runway end and any significant high and low points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;

(c) aerodrome reference temperature;

(d) name of the aerodrome operator and the address and telephone numbers at which the aerodrome operator may be contacted at all times;

(e) aerodrome administrative data: an organizational chart shall be provided, as well as the aerodrome operator's safety responsibilities;

(f) a description of the intended operations, including:

1) the critical aeroplanes the aerodrome is intended to serve;

2) the category of runway(s) provided (non-instrument, instrument including non-precision and precision);

3) the different runways and their associated levels of service;

4) the nature of aviation activities (commercial, passenger, air transport, cargo, aerial work, general aviation);

5) the type of traffic permitted to use the aerodrome (international/national, IFR/VFR, scheduled/non-scheduled); and

6) the minimum RVR that aerodrome operations can be permitted.

(g) list of exemptions granted in respect of aerodrome facilities detailing exemption number, detail of facility /procedure & the period of validity as per paragraph 2.14.

3.9.4.2 Aerodrome Dimensions and Related Information

Information, including the following:

(a) runway - true bearing, designation number, length, width, displaced threshold location, slope, surface type, type of runway, and for a precision approach runway, the existence of an obstacle free zone;

(b) length, width & surface type of strip, runway end safety areas, stopways ;

(c) length, width and surface type of taxiways;

(d) apron surface type and aircraft stands;

(e) clearway length and ground profile;

(f) visual aids for approach procedures viz. approach lighting type and visual approach slope indicator system, marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids on taxiways (including runway holding positions, intermediate holding positions and stop bars) and aprons, location and type of visual docking guidance system; availability of standby power of lighting;

(g) location and radio frequency of VOR aerodrome check-point;

(h) location and designation of standard taxi -routes;

(i) the geographical coordinates of each threshold;

(j) the geographical coordinates of appropriate taxiway center line points;

(k) the geographical coordinates of each aircraft parking stand stand;

(l) the geographical coordinates and the top elevation of significant obstacles in the approach and take-off areas, in the circling area and in the vicinity of the aerodrome. (This information may best be shown in the form of charts such as those required for the preparation of Aeronautical Information Publications). It shall also include description, height and location of obstacles that infringe upon the standard protection surfaces, whether they are lighted and if they are noted in the aeronautical publications.;

(m) pavement surface type and bearing strength using Aircraft Classification Rating - Pavement Classification Rating (ACR-PCR) method;

(n) one or more pre-flight altimeter check locations established on an apron and their elevation;

(o) data for, and the method used to calculate, declared distances and elevations at the beginning and end of each declared distance i.e. take-off run available (TORA); take-off distance available (TODA); accelerate-stop distance available (ASDA); landing distance available (LDA);

(p) disabled aircraft removal plan: the telephone/telex/facsimile numbers; e-mail address of the aerodrome coordinator for the removal of an aircraft disabled on or adjacent to the movement area; information on the capability to remove a disabled aircraft - expressed in terms of the aircraft which the aerodrome is equipped to remove;

(q) rescue and fire fighting: level of protection provided, expressed terms of the category of the rescue and fire fighting services which shall be in accordance with the longest aeroplane normally using the aerodrome and the type and amounts of extinguishing agents normally available at the aerodrome;

(r) procedures for ensuring that the drawings/plans are up to date and accurate; and

(s) details of the surfaces, dimensions and classification or bearing strengths of runways, taxiways and aprons.

3.9.5 **Part 4 -Particulars of the Aerodrome Operating Procedures and Safety Measures Aerodrome Reporting**

3.9.5.1 Aerodrome Reporting

The system of aeronautical information service available and the system that the licence holder uses to promulgate AIP requirements.

Particulars of the procedures for reporting any changes to the aerodrome information set out in the Aeronautical Information Publication (AIP) and procedures for requesting the issue of Notices to Airmen (NOTAMs), including the following:

(i) arrangements for reporting any changes to the Authority and recording the reporting of changes during and outside the normal hours of aerodrome operations;

(ii) the names and roles of persons responsible for notifying the changes, and their telephone numbers during and outside the normal hours of aerodrome operations;

(iii) the address and telephone and facsimile numbers, as provided by the Authority, of the place where changes are to be reported to the Authority; and

(iv) Records.

Refer to paragraph 4.23 and 4.12 for further reference.

3.9.5.2 Access to Aerodrome Movement Area/Public Protection

Particulars of the procedure developed and to be followed in coordination with the agency responsible to prevent unlawful interference in civil aviation at the aerodrome for the prevention of unauthorized entry of persons, vehicles, equipment, animals or other things, into the movement area and as per paragraph 3.6, including the following:

(i) Control of access to the aerodrome and its operational areas, including the location of notice boards, and the control of vehicles in the operational areas;

(ii) the role of the aerodrome operator, the aircraft operator, aerodrome fixed-base operator, the aerodrome security entity, the Authority and other government departments, as applicable;

(iii) the personnel responsible for controlling access to the aerodrome, and the telephone numbers for contacting them during and after working hours;

(iv) inspection checklist;

(v) arrangements for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions; and

(vi) the names and roles of persons responsible for carrying out inspections, and their telephone numbers during and after working hours.

Refer to paragraph 3.6 for further reference.

3.9.5.3 Aerodrome Emergency Plan

Particulars of the aerodrome emergency plan, including:

(i) plans for dealing with emergencies occurring at the aerodrome or in its vicinity, including the malfunction of aircraft in flight; structural fires; sabotage, including bomb threats (aircraft or structure); unlawful seizure of aircraft; and incidents on the covering "during the emergency" and "after the emergency" considerations. These arrangements shall take account of the complexity and size of the aeroplane operations. ;

(ii) details of test and aerodrome facilities and equipment to be used in emergencies, including the frequency of those tests;

(iii) details of exercises to test emergency plans, including the frequency of those exercises;

(iv) a list of organizations, agencies and persons of authority, both on-and/off-, for site roles; their telephone and facsimile numbers, e-mail addresses and the radio frequencies of their offices;

(v) the establishment of an aerodrome emergency committee to organize training and other preparations for dealing with emergencies;

(vi) procedures for the appointment of an on-scene commander for the overall emergency operation and description of responsibilities for each type of emergency;

(vii) arrangements for personnel training and preparation for dealing with emergencies;

(viii) reporting mechanism in the event of emergency;

(ix) contact list of organizations, agencies and persons of authority.

Refer to paragraph 3.4 for further reference.

3.9.5.4 Rescue and Fire Fighting

a) Policy statement on the RFF categories to be provided;

b) Where the senior aerodrome fire officer or designated fire watch officers have specific safety accountabilities, these shall be included in the relevant chapter of the aerodrome manual;

c) Policy and procedures indicating how depletion of the RFF service is to be managed. This shall include the extent to which operations are to be restricted, how pilots are to be notified and the maximum duration of any depletion;

d) At aerodromes where a higher category of RFF is available by prior arrangement, the aerodrome manual shall clearly state the actions necessary to upgrade the facility. Where necessary, this shall include actions to be taken by other departments;

e) The aerodrome operator's objectives for each RFF category provided shall be defined, including a brief description of:

1) amounts of extinguishing agents provided;
2) discharge rates;
3) number of foam-producing appliances;
4) manning levels; and
5) levels of supervision.

f) Procedures for:

1) monitoring the aeroplane movement areas for the purpose of alerting RFF personnel;
2) indicating how the adequacy of the response time capability of the RFF services throughout their functions and locations is monitored and maintained; and
3) indicating how RFF personnel engaged in extraneous duties are managed to ensure that response capability is not affected.

g) Where the aerodrome provides specialist equipment such as rescue craft, emergency tenders, hose layers, and appliances with aerial capability, details shall be included in the aerodrome manual. Procedures to be followed if these facilities are temporarily unavailable shall also be included;

h) Where the aerodrome is reliant upon other organizations to provide equipment which is essential for ensuring the safe operation of the aerodrome (perhaps water rescue), policies or letters of agreement shall be included in the aerodrome manual. Where necessary, contingency plans in the event of non-availability shall be described;

i) A statement describing the process by which aerodrome operators ensure the initial and continued competence of their RFF personnel, including the following:

1) realistic fuel fire training;
2) breathing apparatus training in heat and smoke;
3) first aid;

4) low visibility procedures (LVP);
5) any legal requirements;
6) health and safety policy with regard to training of personnel in the use of respiratory protection equipment and personal protection equipment.

j) Procedures indicating how accidents in the immediate vicinity of the aerodrome are to be accessed. Where difficult environs exist, the aerodrome manual shall indicate how these are to be accessed;

k) Where local authorities or the aerodrome operator expects the RFF facility to respond to domestic fires or special services, procedures for managing their impact upon normal aeroplane RFF responses shall be included.

l) Where the aerodrome operator expects the RFF facility to respond to aeroplane accidents landside, the policy shall be clearly described, including procedures to manage the effects on continued aeroplane operations;

m) The availability of additional water supplies shall be described; and

n) Aerodrome operator's arrangements for ensuring the adequacy of responses in abnormal conditions, i.e. LVP.

Refer to paragraph 3.5 for further reference.

3.9.5.5 Inspections of the Movement Area

Particulars of the procedures for the inspection of the aerodrome movement area and obstacle limitation surfaces as per paragraph 4.17 and including the following:

(i) arrangements for carrying out inspections, including runway friction and water-depth measurements on runways and taxiways, during and outside the normal hours of aerodrome operations, including the following;

a) Routine aerodrome inspections, including lighting inspections, and reporting, including the nature and frequency of these inspections;

b) Inspecting the apron, runways and taxiways following a report of debris on the movement area, an abandoned take-off due to engine, tire or wheel failure, or any incident likely to result in debris being left in a hazardous position;

c) Sweeping of runways, taxiways and aprons;

d) Measurement and promulgation of water and other contaminants including depths on runways and taxiways;

e) Assessment and promulgation of runway surface conditions:

1) details of inspection intervals and times;

2) completion and effective use of an inspection checklist; and

3) arrangements and methods for carrying out inspections on FOD, lighting, pavement surface, grassing.

(ii) arrangements and means of communicating with air traffic control during an inspection;

(iii) arrangements for keeping an inspection logbook, and the location of the logbook;

(iv) details of inspection intervals and times;

(v) inspection checklist;

(vi) arrangements for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions; and

(vii) the names and roles of persons responsible for carrying out inspections, and their telephone numbers during working hours.

3.9.5.6 Visual Aids and Aerodrome Electrical System

Particulars of the visual aids and electrical systems provided at the aerodrome and their layout plan. Procedures for the inspection and maintenance of the aeronautical lights (including obstacle lighting), signs, markings and aerodrome electrical system etc. shall be prepared separately for each type of facility as per paragraph 4.3 and including the following:

(i) arrangements for carrying out inspections during and outside the normal hours of aerodrome operation, and the checklist for such inspections;

(ii) arrangements for recording the result of inspections and for taking follow-up action to correct deficiencies;

(iii) arrangements for carrying out routine maintenance and emergency maintenance;

(iv) arrangements for secondary power supplies and, if applicable, the particulars of any other method of dealing with partial or total system failure;

(v) personnel responsible for the inspection and maintenance of the lighting, and the telephone numbers for contacting those persons during working hours;

(vi) responsibilities with respect to the aerodrome ground lighting system;

(vii) a full description of all visual aids available on each approach, runway, taxiway and apron, including signs, markings and signals;

(viii) procedures for operational use and brilliancy settings of the lighting system;

(ix) standby and emergency power arrangements, including operating procedures both in LVP and during main power failure situations;

(x) procedures for routine inspection and photometric testing of approach lights, runway lights and PAPIs;

(xi) the location of and responsibility for obstacle lighting on and off the aerodrome;

(xii) procedures for recording inspection and maintenance of visual aids and actions to be taken in the event of failures; and

(xiii) the control of work, including trenching and agricultural activity, which may affect the safety of the aeroplane.

Refer to paragraph 4.3 for further reference.

3.9.5.7 Maintenance of the Movement Area

Particulars of the facilities and procedures for the maintenance of movement area as per paragraph 4.2 and including the following:

Particulars of the facilities and procedures for the maintenance of movement area as per paragraph 4.2 and including the following:

1) arrangements for maintaining the paved areas, including the runway friction assessments;

2) arrangements for maintaining the unpaved runways and taxiways;

3) arrangements for maintaining the runway and taxiway strips;

4) arrangements for maintaining aerodrome drainage;

5) arrangements for maintaining the visual aids, including the measurement of intensity, beam spread and orientation of lights;
6) arrangements for maintaining the obstacle lighting; and

7) arrangements for reporting and action taken in the event of failure or unsafe occurrence.

3.9.5.8 Aerodrome Works - Safety

Particulars of the procedures for planning and carrying out works safely (including works which may have to be carried out at short notice) on or in the vicinity of the movement area that may extend above an obstacle limitation surface as per paragraph 4.4 and including the following:

(i) arrangements for communicating with air traffic control during the progress of such work;
(ii) the names, telephone numbers and roles of the persons and organizations responsible for planning and carrying out the work, and arrangements for contacting those persons and organizations at all times;

(iii) the names and telephone numbers, during and after working hours, of the aerodrome fixed-base operators, ground handling agents and aircraft operators who are to be notified of the work; and

(iv) a distribution list for work plans.

3.9.5.9 Apron Management

Particulars of the apron management procedures in line with paragraph 4.8, including the following:

(i) arrangements between air traffic control and the apron management unit;

(ii) arrangements for allocating aircraft parking positions;

(iii) arrangements for initiating engine start and ensuring clearance of aircraft push-back;

(iv) marshalling service; and

(v) follow me service.

3.9.5.10 Apron Safety Management

Procedures to ensure apron safety as per paragraph 4.18 and including the following:

(i) means and procedures for jet blast protection;

(ii) enforcement of safety precautions during aircraft refuelling operations;

(iii) arrangements for apron sweeping and cleaning;

(iv) arrangements for the use of advanced visual docking systems, if provided;

(v) arrangements of safety precautions during aeroplane refuelling operations;

(v) arrangements for reporting incidents and accidents on an apron; and

(vi) arrangements for assessing the safety compliance of all personnel working on the apron.

3.9.5.11 Airside Vehicle Control

Particulars of the procedure for the control of surface vehicles operating on, or in the vicinity of the movement area as per paragraph 4.10 and including the following:

(i) details of the applicable traffic rules (including speed limits and the means of enforcing the rules);

(ii) method and criteria for allowing drivers to operate vehicles on the movement area;

(iii) arrangements and means of communicating with air traffic control;

(iv) the method of issuing driving permits for operating vehicles in the movement area; and

(v) details of the equipment needed in vehicles that operate on the movement area.

3.9.5.12 Wildlife Hazard Management

Particulars of the procedures to deal with the danger posed to aircraft operations by the presence of birds or mammals in the aerodrome flight pattern or movement area, as per paragraph 3.7 and including the following:

(i) arrangements for assessing birds and wildlife hazards;

(ii) arrangements for implementing birds and wildlife control programmes;

(iii) the names and roles of the persons responsible for dealing with birds and wildlife hazards, and their telephone numbers during and after working hours;

(iv) arrangements and method for dispersal of bird and other wildlife; and

(v) measure to discourage birds and other wildlife.

3.9.5.13 Obstacle Control

Particulars of procedures for control of obstacles within and outside the aerodrome as per paragraph 4.19 and including the following:

(i) arrangements for monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces (OLS).;

(ii) monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces;

(iii) arrangements for removal of an obstacle and notifying the Authority of the nature and location of obstacles and subsequent addition of removal of obstacles for action as necessary, including amendment of the Aeronautical Information Services publications;

(iv) reporting procedure and actions to be taken in the event of the appearance of unauthorized obstacles; and

(v) arrangements for controlling new developments in the vicinity of aerodromes.

3.9.5.14 Disabled Aircraft Removal

Particulars of the procedures for removing a disabled aircraft on or adjacent to the movement area, as per paragraph 4.15 and including the following:

(i) the roles of the aerodrome operator, aircraft operator and the holder of the aircraft operator certificate;

(ii) arrangements for notifying the aircraft operator;

(iii) arrangements for liasing with the air traffic control unit;

(iv) arrangements for obtaining equipment and personnel to remove the disabled aircraft;

(v) role and telephone numbers of personnel responsible for arranging for the action as necessary, including amendment of the AIP publications;

(vi) details of the capability for removal of a disabled aeroplane;

(vii) arrangements for removing a disabled aeroplane, including the reporting and notifying procedures and liaison with ATC.

3.9.5.15 Handling of Hazardous Material/dangerous goods

(i) Particulars of the procedures for the safe handling and storage of hazardous materials/dangerous goods on the aerodrome, as per paragraph 4.16 and including the following;

(a) arrangements for special areas of the aerodrome to be set up for the storage of inflammable liquids (including aviation fuels) and any other dangerous goods; and

(b) the method to be followed for the delivery storage, dispensing and handling of hazardous materials/dangerous goods.

(ii) For the purposes of this paragraph “hazardous materials” include inflammable liquids and solids, corrosive liquids, compressed gases and magnetized or radioactive materials.

3.9.5.16 Low Visibility Operations

Particulars of procedures to be introduced for low visibility operations, including the measurement and reporting of runway visual range, as and when required and name and telephone numbers during and after working hours of the persons responsible for measuring the runway visual range.

a) Obtaining and disseminating meteorological information, including runway visual range (RVR) and surface visibility;

b) Protection of runways during LVP if such operations are permitted; and

c) The arrangement and rules before, during and after low visibility operations, including applicable rules for vehicles and personnel operating in the movement area.

3.9.5.17 Protection of Navigational Aids:

Particulars of the procedure for the protection of radio navigational aids located on the aerodrome to ensure that their performance will not be degraded as per paragraph 4.11 and including the following:

(i) arrangements for the control of activities in the vicinity of radar and navigational aids installations;

(ii) arrangements for ground maintenance in the vicinity of these installations;

(iii) arrangements for the supply and installation of signs warning of hazardous microwave radiation; and

(iv) description of the areas to be protected and procedures for their protection.

3.9.5.18 Aerodrome Internal Safety Assurance

The internal safety assurance procedures required by paragraph 3.8

3.9.5.19 Non Complying Conditions

The procedures required by paragraph 4.13 for limiting aircraft operations if a non complying aerodrome condition occurs.

3.9.5.20 Aerodrome Security

Description of measures taken to comply with the security requirements in Chapter 5.

3.9.6 **Part 5 -Aerodrome Administration and Safety Management System (SMS)**

Safety Management System (SMS) established for ensuring compliance with all safety requirements and achieving continuous improvement in safety performance as per paragraph 3.10.

a) Safety policy;

b) Operator’s structure and responsibility. This shall include:

1) the name, status and responsibilities of the accountable executive;
2) the name, status and responsibilities of the safety manager;
3) the name, status and responsibilities of other senior operating staff;
4) the name, status and responsibilities of the official in charge of day-to-day operations;
5) instructions as to the order and circumstances in which the above-named staff may act as the official in charge or accountable executive;
6) an organizational chart supporting the commitment to the safe operation of the aerodrome as well as one simply showing the hierarchy of responsibility for safety management.

c) Training;

d) Complying with regulatory requirements relating to accidents, incidents and mandatory occurrence reporting;

e) Hazard analysis and risk assessment;

f) The management of change;

g) Safety criteria and indicators;

h) Safety audits;

i) Documentation;

j) Safety-related committees;

k) Safety promotion; and

l) Responsibility for monitoring the contractors and third parties operating on the aerodrome.

3.10 SAFETY MANAGEMENT SYSTEM (SMS)

3.10.1 Introduction

(a) The aerodrome operator shall establish an SMS for the aerodrome with a view to ensuring that risks are either eliminated or mitigated and operations are carried out in a demonstrably controlled and safe manner, and that safety processes are reviewed with the aim of continuous improvement. The framework of the SMS to be implemented by the aerodrome operator, is detailed at paragraph 3.10.2;

(b) The SMS shall be approved by the Authority;

(c) SMS is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures;

(d) An SMS is a system to assure the safe operation of aircraft through effective management of safety risk. This system is designed to continuously improve safety by identifying hazards, collecting and analysing data and continuously assessing safety risks. The SMS seeks to proactively contain or mitigate risks before they result in aviation accidents and incidents. It is a system that is commensurate with the Authority's obligations and safety goals;

(e) The intent of a Safety Management System is to have in place an organized and orderly approach in the management of aerodrome safety by the aerodrome operator and to achieve an acceptable level of safety in aerodrome operations. SMS is a tool to translate an organization's concerns about safety into effective actions to mitigate hazards;

(f) One objective of the SMS shall be to reduce the safety risks for passengers, aircraft, personnel, and property to a level as low as reasonably practical (ALARP). The main objectives for an effective SMS effort include ensuring the following;

- Management is always aware of the risks associated with the aerodrome activities and formally documents this awareness;

- Personnel identify, assess, track, and monitor hazards associated with the aerodrome activities and either eliminate or control the associated risks to an acceptable level throughout the life cycle;

- Personnel identify and archive actions taken to eliminate or reduce risk for the purpose of tracking and learning safety lessons;

- Personnel consider and use historical hazard data, including lessons learned from other organizations, particularly aerodomes;

- Personnel quantify and minimize risks resulting from human error in operating, maintaining, and supporting activities;

- Personnel evaluate and minimize risks resulting from hazardous conditions; and

- Aerodrome management keeps aerodrome stakeholders abreast of the safety considerations and includes them in the safety decision process.

(g) The safety management system shall be applicable, amongst others, to aerodrome operations, rescue and fire fighting services, electrical and pavement maintenance and contents of the Aerodrome Manual;

(h) The Aerodrome Operator shall oblige all the users of the aerodrome including fixed-base operators and organisations which perform activities independently at the aerodromes in relation to flight or aircraft handling, fuelling operations and airlines, to comply with the requirements laid down by the Authority with regard to safety management system and shall monitor such compliance; and

(i) The Aerodrome Operator shall require all the users of the aerodrome including fixed-base operators and organisations, to cooperate in the programme to promote safety and order at, and the safe use of, the aerodrome by immediately informing the Aerodrome Operator of the accidents, incidents, defects and faults which have a bearing on safety. Occurrences involving aircraft/ground equipment/vehicles/people shall be reported to the Authority;

3.10.2 SMS Framework

Safety policies and objectives create the frame of reference for the SMS. The objective of the safety risk management component is to identify hazards, assess the related risks and develop appropriate mitigations in the context of the delivery of the organization's products or services. Safety assurance is accomplished through ongoing processes that monitor compliance with international standards and national regulations. Furthermore, the safety assurance process provides confidence that the SMS is operating as designed and is effective. Safety promotion provides the necessary awareness and training. The four components and twelve elements that comprise the SMS framework are as follows:

1. Safety policy and objectives

    1.1 Management commitment
    1.2 Safety accountabilities and responsibilities
    1.3 Appointment of key safety personnel
    1.4 Coordination of emergency response planning
    1.5 SMS documentation

2. Safety risk management

    2.1 Hazard identification
    2.2 Safety risk assessment and mitigation

3. Safety assurance

    3.1 Safety performance monitoring and measurement
    3.2 The management of change
    3.3 Continuous improvement of the SMS

4. Safety promotion

    4.1 Training and education
    4.2 Safety communication

3.10.3 Safety policy and objectives

3.10.3.1 Management commitment

The first component of the SMS framework shall focus on creating an environment where safety management can be effective. It shall be founded on a safety policy and objectives that set out senior management's commitment to safety, its goals and the supporting organizational structure.

Management commitment and safety leadership shall be key to the implementation of an effective SMS and asserted through the safety policy and the establishment of safety objectives. Management commitment to safety shall be demonstrated through management decision-making and allocation of resources; these decisions and actions shall always be consistent with the safety policy and objectives to cultivate a positive safety culture.

The safety policy shall be developed and endorsed by senior management, and shall be signed by the accountable executive. Key safety personnel shall be consulted in the development of the safety policy and safety objectives to promote a sense of shared responsibility.

Policy is management's vehicle to communicate its intentions and commitment to safe operations and continuous improvement. By reading this policy, all staff shall be able to identify and understand that safety is a priority for management and is expected to be a priority for them as well.

(a) The aerodrome operator shall define its safety policy in line with national and international requirements. The safety policy shall:

   (i) reflect organizational commitment regarding safety, size, nature and complexity of the organisation;

   (ii) include a clear statement about the provision of the necessary resources for the implementation of the safety policy;

   (iii) include safety reporting procedures;

   (iv) clearly indicate which types of behaviours are unacceptable related to the aerodrome operator's aviation activities and include the circumstances under which disciplinary action would not apply;

   (v) be signed by the accountable executive of the organization;

   (vi) be communicated, with visible endorsement, throughout the organization. The safety policy shall be visibly endorsed by sthe accountable executive. "Visible endorsement" refers to making management's active support of the safety policy visible to the rest of the organization. This can be done via any means of communication and through the alignment of activities to the safety policy;

(vii) be periodically reviewed to ensure it remains relevant and appropriate to the aerodrome operator; and

(viii) include a commitment to:

a) continuously improve the level of safety performance;
b) promote and maintain a positive safety culture within the organization;
c) comply with all applicable regulatory requirements;
d) provide the necessary resources to deliver a safe product or service;
e) ensure safety is a primary responsibility of all managers; and
f) ensure it is understood, implemented and maintained at all levels.

(ix) include disciplinary policy used to determine whether an error or rule breaking has occurred so that the organization can establish whether any disciplinary action shall be taken.

(x) include a policy on the protection of safety data and safety information, as well as reporters, can have a positive effect on the reporting culture. The aerodrome operator shall allow for the de-identification and aggregation of reports to allow meaningful safety analyses to be conducted without having to implicate personnel or specific service providers.

(b) The disciplinary policy shall be used to determine whether a violation has occurred requiring action beyond the analysis requirements of the risk management systems. Therefore, it is essential to assure that persons responsible for making that determination have the necessary technical expertise to fully consider the context related to the report, thereby diminishing the likelihood that such personnel and the aerodrome operator itself may be exposed to unfair or inappropriate “disciplinary/judicial” proceedings; and

(c) A policy to appropriately protect safety data, as well as the reporters of such data, can have a significant positive effect on the reporting culture. Once it is clear that a report does not involve a violation, the aerodrome operator shall allow for the de-identification and aggregation of reports so as to conduct meaningful safety analysis without implicating personnel or specific service providers.

(d) *Safety Objectives*

Taking into consideration its safety policy, the aerodrome operator shall also establish safety objectives to define what it aims to achieve in respect of safety outcomes. Safety objectives shall be short, high-level statements of the organization's safety priorities and shall address its most significant safety risks. Safety objectives may be included in the safety policy (or documented separately), and shall define what the organization intends to achieve in terms of safety.

i. Safety performance indicators (SPIs) and safety performance targets (SPTs) are needed to monitor the achievement of these safety objectives.

ii. The safety policy and safety objectives shall be periodically reviewed to ensure they remain current.

3.10.3.2 Safety accountabilities and responsibilities

In the SMS context accountability means being ultimately responsible for safety performance, whether at the overall SMS level (accountable executive) or specific product/process levels (members of the management team). This includes being responsible for ensuring appropriate corrective actions are taken to address hazards and errors reported, as well as responding to accidents and incidents.

(a) The aerodrome operator shall:

(i) identify the accountable executive who, irrespective of other functions, has ultimate responsibility and accountability, on behalf of the organization, for the implementation and maintenance of the SMS;

(ii) clearly define lines of safety accountability throughout the organization, including a direct accountability for safety on the part of senior management;

(iii) identify the accountabilities of all members of management, irrespective of other functions, as well as of employees, with respect to the safety performance of the SMS;

(iv) document and communicate safety responsibilities, accountabilities and authorities throughout the organization; and

(v) define the levels of management with authority to make decisions regarding safety risk tolerability.

(b) *Accountable Executive*

i. The accountable executive, typically the chief executive officer, shall be the person who has ultimate authority over the safe operation of the organization. The accountable executive shall establish and promote safety policy and safety objectives that instill safety as a core organizational value. The accountable executive shall have the authority to make decisions on behalf of the organization, have control of resources, both financial and human, be responsible for ensuring appropriate actions are taken to address safety issues and safety risks, and they shall be responsible for responding to accidents and incidents;

ii. The person selected as accountable executive shall be organizationally situated at the highest level of the organization, thus ensuring the right strategic safety decisions are made;

iii. The aerodrome operator shall identify the accountable executive, placing the responsibility for the overall safety performance at a level in the organization with the authority to take action to ensure the SMS is effective.

iv. Specific safety accountabilities of all members of management shall be defined and their role in relation to the SMS shall reflect how they can contribute towards a positive safety culture. The safety responsibilities, accountabilities and authorities shall be documented and communicated throughout the organization. The safety accountabilities of managers shall include the allocation of the human, technical, financial or other resources necessary for the effective and efficient performance of the SMS.

Note.— The term "accountability" refers to obligations which cannot be delegated. The term "responsibilities" refers to functions and activities which may be delegated.

v. The accountable executive shall be visibly involved by leading regular executive safety meetings. Being ultimately responsible for the safety of the organization, the accountable executive shall;

a) review safety objectives;

b) monitor safety performance and the achievement of safety targets;
c) make timely safety decisions;

d) allocate appropriate resources;

e) hold managers accountable for safety responsibilities, performance and implementation timelines; and
f) be seen by all personnel as an executive who is interested in, and in charge of, safety.

vi. The accountable executive is not usually involved in the day-to-day activities of the organization or the problems faced in the workplace and shall ensure there is an appropriate organizational structure to manage and operate the SMS. Safety management responsibility is often delegated to the senior management team and other key safety personnel. Although responsibility for the day-to-day operation of the SMS can be delegated, the accountable executive cannot delegate accountability for the system nor can decisions regarding safety risks be delegated. For example, the following safety accountabilities cannot be delegated:

a) ensuring safety policies are appropriate and communicated;

b) ensuring necessary allocation of resources (financing, personnel, training, acquisition); and

c) setting of the acceptable safety risk limits and resourcing of necessary controls.

vii. The accountable executive shall have the following safety accountabilities:

a) provide enough financial and human resources for the proper implementation of an effective SMS;

b) promote a positive safety culture;

c) establish and promote the safety policy;

d) establish the organization's safety objectives;

e) ensure the SMS is properly implemented and performing to requirements; and

f) see to the continuous improvement of the SMS.

viii. The accountable executive's authorities shall include, but are not limited to, having final authority:

a) for the resolution of all safety issues; and

b) over operations under the licence, authorization or approval of the organization, including the authority to stop the operation or activity.

ix. The authority to make decisions regarding safety risk tolerability shall be defined. This includes who can make decisions on the acceptability of risks as well as the authority to agree that a change can be implemented. The authority may be assigned to an individual, a management position or a committee.

x. Authority to make safety risk tolerability decisions shall be commensurate with the manager's general decision-making and resource allocation authority. A lower level manager (or management group) may be authorized to make tolerability decisions up to a certain level. Risk levels that exceed the manager's authority shall be escalated for consideration to a higher management level with greater authority.

(c) *Accountability and Responsibilities*

i. Accountabilities and responsibilities of all personnel, management and staff, involved in safety-related duties supporting the delivery of safe products and operations shall be clearly defined. The safety responsibilities shall focus on the staff member's contribution to the safety performance of the organization (the organizational safety outcomes). The management of safety shall be a core function; as such every senior manager shall have a degree of involvement in the operation of the SMS;

ii. All defined accountabilities, responsibilities and authorities shall be stated in the aerodrome operator’s SMS documentation and shall be communicated throughout the organization. The safety accountabilities and responsibilities of each senior manager shall be integral components of their job descriptions. This shall also capture the different safety management functions between line managers and the safety manager.

iii. Safety accountabilities and responsibilities shall be reflected in organizational charts, documents defining departmental responsibilities, and personnel job or role descriptions.

iv. The aerodrome operator shall aim to avoid conflicts of interest between staff members’ safety responsibilities and their other organizational responsibilities. They shall allocate their SMS accountabilities and responsibilities, in a way that minimizes any overlaps and/or gaps.

v. *Accountability and responsibilities and in respect to external organizations and subcontractors*

The aerodrome operator shall be responsible for the safety performance of external organizations where there is an SMS interface. The aerodrome operator may be held accountable for the safety performance of services provided by external organizations supporting its activities even if the external organizations are not required to have an SMS. It is essential for the aerodrome operator's SMS to interface with the safety systems of any external organizations that contribute to the safe delivery of their services.

The aerodrome operator shall ensure that:

(i) there is a policy clearly establishing a safety accountability and authority flow between the aerodrome operator and the subcontractor;

(ii) the subcontractor has a safety reporting system commensurate with its size and complexity that facilitates the early identification of hazards and systemic failures of concern to the aerodrome operator;

(iii) the aerodrome operator's safety review board includes subcontractor representation, where appropriate;

(iv) safety indicators to monitor subcontractor performance are developed, where appropriate;

(v) the aerodrome operator's safety promotion process ensures subcontractor employees are provided with the organization's applicable safety communications; and

(vi) any subcontractor roles, responsibilities and functions relevant to the aerodrome operator's emergency response plan are developed and tested.

(d) The SMS-related accountabilities, responsibilities and authorities of all appropriate senior managers shall be described in the organisation's SMS documentation. Mandatory safety functions performed by the safety manager, safety office, safety action groups, etc., may be embedded into existing job descriptions, processes and procedures.

3.10.3.3 Appointment of key safety personnel

The aerodrome operator shall appoint a competent person or persons to fulfill the role of safety manager who is responsible for the implementation and maintenance of an effective SMS. The appointment of a qualified safety manager is key to the effective implementation and functioning of a safety services office. The safety manager may be identified by different titles in different organizations, but the generic term safety manager is used.

(a) the safety manager is the individual responsible for the development and maintenance of an effective SMS. The safety manager also advises the accountable executive and line managers on safety management matters and is responsible for coordinating and communicating safety issues within the organization, as well as with external stakeholders. The safety manager shall have direct access or reporting to the accountable executive concerning the implementation and operation of the SMS. The safety manager's functions include, but are not necessarily limited to:

(i) managing the SMS implementation plan on behalf of the accountable executive;

(ii) performing/facilitating hazard identification and safety risk analysis;

(iii) monitoring corrective actions and evaluating their results;

(iv) providing periodic reports on the organization's safety performance;

(v) maintaining SMS records and safety documentation;

(vi) planning and facilitating staff safety training;

(vii) providing independent advice on safety matters;

(viii) monitoring safety concerns in the aviation industry and their perceived impact on the organization's operations aimed at service delivery;

(ix) coordinating and communicating (on behalf of the accountable executive) with the Authority as necessary on issues relating to safety; and

(x) coordinating and communicating (on behalf of the accountable executive) with international organizations (airside operations, airport rescue firefighting services, airside and pavement maintenance, electrical maintenance etc.) on issues relating to safety, Safety Performance Indicators, Risk Assessments, safety training, internal investigations related to safety, safety assurance and safety communication;

(xi) carrying out the following tasks:

SMS		Tasks to be carried out or coordinated by the SMS Manager
Pillar	**Element**	
Policies and Objectives	Organizational Structure	Be alert to any change in the airport organizational structure and its impact on the SMS structure
		Be sure that all the interfaces among the stakeholder activities work toward the SMS operation
	Documentation	Make sure that all the documentation is managed as required by the SMS
	Coordination of the Emergency Plan	Constantly evaluate the interfaces between AEP, airlines, and ATC emergency plans. Assist with recommendation to improve the AEP.
Safety Risk Management	Hazard Identification	Continuously check the compliance of the procedures for collecting, recording, acting, monitoring and providing feedback on hazards and mitigation actions, considering both reactive and proactive approaches
		Collect, compile, and check the effective use of the mandatory, voluntary, and confidential reporting systems, according to the airport policy
		Create adequate environment for the compliance of the reporting systems
		Continuously improve the reporting systems to make them simple, confidential, accessible, informative, and with rapid feedback
		Collect, organize, and store hazard data and safety reports
		Analyze, consolidate essential data, and provide feedback on hazard reports
	Risk Assessment	Coordinate and carry out risk assessments with multidisciplinary groups, and help delineate risk mitigation strategies
		Be sure that all the activities related to hazard identification, risk assessment, and mitigation processes are developed according to the processes defined in the SMS documentation
	Corrective Actions and Monitoring	Delineate procedures to evaluate the effectiveness of mitigation actions
		Coordinate continuous monitoring of identified hazards and the effectiveness of mitigation actions
	Reporting Systems	Ensure the reporting processes are available and working properly
		Assist the Accountable Executive with making sure the airport complies with the established reporting policy
	Internal Safety Investigations	Coordinate the internal investigations to determine root causes for occurrences or events that are not required to be investigated by organizations outside the airport (e.g., NTSB, FAA)
	Improving SOPs	Constantly analyze available safety information obtained during the SMS operation to determine the need to create or improve SOPs
		Assist with the creation and improvement of SOPs
	Assessing the Impact of Changes	Analyze the need to conduct assessments on the impact of future changes in the airport environment such as construction, introduction of new equipment, introduction of new regulatory requirements and processes, changes in security, reorganization of air traffic control, changes to the airport organization, etc.
		Monitor risk control actions taken
Safety Assurance	Performance Monitoring	Ensure that the airport collects data for all performance indicators defined in the SMS documentation
		Assist and conduct trend analysis for each performance indicator
		Monitor SPI trends and evaluate safety performance to suggest actions
		Identify the hazard(s) behind performance indicator trends that point out safety deficiencies
		Identify and assist identifying appropriate potential performance indicators
	Internal SMS Assessment	Plan and coordinate internal assessments according to the SMS requirements, help prepare checklists, coordinate the organization of the teams
		When necessary, help with the analysis and compilation of the information
		Assist with the Identification of areas that need more attention
		Ensure that every airport department receives a summary of the SMS assessment
		Use safety surveys to check the SMS operation in terms of problem areas or bottlenecks in daily operations, perceptions, and opinions of operational personnel, areas of dissent, or confusion
		Ensure that recommended actions that have been approved are adequately implemented
Safety Assurance	Management Review	Ensure that adequate information is provided for the Management Review
		Advise the airport high level administrative personnel before, during, and after the Management Review
		Put in practice the strategic plan for safety improvement developed by the Management Review

SMS		Tasks to be carried out or coordinated by the SMS Manager
Pillar	**Element**	
		Monitor the strategic plan for safety improvement
Safety Promotion	Training and Education	Ensure that all staff levels receive adequate indoctrination and recurrent training, including airport stakeholders when it is the case
		Identify the areas most in need of additional training
		Identify the necessary resources to meet training needs
		Ensure the SMS training program is implemented
		Assist measuring SMS training effectiveness
	Safety Communication	Develop formal means for safety communication within the SMS environment
		Make sure that employees are involved or consulted in the development and review of policies and procedures implemented to manage risks
		Make sure that safety information is disseminated throughout the organization
		Create processes to assess the effectiveness of safety communication
	Continuous Improvement	Ensure the application of the concepts behind the PDCA (Plan, Do, Check and Act)
		Periodically revise the SMS self-assessment and find out areas where improvement is necessary
		Check all regular, periodic, and planned reviews regarding safety processes and performance
		Monitor the decisions and actions aimed at improving safety to evaluate their effectiveness
Other Tasks		Keep close coordination with the SMS Champion if there is one
		Help the line managers with their safety programs
		Coordination of safety items in meeting agendas
		Participate in the airport safety meetings
		Develop, assist, and coordinate safety promotion initiatives
		Assist with obtaining the necessary resources to carry out mitigation actions, training, and other tasks associated with SMS
		Ensure the necessary resources are allocated to the SMS operation

(b) The competencies for a safety manager shall include, but not be limited to, the following:

a) safety/quality management experience;

b) operational experience related to the product or service provided by the organization;

c) technical background to understand the systems that support operations or the product/service provided;

d) interpersonal skills;

e) analytical and problem-solving skills;

f) project management skills;

g) oral and written communications skills; and

h) an understanding of human factors.

(c) The safety manager shall not be directly involved in the product or service delivery but shall have a working knowledge of these. The appointment shall also consider potential conflicts of interest with other tasks and functions . Such conflicts of interest shall include:

a) competition for funding (e.g. financial manager being the safety manager);

b) conflicting priorities for resources; and

c) where the safety manager has an operational role and the ability to assess the SMS effectiveness of the operational activities the safety manager is involved in.

(d) In cases where the function is allocated to a group of persons, (e.g. when aerodrome operators extend their SMS across multiple activities) one of the persons shall be designated as “lead” safety manager, to maintain a direct and unequivocal reporting line to the accountable executive;

(e) Depending on the size, nature and complexity of the organization, additional staff may support the safety manager. The safety manager and supporting staff shall be responsible for ensuring the prompt collection and analysis of safety data and appropriate distribution within the organization of related safety information such that safety risk decisions and controls, as necessary, can be made.

(f) Aerodrome operators shall establish appropriate safety committees that support the SMS functions across the organization. This shall include determining who shall be involved in the safety committee and frequency of the meetings.

(g) *Safety Review Boards (SRB)*

The aerodrome operator shall set up a Safety Review Boards (SRB) for assessing the effectiveness and efficiency of any mitigation strategies used to achieve the agreed safety performance targets of the organization, providing the platform to achieve the objectives of resource allocation and assessing the effectiveness and efficiency of risk mitigation strategies. The SRB shall be a very high-level committee, chaired by the accountable executive and composed of senior managers, including line managers responsible for functional areas as well as those from relevant administrative departments. The safety manager participates in the SRB in an advisory capacity only.

The SRB shall meet frequently and whenever required. The SRB shall monitor:

a) effectiveness of the SMS;

b) timely response in implementing necessary safety risk control actions;

c) safety performance against the organization's safety policy and objectives;

d) overall effectiveness of safety risk mitigation strategies;

e) effectiveness of the organization's safety management processes which support:

1) the declared organizational priority of safety management; and

2) promotion of safety across the organization.

(h) The SRB is strategic and shall deal with high-level issues related to policies, resource allocation and organizational performance monitoring.

Once a strategic direction has been developed by the SRB, implementation of safety strategies shall be coordinated throughout the organization. Implementation of safety strategies shall be implemented by creating a safety action group (SAG). SAGs shall be composed of line managers and front-line personnel and shall normally be chaired by a designated line manager. SAGs are tactical entities that deal with specific implementation issues per the direction of the SRB. The SAG shall:

a) monitor operational safety performance within their functional areas of the organization and ensure that appropriate SRM activities are carried out;

b) review available safety data and identify the implementation of appropriate safety risk control strategies and ensure employee feedback is provided;

c) assess the safety impact related to the introduction of operational changes or new technologies;

d) coordinate the implementation of any actions related to safety risk controls and ensure that actions are taken promptly; and

e) review the effectiveness of specific safety risk controls.

3.10.3.4 Coordination of emergency response planning

(a) The aerodrome operator shall develop an Aerodrome Emergency Plan appropriate to the size, nature and complexity of the organization and in accordance with paragraph 3.4 of the Aerodrome Licensing Manual;

(b) The aerodrome operator shall ensure that an aerodrome emergency plan is properly coordinated with the emergency response plans of those organizations it shall interface with during the provision of its services;

(c) The Aerodrome Emergency Plan shall document actions to be taken by all responsible personnel during aviation-related emergencies. The purpose of an Aerodrome Emergency Plan is to ensure that there is an orderly and efficient transition from normal to emergency operations, including assignment of emergency responsibilities and delegation of authority. Authorisation for action by key personnel shall also be available in the plan, as well as the means to coordinate efforts necessary to cope with the emergency. The overall objective shall be to save lives, the safe continuation of operations and the return to normal operations as soon as possible;

(d) The emergency/contingency plan shall address all possible or likely emergency/crisis scenarios relating to the aerodrome;

(e) The emergency response plan shall include procedures for the continuing safe aerodrome operations during such emergencies or contingencies;

(f) The emergency response plan shall have provisions for drill exercises and records;

(g) The emergency response plan shall have a process to distribute and communicate its contents to all relevant personnel, including relevant external organizations; and

(h) The emergency response plan shall have a procedure for periodic review of the emergency response plan to ensure it continuing relevance and effectiveness.

3.10.3.5 SMS Documentation

The aerodrome operator shall develop and maintain SMS documentation that covers all elements and processes of the SMS and shall include the following:

(a) a consolidated description of the SMS components and elements including:

a) safety policy and safety objectives;
b) reference to any applicable regulatory SMS requirements;
c) system description;
d) safety accountabilities and key safety personnel;
e) voluntary and mandatory safety reporting system processes and procedures;
f) hazard identification and safety risk assessment processes and procedures;
g) safety investigation procedures;
h) procedures for establishing and monitoring safety performance indicators;
i) SMS training processes and procedures and communication;
j) safety communication processes and procedures;
k) internal audit procedures;
l) management of change procedures;
m) SMS documentation management procedures; and
n) where applicable, coordination of emergency response planning.

(b) a compilation of current SMS related records and documents such as:

(i) hazards report register and samples of actual reports;

(ii) safety performance indicators and related charts;

(iii) record of completed or in-progress safety assessments;

(iv) SMS internal review or audit records;

(v) safety promotion records;

(vi) personnel SMS/safety training records;

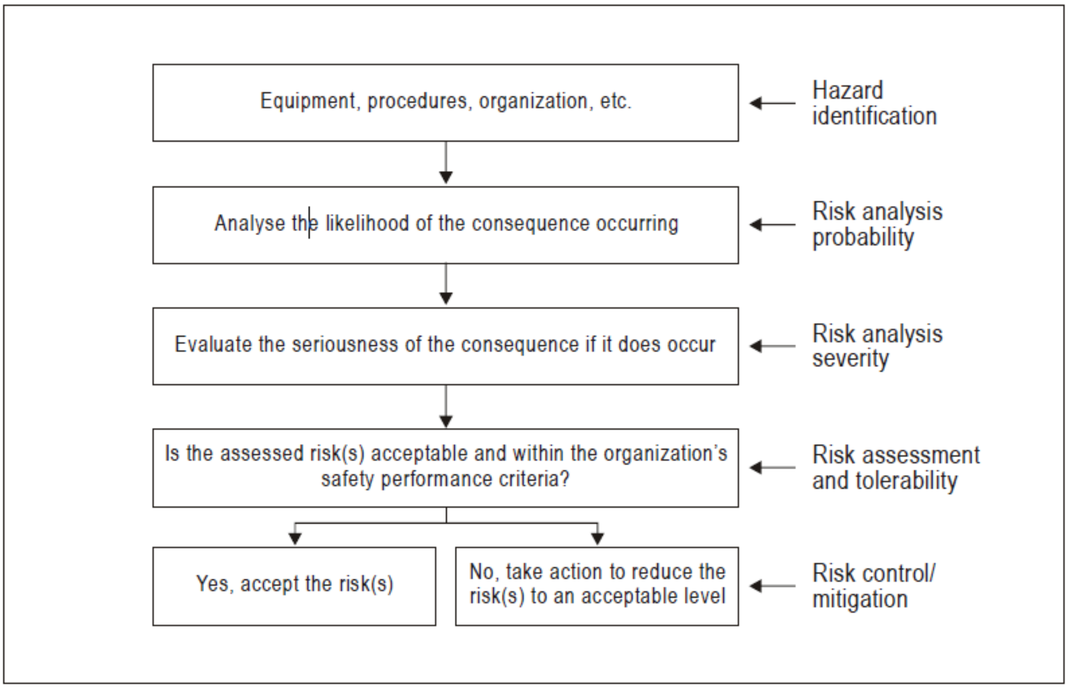
(vii) SMS/safety committee meeting minutes; and

(viii) SMS implementation plan (during implementation process) including gap analysis. The implementation plan shall be endorsed by the accountable executive.

3.10.4 Safety Risk Management (SRM)

Introduction

(a) The aerodrome operator shall ensure that the safety risks encountered in aerodrome activities are controlled in order to achieve their safety performance targets. This process is known as safety risk management and includes hazard identification, safety risk assessment and the implementation of appropriate remediation measures. The safety risk management process is illustrated below;



(b) The safety risk management component systematically identifies hazards that exist within the context of the delivery of its products or services. Hazards may be the result of systems that are deficient in their design, technical function, human interface or interactions with other processes and systems. They may also result from a failure of existing processes or systems to adapt to changes in the aerodrome operator's operating environment. Careful analysis of these factors during the planning, design and implementation phases can often identify potential hazards before the system becomes operational;

(c) Understanding the system and its operating environment is also essential for achievement of high safety performance. Hazards may be discovered during the operational life cycle, through employee reports or incident investigations. Analysis of these hazards shall be conducted in the context of the system. This context is key to avoiding attribution of events to "human error," where defects in the system may be neglected, remaining latent for future and potentially more serious events to occur;

(d) **Safety Assessment**

1. A safety assessment is an element of the risk management process of an SMS that shall be used to assess safety concerns arising from, inter alia, deviations from standards and applicable regulations, identified changes at an aerodrome or when any other safety concerns arise;

2. When a safety concern, change or a deviation has an impact on several aerodrome stakeholders, consideration shall be given to the involvement of all stakeholders affected in the safety assessment process. In some cases, the stakeholders impacted by the change will need to conduct a separate safety assessment themselves in order to fulfil the requirements of their SMSs and coordinate with other relevant stakeholders. When a change has an impact on multiple stakeholders, a collaborative safety assessment shall be conducted to ensure compatibility of the final solutions;

3. A safety assessment considers the impact of the safety concern on all relevant factors determined to be safety-significant. The list below provides a number of items that may need to be considered when conducting a safety assessment. The items in this list are not exhaustive and in no particular order:

   a) aerodrome layout, including runway configurations; runway length; taxiway, taxilane and apron configurations; gates; jet bridges; visual aids; and the RFF services infrastructure and capabilities;

   b) types of aircraft, and their dimensions and performance characteristics, intended to operate at the aerodrome;

   c) traffic density and distribution;

   d) aerodrome ground services;

   e) ground-ground communications;

f) type and capabilities of surveillance systems and the availability of systems providing controller support and alert functions;

g) flight instrument procedures and related aerodrome equipment;

h) complex operational procedures, such as collaborative decision-making (CDM);

i) aerodrome technical installations, such as advanced surface movement guidance and control systems (A-SMGCS) or other air navigation aids;

j) obstacles or hazardous activities at or in the vicinity of the aerodrome;

k) planned construction or maintenance works at or in the vicinity of the aerodrome;

l) any local or regional hazardous meteorological conditions (such as wind shear); and

m) airspace complexity, ATS route structure and classification of the airspace, which may change the pattern of operations or the capacity of the same airspace.

4. Subsequent to the completion of the safety assessment, the aerodrome operator shall be responsible for implementing and periodically monitoring the effectiveness of the identified mitigation measures; and

5. The Authority shall review the safety assessment provided by the aerodrome operator and its identified mitigation measures, operational procedures and operating restrictions and shall be responsible for the subsequent regulatory oversight of their application.

(e) Definition of a safety concern and identification of the regulatory compliance

1. Any perceived safety concerns shall be described in detail, including timescales, projected phases, location, stakeholders involved or affected as well as their potential influence on specific processes, procedures, systems and operations;

2. The perceived safety concern shall first be analysed to determine whether it is retained or rejected. If rejected, the justification for rejecting the safety concern is to be provided and documented;

3. An initial evaluation of compliance with the appropriate provisions in the regulations applicable to the aerodrome shall conducted and documented;

4. The corresponding areas of concern shall be identified before proceeding with the remaining steps of the safety assessment, with all relevant stakeholders; and

5. If a safety assessment was conducted previously for similar cases in the same context at an aerodrome where similar characteristics and procedures exist, the aerodrome operator may use some elements from that assessment as a basis for the assessment to be conducted. Nevertheless, as each assessment is specific to a particular safety concern at a given aerodrome the suitability for reusing specific elements of an existing assessment shall be carefully evaluated.

3.10.4.1 Hazard identification

(a) The aerodrome operator shall develop and maintain a formal process that ensures that hazards associated with its aerodrome are identified;

(b) Hazard identification shall be based on a combination of reactive, proactive and predictive methods of safety data collection;

(c) The aerodrome operator shall develop and maintain a formal process to identify hazards that may contribute to aerodrome safety-related occurrences. Hazard identification is based on a combination of reactive, proactive and predictive safety data collection methods. The three methodologies for identifying hazards are:

(i) ***Reactive*** This methodology involves analysis of past outcomes or events. Hazards are identified through investigation of safety occurrences. Incidents and accidents are clear indicators of system deficiencies and therefore can be used to determine the hazards that either contributed to the event or are latent. It includes mandatory occurrence report, incident and accident reports;

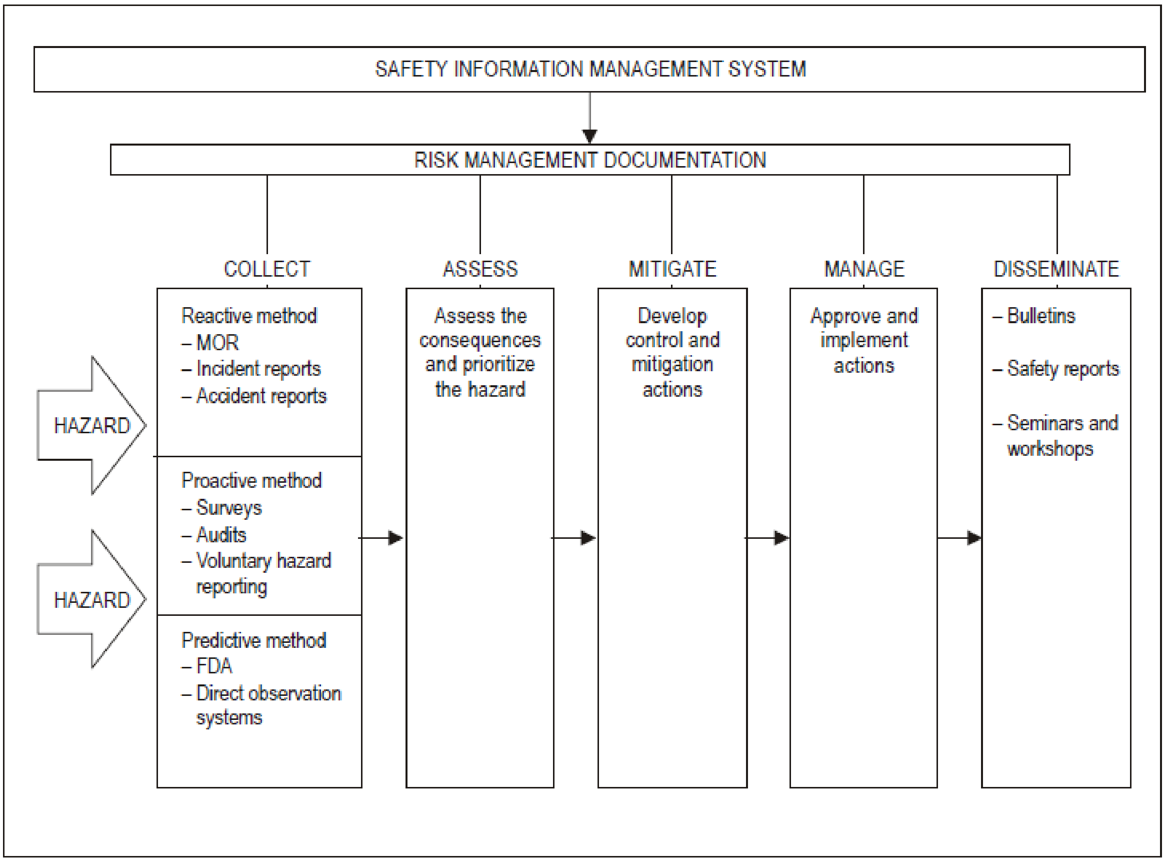
(ii) ***Proactive*** This methodology involves analysis of existing or real-time situations, which is the primary job of the safety assurance function with its audits, evaluations, employee reporting, and associated analysis and assessment processes. This involves actively seeking hazards in the existing processes. It includes surveys, audits, voluntary hazard reporting, safety tours, self inspections, change analysis, hazard reporting, brainstorming sessions, checklists, interviews, hazard analysis tools; and

(iii) ***Predictive*** This methodology involves data gathering in order to identify possible negative future outcomes or events, analysing system processes and the environment to identify potential future hazards and initiating mitigating actions**.**

(d) Hazard identification sessions require a range of experienced operational and technical personnel and are managed by a facilitator. The same group may also be used to assess corresponding safety risks;

(e) The aerodrome operator's safety information management system shall include safety assessment documentation that contains hazard descriptions, the related consequences, the assessed likelihood and severity of the safety risks, and required safety risk controls. Existing safety assessments shall be reviewed whenever new hazards are identified and proposals for further safety risk controls are anticipated;

(f) The figure below illustrates the hazard documentation and follow-up risk management process. Hazards are constantly identified through various data sources. The aerodrome operator is expected to identify hazards, eliminate these hazards or to mitigate the associated risks. In the case of hazards identified in products or services delivered through subcontractors, a mitigation could be the aerodrome operator's requirement for such organizations to have an SMS or an equivalent process for hazard identification and risk management;



(g) The safety management information system becomes a source of safety knowledge to be used as reference in organizational safety decision-making processes. This safety knowledge provides material for safety trend analyses as well as for safety education;

(h) Hazards related to infrastructure, systems or operational procedures shall be initially identified using methods such as brain-storming sessions, expert opinions, industry knowledge, experience and operational judgement. The identification of hazards shall be conducted by considering:

a) accident causal factors and critical events based on a simple causal analysis of available accident and incident databases;

b) events that may have occurred in similar circumstances or that are subsequent to the resolution of a similar safety concern; and

c) potential new hazards that may emerge during or after implementation of the planned changes.

Following the previous steps, all potential outcomes or consequences for each identified hazard shall be identified.

The appropriate safety objective for each type of hazard shall be defined and detailed. This can be done through:

a) reference to recognized standards and/or codes of practices;
b) reference to the safety performance of the existing system;
c) reference to the acceptance of a similar system elsewhere; and
d) application of explicit safety risk levels.

(i) Once hazards are identified, their consequences shall be determined. A list of potential hazards and their consequences are listed at Appendix 11.

(j) Hazard identification example at an aerodrome

Hazard #	System	Subsystem	Activity	Description of Hazard	How Hazard Was Identified
1	Airside	Movement Area	Runway operations	Runway rubber build-up	Pilot reports and runway friction measurements
2	Airside	Construction Site	Construction - drainage pipe replacement near runway threshold	FOD	Pre-construction conference
3	Airside	Non-Movement Area	Ground traffic in ramp area	Speeding in ramp area	Increase in speeding violations from trend analysis
4	Airside	Movement Area	Topographic survey for runway rehabilitation	People crossing movement areas	Manager's meeting
5	Airside	Gate Areas	Aircraft services in gate areas	People approaching aircraft before anti-collision light is turned off	Daily inspections at the ramp

(k) *Sources of hazard identification*

1. Internal Sources

a) Normal operations monitoring; this uses observational techniques to monitor the day-to-day operations and activities such as audits.

b) Automated monitoring systems, if any;

c) Voluntary and mandatory safety reporting systems; this provides everyone, including staff from external organizations, with opportunities to report hazards and other safety issues to the organization.

d) Audits; these can be used to identify hazards in the task or process being audited. These shall also be coordinated with organizational changes to identify hazards related to the implementation of the change.

e) Feedback from training; training that is interactive (two way) can facilitate identification of new hazards from participants.

f) Aerodrome operator safety investigations; hazards identified in internal safety investigation and follow-up reports on accidents/incidents.

2. External Sources

a) Aviation accident reports; reviewing accident reports; this may be related to accidents in the same place or to a similar aircraft type, region or operational environment.

b) Mandatory and voluntary safety reporting systems.

c) Authority oversight audits and third-party audits; external audits can sometimes identify hazards. These may be documented as an unidentified hazard or captured less obviously within an audit finding.

d) Trade associations and information exchange systems; many trade associations and industry groups are able to share safety data that may include identified hazards.

3. Safety Reporting System

a) One of the main sources for identifying hazards shall be the safety reporting system, especially the voluntary safety reporting system. Whereas the mandatory system shall normally be used for incidents that have occurred, the voluntary system shall provide an additional reporting channel for potential safety issues such as hazards, near misses or errors. They shall provide valuable information to the Authority and aerodrome operator on lower consequence events.

b) Reported information shall be used solely to support the enhancement of safety. The intent shall be to promote an effective reporting culture and proactive identification of potential safety deficiencies.

c) The aerodrome operator shall adopt the following two types of reporting systems:

(i) mandatory incident reporting systems; and

(ii) voluntary incident reporting systems.

d) **Mandatory incident reporting systems** require the reporting of certain types of events (e.g. serious incidents, runway incursions). Mandatory reporting systems tend to collect more information related to high-consequence technical failures than other aspects of operational activities. Refer to paragraph 4.22 for further information on mandatory occurrence reporting;

e) **Voluntary reporting systems** allow for the submission of information related to observed hazards or inadvertent errors without an associated legal or administrative requirement to do so. In these systems, regulatory agencies or organizations may offer an incentive to report. For example, enforcement action may be waived for reports of inadvertent errors or unintentional violations. Under these circumstances, reported information shall be used solely to support the enhancement of safety. Such systems are considered "non-punitive" because they afford protection to reporters thereby ensuring the continued availability of such information to support continuous improvements in safety performance. The intent is to promote an effective reporting culture and proactive identification of potential safety deficiencies. The following Voluntary Safety Reporting Form shall be used:

VOLUNTARY SAFETY REPORTING FORM

This form should be used to report any airport hazard that has caused or could cause an accident or incident. Send to the SMS Manager as soon as possible after the hazard has been identified or an incident/accident has occurred.

1 PERSONAL DETAILS (person reporting)

Name: (optional)	**Position:** (optional)	**Contact info:** (optional)

2 INCIDENT/HAZARD DETAILS

Date:	Time: AM/PM	Shift: Day: ☐ Afternoon: ☐ Night: ☐

Location:

Brief Description of Incident/Hazard: (attach diagrams, sketches, or photographs, if available)

Are there witnesses?: YES: ☐ NO: ☐	**Names of witnesses:** (optional)

Type of Incident/Hazard		**Level of Injury (If applicable)**		Brief description of injury/damage
Health and/or Safety	☐	No Injury	☐	
Property Damage	☐	First Aid	☐	
Environmental	☐	Medical Treatment (Doctor)	☐	
Near Miss	☐	Hospital Inpatient	☐	
Other	☐	Fatal	☐	

Confidentiality Commitment

You can submit the form anonymously (if you so chose) by omitting relevant details. If you do provide your name, it will only be used by the SMS Manager to enhance the understanding of the event with follow-up actions should that be required; and, under no circumstances, will your identity be disclosed to any person or organization without your express permission.

f) Voluntary reporting systems shall be confidential, requiring that any identifying information about the reporter is known only to "gatekeepers" in order to allow for follow-up action. Confidential incident reporting systems facilitate the disclosure of hazards leading to human error, without fear of retribution or embarrassment. Voluntary incident reports may be archived and de-identified once any necessary follow-up actions are taken. De-identified reports can support future trending analyses to track the effectiveness of risk mitigation and to identify emerging hazards. The following Safety Report Processing Form below shall be used.

SAFETY REPORT PROCESSING FORM

(To be completed by SMS Manager)

Report Number: Date report was received:	Assessed Level of Risk:

Referred to:

- Appropriate Dept Manager: ☐ Yes ☐ No, Name/Dept............................
- Safety Committee: ☐ Yes ☐ No, Name/Organization.....................

Entered into Safety Risk Database: ☐ Yes ☐ No

If yes, specify the date.

Treatment actions required:

Person responsible:

Completion date estimated:

Feedback:

Is reporter known? ☐ Yes, advised of outcome on: Date:

☐ No, event and action communicated on: Date:

Through:

☐ Safety bulletin

☐ Safety meeting

☐ Ramp Safety Committee minutes

☐ Other Safety event (describe):

Person completing form: ________________________ Signature:
Date: __________

Manager/Supervisor: ________________________ Signature:
Date: __________

g) To be effective, safety reporting tools shall be readily accessible to operational personnel. Operational personnel shall be educated on the benefits of safety reporting systems and provided with positive feedback regarding remedial actions taken in response to the report. The alignment of reporting system requirements, analysis tools and methods can facilitate exchange of safety information as well as comparisons of certain safety indicators;

h) Other methods of hazard identification shall include workshops or meetings in which subject matter experts conduct detailed analysis scenarios. These sessions benefit from the contributions of a range of experienced operational and technical personnel. Existing safety committee meetings (SRB, SAG, etc.) shall be used for such activities; the same group may also be used to assess associated safety risks.

i) Identified hazards and their potential consequences shall be documented. This will be used for safety risk assessment processes.

j) The hazard identification process shall consider all possible hazards that may exist within the scope of the aerodrome operator's aviation activities including interfaces with other systems, both within and external to the organization. Once hazards are identified, their consequences (i.e. any specific events or outcomes) shall be determined.

k) To be effective, safety reporting tools shall be readily accessible to operational personnel. Operational personnel shall be educated on the benefits of safety reporting systems and provided with positive feedback regarding remedial actions taken in response to the report. The alignment of reporting system requirements, analysis tools and methods can facilitate exchange of safety information as well as comparisons of certain safety indicators.

l) **Non punitive reporting system.** The aerodrome operator shall encourage a non punitive reporting system to encourage reporting by removing fear of punishment. However, that does not mean that people can get away with negligent behavior or with willfully breaking rules. A non-punitive reporting system may encourage people to report events that might otherwise not get reported. This would allow the aerodrome operator to get more information about hazards in your operation before an accident happens.

4. Investigation of Hazards

a) Hazard identification shall be continuous and part of the aerodrome operator's ongoing activities. Some conditions shall merit more detailed investigation. These shall include:

i. instances where the organization experiences an unexplained increase in aviation safety-related events or regulatory non-compliance; or

ii. significant changes to the organization or its activities.

b) There shall be a clear distinction between accident and incident investigations by the Authority under ICAO Annex 13 and aerodrome operator investigations. Investigation of accidents and serious incidents under ICAO Annex 13 are the responsibility of the Authority. This type of information is essential to disseminate lessons learned from accidents and incidents. Aerodrome operator safety investigations shall be conducted as part of their SMS to support hazard identification and risk assessment processes and provide a valuable source of hazard identification or identify weaknesses in risk controls. These problems shall be revealed and remedied by a safety investigation led by the aerodrome operator.

c) The primary objective of the aerodrome operator safety investigation shall be to understand what happened, and how to prevent similar situations from occurring in the future by eliminating or mitigating safety deficiencies. This shall be achieved through careful and methodical examination of the event and by applying the lessons learned to reduce the probability and/or consequence of future recurrences. Aerodrome operator safety investigations shall be an integral part of the aerodrome operator's SMS.

d) Aerodrome operator investigation of safety occurrences and hazards shall be an essential activity of the overall risk management process in aviation. The benefits of conducting a safety investigation include:

a) gaining a better understanding of the events leading up to the occurrence;

b) identifying contributing human, technical and organizational factors;

c) identifying hazards and conducting risk assessments;

d) making recommendations to reduce or eliminate unacceptable risks; and

e) identifying lessons learned that shall be shared with the appropriate members of the aviation community.

e) An aerodrome operator safety investigation is usually triggered by a notification (report) submitted through the safety reporting system.

f) Aerodrome operators shall use a structured decision-making approach with defined trigger points. These shall guide the safety investigation decisions: what to investigate and the scope of the investigation. This shall include:

i. the severity or potential severity of the outcome;
ii. regulatory or organizational requirements to carry out an investigation;
iii. safety value to be gained;
iv. opportunity for safety action to be taken;
v. risks associated with not investigating;
vi. contribution to targeted safety programmes;
vii. identified trends;
viii. training benefit; and
ix. resources availability.

g) If an investigation is to commence, the first action shall be to appoint an investigator. Aerodrome operator safety investigators shall be ideally organizationally independent from the area associated with the occurrence or identified hazard.

h) The investigation shall identify what happened and why it happened and this shall require root cause analysis to be applied as part of the investigation. Ideally, the people involved in the event shall be interviewed as soon as possible after the event. The investigation shall include:

i. establishing timelines of key events, including the actions of the people involved;

ii. review of any policies and procedures related to the activities;

iii. review of any decisions made related to the event;

iv. identifying any risk controls that were in place that shall have prevented the event occurring; and

v. reviewing safety data for any previous or similar events.

i) The safety investigation shall focus on the identified hazards and safety risks and opportunities for improvement, not on blame or punishment. The way the investigation shall be conducted, and most importantly, how the report shall be written, shall influence the likely safety impact, the future safety culture of the organization, and the effectiveness of future safety initiatives.

j) The investigation shall conclude with clearly defined findings and recommendations that eliminate or mitigate safety deficiencies.

k) The following four steps are necessary for the investigation process:

(i) Gather Information;

(ii) Analyze Information;

(iii) Draw Conclusions; and

(iv) Make Recommendations

3.10.4.2 Safety risk assessment and mitigation

(a) Safety risk is the projected likelihood and severity of the consequence or outcome from an existing hazard or situation. The aerodrome operator shall develop and maintain a process that ensures analysis, assessment and control of the safety risks associated with identified hazards.

i. The level of risk of each identified potential consequence shall be estimated by conducting a risk assessment. This risk assessment shall determine the severity of a consequence (effect on the safety of the considered operations) and the probability of the consequence occurring and will be based on experience as well as on any available data (e.g. accident database, occurrence reports).

ii. Once each hazard has been identified and analysed in terms of causes, and assessed for severity and probability of its occurrence, it shall be ascertained that all associated risks are appropriately managed. An initial identification of existing mitigation measures shall be conducted prior to the development of any additional measures.

iii. All risk mitigation measures, whether currently being applied or still under development, are evaluated for the effectiveness of their risk management capabilities.

iv. The aerodrome operator shall apply a prioritization process as follows:

a) assesses and controls highest safety risk;

b) allocates resources to highest safety risks;

c) effectively maintains or improves safety;

d) achieves the stated and agreed safety objectives and safety performance targets; and

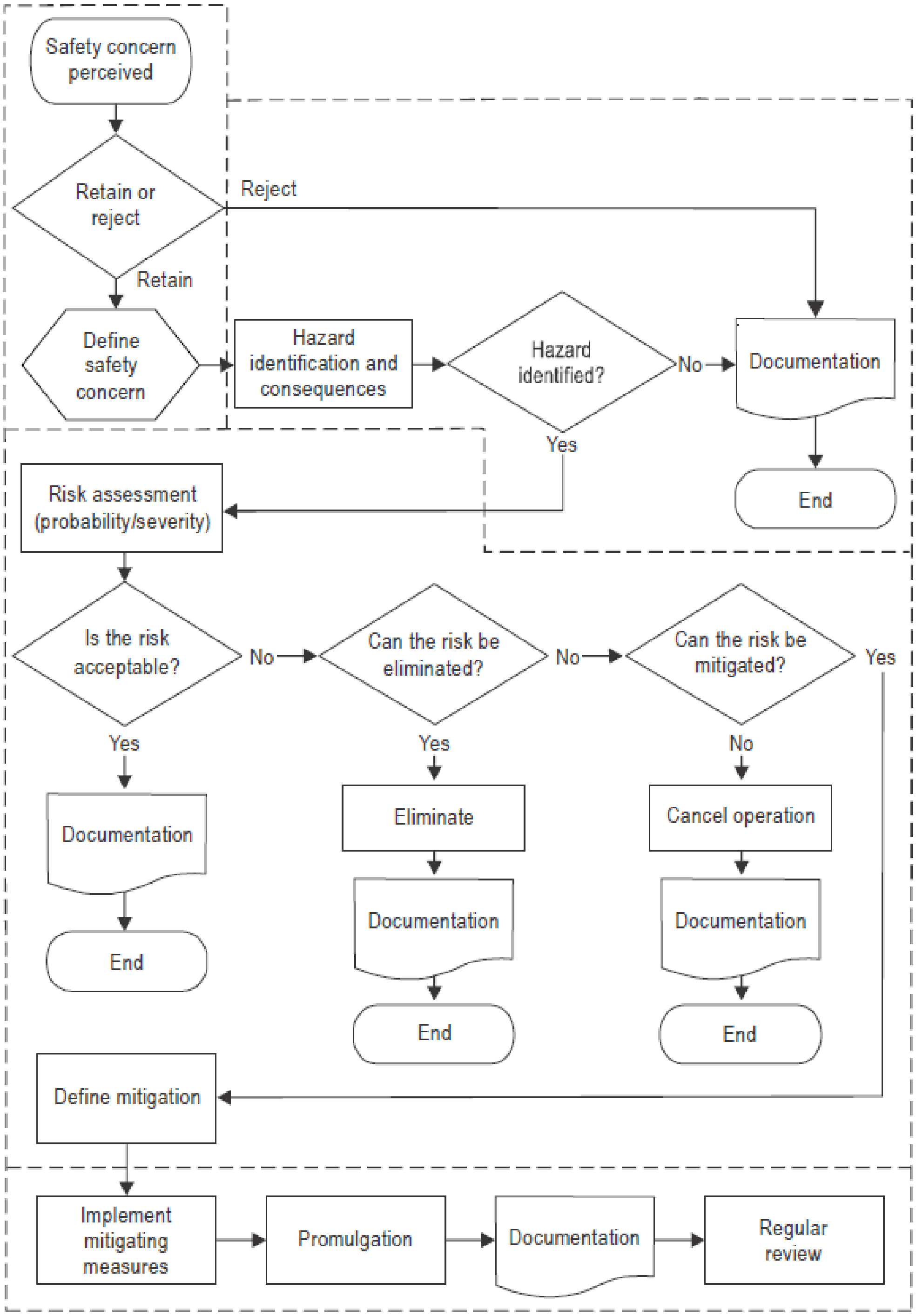
e) satisfies the requirements of the Authority's regulations with regard to control of safety risks.

v. After safety risks have been assessed, appropriate safety risk controls shall be implemented. It is important to involve the "end users" and subject matter experts in determining appropriate safety risk controls. Ensuring the right people are involved shall maximize the practicality of safety risk chosen mitigations. A determination of any unintended consequences, particularly the introduction of new hazards, shall be made prior to the implementation of any safety risk controls.

vi. Once the safety risk control has been agreed and implemented, the safety performance shall be monitored to assure the effectiveness of the safety risk control. This is necessary to verify the integrity, efficiency and effectiveness of the new safety risk controls under operational conditions.

vii. The SRM outputs shall be documented. This shall include the hazard and any consequences, the safety risk assessment and any safety risk control actions taken. These are often captured in a register so they can be tracked and monitored. This SRM documentation shall become a historical source of organizational safety knowledge which can be used as reference when making safety decisions and for safety information exchange. This safety knowledge provides material for safety trend analyses and safety training and communication. It is also useful for internal audits to assess whether safety risk controls and actions have been implemented and are effective.

(b) The safety assessment process is detailed below;



Example of risk determination is tabled below:

Hazard #	Description of Hazard	Risk Scenarios
1	Runway rubber build-up	(a) Aircraft losing directional control and/or braking capability and departing the runway during operation (overruns and veer-offs)
2	FOD	(a) Debris being ingested by aircraft engines (b) Jet or propeller blast displacing debris, equipment, and people
3	Speeding in ramp area	(a) Vehicles striking aircraft, other vehicles and equipment, or people
4	People crossing movement areas	(a) Runway incursions (b) Jet or propeller blasts displacing equipment or people
5	People approaching aircraft before anti-collision light is turned off	(a) People affected by engine blast, propeller blades, or engine suction (b) People being struck by moving aircraft

(c) Safety Risk Probability (How likely is it that it will occur?)

The process of controlling safety risks starts by assessing the probability that the consequences of hazards will materialize during aviation activities performed by the organization. Safety risk probability is defined as the likelihood or frequency that a safety consequence or outcome might occur. The determination of likelihood can be aided by questions such as:

(i) Is there a history of occurrences similar to the one under consideration, or is this an isolated occurrence?
(ii) What other equipment or components of the same type might have similar defects?
(iii) How many personnel are following, or are subject to, the procedures in question?
(iv) What percentage of the time is the suspect equipment or the questionable procedure in use?
(v) To what extent are there organizational, managerial or regulatory implications that might reflect larger threats to public safety?

This is a probability issue. How often is it likely to occur within a certain number of movements? The Table below gives the probability levels and their description.

Probability class	*Meaning*
5 Frequent	Likely to occur many times (has occurred frequently)
4 Reasonably probable	Likely to occur sometimes (has occurred infrequently)
3 Remote	Unlikely to occur (has occurred rarely)
2 Extremely remote	Very unlikely to occur (not known to have occurred)
1 Extremely improbable	Almost inconceivable that the event will occur

(d) Safety Risk Severity

Once the probability assessment has been completed, the next step is to assess the safety risk severity, taking into account the potential consequences related to the hazard. Safety risk severity is defined as the extent of harm that might reasonably occur as a consequence or outcome of the identified hazard. The severity assessment can be based upon:

(i) *Fatalities/injury*. How many lives may be lost (employees, passengers, bystanders and the general public)? and

(ii) *Damage*. What is the likely extent of aircraft, property or equipment damage?

The severity assessment shall consider all possible consequences related to an unsafe condition or object, taking into account the worst foreseeable situation. The table below illustrates a typical safety risk severity table. It includes five categories to denote the level of severity, the description of each category, and the assignment of a value to each category.

Severity	***Meaning***	***Value***	***Example***
Catastrophic	1. Equipment destroyed 2. Multiple deaths	A	collision between aircraft and/or other object during take-off or landing
Hazardous	1. A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely 2. Serious injury 3. Major equipment damage	B	1. runway incursion, significant potential for an accident, extreme action to avoid collision 2. attempted take-off or landing on a closed or engaged runway 3. take-off/landing incidents, such as undershooting or overrunning
Major	1. A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency 2. Serious incident 3. Injury to persons	C	1. runway incursion, ample time and distance (no potential for a collision) 2. collision with obstacle on apron/ parking position (hard collision) 3. person falling down from height 4. missed approach with ground contact of the wing ends during the touchdown 5. large fuel puddle near the aircraft while passengers are on-board
Minor	1. Nuisance 2, Operating limitations 3. Use of emergency procedures 4. Minor incident	D	1. hard braking during landing or taxiing 2. damage due to jet blast (objects) 3. expendables are laying around the stands 4. collision between maintenance vehicles on service road 5, breakage of drawbar during pushback (damage to the aircraft) 6. slight excess of maximum take-off weight without safety consequences 7. aircraft rolling into passenger bridge with no damage to the aircraft needing immediate repair. 8. forklift that is tilting 9. complex taxiing instructions /procedures
Negligible	Few consequences	E	1. slight increase in braking distance 2. temporary fencing collapsing because of strong winds 3. cart losing baggage

Example of risk level classification is tabled below:

Hazard #	Description of Hazard	Risk Description	Likelihood Level	Severity Level	Risk Classification
1	Runway rubber build-up	(a) Aircraft departing runway	2	E	High
2	FOD from construction	(a) FOD ingestion	3	E	High
		(b) Jet blast effects	5	C	High
3	Speeding in ramp area	(a) Accidents at the ramp	3	D	High
4	Survey workers crossing movement areas	(a) Runway incursions	2	E	High
		(b) Jet blast effects	2	C	Low
5	People approaching aircraft before anti-collision light is turned off	(a) Aircraft engine effects	3	C	Medium
		(b) Aircraft striking people	2	C	Low

(e) Risk Assessment

(i) Risks are the potential adverse consequences of a hazard, and are assessed in terms of their severity and probability; and

(ii) The safety risk probability and severity assessment process can be used to derive a safety risk index. The index created through the methodology described above consists of an alphanumeric designator, indicating the combined results of the probability and severity assessments. The respective severity/probability combinations are presented in the safety risk assessment matrix below.

Risk probability		Risk severity				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

(f) Safety risk tolerability

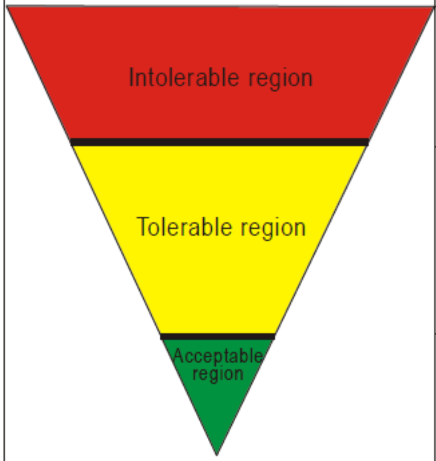
Another step is to determine safety risk tolerability. First, it is necessary to obtain the indices in the safety risk assessment matrix. For example, consider a situation where a safety risk probability has been assessed as occasional (4), and safety risk severity has been assessed as hazardous (B). The composite of probability and severity (4B) is the safety risk index of the consequence.

The index obtained from the safety risk assessment matrix shall then be exported to a safety risk tolerability matrix below that describes the tolerability criteria for the particular organization. Using the example above, the criterion for safety risk assessed as 4B falls in the "unacceptable under the existing circumstances" category. In this case, the safety risk index of the consequence is unacceptable. The organization shall therefore:

(i) take measures to reduce the organization's exposure to the particular risk, i.e. reduce the likelihood component of the risk index; or

(ii) take measures to reduce the severity of consequences related to the hazard, i.e. reduce the severity component of the risk index; or

(iii) cancel the operation if mitigation is not possible.

Tolerability description	Assessed risk index	Suggested criteria
 Intolerable region	5A, 5B, 5C, 4A, 4B, 3A	Unacceptable under the existing circumstances
Tolerable region	5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Acceptable based on risk mitigation. It may require management decision.
Acceptable region	3E, 2D, 2E, 1B, 1C, 1D, 1E	Acceptable

Risk index range	Description	Recommended action
5A, 5B, 5C, 4A, 4B, 3A	High risk	Cease or cut back operation promptly if necessary. Perform priority risk mitigation to ensure that additional or enhanced preventive controls are put in place to bring down the risk index to the moderate or low range.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Moderate risk	Schedule performance of a safety assessment to bring down the risk index to the low range if viable.
3E, 2D, 2E, 1B, 1C, 1D, 1E	Low risk	Acceptable as is. No further risk mitigation required.

(g) As can be seen from the risk classification matrix, risk reduction measures can aim towards either reducing the likelihood of an occurrence, or reducing the probability of an occurrence.

Example of risk scenarios prioritization is tabled below:

Hazard #	Description of Hazard	Risk Description	Risk Classification	Priority
1	Runway rubber build-up	(a) Aircraft departing runway	**2E - High**	2
2	FOD from construction	(a) FOD ingestion (b) Jet blast effects	**3E - High** **5C - High**	1 1
3	Speeding in ramp area	(a) Accidents at the ramp	**3D - High**	2
4	Survey workers crossing movement areas	(a) Runway incursions (b) Jet blast effects	**2E - High** **2C - Low**	3 5
5	People approaching aircraft before anti-collision light is turned off	(a) Aircraft engine effects (b) Aircraft striking people	**3C - Medium** **2C - Low**	4 5

(h) Identification of possible mitigating measures

1. The first priority shall always be to seek measures that will reduce the likelihood of an occurrence (i.e. accident prevention). When contemplating mitigating measures, it is always necessary to look to the intent of the requirement that is not (fully) complied with;

2. Examples of mitigating measures include, but are not limited to:

   (i) Publication in the AIP as a minimum;

   (ii) Aerodrome operational procedures are in some cases relevant. One example is to restrict traffic on a parallel taxiway if runway/taxiway or taxiway/taxiway separation distance is insufficient;

   (iii) Infrastructure and/or additional visual and/or non-visual aids;

   (iv) Operational restrictions that might be necessary. These may include restrictions on all-weather operations, increased spacing between aircraft (in the air or on the ground);

   (v) revision of the system design;

   (vi) changes to staffing arrangements;

   (vii) training of personnel to deal with the hazard;

(viii) development of emergency and/or contingency arrangements and plans;

(ix) Restrictions on aircraft operators that might be necessary, such as:

(a) Operations restricted to operators/crew who can demonstrate special competence;

(b) Requirements that aircraft carry special equipment or certifications; and

(c) Requirements that operator sets for special wind limits.

(x) ultimately, ceasing operation

3. The three generic safety risk mitigation approaches shall include:

(i) *Avoidance.* The activity is suspended either because the associated safety risks are intolerable or deemed unacceptable vis-à-vis the associated benefits;

(ii) *Reduction.* Some safety risk exposure is accepted, although the severity or probability associated with the risks are lessened, possibly by measures that mitigate the related consequences; and

(iii) *Segregation of exposure.* Action is taken to isolate the potential consequences related to the hazard or to establish multiple layers of defences to protect against them.

4. Each time a risk control is added, the person performing the assessment shall re-assess the risk until it has been reduced to a level as low as reasonably practicable (otherwise known as ALARP).

Example of risk mitigation actions is tabled below:

Hazard #	Description of Hazard	Risk	Priority	Action to Mitigate Risk	Further Actions (when required)
1	Runway rubber build-up	(a) Aircraft departing runway	2	Remove rubber build-up	Repave and groove
2	FOD from construction	(a) FOD ingestion	1	Clean up and define procedure to eliminate source	Provide training on new procedure to contractor workers
		(b) Jet blast effects	1	Clean up and define procedure to eliminate source	Provide training on new procedure to contractor workers
3	Speeding in ramp area	(a) Accidents at the ramp	2	Enforce and implement safety promotion campaign to address issue	Monitor trends in number of violations and implement system of accumulated points to suspend and revoke airport driver's permit
4	Survey workers crossing movement areas	(a) Runway incursions	3	Provide training to contractor employees	Monitor activities and, if necessary, have an airport escort with the survey crew
		(b) Jet blast effects	5	Only allow survey job on areas closed to operations	None
5	People approaching aircraft before anti-collision light is turned off	(a) Aircraft engine effects	4	Enforce SOP for aircraft arrival and departure	Monitor violations and establish recurrent training program for frequent violators
		(b) Aircraft striking people	5	Enforce SOP for aircraft arrival and departure	Monitor violations and establish recurrent training program for frequent violators

(i) Risk Register

The aerodrome operator shall maintain a risk register for recording safety assessment of an aeronautical study. The risk register shall be constantly updated throughout the risk assessment cycle. A sample risk register is as shown below.

No.	**Type of operation or activity**	**Generic Hazard**	**Specific components of the hazard**	**Hazard related consequences**	**Existing defences to Control risk(s) and risk index**	**Further action to reduce risk(s) and resulting risk index**
1.0	*Aircraft operation*	*Operation of Code 4F aircraft in <name of >. Code F aircraft using runway for landing and takeoff….*	Larger Winspan	*Wing tip collision at <parking bay numbers>.* *Loss of control of aircraft during pushback/towing operations.*	Use of wing walkers; *Aircraft to taxi at <speed value>.* *Training of staff for pushback/towing operations;* *Restrictions on other aircraft movements within <parking bay number>* *Safety risk index: 3C* *Safety risk tolerability: Tolerable*	*Conduct trials to study the effectiveness of the implementation.* Resulting risk index: 2E *Safety risk index: 2D* *Safety risk tolerability: Acceptable*

Date	Hazard No.	Hazard	Location	Responsible Dept/Person	Potential Consequences	Risk Rating Prior to Mitigation	Action to Mitigate Risk	Expected Risk Rating After Mitigation	Review Date	Closed Out Date
Jul 3 2008	1	Runway Rubber Build-Up (low surface friction)	Runway 08/26	Dept of Engineering (John S.)	Aircraft excursion (overrun, veer-off)	2E- H	Remove rubber build-up	M	Apr 1 2008	Jun 12 2008
Jan 4 2008	2	FOD from construction	Intersection of Taxiway A and C	Dept of Engineering (John S.)	FOD ingestion	3E- H	Clean up and define procedure to eliminate source	L	Jun 29 2008	Aug 1 2008
					Jet blast effects	5C- H	Clean up and define procedure to eliminate source	L	Jun 27 2008	Aug 3 2008
Sep 4 2008	3	Speeding in ramp area	Terminal A	Dept of Public Safety (Scott L.)	Accidents at the ramp	3D- H	Enforce and implement safety promotion campaign to address issue	M	Jul 6 2008	
May 15 2008	4	Survey workers crossing movement areas	Terminal C	Dept of Operation (John C.)	Runway incursions	2E- H	Provide training to contractor employees	M	Jul 7 2008	Aug 31 2008
					Jet blast effects	2C- L	Only allow survey job on areas closed to operations	L		
Jun 21 2008	5	People approaching aircraft before anti-collision light is turned off	Terminal A	Terminal Manager (Lynda F.)	Aircraft engine effects	3C- M	Enforce Standard Operating Procedure for aircraft arrival and departure	L	Aug 11 2008	
					Aircraft striking people	2C- L	Enforce Standard Operating Procedure for aircraft arrival and departure	L		

Note: H, M, and L are high, medium, and low, respectively.

(j) A risk mitigation strategy shall involve one of the approaches described above or may include multiple approaches. It is important to consider the full range of possible control measures to find an optimal solution. The effectiveness of each alternative strategy shall be evaluated before a decision can be taken. Each proposed safety risk mitigation alternative shall be examined from the following perspectives:

(i) *Effectiveness* The extent to which the alternatives reduce or eliminate the safety risks. Effectiveness can be determined in terms of the technical, training and regulatory defences that can reduce or eliminate safety risks;

(ii) *Cost/benefit.* The extent to which the perceived benefits of the mitigation outweigh the costs;

(iii) *Practicality.* The extent to which mitigation can be implemented and how appropriate it is in terms of available technology, financial and administrative resources, legislation and regulations, political will, etc;

(iv) *Acceptability.* The extent to which the alternative is consistent with stakeholder paradigms;

(v) *Enforceability.* The extent to which compliance with new rules, regulations or operating procedures can be monitored;

(vi) *Durability.* The extent to which the mitigation will be sustainable and effective;

(vii) *Residual safety risks.* The degree of safety risk that remains subsequent to the implementation of the initial mitigation and which may necessitate additional risk control measures; and

(viii) *Unintended consequences.* The introduction of new hazards and related safety risks associated with the implementation of any mitigation alternative.

(k) The last phase of the safety assessment process shall be the development of a plan for the implementation of the identified mitigation measures. The implementation plan shall include time frames, responsibilities for mitigation measures as well as control measures that may be defined and implemented to monitor the effectiveness of the mitigation measures.

(l) The aerodrome operator shall ensure that all hazards on the aerodrome including those at Appendix 11, are identified, the risks assessed and mitigation measures applied. The aerodrome operator shall also maintain a risk register of all hazards and the risk register shall be reviewed regularly.

(m) All safety assessment reports shall be accepted/approved by the Authority. The Authority shall analyse the safety assessment and verify that:

1) appropriate coordination has been performed between the concerned stakeholders;

2) the risks have been properly identified and assessed, based on documented arguments (e.g. physical or Human Factors studies, analysis of previous accidents and incidents);

3) the proposed mitigation measures adequately address the risk; and

4) the time frames for planned implementation are acceptable.

On completion of the analysis of the safety assessment, the Authority shall:

a) either give formal approval or acceptance of the safety assessment to the aerodrome operator; or

b) if some risks have been underestimated or have not been identified, coordinate with the aerodrome operator to reach an agreement on safety acceptance; or

c) if no agreement can be reached, reject the proposal for possible resubmission by the aerodrome operator; or

d) choose to impose conditional measures to ensure safety.

(n) In order to ensure adequate dissemination of information to interested parties, information that affects the aeronautical information publication or other relevant safety information, shall be:

1) promulgated in the relevant section of the AIP or automatic terminal information service (ATIS); and

2) published in the relevant aerodrome information communications through appropriate means.

The aerodrome operator shall determine the most appropriate method for communicating safety information to the stakeholders and ensure that all safety-relevant conclusions of the safety assessment are adequately communicated.

3.10.5 Safety Assurance

3.10.5.1 Introduction

(a) Aerodrome Operators shall develop and maintain the means to verify the safety performance of the organization and to validate the effectiveness of safety risk controls. The safety assurance component of the aerodrome operator's SMS shall provide these capabilities.

(b) Safety assurance shall consist of processes and activities undertaken to determine whether the SMS is operating according to expectations and requirements. This involves continuously monitoring its processes as well as its operating environment to detect changes or deviations that may introduce emerging safety risks or the degradation of existing safety risk controls. Such changes or deviations shall then be addressed through the SRM process.

(c) Safety assurance activities shall include the development and implementation of actions taken in response to any identified issues having a potential safety impact. These actions continuously improve the performance of the aerodrome operator's SMS.

3.10.5.2 Safety performance monitoring and measurement

(a) To verify the safety performance and validate the effectiveness of safety risk controls requires the use of a combination of:

i. internal audits; and

ii. establishment and monitoring of SPIs.

Assessing the effectiveness of the safety risk controls is important as their application does not always achieve the results intended. This will help identify whether the right safety risk control was selected and may result in the application of a different safety risk control strategy.

(b) Internal Audit

i. Internal audits shall be performed to assess the effectiveness of the SMS and identify areas for potential improvement. Most aviation safety regulations are generic safety risk controls that have been established by the Authority. Ensuring compliance with the regulations through the internal audit shall be a principle aspect of safety assurance.

ii. It shall also necessary to ensure that any safety risk controls shall be effectively implemented and monitored. The causes and contributing factors shall be investigated and analysed where non-conformances and other issues are identified. The main focus of the internal audit shall be on the policies, processes and procedures that provide the safety risk controls.

iii. Internal audits shall be conducted by persons or departments independent of the functions being audited. Such audits shall provide the accountable executive and senior management with feedback on the status of:

a) compliance with regulations;
b) compliance with policies, processes and procedures;
c) the effectiveness of safety risk controls;
d) the effectiveness of corrective actions; and
e) the effectiveness of the SMS.

iv. Some organizations cannot ensure appropriate independence of an internal audit, in such cases, the aerodrome operator shall consider engaging external auditors (e.g. independent auditors or auditors from another organization).

v. Planning of internal audits shall take into account the safety criticality of the processes, the results of previous audits and assessments (from all sources), and the implemented safety risk controls. Internal audits shall identify non-compliance with regulations and policies, processes and procedures. They shall also identify system deficiencies, lack of effectiveness of safety risk controls and opportunities for improvement.

vi. Assessing for compliance and effectiveness are both essential to achieving safety performance. The internal audit process shall be used to determine both compliance and effectiveness. The following questions shall be asked to assess compliance and effectiveness of each process or procedure:

a) Determining compliance

1) Does the required process or procedure exist?

2) Is the process or procedure documented (inputs, activities, interfaces and outputs defined)?

3) Does the process or procedure meet requirements (criteria)?

4) Is the process or procedure being used?

5) Are all affected personnel following the process or procedure consistently?

6) Are the defined outputs being produced?

7) Has a process or procedure change been documented and implemented?

b) Assessing effectiveness

1) Do users understand the process or procedure?

2) Is the purpose of the process or procedure being achieved consistently?

3) Are the results of the process or procedure what the "customer" asked for?

4) Is the process or procedure regularly reviewed?

5) Is a safety risk assessment conducted when there are changes to the process or procedure?

6) Have process or procedure improvements resulted in the expected benefits?

vii. Internal audits shall monitor progress in closing previously identified non-compliances. These shall have been addressed through root cause analysis and the development and implementation of corrective and preventive action plans. The results from analysis of cause(s) and contributing factors for any non-compliance shall feed into the aerodrome operator's SRM processes.

viii. The results of the internal audit process shall become one of the various inputs to the SRM and safety assurance functions. Internal audits inform the management of the level of compliance within the organization, the degree to which safety risk controls are effective and where corrective or preventive action is required.

ix. The aerodrome operator shall arrange for an audit of the safety management system, including an inspection of the aerodrome facilities and equipment. The audit shall cover the aerodrome operator's own functions. The aerodrome operator shall also arrange for an external audit and inspection programme for evaluating other users, including fixed-base operators, ground handling agencies, fuelling agents, airlines and other organizations working at the aerodrome.

x. The internal audits shall be carried out by suitably qualified and trained personnel. The internal auditor shall follow a recognised "Auditing Techniques Course, have at least 5 years' experience in aerodrome operations and followed training courses in Safety Management System, Aerodrome Licensing, Aerodrome Emergency Planning, Apron Safety Management and Aerodrome Design and Operations;

xi. The audits shall cover the following areas:

(i) Safety Management System;

(ii) Aerodrome Emergency Plan;

(iii) Aerodrome Manual and associated safety procedures; and

(iv) external audit for evaluating other users, including fixed-base operators, ground handling agencies, fuelling agents, airlines and other organisations working at the aerodrome to ensure that they are complying with all the aerodrome safety rules.

xii. The aerodrome operator shall establish:

(i) an audit programme;

(ii) procedures for implementing internal audits including pre audit activities, audit activity, audit report and findings, corrective action plan and follow up.

(c) Safety Performance Monitoring

i. Safety performance monitoring shall be conducted through the collection of safety data and safety information from a variety of sources typically available to an organization. Data availability to support informed decision-making shall be one of the most important aspects of the SMS. Using this data for safety performance monitoring and measurement shall be essential activities that generate the information necessary for safety risk decision-making.

ii. Safety performance monitoring and measurement shall be conducted observing some basic principles. The safety performance achieved shall an indication of organizational behaviour and is also a measure of the effectiveness of the SMS. This requires the organization to define:

a) **safety objectives**, which shall be established first to reflect the strategic achievements or desired outcomes related to safety concerns specific to the organization's operational context;

b) **safety performance indicators (SPIs)**, which are tactical parameters related to the safety objectives and therefore are the reference for data collection; and

c) **safety performance targets (SPTs)**, which are also tactical parameters used to monitor progress towards the achievement of the safety objectives.

iii. Safety Performance Indicators

SPIs shall encompass a wide spectrum of indicators including:

a) low probability/high severity events (e.g. accidents and serious incidents);

b) high probability/low severity events (e.g. uneventful operational events, non-conformance reports, deviations etc.): and

c) process performance (e.g. training, system improvements and report processing).

iv. SPIs shall be used to measure operational safety performance of the aerodrome operator and the performance of their SMS. SPIs shall rely on the monitoring of data and information from various sources including the safety reporting system. They shall be specific to the individual aerodrome operator and be linked to the safety objectives already established.

v. A measure (or metric) shall be used to express the level of safety performance achieved in a system. Safety indicators shall be linked to the safety performance targets. They shall enable the organisation to measure and demonstrate the achievement of the set target levels. The safety performance indicators shall be easy to measure. In general, safety performance indicators are presented in terms of the frequency of occurrence of harmful event(s).

A non-exhaustive list of common SPIs used by aerodromes is as follows:

1. Airside Operations

- Number of airside accidents per 10000 movements per year
- Number of airside incidents per 10000 movements per year
- Number of job-related injuries at the ramp per 10000 movements per year
- Number of job-related injuries at other airside areas per 10000 movements per year
- Number of runway incursions per 10000 movements per year
- Number of incidents involving wildlife per 10000 movements per year
- Number of airside driving infractions per 10000 movements per year
- Damage to stationary aircraft per 10000 movements per year

  — By passenger handling equipment
  — By aircraft loading equipment
  — By aircraft service equipment
- Equipment to equipment damage per 10000 movements per year
- Number of spillage incidents per 10000 movements per year
- Number of training sessions delivered per 10000 movements per year
- Number of airside vehicle operation infractions per month
- Number of FOD reports
- Number of bird strikes
- Number of airside vehicle operations infractions per month on Apron C
- Number of runway incursions at a specific “hot spot”

Note : Normalizing accident rates makes these numbers comparable

For example, a large aerodrome had 3 runway incursions in 2014. During that year, the number of movements was 200,000. The normalized rate is 0.15:
(3 × 10,000 ÷ 200,000) incursions per 10,000 movements per year.

2. SMS

Percentage of employees with basic SMS training etc.

3. ARFFS

1. Response time;
2. Acceleration;
3. Top speed;
4. Extinguishing time – Fire Test Method;
5. Foam discharge rate etc.

4. Maintenance

1. Friction coefficient;
2. Electrical switchover time for generator sets;
3. Lux level of floodlights;
4. Insulation resistance values for electrical circuits for runway, taxiway, apron lights, CCR, PAPI, approach lights etc.
5. PAPI/HAPI angles; etc.

vi. safety performance targets

Safety performance targets define the required level of safety performance of a system. A safety performance target comprises one or more safety performance indicators, together with desired outcomes expressed in terms of those indicators. They are set so as to ensure the achievement of the acceptable level of safety considered desirable and realistic for the individual operator/aerodrome operator.

1) Examples of safety performance targets are as follows:

- Reduce number of airside accidents by X% per 10000 movements per year
- Reduce number of airside incidents by X% per 10000 movements per year
- Reduce number of ramp accidents by X% per 10000 movements per year

- Reduce number of job related injuries at the ramp by X% per 10000 movements per year
- Reduce number of runway incursions by X% per 10000 movements per year
- Reduce number of bird strikes by X% per 10000 movements per year
- Increase the number of training sessions by X% per 10000 movements per year
- Reduce number of FOD occurrences by X% per 10000 movements per year
- Reduce number of speeding violations at the ramp by X% per 10000 movements per year
- Reduce number of airside driving infractions by X% per 10000 movements per year
- Reduce number of incidents involving damage to stationary aircraft by X% per 10000 movements per year
- Reduce number of incidents involving passenger handling equipment by X% per 10000 movements per year
- Reduce number of incidents involving aircraft loading equipment by X% per 10000 movements per year
- Reduce number of incidents involving aircraft service equipment X% per 10000 movements per year
- Reduce number of incidents involving passenger handling equipment X% per 10000 movements per year
- Reduce number of incidents involving fuel spillage by X% per 10000 movements per year

2) The relationship between acceptable level of safety, safety performance targets and safety performance indicators, and safety requirements is as follows: acceptable level of safety is the overarching concept; safety performance targets are the quantified objectives pertinent to the acceptable level of safety; safety performance indicators are the measures/metrics used to determine if the acceptable level of safety has been achieved.

3) Safety performance targets are subject to a periodic review and update, as necessary. These reviews are carried out as part of the strategic safety planning and improvement activities of the aerodrome operator.

4) Safety performance indicators also provide objective evidence for the Authority to assess the effectiveness of the aerodrome operator's SMS and to monitor achievement of its safety objectives. Safety performance indicators shall be selected and developed by the aerodrome operator in consultation with the Authority. The safety performance indicators and associated targets shall be accepted by the Authority.

5) The safety performance of an SMS shall be expressed by safety performance indicators and their corresponding alert and target values. The aerodrome operator shall monitor the performance of current indicators in the context of historical trends to identify any abnormal changes in safety performance. Likewise, target and alert settings shall take into consideration recent historical performance for a given indicator. Desired improvement targets shall be realistic and achievable for the aerodrome operator and the associated aviation sector.

6) Establishing an alert level for a safety indicator is pertinent from a risk-monitoring perspective. An alert level is a common criterion to delineate the acceptable from the unacceptable performance regions for a particular safety indicator.

7) A range of high-consequence as well as lower-consequence safety performance indicators provide a more comprehensive insight into the aerodrome operator's safety performance. This will ensure that high-consequence outcomes (e.g. accidents and serious incidents) as well as lower-consequence events (e.g. incidents, non-conformance reports, deviations) are addressed. Safety performance indicators are essentially data trending charts that track occurrences in terms of event rates.

8) Once safety performance indicators and their corresponding targets and alert settings have been defined, the performance outcome of each indicator shall be updated and monitored on a regular basis. The target and alert level for each indicator may be tracked for their respective performance status. A consolidated summary of the overall target and alert performance outcome of the complete safety performance indicators package may also be compiled/aggregated for a given monitoring period. Qualitative values (satisfactory/unsatisfactory) may be assigned for each "target achieved" and each "alert level not breached". Alternatively, numeric values (points) may be used to provide a quantitative measurement of the overall performance of the package of indicators.

vii. The following activities shall provide sources to monitor and measure safety performance:

a) ***Safety studies*** are analyses to gain a deeper understanding of safety issues or better understand a trend in safety performance.

b) ***Safety data analysis*** uses the safety reporting data to uncover common issues or trends that might warrant further investigation.

c) ***Safety surveys*** examine procedures or processes related to a specific operation. Safety surveys may involve the use of checklists, questionnaires and informal confidential interviews. Safety surveys generally provide qualitative information. This may require validation via data collection to determine if corrective action is required. Nonetheless, surveys may provide an inexpensive and valuable source of safety information.

d) ***Safety audits*** focus on assessing the integrity of the aerodrome operator's SMS and supporting systems. Safety audits can also be used to evaluate the effectiveness of installed safety risk controls or to monitor compliance with safety regulations. Ensuring independence and objectivity is a challenge for safety audits. Independence and objectivity can be achieved by engaging external entities or internal audits with protections in place - policies, procedures, roles, communication protocols.

e) ***Findings and recommendations from safety investigations*** can provide useful safety information that can be analysed against other collected safety data.

f) ***Operational data collection systems*** can provide useful data of events and operational performance.

viii. **Safety Culture** Effective safety management requires more than a safety office and safety procedures. The safest organizations have something that is difficult to describe and quantify but, when it is there, it is perceptible and obvious. It is the way that the organization and the people within it behave—their **safety culture.** Safety culture is an essential feature of any effective SMS and shall permeate the whole organization to bind its SMS pillars.

Safety culture is difficult to quantify, but the following examples provide an idea of what would be expected in an organization with a strong safety culture compared with a weak safety culture.

In a strong safety culture	*In a weak safety culture*
Employees are proactive; they continually identify unsafe situations and make an effort to correct them before they become a real problem.	**Employees never question procedures they know to be outdated or recommend new procedures that are safer and more effective.**
Employees feel that safety is their responsibility and that they have the power to do something about it.	**Employees believe that safety is the responsibility of the supervisors or the safety officers.**
There are clear policies and procedures that spell out expectations for safety, and the employees understand and believe in them.	**There is a safety policy but most people think it is lip-service and window dressing.**
Employees truly understand the risks involved in their work.	**Employees accept procedures without really understanding why. They do not understand all the risks.**
Proactive risk assessment is an integral part of the way the organization manages business, before incidents or accidents happen.	**Risk is only evaluated after something bad has happened.**
The behavior of employees reflects what the safety policy proclaims.	**Employees and managers say one thing, but their actions reflect a different belief**
Personnel receive feedback on safety issues and safety reports.	**Safety issues may be analyzed but employees are never really told what was done to address the issue.**
Managers and supervisors promote a questioning attitude regarding safety issues on the part of all employees.	**Through their actions and behavior, supervisors and managers let it be known that questioning management decisions is not a good thing.**
Safety is an integral part of operations management and line managers are clearly responsible.	**Safety is seen as the responsibility of a safety office, and their interventions are often perceived as a nuisance to operations.**
Upper management takes an active role in safety activities and promotion.	**Senior managers delegate their safety functions to a junior manager. They may show occasional interest, but people know that safety is only important as long as it does not affect operations.**
All employees believe that safety does not have to come at the cost of productivity or profit.	**Employees really think safety efforts are OK as long as the cost is not too high, or as long as it is not THEIR operation that is affected.**
Safety goals are set and all employees work toward their achievement.	**There are no detailed safety goals other than very general statements.**
Safety is an integral part of the training that all employees receive.	**There is no specific training on safety management processes and safety is barely mentioned in the existing training courses.**
Errors are understood as unintentional, but willful violations are not tolerated.	**Errors are treated unevenly and punishment" depends on the manager.**
Employees know and agree on what is acceptable and unacceptable behavior.	**The treatment of errors is inconsistent**
The organization takes safety initiatives that go beyond strict regulatory requirements.	**The organization waits for the regulator to make a safety requirement mandatory before it commits any effort to new safety initiatives.**

The aerodrome operator shall implement the following measures and activities to strengthen safety culture:

1. Employees empowerment;

2. Demonstrated management leadership;

3. Incentive programs;

4. Non-punitive reporting;

5. Communication and marketing;

6. Integrated training;

7. Organizational performance measurement;

8. Special events; and

9. Partnering.

ix. Safety data collection

(i) Data-based decision making is one of the most important facets of any management system. The type of safety data to be collected may include accidents and incidents, events, non-conformance or deviations and hazard reports. The quality of the data that are used to enable effective decision making shall be considered throughout SMS development and implementation;

(ii) In the context of safety data collection and analysis, the term "safety database" may include the following type of data or information which can be used to support safety data analysis:

1. accident investigation data;
2. mandatory incident investigation data;
3. voluntary reporting data;
4. operational performance monitoring data;
5. safety risk assessment data;
6. data from audit findings/reports; and
7. data from safety studies/reviews.

x. Safety data analysis

1. After collecting safety data through various sources, the aerodrome operator shall then perform the necessary analysis to identify hazards and control their potential consequences. Among other purposes, the analysis may be used to:

   (i) assist in deciding what additional facts are needed;

   (ii) ascertain latent factors underlying safety deficiencies;

   (iii) assist in reaching valid conclusions;

   (iv) monitor and measure safety trends or performance;

   (v) identify the overall pattern of change in a safety performance indicator over time (increase or decrease, rate of change);

   (vi) To compare one-time period with another (effectiveness of operations before versus after a risk control action or the implementation of new regulations);

   (v) To compare different areas or seasonal differences (level of safety for Apron A and Apron B; accident rates in summer versus winter);

   (vi) To compare two or more groups (trained versus untrained, different aerodrome operators); and

   (vii) To make future projections (monitor progress toward a safety objective; provide an estimate of the rate of future occurrence).

2. As a minimum, the following information shall be reported for each trend analysis:

   (i) Display plots of the observed data over time;

   (ii) Comments in narrative form on the stability of the rates and approaches used to improve it;

   (iii) Report average percent change for periods when the rate is fairly constant; and

   (iv) Interpret in narrative form the trend and how it relates to achieving the safety objectives of the aerodrome.

3.10.5.3 The management of change

a) Aerodrome operator experiences change due to a number of factors including, but not limited to:

i. organizational expansion or contraction;
ii. business improvements that impact safety; these may result in changes to internal systems, processes or procedures that support the safe delivery of the products and services;
iii. changes to the organization's operating environment;
iv. changes to the SMS interfaces with external organizations; and
v. external regulatory changes, economic changes and emerging risks.

b) Change may affect the effectiveness of existing safety risk controls. In addition, new hazards and related safety risks may be inadvertently introduced into an operation when change occurs. Hazards shall be identified and related safety risks assessed and controlled as defined in the organization's existing hazard identification or SRM procedures.

c) The organization's management of change process shall take into account the following considerations:

i. Criticality. How critical is the change? The aerodrome operator shall consider the impact on their organization's activities, and the impact on other organizations and the aviation system.

ii. Availability of subject matter experts. It is important that key members of the aviation community are involved in the change management activities; this may include individuals from external organizations.

iii. Availability of safety performance data and information. What data and information is available that can be used to give information on the situation and enable analysis of the change?

d) Small incremental changes often go unnoticed, but the cumulative effect can be considerable. Changes, large and small, might affect the organization's system description, and may lead to the need for its revision. Therefore, the system description shall be regularly reviewed to determine its continued validity, given that most aerodrome operators experience regular, or even continuous, change.

e) The aerodrome operator shall define the trigger for the formal change process. Changes that are likely to trigger formal change management shall include include:

i. introduction of new technology or equipment;
ii. changes in the operating environment;
iii. changes in key personnel;
iv. significant changes in staffing levels;
v. changes in safety regulatory requirements;
vi. significant restructuring of the organization; and
vii. physical changes (new facility or base, aerodrome layout changes etc.).

f) The aerodrome operator shall also consider the impact of the change on personnel. This could affect the way the change is accepted by those affected. Early communication and engagement shall normally improve the way the change is perceived and implemented.

g) The change management process shall include the following activities:

i. *understand and define the change*; this shall include a description of the change and why it is being implemented;

ii. *understand and define who and what it will affect*; this may be individuals within the organization, other departments or external people or organizations. Equipment, systems and processes may also be impacted. A review of the system description and organizations' interfaces may be needed. This is an opportunity to determine who shall be involved in the change. Changes might affect risk controls already in place to mitigate other risks, and therefore change could increase risks in areas that are not immediately obvious;

iii. *identify hazards related to the change and carry out a safety risk assessment*; this shall identify any hazards directly related to the change. The impact on existing hazards and safety risk controls that may be affected by the change shall also be reviewed. This step shall use the existing organization's SRM processes;

iv. *develop an action plan*; this shall define what is to be done, by whom and by when. There shall be a clear plan describing how the change will be implemented and who will be responsible for which actions, and the sequencing and scheduling of each task;

v. *sign off on the change*; this is to confirm that the change is safe to implement. The individual with overall responsibility and authority for implementing the change shall sign the change plan; and

vi. *assurance plan*; this is to determine what follow-up action is needed. Consider how the change shall be communicated and whether additional activities (such as audits) are needed during or after the change. Any assumptions made need to be tested.

3.10.5.4 Continuous improvement of the SMS

a) Maintenance and continuous improvement of the aerodrome operator's SMS effectiveness shall be supported by safety assurance activities that include the verification and follow up of actions and the internal audit processes. It shall be recognized that maintaining and continuously improving the SMS is an ongoing journey as the organization itself and the operational environment will be constantly changing.

b) Internal audits shall involve assessment of the aerodrome operator's aviation activities that can provide information useful to the organization's decision-making processes. The internal audit function shall include evaluation of all of the safety management functions throughout the organization.

c) SMS effectiveness shall not be based solely on SPIs; aerodrome operators shall aim to implement a variety of methods to determine its effectiveness, measure outputs as well as outcomes of the processes, and assess the information gathered through these activities. Such methods shall include:

i. Audits; shall include internal audits and audits carried out by other organizations.

ii. Assessments; shall include assessments of safety culture and SMS effectiveness.

iii. Monitoring of occurrences: shall monitor the recurrence of safety events including accidents and incidents as well as errors and rule-breaking situations.

iv. Safety surveys; including cultural surveys providing useful feedback on staff engagement with the SMS. It may also provide an indicator of the safety culture of the organization.

v. Management reviews; examine whether the safety objectives are being achieved by the organization and are an opportunity to look at all the available safety performance information to identify overall trends. It is important that senior management review the effectiveness of the SMS. This may be carried out as one of the functions of the highest-level safety committee.

vi. Evaluation of SPIs and SPTs; possibly as part of the management review. It considers trends and, when appropriate data is available, can be compared to other aerodrome operators.

vii. Addressing lessons learnt; from safety reporting systems and aerodrome operator safety investigations. These shall lead to safety improvements being implemented.

d) The monitoring of the safety performance and internal audit processes shall contribute to the aerodrome operator's ability to continuously improve its safety performance. Ongoing monitoring of the SMS, its related safety risk controls and support systems shall assure the aerodrome operator and the Authority that the safety management processes are achieving their desired safety performance objectives.

e) The SMS audit plan shall cover SMS interface with subcontractors;

f) SMS audit/assessment shall be submitted or highlighted for the accountable executive's attention where appropriate.

3.10.6 Safety Promotion

3.10.6.1 Introduction

(a) Safety promotion encourages a positive safety culture and creates an environment that is conducive to the achievement of the aerodrome operator's safety objectives. A positive safety culture is characterized by values, attitudes and behaviour that are committed to the organization's safety efforts. This is achieved through the combination of technical competence that is continually enhanced through training and education, effective communications and information sharing. Senior management provides the leadership to promote the safety culture throughout an organization;

(b) An organizational safety effort cannot succeed solely by mandate or strict adherence to policies. Safety promotion affects both individual and organizational behaviour and supplements the organization's policies, procedures and processes, providing a value system that supports safety efforts; and

(c) The aerodrome operator shall establish and implement processes and procedures that facilitate effective communication throughout all levels of the organization. Aerodrome operators shall communicate their safety objectives, as well as the current status of any related activities and events. Aerodrome operators shall also encourage "bottom-up" communication, providing an environment that allows senior management to receive open and constructive feedback from operational personnel.

3.10.6.2 Training and education

The aerodrome operator shall establish and provide a training programme to staff to maintain excellent safety levels. This may apply to general work functions and SMS functions. It may also apply to contractors and aerodrome operators who need to be aware of at least a minimum level of aerodrome SMS requirements and emergency procedures. Moreover, safety training and education are essential elements in creating a positive safety culture within the organization, which is vital to the operation of an effective SMS.

All employees shall have the skills and competencies necessary to perform their duties in an effective and safe manner. In addition to safety skills training, aerodrome workers need to be aware of their SMS roles, safety responsibilities, and how they can cooperate to bring about a safety system that works.

(a) The aerodrome operator shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform their SMS duties;

(b) The scope of the safety training programme shall be appropriate to each individual's involvement in the SMS;

(c) The safety manager shall provide current information and facilitate training relevant to specific safety issues encountered by organizational units. The provision of training to appropriate staff, regardless of their level in the organization, is an indication of management's commitment to an effective SMS. Safety training and education curricula shall consist of the following, amongst others:

1. Organizational safety policies and safety objectives;
2. Organizational roles and responsibilities related to safety;
3. Basic safety risk management principles;
4. Safety reporting systems;
5. Organisation's SMS processes and procedures;
6. Human factors;

(d) Training requirements consistent with the needs and complexity of the organization shall be documented for each area of activity. A training file shall be developed for each employee, including management;

(e) Safety training within an organization shall ensure that personnel are competent to perform their safety related duties. Training procedures shall specify initial and recurrent safety training standards for operational personnel, managers and supervisors, senior managers and the accountable executive. The amount of safety training shall be appropriate to the individual's responsibility and involvement in the SMS. The SMS training documentation shall also specify responsibilities for development of training content and scheduling as well as training records management;

(f) The training shall include the organization's safety policy, safety roles and responsibilities, SMS principles related to safety risk management and safety assurance, as well as the use and benefits of the organization's safety reporting system(s);

(g) Safety training for senior managers shall include content related to compliance with national and organizational safety requirements, allocation of resources and active promotion of the SMS including effective interdepartmental safety communication. In addition, safety training for senior managers shall include material on establishing safety performance targets and alert levels;

(h) Finally, the safety training programme may include a session designed level providing the accountable executive with an understanding of the SMS and its relationship to the organization's overall business strategy;

(i) All training programmes and training materials shall be approved by the Authority;

(j) The trainer shall be appropriately trained and have followed recognized courses for each training programme. The trainer shall also follow a "Train the Trainer" course for teaching and assessment skills;

(k) Safety training and education shall consist of the following:

(i) A documented process to identify training requirements;

(ii) A validation process that measures the effectiveness of training;

(iii) Initial (general safety) job-specific training; and

(iv) Recurrent safety training (every three years). Recurrent safety training shall focus on changes to the SMS policies, processes and procedures, and shall highlight any specific safety issues relevant to the organization or lessons learned.

(l) The aerodrome operator shall maintain records of all training sessions, attendees, test results, and syllabus review and updates shall be stored and managed.

(m) The training programme shall be tailored to the needs of the individual’s role within the SMS. For example, the level and depth of training for managers involved in the organization's safety committees shall be more extensive than for personnel directly involved with delivery of the organization’s product or services. Personnel not directly involved in the operations may require only a high level overview of the organization’s SMS.

(n) *Training needs analysis*

A formal training needs analysis (TNA) is necessary to ensure there is a clear understanding of the operation, the safety duties of the personnel and the available training. A typical TNA shall normally start by conducting an audience analysis, which usually includes the following steps:

i. Every one of the aerodrome operator’s staff will be affected by the implementation of the SMS, but not in the same ways or to the same degree. Identify each staff grouping and in what ways they will interact with the safety management processes, inputs and outputs - in particular with safety duties. This information shall be available from the position/role descriptions. Normally groupings of individuals will start to emerge that have similar learning needs. The aerodrome operator shall consider whether it is valuable to extend the analysis to staff in external interfacing organizations;

ii. Identify the knowledge and competencies needed to perform each safety duty and required by each staff grouping.

iii. Conduct an analysis to identify the gap between the current safety skill and knowledge across the workforce and those needed to effectively perform the allocated safety duties.

iv. Identify the most appropriate skills and knowledge development approach for each group with the aim of developing a training programme appropriate to each individual or group’s involvement in safety management. The training programme shall also consider the staff’s ongoing safety knowledge and competency needs; these needs will typically be met through a recurrent training programme.

(o) It is also important to identify the appropriate method for training delivery. The main objective is that, on completion of the training, personnel are competent to perform their SMS duties. Competent trainers are usually the single most important consideration; their commitment, teaching skills and safety management expertise will have a significant impact on the effectiveness of the training delivered. The safety training programme shall also specify responsibilities for development of training content and scheduling as well as training and competency records management.

(p) The organization shall determine who shall be trained and to what depth, and this will depend on their involvement in the SMS. Most people working in the organization have some direct or indirect relationship with aviation safety, and therefore have some SMS duties. This applies to any personnel directly involved in the delivery of products and services, and personnel involved in the organization's safety committees. Some administrative and support personnel will have limited SMS duties and will need some SMS training, as their work may still have an indirect impact on aviation safety.

(q) The aerodrome operator shall identify the SMS duties of personnel and use the information to examine the safety training programme and ensure each individual receives training aligned with their involvement with SMS. The safety training programme shall specify the content of safety training for support staff, operational personnel, managers and supervisors, senior managers and the accountable executive.

(r) There shall be specific safety training for the accountable executive and senior managers that includes the following topics:

i. specific awareness training for new accountable executives and post holders on their SMS accountabilities and responsibilities;

ii. importance of compliance with national and organizational safety requirements;

iii. management commitment;

iv. Safety management systems;

v. allocation of resources;

vi. promotion of the safety policy and the SMS;

vii. promotion of a positive safety culture;

viii. effective interdepartmental safety communication;

ix. safety objective, SPTs and alert levels; and

x. disciplinary policy.

(s) The main purpose of the safety training programme shall be to ensure that personnel, at all levels of the organization, maintain their competence to fulfil their safety roles; therefore competencies of personnel shall be reviewed on a regular basis.

3.10.6.3 Safety communication

There shall be a process in place to formalize information sharing across all levels of the organization and between the organization and external agencies to ensure that staff members have the adequate safety information they need. The objective is to promote a positive safety culture through the free exchange of safety information to ensure that the organization functions as a single entity when it comes to safety and to eliminate the emergence of silos (isolated groups) on safety issues by sharing lessons learned. Formal two-way communication shall be developed between all stakeholders including management and staff, staff and staff, and organization and organization. The aerodrome operator shall ensure that there is a way to communicate with outside stakeholders—tenants, contractors, and other groups—to share mistakes, lessons learned, and best practices. Safety communication shall aim at:

a) *ensure that staff are fully aware of the SMS;* this is a good way of promoting the organization's safety policy and safety objectives.

b) *convey safety-critical information;* Safety critical information is specific information related to safety issues and safety risks that could expose the organization to safety risk. This could be from safety information gathered from internal or external sources such as lessons learned or related to safety risk controls. The aerodrome operator determines what information is considered safety critical and the timeliness of its communication.

c) *raise awareness of new safety risk controls and corrective actions;* The safety risks faced by the aerodrome operator will change over time, and whether this is a new safety risk that has been identified or changes to safety risk controls, these changes will need to be communicated to the appropriate personnel.

d) *provide information on new or amended safety procedures;* when safety procedures are updated it is important that the appropriate people are made aware of these changes.

e) *promote a positive safety culture and encourage personnel to identify and report hazards;* safety communication is two-way. It is important that all personnel communicate safety issues to the organization through the safety reporting system.

f) *provide feedback;* provide feedback to personnel submitting safety reports on what actions have been taken to address any concerns identified.

g) communicate the organization’s SMS objectives and procedures to all operational personnel. The safety manager shall regularly communicate information regarding the safety performance trends and specific safety issues through bulletins and briefings. The safety manager shall also ensure that lessons learned from investigations and case histories or experiences, both internally and from other organizations, are distributed widely. The following communication initiatives include:

(i) dissemination of the SMS manual;

(ii) safety processes and procedures;

(iii) safety newsletters, notices and bulletins; and

(iv) websites or email.

3.11 ISOLATED AIRCRAFT PARKING

3.11.1 The aerodrome operator shall ensure that an isolated aircraft parking position shall be designated or the aerodrome control tower shall be advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities;

3.11.2 The isolated aircraft parking position shall be located at the maximum distance practicable and in any case never less than 100 m from other parking positions, buildings or public areas, etc; and

3.11.3 Care shall be taken to ensure that the position is not located over underground utilities such as gas and aviation fuel and, to the extent feasible, electrical or communication cables.

3.12 AERODROME COMPATIBILITY

3.12.1 The aerodrome operator shall assess the compatibility between aeroplane operations and aerodrome infrastructure and operations when an aerodrome accommodates an aeroplane that exceeds the licensed characteristics of the aerodrome.

Introducing new types of aeroplanes into existing aerodromes may have an impact on the aerodrome facilities and services, in particular, when the aeroplane characteristics exceed the parameters that were used for planning the aerodrome. The parameters used in aerodrome planning are defined in MCAR Aerodrome Design and Operations, which specifies the use of the aerodrome reference code determined in accordance with the characteristics of the aeroplane for which an aerodrome facility is intended. The aerodrome reference code provides a starting point for the compatibility study and may not be the sole means used to conduct the analysis and to substantiate the aerodrome operator's decisions and the Authority's safety oversight actions.

3.12.2 A compatibility study shall be performed collaboratively between affected stakeholders which includes the aerodrome operator, the aeroplane operator, ground handling agencies as well as the various air navigation service providers (ANSPs);

3.12.3 The following steps describe the arrangement, to be appropriately documented, between the aeroplane operator and aerodrome operator for the introduction of an aeroplane type/subtype new to the aerodrome:

a) the aeroplane operator shall submit a request to the aerodrome operator to operate an aeroplane type/subtype new to the aerodrome;

b) the aerodrome operator shall identify possible means of accommodating the aeroplane type/subtype including access to movement areas and, if necessary, considers the feasibility and economic viability of upgrading the aerodrome infrastructure; and

c) the aerodrome operator and aircraft operator shall discuss the aerodrome operator's assessment, and whether operations of the aeroplane type/subtype can be accommodated and, if permitted, under what conditions.

3.12.4 The following procedures shall be included in the aerodrome compatibility study:

a) identify the aerodrome's physical characteristics including the following:

i. Runway Length

Runway length is a limiting factor on aeroplane operations and shall be assessed in collaboration with the aeroplane operator.

ii. Runway Width

For a given runway width, factors affecting aeroplane operations include the characteristics, handling qualities and performance demonstrated by the aeroplane.

iii. Runway Shoulders

The shoulders of a runway shall be capable of minimizing any damage to an aeroplane veering off the runway. In some cases, the bearing strength of the natural ground may be sufficient without additional preparation to meet the requirements for shoulders. The prevention of ingestion of objects from jet engines shall always be taken into account particularly for the design and construction of the shoulders. In case of specific preparation of the shoulders, visual contrast, such as the use of runway side-stripe markings, between runway and runway shoulders, may be required.

iv. Runway Turn Pads

Turn pads are generally provided when an exit taxiway is not available at the runway end. A turn pad allows an aeroplane to turn back after landing and before take-off and to position itself correctly on the runway.

v. Runway Strips (dimensions and obstacles)

A runway strip is an area enclosing a runway and any associated stopway. Its purpose is to:

a) reduce the risk of damage to an aeroplane running off the runway by providing a cleared and graded area which meets specific longitudinal and transverse slopes, and bearing strength requirements; and

b) protect an aeroplane flying over it during landing, balked landing or take-off by providing an area which is cleared of obstacles, except for permitted aids to air navigation.

vi. Runway End Safety Area (RESA)

A RESA is primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway. Consequently, a RESA shall enable an aeroplane overrunning to decelerate, and an aeroplane undershooting to continue its landing.

vii. Taxiways

Taxiways are provided to permit the safe and expeditious surface movement of aeroplanes. A sufficiently wide taxiway with appropriate curves, permits smooth traffic flow while facilitating aeroplane ground steering.

viii. Runway and Taxiway Minimum Separation Distances

A minimum distance shall be provided between the centre line of a runway and the centre line of the associated parallel taxiway for instrument runways and non-instrument runways.

ix. Taxiway and Taxilane Minimum Separation Distances

1. Taxiway to object separation; and
2. Parallel taxiway separation.

x. Taxiway Shoulders

Taxiway shoulders are intended to protect an aeroplane operating on the taxiway from FOD ingestion and to reduce the risk of damage to an aeroplane running off the taxiway. The taxiway shoulder dimensions are based on current information regarding the width of the inner engine exhaust plume for breakaway thrust. Furthermore, the surface of taxiway shoulders is prepared so as to resist erosion and ingestion of the surface material by aeroplane engines.

xi. Clearance Distance on Aircraft Stands

It shall include the minimum distance between an aeroplane using the stand and an obstacle.

xii. Pavement Design.

b) identify the aeroplane's physical and operational characteristics including the following:

i. Fuselage length;

ii. Fuselage width;

iii. Door sill height;

iv. Aeroplane nose characteristics;

v. Tail height;

vi. Wingspan;

vii. Wing tip vertical clearance;

viii. Cockpit view;

ix. Distance between the pilot's eye position to the nose landing gear;

x. Landing gear design;

xi. Outer main gear wheel span;

xii. Wheelbase;

xiii. Gear steering system;

xiv. Maximum aeroplane mass;

xv. Landing gear geometry, tire pressure, ACN values (applicable until 27 November 2024);

xvi. Landing gear geometry, tire pressure, ACR values (applicable as of 28 November 2024);

xvii. Engine characteristics;

xviii. Maximum passenger and fuel carrying capacity; and

xix. Flight performance.

c) identify the aeroplane ground servicing requirements including the following:

i. ground power;

ii. passengers embarking and disembarking;

iii. cargo loading and unloading;

iv. fuelling;

v. pushback and towing;

vi. taxiing and marshalling;

vii. aeroplane maintenance;

viii. RFF;

ix. equipment areas;

x. stand allocation; and

xi. disabled aircraft removal.

d) identify the applicable regulatory requirements;

e) establish the adequacy of the aerodrome infrastructure and facilities vis-à-vis the requirements of the new aeroplane;

f) identify the changes required to the aerodrome;

g) document the compatibility study; and

h) perform the required safety assessments identified during the compatibility study.

3.12.5 The result of the compatibility study shall enable decisions to be made and shall provide:

a) the aerodrome operator with the necessary information in order to make a decision on allowing the operation of the specific aeroplane at the given aerodrome;

b) the aerodrome operator with the necessary information in order to make a decision on the changes required to the aerodrome infrastructure and facilities to ensure safe operations at the aerodrome with due consideration to the harmonious future development of the aerodrome; and

c) the Authority with the information which is necessary for its safety oversight and the continued monitoring of the conditions specified in the aerodrome licensing.

Chapter 4

Operating Requirements

CHAPTER 4: OPERATING REQUIREMENTS

4.1 CONTINUED COMPLIANCE

The aerodrome operator shall-

(a) comply with all procedures, plans, systems and programmes detailed in their Aerodrome Manual;

(b) hold at least one complete and current copy of their Aerodrome Manual on the aerodrome;

(c) make each applicable part of their Aerodrome Manual available to personnel who require those parts to carry out their duties; and

(d) continue to meet the standards and comply with the requirements of Chapter 3 for aerodrome licensing under this manual.

4.2 MAINTENANCE OF THE MOVEMENT AREA

4.2.1 Aerodrome Pavement Management Programme

4.2.1.1 Introduction

(a) An Aerodrome Pavement Management Programme is a set of defined procedures for collecting, analyzing, maintaining, and reporting pavement data. An Aerodrome Pavement Management Programme assists s in finding optimum strategies for maintaining pavements in a safe serviceable condition over a given period for the least cost. An Aerodrome Pavement Management Programme shall take into account not only inspection procedures and condition assessment, maintenance protocols and procedures, management and oversight of completed works, but also staff competence needs;

(b) The aerodrome operator shall establish an Aerodrome Pavement Management Programme that shall provide a consistent, objective, and systematic procedure for establishing facility policies, setting priorities and schedules, allocating resources, and budgeting for pavement maintenance and rehabilitation. It shall quantify information and provide specific recommendations for actions required to maintain a pavement at an acceptable level of safety while minimizing the cost of maintenance and rehabilitation. An Aerodrome Pavement Management Programme shall not only evaluate the present condition of a pavement, but also shall predict its future condition through the use of pavement condition indicators. By projecting the rate of deterioration, a life-cycle cost analysis can be made for various alternatives to determine the optimal time to apply the best maintenance and rehabilitation alternative and avoid higher maintenance and rehabilitation costs in the future;

(c) The Aerodrome Pavement Management Programme shall be approved by the Authority; and

(d) The aerodrome operator shall appoint an officer for managing the Aerodrome Pavement Management Programme and the designated officer shall be acceptable to the Authority. The designated officer shall be a civil engineer and shall have followed an acceptable training course in aerodrome pavement management.

4.2.1.2 Benefits of an Aerodrome Pavement Management Programme

An Aerodrome Pavement Management Programme can provide several benefits, including:

(a) Increased pavement useful life;

(b) An objective and consistent evaluation of the condition of pavements;

(c) A systematic and documentable engineering basis for determining maintenance and rehabilitation needs including consideration of future operational needs and/or planned aerodrome expansion projects;

(d) Identifying budget requirements necessary to maintain pavement functionality;

(e) Documentation on the present and future condition of the pavements;

(f) Life Cycle Cost Analysis for various maintenance and rehabilitation alternatives; and

(g) Identifying the impact on the pavement if no major repairs are performed.

4.2.1.3 Components of an Aerodrome Pavement Management Programme

The Aerodrome Pavement Management Programme shall have the following basic components:

(a) Pavement inventory.

The following shall be included:

(i) dimensions and locations of pavement (runways, taxiways and aprons) sections;

(ii) types of pavement surfaces/structures (material and thickness) and load bearing capacity e.g PCR;

(iii) identification of all runways, taxiways, and aprons with pavement broken down into sections each having similar properties;

(iv) year of construction including as build records and/or most recent major rehabilitation;

(v) year of construction and recent rehabilitation/maintenance works/overlay;

(vi) maintenance history of all paved (runway, taxiway and apron) surfaces. The aerodrome operator shall also track and document routine maintenance activities including the types and severities of distresses repaired, type of work, quantities, and cost of work performed to help determine the effectiveness of different maintenance and rehabilitation strategies;

(vii) procedure to amend the Aerodrome Pavement Management Programme for any changes of the above requirements;

(viii) traffic data. Data about the current and future operational needs including operations and type of aircraft using the pavement is beneficial when analyzing probable causes of deterioration and when evaluating alternate maintenance and rehabilitation procedures; and

(ix) condition of the pavements including pavement classification index.

(b) Inspection schedule.

Procedures shall be included for the following inspections:

(i) drive by inspections at least once every month;

To complete the monthly inspection:

1. Walk or slowly drive the pavements, looking for any irregularities, damage, or deficiencies;

2. Make written notes describing the date, the pavement section, the location, the type, and the extent of the problems. Appropriate forms shall be used; and

3. Note the corrective action taken, or to be taken, including the date of action.

It is very helpful to inspect the pavements either early or late in the day, when the sun is low to the horizon, or just after a rain. At these times, shadows or moisture highlight deformities in the pavement surface. On runways, it is helpful to reference locations to runway lights. They shall have numbered tags attached to each fixture.

(ii) detailed survey of pavement every two years.

(c) Maintenance of Pavement

1. The aerodrome operator shall establish maintenance programmes to maintain the paved area including friction characteristics of all movement surface, markings, signs, safety areas and strip) in a condition that does not impair the safety, security, regularity or efficiency of aircraft operations;

2. The aerodrome operator shall keep the surface of paved manoeuvring areas clear of any objects that might endanger aircraft operations;

3. The aerodrome operator shall arrange for maintaining the runway and taxiway strips;

4. The paved areas shall:

    (a) not have edges between abutting pavement sections and between the pavement and abutting areas;

    (b) have no hole in the pavement;

    (c) be free of cracks, spalling, bump or other surface variances that might limit control or aircraft;

    (d) be kept clean of mud, other foreign FODs, vegetation growth in tracks, rubber deposits, loose debris and loose aggregate;

    (e) be kept free of solvents or other liquids that may be used to clean the surface or are accidentally spilled on the movement area; and

    (f) have no water ponding that may obscure markings or impair aircraft control.

5. The safety areas and strips shall:

   (a) be cleared and graded smooth of ruts, depressions, ponding of water or other surface variations that might be hazardous to aircraft;

   (b) be kept clear of rocks, vegetation or foreign objects that could be hazardous to aircraft. Vegetation shall be kept in mowed condition at all times;

   (c) be drained by grading or drains to prevent water accumulation;

   (d) be free of objects except those needed to be located in the safety areas because of their location and use. These objects shall be constructed on frangibly mounted structures of the lowest practical height. The frangible point shall not be more than 3 inches above grade; and

   (e) ensure that manhole and hand hole covers are at grade levels and mounts for light fixture are at grade levels.

6. The aerodrome operator shall comply with the frangibility and height restriction requirements for equipment and installations located near or on a runway, on the non-graded portion of a runway strip, on precision approach runways or which are obstacles of operational significance;

7. The aerodrome operator shall ensure that

   (a) runway, apron and taxiway markings are according to standards, markings are not fading, peeling, blistering and chipping and are in good conditions and clearly visible;

   (b) all unused markings shall be removed; and

   (c) an ongoing programme is established for the continuous maintenance of the markings.

8. The aerodrome operator shall ensure that all signs for runway, apron and taxiways are:

   (a) according to requirements;

   (b) of correct colour coding, easy to read and not obstructed by vegetation. Sign lights shall be available at night; and

   (c) frangibly mounted and according to allowable height.

9. The following specifications shall be used for runway pavement overlay projects when the runway is to be returned to an operational status before overlay of the entire runway is complete thus normally necessitating a temporary ramp between the new and old runway surfaces.

(a) The longitudinal slope of the temporary ramp, measured with reference to the existing runway surface or previous overlay course, shall be:

(i) 0.5 to 1.0 per cent for overlays up to and including 5 cm in thickness; and

(ii) not more than 0.5 per cent for overlays more than 5 cm in thickness.

(b) Overlaying shall proceed from one end of the runway toward the other end so that based on runway utilization most aircraft operations will experience a down ramp;

(c) The entire width of the runway shall be overlaid during each work session; and

(d) Before a runway being overlaid is returned to a temporary operational status, a runway centre line marking conforming to standards shall be provided.

10. The aerodrome operator shall ensure that:

(a) the design and application of the maintenance programme shall observe Human Factor principles;

(b) all maintenance records are documented, including information on the design and construction of aircraft pavements. A system for easy retrieval of such document shall be implemented;

(c) when a taxiway is used by turbine engined aeroplanes, the surface of the taxiway shoulders shall be maintained so as to be free of any loose stones or other objects that could be ingested by the aeroplane engines;

(d) chemicals which may have harmful effects on aircraft or pavements, or chemicals which may have toxic effects on the aerodrome environment, shall not be used; and

(e) an evaluation of the runway, apron and taxiways (Pavement Classification Rating) shall be conducted at least every 10 years and when required by the Authority by qualified pavement engineers for the preparation/upkeep of a pavement management system and maintenance schedule.

11. Runway surface can be grooved in order to improve surface friction characteristics. Typical cross sections for grooving cement concrete and asphalt surfaces are as follows:

(a) Portland Cement Concrete: Width/Depth/Pitch: 10/3/27 mm, edges and trough rounded.

(b) Asphalt Surface: Width/Depth/Pitch : 9/3/58 mm, edges and trough rounded.

The alphanumeric coding for groove conditions is illustrated in Appendix 9

12. The aerodrome operator shall ensure that runway rubber deposits are removed as illustrated in Appendix 8.

13. Information that a runway or portion thereof may be slippery when wet shall be made available by the aerodrome operator.

The Global Reporting Format (GRF) shall be used for the assessment and reporting of runway surface conditions as it allows a harmonised assessment and reporting of runway surface conditions and a correspondingly improved flight crew assessment of take off and landing performance. Aerodrome operators shall assess the condition of the runway for each third of the runway and issue a Runway Condition Report (RCR). This report shall contain the Runway Condition Code (RWYCC) and information, which describes the runway surface condition, type of contamination, depth, coverage for each third of the runway, etc. and other relevant information. This code is derived from the Runway Condition Assessment Matrix (RCAM). The aerodrome operator shall then relay the RCR to Air Traffic Services/Aeronautical Information Services which then shall transmit the RCR information to pilots by VHF radio, Automatic Terminal Information Services (ATIS) or by SNOWTAM.

(d) Aerodrome Pavement Management Programme Capabilities

(i) Predicting current and future pavement condition

An Aerodrome Pavement Management Programme shall be capable of predicting current and future pavement condition. Condition predictions are necessary to develop optimum, multi-year maintenance and rehabilitation plans. Pavement deterioration is affected by many factors including environment, surface condition, structural condition, change in traffic operations, etc. Overall pavement condition cannot be determined solely from the results of pavement inspections.

(ii) Determining optimum maintenance and rehabilitation plans for a given budget.

An Aerodrome Pavement Management Programme shall be capable of producing an optimum maintenance and rehabilitation plan that identifies where and when maintenance and rehabilitation is required and approximately how much it will cost. This data will assist in setting priorities that fit predetermined maintenance and rehabilitation budgets.

(iii) Determining budget requirements to meet management objectives.

An Aerodrome Pavement Management Programme shall be capable of determining the budget requirements to meet specified management objectives. Typical management objectives include maintaining pavements above a specified condition and/or eliminating major maintenance and rehabilitation requirements over a specified number of years.

(iv) Facilitating the formulation and prioritization of maintenance and rehabilitation projects

In addition to developing optimum maintenance and rehabilitation plans, an Aerodrome Pavement Management Programme shall facilitate the formulation and prioritization of maintenance and rehabilitation projects. Engineering judgment, however, remains a key component in transforming the optimum maintenance and rehabilitation plans into practical executable projects.

(e) Record keeping

The aerodrome operator shall maintain records and keep on file complete information about all detailed inspections and maintenance performed until the pavement system is replaced. The types of distress, their locations, and remedial action, scheduled or performed, shall be documented. The minimum information recorded shall include the following:

(i) Inspection dates;

(ii) Locations of distress;

(iii) Findings;

(iv) Distress types;

(v) Action plans;

(vi) Maintenance scheduled or performed;

(vii) Remedial actions scheduled and performed;

(ix) Inventory records;

(x) Inspection records;

(xi) Pavement condition records; and

1. Pavement condition records shall provide a tabulation of pavement condition for the previous, current and future years. The records provide the condition of individual pavement sections and the overall network condition. The projected condition shall be used to assist in planning future maintenance and repair needs and to inform management of present and future conditions; and

2. For each pavement selected, the records shall indicate the year in which the minimum condition or PCI will be reached and shall include maintenance activities, pavement preservation activities, and major rehabilitation activities for a given planning timeframe.

(xii) PCR measurement records

(f) Data retrieval

The aerodrome operator may use any form of record keeping it deems appropriate, as long as the information and records may be retrieved to provide a report to the Authority. Records of materials and equipment used to perform maintenance shall be kept on file for future reference. These records may be used to identify materials and remedial measures which may reduce maintenance costs and improve pavement serviceability. Unless adequate records are kept, there will be no benefit to the future use of this information to possibly reduce maintenance costs. Remember, if inspections and remedial actions are not documented, then they did not occur. Documentation is vital.

(g) PAVEMENTS: COMPOSITION AND FUNCTION

1. Introduction to Aerodrome Pavements

Aerodrome pavements shall be designed, constructed, and maintained to support the critical loads imposed by aircraft and to produce a smooth, skid- resistant, and safe-riding surface. The pavement shall be of such quality and thickness to ensure it will not fail under the loads imposed and be durable enough to withstand the abrasive action of traffic, adverse weather conditions, and other deteriorating influences.

2. Classification of Aerodrome Pavements

Generally, pavements fall into two classes: rigid and flexible pavements.

(a) Rigid Pavement Composition and Structure

Rigid pavements normally use Portland cement concrete (PCC) as the prime structural element. Depending on conditions, engineers may design the PCC pavement slab with plain, lightly reinforced, continuously reinforced, pre-stressed, or fibrous concrete. The PCC pavement slab usually lies on a compacted granular or treated sub-base, which is supported, in turn, by a compacted sub-grade. The sub-base provides uniform stable support and may provide subsurface drainage.
The PCC pavement slab has considerable flexural strength and spreads the applied loads over a large area.

(b) Flexible Pavement Composition and Structure

Flexible pavements support loads through bearing rather than flexural action as the rigid pavements. They comprise several layers of carefully selected materials designed to gradually distribute loads from the bituminous pavement to the layers underneath. The design ensures the load transmitted to each successive layer does not exceed the layer's load-bearing capacity.

(c) Aerodrome Pavement Overlays

Aerodrome pavement overlays may correct deteriorating pavement surfaces, improve ride quality or surface drainage, maintain structural integrity, or increase pavement strength. Overlays are used when a pavement is damaged by overloading, requires strengthening to serve heavier aircraft, shows severe ponding because of uneven settling, or has simply served its design life and is worn out. Aerodrome pavement overlays generally consist of either PCC or bituminous pavements, or the resulting pavement system may be classified as either rigid or flexible for load-support purposes.

(h) PAVEMENT DISTRESSES

1. General

Various external signs or indicators make the deterioration of a pavement apparent, and often reveal the probable causes of the failure.

2. Types of Pavement Distress

The discussions of problems related to pavement distress are generally based on whether the pavement has a rigid or flexible surface type. However, while different distresses possess their own particular characteristics, the various types generally fall into one of the following broad categories:

(i) Cracking;
(ii) Joint Seal Damage;
(iii) Disintegration;
(iv) Distortion; and
(v) Loss of skid resistance.

3. Modes of Rigid Pavement Distresses.

(i) Cracking

Cracks in rigid pavements often result from stresses caused by expansion and contraction or warping of the pavement. Overloading, loss of subgrade support, and insufficient and/or improperly cut joints acting singly or in combination are also possible causes. Several different types of cracking can occur such as:

1. Longitudinal, Transverse, and Diagonal Cracks;
2. Corner Breaks;
3. Durability "D" Cracking;
4. Shrinkage Cracking; and
5. Joint Seal Damage.

(ii) Disintegration.

Disintegration is the breaking up of a pavement into small, loose particles and includes the dislodging of aggregate particles. Improper curing and finishing of the concrete, unsuitable aggregates and improper mixing of the concrete can cause this distress. Disintegration falls into several categories:

1. Scaling;
2. Spalling;
3. Blowups;
4. Pop-outs; and
5. Patching.

(iii) Distortion

Distortion refers to a change in the pavement surface’s original position, and it results from foundation settlement, expansive soils or loss of fines through improperly designed sub-drains or drainage systems. Two types of distortion generally occur:

1. Pumping; and
2. Settlement or Faulting.

(iv) Loss of Skid Resistance

Skid resistance refers to the ability of a pavement to provide a surface with the desired friction characteristics under all weather conditions. It is a function of the surface texture. Loss of skid resistance is caused by the wearing down of the textured surface through normal wear and tear or the buildup of contaminants.

(v) Polished Aggregates.

Some aggregates become polished quickly under traffic. Naturally polished aggregates create skid hazards if used in the pavement without crushing. Crushing the naturally polished aggregates creates rough angular faces that provide good skid resistance.

4. Modes of Flexible Pavement Distresses

(i) Cracking

Cracks in flexible pavements are caused by deflection of the surface over an unstable foundation, shrinkage of the surface, thermal expansion and contraction of the surface, poorly constructed lane joints, or reflection cracking. Five types of cracks commonly occur in these types of pavements:

1. Longitudinal and Transverse Cracks;
2. Block Cracking;
3. Reflection Cracking;
4. Alligator or Fatigue Cracking; and
5. Slippage Cracks.

(ii) Disintegration

Disintegration in a flexible pavement is caused by insufficient compaction of the surface, insufficient asphalt binder in the mix, loss of adhesion between the asphalt coating and aggregate particles, or severe overheating of the mix. The following are common types of disintegration:

1. Raveling and Weathering;
2. Potholes;
3. Asphalt Stripping;
4. Jet Blast Erosion; and
5. Patching and Utility Cut Patch.

(iii) Distortion

Distortion in pavements is caused by foundation settlement, insufficient compaction of the pavement courses, lack of stability in the bituminous mix, poor bond between the surface and the underlying layer of the pavement structure, and swelling subgrade soils. Four types of distortion commonly occur:

1. Rutting;
2. Corrugation;
3. Shoving;
4. Depression; and
5. Swelling.

(iv) Loss of Skid Resistance

Factors that decrease the skid resistance of a pavement surface and can lead to hydroplaning include too much asphalt in the bituminous mix, too heavy a tack coat, poor aggregate subject to wear, and buildup of contaminants. In bituminous pavements, a loss of skid resistance may result from the following:

1. Polished Aggregate;
2. Contaminants;
3. Bleeding; and
4. Fuel/Oil Spillage.

(i) Drainage of Aerodrome Pavements

A proper drainage system is essential to preventive maintenance. Probably no other factor plays such an important role in determining the ability of a pavement to withstand the effects of weather and traffic. The drainage system collects and removes surface water runoff, removes excess underground water, lowers the water table, and protects all slopes from erosion. An inadequate drainage system can cause saturation of the sub-grade and sub-base, damage to slopes by erosion, and loss of the load-bearing capacity of the paved surfaces.

(j) METHODS FOR INSPECTION OF PAVEMENTS

1. Introduction to Pavement Inspection

Adequate and timely maintenance is the greatest single means of controlling pavement deterioration. Many cases exist where inadequate maintenance characterized by the absence of a vigorously followed inspection program directly attributed to failures of aerodrome pavements and drainage features. The maintenance inspection can reveal at an early stage where a problem exists and thus provide enough warning and time to permit corrective action.

2. Inspection Procedures.

Maintenance is an ongoing process and a critical responsibility of aerodrome personnel. Truly effective maintenance programs require a series of scheduled, periodic inspections or surveys, conducted by experienced engineers, technicians, or maintenance personnel. These surveys shall be controlled to ensure that each element or feature being inspected is thoroughly checked, potential problem areas are identified, and proper corrective measures are recommended.

(a) Inspection Schedules.

The aerodrome is responsible for establishing a schedule for pavement inspections. Inspection schedules shall ensure that all areas, particularly those that are not observed daily, are thoroughly checked; and

(b) Records on pavement distress condition.

The aerodrome shall prepare and maintain complete records of all inspections and maintenance performed. These records shall document the severity level of existing distress types, their locations, their probable causes, remedial actions, and results of follow up inspections and maintenance.

3. Friction Surveys of Pavement Surfaces.

Aerodromes shall maintain runway pavements that provide surfaces with good friction characteristics under all weather conditions. Parameters that affect the skid resistance of wet pavement surfaces include the following:

1. Texture depth;
2. Rubber deposits;
3. Paint marking; and
4. Pavement abnormalities, such as rutting, raveling, and depression

Visual observations made during a pavement inspection are an inadequate predictor of skid resistance.

4. Non Destructive Testing.

In addition to collecting information from visual inspections of the pavement area and about runway history, aerodromes shall consider collecting data from nondestructive testing. Such data are used to evaluate the pavement load-carrying capacity. Loads are applied to the pavement through loading plates or wheels, and the pavement deflection response is recorded. The stiffness or strength of the aerodrome pavement can be related to the magnitude of these deflections. Nondestructive testing involves a large number of readings, and a statistical average is used.

5. Drainage Surveys

The maintenance program shall take into account the importance of adequate drainage of surface and ground water because water is directly or partly responsible for many pavement failures and deterioration. The personnel making the inspection shall look for distress signals that may indicate impending problems. These distress signals include the following among others:

1. Ponding of water;
2. Soil buildup at pavement edge preventing runoff;
3. Eroded ditches and spill basins;
4. Broken or displaced inlet grates or manhole covers;
5. Clogged or silted inlet grates and manhole covers;
6. Blocked subsurface drainage outlets;
7. Broken or deformed pipes; and
8. Backfill settlement over pipes.

6. Pavement Performance Monitoring

Aerodrome operator shall use the pavement condition survey to develop pavement performance data. Distress intensity recorded over time helps determine how the pavement is performing. The data are indispensable for long term pavement performance monitoring system for understanding causes and mechanism of pavement distress.

(k) MATERIALS AND EQUIPMENT FOR MAINTENANCE WORKS

1. General

Normal day-to-day pavement maintenance will require hand tools, however some maintenance necessitates specialized equipment. Most normal maintenance projects require the following:

1. Mechanical Hammers;
2. Trailer-Type Asphalt Kettles;
3. Compaction Equipment;
4. Distributors; and
5. Work Crew.

2. Common Materials for Maintenance and Repair

The Aerodrome operator shall use the materials listed below for maintenance and repair of pavements.

(a) Hot-Mix Asphalt

Hot mix asphalt is a blend of asphalt binder and well-graded, high- quality aggregates. The materials are mixed in a plant and placed and compacted while hot. Hot mix asphalt is used for construction of new airfield pavement and patching and overlay of airfield pavements.

(b) Tack Coat

A tack coat, usually a light application of emulsified asphalt, is applied to an existing pavement to provide a bond with an overlying course, such as a hot mix asphalt overlay. A tack coat is also used on the sides of an existing pavement that has been cut vertically before patching. Asphalt emulsions are manufactured in several grades and are selected by the desired setting time.

(c) Prime Coat

A prime coat of emulsified or cutback asphalt is applied to an aggregate base course for the following purposes:

1. To waterproof the surface of the base;
2. To plug capillary voids; and
3. To promote adhesion between the base and the surface course.

(d) Fog Seal

A fog seal is a light application of emulsified asphalt used to rejuvenate the surface of a hot mix asphalt pavement.

(e) **Aggregate Seal**

This process is used to seal the surface of weathered pavements. Aggregate seals consist of sprayed asphalts that are immediately covered with aggregate and rolled to seat the aggregate in the asphalt coating. Aggregate seals for airfield pavements are not recommended because of the potential for propeller and engine damage caused by loose aggregates.

(f) **Slurry Seal**

A slurry seal is a mixture of asphalt emulsion, fine aggregate, mineral filler, and water. The mixture is prepared in slurry form and applied in a film approximately 1/8 inch (3 mm) thick. Slurry seals are used to seal small cracks, correct surface conditions, and improve the skid resistance of pavement surfaces.

(g) **Coal-Tar Sealer**

Coal-tar sealer is a coal-tar-based product designed to coat the surface and protect the pavement against fuel spill damage and the intrusion of air and water. It is cold applied and shall be periodically reapplied and maintained. Coal-tar sealers may contain fine aggregates to enhance traction and applied in multiple coatings.

(h) **Crack and Joint Sealants for Flexible Pavement**

Material for sealing cracks shall meet relevant ASTM standards for the type of pavement and service for which the pavement is intended.

(i) **Crack and Joint Sealing Material for Rigid Pavement.**

Material for sealing joints in Portland cement concrete pavement may be hot- or cold-applied compounds, as long as they meet the following standards.

(j) **Crack Filler Material for Flexible or Rigid Pavement.**

Material for filling cracks in rigid or flexible pavement shall meet appropriate standards.

(k) Concrete

Concrete is a blend of Portland cement, fine and coarse aggregate, and water, with or without additives. Concrete is used to repair a distressed Portland cement concrete pavement so it may be used at its original designed capacity.

(l) Epoxy Grouts and Concretes.

There are many types of epoxy resins; the type to be used depends on the intended application. Under normal conditions, mixed resins may be workable up to 1 hour after mixing. Repairs with epoxy materials are costly, so their use shall be limited to small areas and their application left to experienced personnel.

(l) Equipment Used for Pavement Maintenance.

There are many different types and models of equipment aerodromes can use for pavement maintenance. However, aerodrome operator shall use the following equipment for the intended purpose:

(a) Pavement Removal.

Pavement removal is normally conducted when the upper or whole pavement structure shall be removed to give way for replacement with a new pavement structure and hot mix asphalt placing. The equipment is normally used in patching works, reconstruction and full rehabilitation projects and includes the following:

(i) Power Saws;
(ii) Cutting Disks;
(iii) Jackhammers: Pavement Grinders;
(iv) Cold Milling Machines;
(v) Front-end Loaders and Skid-steer Loaders; and
(vi) Dump Trucks.

(b) Maintenance Equipment

The equipment is normally used for heating of hot mix asphalt mixes and aggregate works during laying work and involves the following:

1. Asphalt Kettle;
2. Aggregate Spreaders; and
3. Hand Tools (rakes, lutes etc).

(c) Compaction Equipment

1. Vibratory Plate Compactors

Vibratory plate compactors are hand-operated units used to compact granular base or hot mix asphalt plant-mix materials.

2. Vibratory and Non Vibratory Steel-Wheel Rollers

Steel-wheel rollers are used to compact material, including hot mix asphalt in patchwork areas. Smaller rollers can be hand operated, while large rollers are self-powered.

3. Rubber-Tired Rollers

Rubber-tired rollers are self-powered and used to compact HMA pavement.

(d) Crack and Joint Sealing Equipment

Joint Plow: A joint plow is used to remove old sealer from joints. This is usually a specially made tool attached to a skid-steer loader;

Joint Router: A joint router is used to clear existing cracks or joints to be resealed. A router is usually a self-powered machine operating a rotary cutter or revolving cutting tool. A rotary routing tool with a V-shaped end can be used for cleaning out random cracks.

Random Crack Saw: A random crack saw is designed to follow irregular crack patterns in concrete and asphalt surfaces. The crack saw utilizes small diameter, dry-cut diamond blades in standard widths to create smooth sided cuts to prepare surfaces for proper crack filling.

Power Brush: A power-driven wire brush may be used to clean joints after all of the old joint sealer has been removed.

Air Compressor and Sand Blasting: Sand blasting may be used for final removal of old joint sealants.

Pavement Sweeper: A pavement sweeper can be used for cleaning the pavement surface and removing excess aggregate. Cleaning operations are necessary in preparation for seal coating and crack filling.

Heating Kettle: A heating kettle is a mobile, indirect-fired double boiler used to melt hot-applied joint sealing material. It is equipped with a means to agitate and circulate the sealer to ensure uniform heating and melting of the entire charge in the kettle.

Pouring Pot: A pouring pot is hand carried or mounted on a hand-pushed pot dolly and used to pour hot sealing materials into a previously prepared crack or joint.

High-pressure Water Sprayer: A water sprayer can be used to clean out joints prior to resealing and to clean vertical faces of pavement to be patched.

Hot Air Lance: A hot air lance enhances adhesion by drying and heating cracks in existing bituminous material while removing debris prior to crack sealing.

(e) Removal of Pavement Markings.

The following is a list of equipment recommended to be used for removal of faded or old pavement markings:

1. High Pressure Water Jet;
2. Abrasive Blasting; and
3. Solvent Cleaning.

(m) PAVEMENT REPAIR METHODOLOGIES

1. General

Repair method for a particular pavement type, whether rigid or flexible, is dependent on degree, mechanism of distresses and material characteristics. Different methods of repair are available to address the different distresses. However, in many cases pavements fails due to a combination of causative factors and therefore an aerodrome operator shall choose a repair method based on rational assessment of the prevailing condition.

2. Repair Methods for Rigid Pavements.

(a) crack repair and sealing

Sealing cracks prevents surface moisture from entering the pavement structure. This type of repair first requires establishing a properly shaped sealant reservoir, which shall be done with a saw rather than with router equipment because routers use a mechanical impact to remove material and can cause micro-cracks in the concrete.

(b) disintegration

If not impeded in its early stages, disintegration can progress rapidly until the pavement requires complete rebuilding.

(c) distortion

If not too extensive, some forms of distortion, such as that caused by settlement, can be remedied by raising the slab to the original grade. Slabjacking procedures may be used to correct this type of distress. In slab jacking, a grout is pumped under pressure through holes cored in the pavement into the void under the pavement. This creates an upward pressure on the bottom of the slab in the area around the void. The upward pressure lessens as the distance from the grout hole increases. Thus, it is possible to raise one corner of a slab without raising the entire slab. Because of the special equipment and experience required, slab jacking is usually best performed by specialty contractors.

(d) loss of skid resistance

Rehabilitation treatment includes resurfacing, milling, diamond grinding, shot peening, and surface cleaning. Grooving may be considered when a loss of skid resistance is observed. Grooving does not impact the surface texture but does provide a channel for water that becomes trapped between a pavement and the tire to escape. Grooving thus minimizes the potential for hydroplaning during wet conditions.

3. Repair Methods for Bituminous Concrete Pavements

(a) crack sealing

Cracking takes many forms. In some cases, simple crack filling may be the proper corrective action. Some cracks, however, require complete removal of the cracked area and the installation of drainage.

(b) disintegration

If not impeded in its early stages, disintegration can progress rapidly until the pavement requires complete rebuilding. Sealer-rejuvenator products can be applied to retard disintegration. The products help reverse the aging process of the surface asphalt. Deterioration from raveling may also be impeded by applying a light fog seal or a slurry seal. The basic procedures for either surface treatment are as follows:

1. Sweep the surface free of all dirt and loose aggregate material;

2. Apply the surface treatment; and

3. Close to traffic until the seal has cured.

(c) distortion

Repair techniques for distortion range from leveling the surface by filling with new material to completely removing of the affected area and replacing with new material. Cold milling can be employed prior to overlaying for many of these distresses.

(d) swelling

Patch repair procedure can be applied.

(e) loss of skid resistance

Treatment for loss of skid resistance includes removal of excess asphalt, resurfacing, grooving to improve surface drainage, and removing of rubber deposits.

1. Bleeding. A pavement milling or grinding machine may be used to remove the excess asphalt by milling off 1/8 inch to ¼ inch (3 to 6 mm) of pavement. Repair procedures include using hot sand or aggregate.

2. **Polished Aggregate.** One means of correcting this condition is to cover the surface with an aggregate seal coat. Grooving, milling, or diamond grindings the pavement surface are also useful techniques.

3. **Fuel Spillage.** Permanent repairs for areas subjected to continuous fuel spillage consist of removal of the damaged pavement and replacement with Portland cement concrete or bituminous asphalt, and application of a coal-tar emulsion seal coat or other fuel-resistant coating.

4. **Contaminants.** Rubber deposits may be removed by use of high-pressure water or biodegradable chemicals.

4.2.2 **Runway Surface Friction**

(a) Introduction

(i) The aerodrome operator shall ensure that procedures are established for undertaking runway surface friction assessments and defining the criteria by which friction values shall be assessed on runways under specified conditions;

(ii) Regular tests of runway surface friction characteristics shall be undertaken by using the self wetting continuous friction measuring equipment (CFME) and to ensure that the friction level does not fall below an acceptable level;

(iii) The procedures for runway surface friction assessments shall include elements listed in paragraph 4.2.12 (a);

(iv) The procedures for runway surface friction assessments shall be approved by the Authority; and

(v) the surface of a paved runway shall be maintained in a good condition so as to provide good friction characteristics and low rolling resistance. Standing water, mud, dust, sand, oil, rubber deposits and other contaminants shall be removed as rapidly and completely as possible to minimize accumulation.

(b) Technique for Runway Surface Friction Measurements

A runway surface friction assessment shall be conducted under controlled conditions using self-wetting CFME devices, to establish the friction characteristics of a runway and to identify those areas of a runway surface that may require rejuvenation for safe aircraft operation. A list of CFME and their recommended target friction levels are indicated below.

Test Equipment	Test Tire		Test speed (km/h)	Test water depth (mm)	Design objective for new surface	Maintenance planning level	Minimum friction level
	Type	Pressure (kPa)					
(1)	(2)		(3)	(4)	(5)	(6)	(7)
Mu-meter Trailer	A	70	65	1.0	0.72	0.52	0.42
	A	70	95	1.0	0.66	0.38	0.26
Skiddometer Trailer	B	210	65	1.0	0.82	0.60	0.50
	B	210	95	1.0	0.74	0.47	0.34
Surface Friction	B	210	65	1.0	0.82	0.60	0.50
Tester Vehicle	B	210	95	1.0	0.74	0.47	0.34
Runway Friction	B	210	65	1.0	0.82	0.60	0.50
Tester Vehicle	B	210	95	1.0	0.74	0.54	0.41
TATRA Friction	B	210	65	1.0	0.76	0.57	0.48
Tester Vehicle	B	210	95	1.0	0.67	0.52	0.42
GRIPTESTER	C	140	65	1.0	0.74	0.53	0.43
Trailer	C	140	95	1.0	0.64	0.36	0.24

(c) Procedures for Runway Surface Friction Assessment

(i) Equipment Checks

The CFME operator shall ensure that the equipment is in full working order and calibrated in accordance with the manufacturers' operating instructions.

(ii) Operator and Training Competency

1. The success of friction measurement in delivering reliable friction data depends greatly on the personnel who are responsible for operating the CFME. All operators shall be trained in its operation and maintenance and be aware of the critical factors affecting the accuracy of friction measurements. General guidance on assessment speed, calculated water depth and tyre type and pressure shall be sought from the CFME manufacturer;

2. Where a consultant carries out an assessment, it is the responsibility of the aerodrome operator to satisfy himself as to the competency and experience of the CFME operator; and

3. For consistency purposes, one type of CFME and consultancy source(s) can be adopted to be used by an aerodrome operator over a given period of time for data integrity and prevent inadvertent confusions that may arise from using different CFME within a short period of time.

(iii) Assessment Conditions

1. The runway surface shall be free from precipitation during the assessment, with no wet patches;

2. The assessment shall be conducted at an ambient air temperature above 2° C; and

3. Surface dampness and fog conditions might also affect the outcome of the assessment and aerodrome operators shall be aware that cross-winds may affect self-wetting assessments. Aerodrome operators shall seek advice on these issues from the CFME manufacturer.

(iv) Assessment procedure

1. runway friction testing shall be conducted at two speeds; 65 and 95 km/h;

2. friction measurement shall be conducted over the entire length of the runway;

3. to cover the required width, measurements shall be carried out along a line approximately 3m of each side of the runway centerline or that distance from the centerline at which most operations take place;
4. for runways that have a mix of widebody and narrow-body aeroplane operations, measurements shall be conducted at 5m on both sides of the runway centre line;

5. runs shall be made in both directions and a mean value taken;

6. additionally, a measurement shall be made along a track 5m from the runway edge, to provide a datum of the unworn and uncontaminated surface for comparison with the centre tracks subjected to traffic;

7. the friction value shall be obtained by averaging the results of measurements made with the test device. If the friction characteristics differ significantly along major portions of a runway, the friction value shall be obtained for each portion of the runway. A portion of runway approximately 100m long is considered significant for maintenance or reporting action;

8. the wet runway surface friction characteristics shall be evaluated when first constructed and after resurfacing;

9. friction tests of existing, new or resurfaced runways shall be made with a continuous friction measuring device provided with a smooth tread tyre; and

10. if there is any reason to doubt the accuracy of the runway surface friction assessment, it shall be repeated.

(v) Records

Aerodrome Operators shall keep records of all runway surface friction assessments. The following items shall be recorded for each assessment, and made available upon request:

- Date and time of assessment;
- Runway assessed;
- Run number and runway direction;
- Distance from the centreline and on which side of centreline the run was performed;
- Constant run speed (Km/h) for each run;
- Run length;
- Self-wetting system on/off (refers to check runs only);
- Surface condition;
- Average friction level per run;
- Friction levels for each portion of the pavement; and
- Overall friction level.

(vi) Evaluation of Runway Surface FrictionTest Results

1. The friction level values obtained shall be compared with the following criteria:

    - The Design Objective for New Surface;
    - The Maintenance Planning Level; and
    - The Minimum Friction Level.

The above readings shall be included in the Aerodrome Manual.

2. The friction level values produced by different CFME vary slightly for any given runway surface friction characteristics. Therefore, correlation among assessment criteria of CFME devices can be established.

(vii) Action to be Taken as a Result of a Runway Friction Assessment

The aerodrome operator shall review the results of each runway friction assessment and where appropriate take the following actions:

1. If the friction level is below the maintenance planning level, maintenance shall be arranged to restore the friction level, ideally to a value equal to or greater than the Design Objective for New Surface;

2. If the friction level indicates a falling trend, the Aerodrome Operator shall increase the frequency of runway friction assessments in order to identify any further or rapid deterioration and, if appropriate, repair works be envisaged;

3. If the friction level is below the Minimum Friction Level, maintenance shall be arranged urgently in order to restore the friction level and a NOTAM shall be issued advising that the runway may be slippery when wet;

4. If the friction level is significantly below the Minimum Friction Level, the aerodrome operator shall consider withdrawing the runway from use for take-off and/or landing when wet and issue a NOTAM in that respect; and

5. The friction measurement using the CFME shall, if required for detailed analysis of pavement macrotexture, be conducted in conjunction with measurements of texture depth for the purpose of assessing macrotexture quality of the paved surface.

(viii) Assessments made following maintenance activities

1. The friction characteristics of a runway vary over time as the runway is subject to tyre abrasive forces, rubber build up and to the effects of climate and other environmental conditions. Aerodrome operators shall monitor the results of assessments and shall vary the interval between assessments depending on the results. If historical data indicates that the surface is deteriorating relatively quickly, more frequent monitoring may be required in order to ensure that maintenance is arranged before the friction characteristics deteriorate to an unacceptable level. The aerodrome operator shall record the justification for any variation from the recommended periodicity for assessments;

2. The friction characteristics of a runway can also alter significantly following maintenance activities, even if the activity was not intended to affect the friction characteristics. Therefore, a runway surface friction assessment shall be conducted following any significant maintenance activity conducted on the runway and before the runway is returned to service. Runway surface friction assessments shall also be conducted following pilot reports of perceived poor braking action, if there are visible signs of runway surface loss of macrotexture, or for any other relevant reason; and

3. The friction characteristics of some runway surface materials can improve over time, commonly as a result of the dispersal of oils in the surface layers. However, if the runway surface friction assessment indicates that the friction characteristics of an area of the runway that has been subject to maintenance work are poorer than anticipated or fall below the minimum friction level, additional assessments shall be performed over a period of time to ascertain whether the friction characteristics remain stable, improve, or if additional work shall be carried out.

(ix) **Frequency of Runway Surface Friction Testing**

The frequency of runway surface friction tests shall be as per the table below.

Daily turbo-jet aircraft arrivals for runway end	Annual aircraft weight for runway end (million kg)	Minimum Friction Survey Frequency
Less than 15	Less than 447	Once per year
16 to 30	448 to 838	Once every 6 month
31 to 90	839 to 2404	Once every 3 months
91 to 150	2405 to 3969	Once every month
151 to 210	3970 to 5535	Once every 2 months
Greater than 210	Greater than 5535	Once every week

4.3 VISUAL AIDS AND AERODROME ELECTRICAL SYSTEMS:

4.3.1 The aerodrome operator shall establish procedures to ensure that a system of inspection (daily and as when required) and preventive maintenance (daily, weekly, monthly and yearly and as required) for all aeronautical lightings and electrical systems is available.

4.3.2 The following lighting equipment shall be inspected (at least twice per day), maintained regularly and calibrated if required:

(a) Simple Approach Lighting System
(b) Precision Approach Lighting System, Category I
(c) Visual Approach Slope Indicator System (PAPI) (calibration required)
(d) Runway Edge Light
(e) Runway End Light
(f) Taxiway Edge Light
(g) Runway Turn Pad Light
(h) Apron Flood Lighting
(i) Visual Docking Guidance System (calibration required)
(j) Obstruction lights
(k) Lights for denoting restricted areas.
(l) Wind Direction Indicator.
(m) capacitor discharge lights
(n) Runway Threshold Lights
(o) Signage lights.
(p) Generator Sets
(q) Airbridge
(r) Ground Power Units

The Automatic airfield lighting monitoring system at Control Tower and Constant Current Regulator for airfield lighting shall be inspected at least once weekly.

4.3.3 A checklist shall be available for the inspection and maintenance of the abovementioned aeronautical light equipment. All records (period of one year) shall be maintained and available for inspection.

4.3.4 Any deficiency noticed during inspections and maintenance shall be reported and immediate remedial actions shall be taken. Unserviceable lights shall be reported to AIS section for NOTAM action.

4.3.5 A light shall be deemed to be unserviceable when the main beam average intensity is less than 50% of the required value.

4.3.6 For Category I operation, at least 85% of the lights shall be serviceable for Precision Approach Category I Lighting System, Runway Threshold Lights, Runway Edge Lights and Runway End Lights.

4.3.7 The aerodrome operator shall ensure that:

(a) adequate primary power supply at aerodromes is available;

(b) secondary power supply is available. The facilities shall be automatically connected to the secondary power supply on failure of the primary power supply;

(c) the sources of primary and secondary power shall be analyzed for availability, capacity, reliability, practicality for the proposed installation, voltages and frequency, whether for a new aerodrome or for modernization or expansion of an existing aerodrome and for future needs;

(d) for the primary power source, two independent incoming power sources are required with automatic changeover. These two sources shall come from widely separated sections of the electricity network;

(e) the design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure will not leave the pilot with inadequate visual and non-visual guidance or misleading information;

(f) installation of the electrical systems needs to take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, interference with communication system etc;

(g) where a change in the operational status of lights has occurred, an indication shall be provided within five seconds for all types of visual aids;

(h) for a precision approach runway, the electrical circuits shall be designed so that the failure of one circuit will not leave the pilot without visual guidance and will not result in a misleading pattern;

(i) every approach and runway lighting system shall be interleaved over at least two circuits. Each circuit in an interleaved service shall extend throughout the whole of that service and be so arranged that a balanced symmetrical lighting pattern remains in the event of failure of one or more of the circuits;

(j) visual approach slope indicator systems shall have two circuits per runway end. When visual approach slope indicator systems are installed on only one side of the runway, part of the lamps in each light unit shall be connected to one circuit and the remainder to the other circuit in order to maintain the integrity of the pattern, but with reduced intensity;

(k) visual approach slope indicator systems shall be deenergized when a misleading signal results from the failure of a light unit and NOTAM action initiated;

(l) taxiway lighting shall be designed for series circuits;

(m) taxiway lighting shall be circuited to permit selective lighting of segments of the system to provide route guidance to pilots;

(n) constant current regulators shall be used to produce a constant-current output independent of variations in the circuit load and in the voltage of the power source;

(o) the constant current regulators shall:

(i) indicate a grounding fault on the circuit while permitting the circuit to operate normally when a single ground fault prevails;

(ii) have a high degree of reliability and therefore have no moving part;

(iii) incorporate a security device that sets the regulator out of service or assures a reduction of the current in case of an over current;

(iv) provide the required number of intensity settings or a continuously variable control as required;

(v) electrically isolate the primary power circuit from the secondary lighting circuit;

(vi) the control circuitry for aerodrome lighting provides the means of switching on or off and of changing the intensity of the various lighting systems from Control Tower; and

(vii) the primary control panel shall be located in the Control Tower at a lighting control desk or panel. This panel shall be designed to provide the operator with control switches, operating circuit indicator lights and intensity controls, and their associated indicating features which are easily identifiable under all conditions of illumination in the Control Tower.

(p) flight check of PAPI shall be carried out at least once per year. Ground checks of PAPI shall also be carried once every month.

4.3.8 The following aerodrome facilities shall be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:

(a) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;

(b) all obstacle lights essential to ensure the safe operation of aircraft;

(c) approach, runway and taxiway lighting;

(d) meteorological equipment;

(e) essential security lighting;

(f) essential equipment and facilities for the aerodrome responding emergency agencies;

(g) floodlighting on a designated isolated aircraft parking position; and

(h) illumination of apron.

4.3.9 Where lighting systems are used for aircraft control purposes, such systems shall be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information shall be automatically relayed to the Air Traffic Services.

4.3.10 The electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are capable of meeting the requirements of Appendix 10 for maximum switch-over times.

4.3.11 The system of preventive maintenance employed for a precision approach runway category I shall include at least the following checks:

(a) control and measurement of the electrical characteristics of each circuitry included in the approach and runway lighting system; and

(b) control of the correct functioning of light intensity settings used by the air traffic control.

4.3.12 All electrical power supply equipment including generator sets and Ground Power Units shall be inspected and maintained according to a programme. All records shall be kept and immediate remedial actions shall be taken if any deficiency is found during inspection and maintenance.

4.3.13 The aerodrome operator shall ensure that:

(i) apron floodlighting shall be adequately designed to:

1. assist the pilot in taxiing the aircraft into and out of the final parking position;

2. provide lighting suitable for passengers to embark/debark and for personnel to load and unload cargo, refuel and perform other apron service functions; and

3. maintain security.

(ii) apron floodlights shall be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on ground, air traffic controllers and personnel on the apron;

(iii) the arrangement and aiming of floodlights shall be such that an aircraft stand receives light from two or more directions to minimize shadows as shown in Appendix 5;

(iv) the average illuminance of the floodlighting shall be:

1. Aircraft Stand: horizontal illuminance of 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1 and vertical illuminance of 20 lux at a height of 2m above the apron in relevant directions; and

2. Other Apron Areas: horizontal illuminance of 50% of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

(v) the mounting height of the floodlights shall be at least two times the maximum aircraft eye height of pilots of aircrafts; and

(vi) the location and height of the floodlights shall be according to dimension of apron, arrangement of aircraft stands, taxiway arrangement and traffic scheme, adjacent areas and buildings, location and status of runways and helicopter landing areas.

4.3.14 Trenching dimensions for underground electrical cables, cable grounding and marking shall be as follows:

(**a**) **Direct Burial of Cables**

(i) the trench depth shall not be less than 5 cm below the lowest cable;

(ii) cables shall be at a minimum of 50 cm below the finished grade when on the aerodrome property and 75 cm below the finished grade when off the aerodrome property;

(iii) vertical separation of control and telephone cables and of low voltage power cables shall not be less than 6 cm. The ground wire or counterpoise shall be a minimum of 15 cm above the uppermost layer of cables. Trench depths shall allow for these vertical separations;

(iv) where rock excavation is encountered, the rock shall be removed to a depth of at least 8 cm below the required cable depth and replaced with bedding material of earth and sand;

(v) all trenches shall have a bedding of at least 5 cm of fine earth or sand having no material aggregate particles larger than 6 mm in diameter. Trench width for a single cable shall not be less than 15 cm. Where more than one cable is located in a trench, the trench width shall be adjusted so that the separations can be maintained;

(vi) a cable slack loop of about one meter shall be left at each end of cable runs and at all points where cable connections are brought above ground. Where cable is brought above ground, additional slack shall be left above ground. At all cable splices, slack loops free of bends shall be provided at the splice or within 30 cm at the ends of the splice;

(vii) the first layer of backfilling shall not be less than 7.5 cm deep and shall constitute of rocksand or sand;

(viii) the second layer shall not be less than 12 cm deep and particles shall be less than 25 mm diameter;

(ix) the remainder shall be either excavated or imported material with aggregate less than 100 mm diameter;

(x) power cables of the same or different circuits of less than 600 volts, may be laid together in the same trench without horizontal separation;

(xi) power cables of different circuits with voltages between 600 and 5000 volts shall be separated by a minimum of 10 cm;

(xii) all power cables, 5000 volts and below, shall be separated from all control, telephone and coaxial type cables by a minimum of 15 cm;

(xiii) power cables, of more than 5000 volts, shall be separated from all other cables by a minimum of 30 cm;

(xiv) control, telephone, and coaxial cables may be laid in the trench without horizontal separation from each other;

(xv) cables that do not require horizontal separation shall be separated by a minimum of 6 cm vertically; and

(xvi) no cable shall directly overlap another cable because compacting may damage the cable.

(b) Cables Installed in Ducts

(i) size of conduits in a duct bank shall not be less than 10 cm inside diameter except that ducts for communication lines with a minimum diameter of 7.5 cm are acceptable;

(ii) acceptable standard materials for ducts include fibre, cement, tile, PVC and plastic;

(iii) trenches for a single duct lines shall not be less than 15 cm nor more than 30 cm wide, and the trench for two or more ducts installed at the same level shall be proportionately wider;

(iv) trench bottoms shall be made to conform accurately to grade so as to provide uniform support for the duct along its entire length. A layer of fine earth or sand shall be placed in the bottom of the trench as bedding for the duct. The bedding material shall be tamped until firm;

(v) when two or more ducts are installed in the same trench, they shall be spaced not less than 5 cm apart in a horizontal direction or not less than 15 cm in a vertical direction;

(vi) power cables of the same voltage may be installed in the same duct;

(vii) power cables of less than 600 volts may be installed in the same duct;

(viii) power cables of less than 600 volts shall not be installed in the same duct with control, telephone, or coaxial type cables;

(ix) power cables of more than 600 volts shall not be installed in the same duct with control, coaxial or power cables of less than 600 volts;

(x) control, telephone and coaxial cables may be installed in the same duct;

(xi) power and control cables shall be installed in separate manholes and handholes unless required otherwise; and

(xii) when it is not possible to install power and other type cables in separate manholes or handholes, they shall be installed in separate compartments or on opposite sides of the manhole or handhole.

(c) Cable Grounding

(i) all shielded power cables shall have the shield grounded at each end;

(ii) all shielded control cables shall have the shield grounded at each end;

(iii) telephone cables shall have the shields grounded at one end only; and

(iv) coaxial cable shields shall be insulated from ground throughout the length of the cable run. The shields shall be grounded only at the coaxial connector terminating into the equipment on each end of the cable run.

(d) Cable Marking, Tagging and Cable Route Markers

(i) all cables and cable routes shall be marked for easy identification in the future;

(ii) all cables shall be tagged in each manhole or handhole with not less than two tags per cable, one near each duct entrance hole; and

(iii) cable routes shall be marked every 60m along the cable run, at each change of direction of cable and at each splice with a concrete slab marker of suitable size and thickness. The markers shall be installed flat in the ground with the top approximately 2.5cm above the finished grade. The surface shall then be painted bright orange and be impressed with the necessary information(name of facility, ‘cable’ or ‘splice’, type of cable installed, letters shall not be 10 cm high, 7 cm wide and 1 cm deep, arrows to indicate the direction or change in direction of the cable run). Manholes and handholes shall be identified by purpose.

4.4 AERODROME WORKS – SAFETY

4.4.1 The aerodrome operator shall establish a method of work plan including procedures and precautions to ensure that any works carried out on the aerodrome do not endanger aircraft operations or prejudice aerodrome security. The method of work plan shall be approved by the Authority before start of works. The method of work plan shall be submitted at least 10 days to the Authority before start of works.

a) 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.

b) 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.

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

d) 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.

e) The method of work plan shall 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) shall be involved at the earliest opportunity to consider the requirements for the efficient operations of the aerodrome during the proposed works.

4.4.2 Contents of method of work plan

The method of work plan shall include at least the following:

(a) Introduction

The introduction shall clearly specify the:

(i) name of the aerodrome;

(ii) short description of the project; and

(iii) date of issue of the method of work plan.

(b) Works information

1. The works information shall outline:

i. the scope of the works and information related to the works;

ii. work planning;

iii. the details of operational facilities affected;

iv. the implementation of any proposed change to operational facilities;

v. the date and time when the facilities will be withdrawn or changed from normal operations;

vi. the methods by which such changes will be promulgated;

vii. the planned date of commencement and completion of the work;

viii. the duration of each stage, and the date and time of their works;

ix. safety risk assessment of the planned works and changes to the operations or systems. A safety assessment of all planned works shall 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;

x. Procedure for worksite establishment and return to aircraft operations;

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

xii. Before implementation, draft operational procedures, instructions or other information to be promulgated, shall 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 shall be made by personnel having a comprehensive understanding of the operational implications of the works; and

xiii. Where reduced runway length operations are required due to works, procedures shall be developed and implemented by the aerodrome operator.

2. Information related to the works shall be promulgated.

The method of work plan shall contain the statement that "The actual date and time of work commencement will be advised by NOTAM, to be issued by the Aeronautical Information Service unit". The intended text of all planned NOTAM with procedures for its issue associated with the aerodrome works shall be included.

(c) Restrictions to aircraft operations

This section of the method of work plan shall detail the restrictions to aircraft operations and shall allow all concerned stakeholders to have easy reference and details of the restrictions as they affect them.

1. Work stages

For convenience and better work control, particularly on operational areas, the works shall be categorised in various stages and:

(i) Any restrictions to aircraft operations on the manoeuvring area, or in the approach and take-off areas that is to be listed in the method of work plan, shall be shown on drawings of each stage of the works;

(ii) When complex works are being undertaken, a table showing the restrictions applicable to each stage of the works and for each type of aircraft operations shall be included; and

(iii) The table shall outline the various work stages with start and completion dates and have a remarks column to list details of special restrictions and instruction for issue of NOTAM for the information of pilots.

2. Emergencies

The procedures shall detail special arrangements to be made during works if emergencies arise or adverse weather conditions occur.

(d) Restrictions of work organisations

This part of the method of work plan shall provide details of any restrictions on carrying out of aerodrome works and requirements for restoration of normal safety standards.

1. Personnel and equipment

The specific mention shall be made when personnel and equipment are required to vacate the movement area for aircraft movements. This shall include the withdrawal line or area for personnel and equipment, and the limitation on stockpiling of material, excavations and the like.

2. Access

The method of work plan shall identify the routes to and from the work areas and the procedures for entering any work areas within the movement area. Particulars of routes to and from the work areas shall be shown in drawing attached to the method of work plan.

3. Aerodrome markers, markings and lights

Details of arrangements for the installation, alteration, or removal of aerodrome markers and lights in work areas affected by the aerodrome works shall be shown on drawing attached to the method of work plan.

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

a) unserviceability markers shall be 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 shall be masked or the route closed;

c) unserviceability lights shall be used and existing aeronautical ground lighting and signs leading into a worksite shall be extinguished or masked on a movement area used at night or during low visibility;

d) suitable site fencing shall be installed to protect from jet blast, and FOD containment within the site shall be enforced;

e) the perimeter of the worksite shall be clearly marked and/or lit, particularly at night or during reduced visibility.

4. Protection of navaids and electrical services

Set out the procedures for protecting and ensuring the safe operations of the facilities, utilities and transport services dependent on navaids and electrical services.

5. Management and Control

The aerodrome operator shall ensure that procedures are established to ensure that:

(a) a project manager is appointed or designated to co-ordinate the works at the aerodrome. The project manager shall make arrangements and establish procedures for the safety of aircraft operations while the works are in progress. These arrangements and procedures shall be documented in the method of work plan;

(b) aerodrome works are carried out according to the method of work plan;

(c) in terms of customer service and the availability of facilities, a scheduling process shall be in place to ensure that construction or maintenance works do not close or restrict too many stands or operational areas at once;

(d) where significant changes to markings or lighting are being made, aerodrome operator shall conduct a preliminary check in order to ensure that the proposals have been correctly implemented and are functioning as intended;

(e) where shift working is in operation, each shift shall be properly and fully briefed;

(f) The aerodrome operator shall obtain feedback from the parties involved to ensure the implementation of corrective measures, if necessary;

(g) The aerodrome operator shall ensure that contractors have made available a point-of-contact outside normal working hours.

(h) all contractor drivers shall be escorted by a qualified vehicle operator or undergo movement area driver training and testing;

(i) access routes shall be agreed upon in advance and clearly identified to minimize interference with operations on the aerodrome;

(j) the existing road layout may require changes depending on the vehicle traffic levels;

(k) staff access routes shall also be agreed upon in advance and if such a route does not exist, then a safety risk assessment shall be undertaken to ensure access can be safely achieved;

(l) hours of operation of the works shall be agreed upon in advance;

(m) service clearance checks (underground location of services) shall be undertaken before work commences to ensure that cables or pipes are not damaged;

(n) smoking restrictions shall be advertised, monitored and enforced;

(o) hot works restrictions (including a separate hot works permit) shall be described, monitored and enforced;

(p) the use of lookouts and/or a listening watch on the appropriate ATS frequency may be required, along with suitable training for this task;

(q) any cranes shall be suitably lit and operating heights shall not infringe the protected surfaces;

(r) if the construction activity continues into darkness or in low visibility conditions, procedures shall be in place to discontinue or modify the activity, depending on its location and if necessary;

(s) procedures shall be in place for taxiway crossings, if required;

(t) all contractors shall have adequate FOD, noise and dust control measures in place to cover all eventualities;

(u) vehicles entering or exiting the worksite may need to be cleaned to prevent mud or debris being deposited in the movement area;

(v) in case of possible adverse meteorological conditions (e.g. lightning strikes, high winds) or aircraft emergencies, an appropriate alerting mechanism shall be in place and works activities may be suspended;

(w) precautions shall be taken to ensure that worksite floodlighting (light direction and/or height) does not affect aircraft and ATS operations.

(x) advance notification with relevant information shall be provided to the Aeronautical Information Service unit and the NOTAM shall be issued well in time to give notice of the works; and

(y) a Works Safety Officer shall be appointed to carry out the following functions:

1. ensure the safety of aircraft operations on the aerodrome.

2. ensure the monitoring, oversight and control of the works in progress;

3. ensure compliance with all relevant movement area safety rules;

4. ensure the safety of aircraft operations in accordance with the directions issued and the method of work plan;

5. ensure that, where applicable, the aerodrome works are notified by issue of a NOTAM by AIS and maintain close communication with the Aeronautical Information Service to ensure that the NOTAM provide current information and is at set out in the applicable method of work plan;

6. discuss, daily, with the project manager any matters necessary for the safety of aircraft operations and advise, where applicable, the aerodrome air traffic control unit of whatever information is necessary for the safety of aircraft operations;

7. ensure that unserviceable portions of the movement area, temporary obstructions, and the limits of the works area are correctly marked and lit in accordance with the applicable method of work plan;

8. ensure that vehicles, plant and equipment carrying out aerodrome works are properly marked, lit and operates within properly marked and lit work areas;

9. ensure that all other requirements in the method of work plan relating to vehicles, plant and equipment and materials are complied with;

10. ensure that access routes to work areas are in accordance with the applicable method of work plan, are clearly identified and that access is restricted to those routes;

11. ensure that excavation is carried out in accordance with the method of work plan to avoid damage to any utility or transport service, or loss of calibration associated with a precision approach and landing system or any other navigational aid;

12. ensure that the aerodrome air traffic control unit is kept informed of the radio call signs of the vehicles used during the works;

13. ensure the immediate removal of vehicles, plant and personnel from the movement area where necessary for the safety of aircraft operations or if instructed by air traffic control unit;

14. ensure that the movement area is safe for normal aircraft operations before it is cleared for aircraft operations following removal of personnel, vehicles, plant, equipment, and rubbish, from the works area;

15. ensure that floodlighting or any other lighting required to carry out aerodrome works do not present any glare to pilots;

16. report immediately, to the aerodrome air traffic control unit and the aerodrome operator, any incident, or damage to facilities; likely to affect air traffic services or the safety of aircraft;

17. remain on duty at the works area while work is in progress and the aerodrome is open to aircraft operations;

18. use the checklist below for establishing worksites and returning them to operational use:

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	

19. 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; and

20. any other function required by the Authority or the aerodrome operator to ensure operation safety.

6. Liaison

Before the commencement of any substantial work on the aerodrome, the aerodrome operator shall ensure that:

(a) a liaison process is established between representatives of the aerodrome operator, the air traffic control unit, the major aerodrome users, aerodrome security, works consultant and if applicable the contractor who is to do the work;

(b) A committee is set up, composed of representatives of those concerned with the works, including the contractors. This committee shall have as its primary concern the identification of interface problems between the various organisations involved;

(c) The committee shall meet as often as considered necessary to review progress and consider the need for any change in working practice to meet operational requirements; and

(d) Pre-startup and regular site meetings shall 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).

7. Isolation of Work Area

As far as practicable, working areas shall be isolated from the active movement by physical barriers:

(a) These barriers serve to warn pilots and to preclude work vehicles inadvertently straying onto each other's active movement areas;

(b) The barriers shall be marked for day use and adequately lit for night use;

(c) The lights of taxiways leading into working areas shall be made permanently off during the work period; and

(d) The unserviceable areas shall be marked properly as per requirements (MCAR).

8. General Working Rules

Before work commences, agreement shall be established on:

(a) the hours allowed to be worked;

(b) the authorised vehicle routes;

(c) the control of work personnel and vehicles;

(d) the communication equipment to be used and the associated procedures;

(e) the permitted heights of vehicles and equipment, and the limitations to be placed on operating heights of crane jibs and the like; and

(f) any limitation of the use of electrical to prevent interference with navigation facilities or aircraft communications.

9. Safety

Construction personnel shall be warned, in writing, of possible hazards to personnel working on the operational aerodromes, in particular the jet-blast problems and noise. Where necessary, the contractor shall be advised to provide look-out persons wearing distinctive jacket.

10. Paved Area Cleanliness

Where work is conducted on, or involves traversing, paved areas the paving shall be thoroughly inspected before being opened for aircraft use. The particular attention shall be given to the presence of debris and the general cleanliness of the surface. Where aircraft are constantly using areas open to the construction activity, inspection shall be regular to ensure that the necessary cleaning has been carried out.

11. Marking and Lighting

Tall equipment such as crane jibs shall be marked and, if the aerodrome is open for night operations, lit. If work is of prolonged duration, a constant watch shall be maintained to ensure that the marking and lighting, of obstacles and unserviceable areas, are serviceable. This is particularly important for marking and lighting arrangements to indicate a displaced threshold and runway end.

12 Effect on Operating Limits

The effect of tall equipment, such as crane jibs, on navaids etc will need to be considered, in conjunction with those responsible for electronic landing aids, and steps taken to reduce interference to the minimum. Construction equipment may have adverse effects on obstacle clearance limits and shall be considered when working plans are being formulated.

13 Operation Safety Considerations

The following is a partial list of safety considerations which will need attention during aerodrome works and shall be included in the method of work plan. There may be others in a particular situation that will need attention and shall be considered.

(a) minimum disruption of standard operating procedures for aircraft operations;

(b) clear routes from rescue and firefighting stations to active aerodrome movement areas;

(c) a procedure for notification, and authority to change safety-oriented aspects of the method of work plan or construction plan;

(d) initiation, currency, and cancellation of NOTAM;

(e) suspension, or restriction, of aircraft activity on aerodrome movement areas;

(f) runway end or threshold displacement, or both, and appropriate temporary lighting and marking;

(g) installation and maintenance of temporary lighting and marking for closed, or diverted, aircraft routes on the aerodrome movement areas;

(h) revised vehicular control procedures, or additional equipment and personnel;

(i) marking and lighting of construction equipment and construction areas;

(j) parking of construction equipment and storage of material, when not in use;

(k) conspicuous identification of construction personnel, equipment and location for construction personnel vehicle parking, and their transportation to and from the work site;

(l) designation of responsible representatives of all involved parties, and their availability;

(m) location of the construction offices, contractor plants and utilities;

(n) designation of waste areas and disposal of waste;

(o) debris cleanup responsibilities and schedule;

(p) security control of temporary gates and relocated fences;

(q) dust, smoke, steam, and vapour controls;

(r) additional security measures necessary, if it is a security designated aerodrome;

(s) marking and lighting of closed aerodrome movement areas;

(t) phasing of the work to be executed;

(u) shutdown or protection, or both, of aerodrome electronic visual navigation aids;

(v) the need to notify the rescue and firefighting unit when working on water lines; and

(w) contractor personnel are provided with safety and security briefings.

14. Hazardous and Marginal Conditions

Analysis of past accidents and incidents has identified many contributory hazards and conditions. Some examples of such conditions that shall be watched carefully. Procedures and mitigating measures shall be included in the method of work plan for the following hazardous and marginal conditions:

(a) excavation adjacent to runways, taxiways, and aprons;

(b) stockpiles of earth, construction material, temporary structures, and other obstacles in proximity to aerodrome movement areas and runway approach and take-off surfaces;

(c) runway projects resulting in lips between old and new surfaces at runway edges and ends;

(d) heavy equipment operating or idle near aerodrome movement areas;

(e) proximity of equipment or material which may degrade radiated signals from, or impair monitoring of, navigation aids;

(f) tall but relatively inconspicuous objects, such as cranes, drills, and the like, in critical areas such as safety areas and runway approach and take-off surfaces;

(g) improper or malfunctioning lights or unlighted aerodrome hazards;

(h) holes, obstacles, loose pavement, rubbish, or other debris, on or near aerodrome movement areas;

(i) failure to maintain barriers, such as fences, during construction to prevent unauthorised access;

(j) improper marking or lighting of runways, taxiways, and displaced thresholds;

(k) attractions for birds such as exposed earth works, rubbish, grass seeding, or ponded water on or near aerodromes;

(l) inadequate or improper methods of marking temporarily closed movements areas including improper and unsecure barricades;

(m) obliterated markings on active movement areas;

(n) effects of reduced visibility, adverse weather conditions, and strong winds etc;

(o) trenching works.

(e) Authorisation of the works

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

(f) Inspection

The aerodrome operator shall establish a special inspection programme during the work to ensure that the movement area is safe for aircraft operations. Frequent inspections shall be made by the aerodrome operator or a representative during critical phases of the work to ensure that the contractor is following the prescribed safety procedures and that there is an effective litter control programme.

(g) Administration

(i) Provide the name of the project manager and works safety officer appointed or designated and the means of contact, including the means outside normal working hours; and

(ii) The method of work plan shall contain the statement that “All works shall be carried out in accordance with the method of work plan”. Each method of work plan shall require compliance with these statements.

(h) Drawings

The drawings which provide a visual reference for each state of the work shall be attached with the method of work plan. The drawings shall contain specific details such as work areas, restrictions to aircraft, location of the radio navigation aids, exact location of visual aids and markings, details of the height and location of critical obstacles, location of temporary taxiways, access routes, storage areas for material and equipment, and the location of utilities and transport services which may be disturbed during the works.

(i) Distribution list:

The distribution list of the method of work plan shall include at least the following persons and organizations:

(i) the project manager;
(ii) the works safety officer(s);
(iii) the aerodrome security service;
(iv) the aerodrome air traffic control unit;
(v) the aerodrome licensing authority;
(vi) air transports operators who might be affected by the works;
(vii) aircraft operators based at the aerodrome;
(viii) the rescue & firefighting service; and
(ix) the contractors and subcontractors.

4.4.3 The aerodrome operator shall ensure that all concerned personnel be provided training on establishing of method of work plans for aerodrome works as detailed in chapter 4.4. The training programme on aerodrome works shall be approved by the Authority.

4.5 ENVIRONMENT PROTECTION

The aerodrome operator shall ensure that procedures are available for the following:

(a) the aerodrome operator shall have the duty to prevent contamination of the land occupied, and any pollution that results from his activities is his responsibility to manage and clean up. The licence holder shall also prevent contamination when he is storing or handling chemical substances or waste that has the potential to contaminate land. The outputs of waste water treatment plants shall be continuously monitored in relation with acceptable national standards;

(b) spray painting shall be undertaken within sealed booth or covered area to prevent particle release into the atmosphere;

(c) vehicle emissions shall be reduced by ensuring regular vehicle maintenance and use of noise suppression devices to the manufacturer’s specifications;

(d) chemicals shall be stored in bunded areas;

(e) all staff shall be trained to undertake a spill response;

(f) spill clean up kits for minor spills shall be supplied by the aerodrome operator;

(g) all liquid waste shall be stored in appropriate containers, in hardstanded, kerbed or channelled areas to collect runoff;

(h) machinery shall be maintained regularly to reduce potential of leakage;

(i) aircraft, vehicles or component washing shall be performed in designated areas, where aircraft/aerodrome operation is not endangered and run off can be collected and diverted from spillage or leakage onto soil;

(j) report of any environmental incident shall be immediately reported to the Authority;

(k) all waste oils, fuels, chemicals and hazardous waste shall be disposed in accordance with environmental regulatory requirements in force;

(l) noise exposure contours around the aerodrome shall be established depending on largest aircraft and volume of traffic; and

(m) all constructions on the aerodrome shall be according to all national environmental regulations.

4.6 PASSENGER BOARDING BRIDGE (PBB) OPERATOR PERMIT

4.6.1 Scope and Applicability

(a) The requirement for a PBB Operator Permit applies to:

(i) all persons operating the PBB; and

(ii) any person or entity responsible for the supervision or management of any person or persons operating the PBB.

(b) The different types of operator permits shall be categorized according to the types of bridges available at the aerodrome;

(c) The validity of the Passenger Boarding Bridge Operator Permit shall be determined by the Authority; and

(d) The fees for the Passenger Boarding Bridge Operator Permit shall be determined by the Authority.

4.6.2 Requirements

Training requirements shall be as follows:

The applicant shall have followed successfully the required training in operating the PBB for which a PBB Operator Permit is required. The training to be undertaken shall take into account initial, practical, on-the-job (OJT) and recurrent training.

(i) Initial training shall be carried out by an instructor approved by the Authority. Initial training shall consist of theoretical and practical training and a period of supervised OJT.

Initial training shall adequately address the following topics:

(a) Operating instructions;
(b) PBB operation procedure as per Operations Manual;
(c) Actions and Elements of the PBB;
(d) Screen information of alarm messages, alerts, damages and errors in functioning system of the PBB;
(e) Operational Safety;
(f) Basic and Special Safety Instructions;
(g) Safety norms that shall be observed when carrying out operation of the PBB;
(h) Operation/safety on parking stands; and
(i) Emergency and manual operation procedures.

On successful completion of the initial training on the operation of the PBB, the applicant will be issued with a training certificate.

(ii) Refresher training shall take place after a period of not more than 3 years. Refresher training shall be consistent with the PBB operator duties being performed and shall consist of theoretical, practical and OTJ training.

Refresher training shall be conducted by an instructor approved by the Authority.

Recurrent training shall adequately address the following topics:

(a) Review of past and new operating instructions;
(b) Any modification in actions and elements of the PBB;
(c) Review of alarm messages, alerts, damages and errors in functioning system of the PBB;
(d) Review of Operational Safety;
(e) Review of Basic and Special Safety Instructions;
(f) Review of Safety norms that shall be observed when carrying out operation of the PBB;
(g) Review of Operation/safety on parking stands; and
(h) Review of emergency and manual operation procedures.

On successful completion of the refresher training on the operation of the PBB, the applicant will be issued with a training certificate.

The above trainings shall enable the trainee to:

(i) get to know PBB operating procedures;
(ii) become aware of operational safety;
(iii) identify and understand safety warnings and alarm messages; and
(iv) avoid damage to aircraft and other equipment or structure.

4.6.3 Approval by Authority

(a) The training course and attached training materials shall be approved by the Authority; and

(b) The instructor delivering the training course shall be approved by the Authority.

The instructor shall:

(i) have a minimum of 3 years' experience in operation of PBB;

(ii) have followed a training course on the operation of PBB, delivered either by the manufacturer of the PBB or any other recognized person/organization;

(iii) possess relevant instructional techniques;

(iv) possess effective communication skills; and

(v) be able to conduct theoretical and practical assessments.

4.6.4 Records

Records of application of PBB Operator Permit and training shall be maintained and made available by the agency operating the PBB for inspection by the Authority.

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4.8 APRON MANAGEMENT SERVICE

4.8.1 Introduction

1. The air traffic control service at an aerodrome extends throughout the manoeuvring area, but no specific instructions relating to such a service covers the apron. Therefore, an apron management service is required to regulate the activities and movement of aircraft, vehicles and personnel on the apron.

2. There are a variety of different approaches to apron management which have been developed and which can, depending on the particular condition, accommodate the requirements of the aerodrome.

3. Generally, it is not practicable to exercise total control over all traffic on the movement area. However, in very poor visibility conditions it shall be necessary to exercise such a control at the expense of capacity. Safety and expedition generally depend on aircraft and vehicles conforming to standard ground movement rules and regulations. The apron management shall establish rules related to the operation of aircraft and ground vehicles on the aprons. These rules shall be compatible with those for the manoeuvring area.

4.8.2 When shall an apron management service be established?

1. An apron management service shall be provided when warranted by the volume of traffic and operating conditions.

2. It is not possible to define at what levels of traffic volume and under what operating conditions an apron management service shall be established. Generally speaking the more complex the apron layout the more comprehensive an apron management service needs to be, particularly when taxiways are included in the apron area. The decision whether or not to provide an apron management service at a particular airport rests with aerodrome operator.

3. The following operational factors shall be considered when determining the need to establish a dedicated apron management service:

   a) the traffic density;
   b) the complexity of the apron layout; and
   c) the visibility conditions under which the aerodrome operator plans to maintain operations.

4. Most aerodromes may already have some form of apron management. This may simply be an area set aside for the parking of aircraft, with painted lines to guide pilots to self-manoeuvring aircraft stands. At the other end of the scale, the apron area may be a large part of the movement area with numerous nose-in stands, several terminals and complex taxiways forming part of the layout. A complex apron area such as this will need a comprehensive apron management service including radio communication facilities.

5. Aerodrome operators shall therefore consider what scope of management is needed for the activity on their apron areas to ensure safe and efficient operation of aircraft and vehicles in close proximity. This is particularly important where low visibility operations are contemplated.

6. The following may be considered when considering the scope of the apron management service:

   a) Is the apron area sufficiently large, complex or busy to merit a separate staff to manage it?

   b) What radiotelephony facilities do the staff need to exercise control over their own vehicles, airline vehicles and, if necessary, over aircraft using apron taxiways?

   c) If apron management staff are required to exercise control over aircraft and vehicles on the apron area to ensure safe separation, then such staff shall be properly trained.

   d) Will the apron management service issue its own instructions such as stand allocation, start-up, push back, and taxi clearances, or will these be given by the ATS unit as an element of the apron management service?

   e) How will the various airline service vehicles be managed on the apron as well as on airside roads serving aircraft stands?

   f) Is there a need for roads, controlled or uncontrolled, crossing apron taxiways?

   g) Who will be responsible for inspection, maintenance and cleanliness of the aprons?

   h) What size marshalling service, including follow-me vehicles, is required to meet aircraft parking and guidance needs?

   i) Are low visibility operations contemplated at the aerodrome? If so what procedures need to be developed to ensure safety on the apron area?

   j) Are there procedures to cater for contingencies such as accidents, emergencies, diversion aircraft, and flow control when the stands are nearly all occupied, maintenance work, stand cleaning and security?

4.8.3 Who operates the apron management service?

1. Apron management service may be provided by the aerodrome ATS, by a unit set up by the aerodrome operator, or by co-ordinated control between ATS and the aerodrome operator.

2. Management by the aerodrome operator

   Some countries have found that a preferred system of operating aprons has been to set up a traffic management control procedure in which a single unit takes over the responsibility for aircraft and vehicles at a pre-determined handover point between the apron and the manoeuvring area. Generally, the edge of the manoeuvring area represents the handover point. In any event, the handover point shall be clearly defined and be indicated on the ground and on appropriate charts, for example the aerodrome chart, for the benefit of aircraft and vehicle operators. The apron management unit will then assume responsibilities for managing and co-ordination all aircraft traffic on the apron, issuing verbal instructions on an agreed radio frequency, and managing all apron vehicle traffic and other apron activities in order to advise aircraft of potential hazards within the apron area. By arrangement with the aerodrome ATS unit, start-up and taxi clearances will be given to departing aircraft to the handover point where the ATS unit assumes responsibility.

3. Co-ordinated management

   One form of the co-ordinated apron management service is where radio communication with aircraft requiring start-up or pushback clearance on the apron is vested in the ATS unit, and the control of vehicles is the responsibility of the aerodrome operator. At these aerodromes, ATS instructions to aircraft are given on the understanding that safe separation between the aircraft and vehicles not under radio control is not included in the instruction.

   The apron management unit provided by the aerodrome operator maintains close communication with the ATS unit, and is responsible for aircraft stand allocation, dissemination of movement information to aircraft operators by monitoring ATC frequencies, and by updating basic information continuously on aircraft arrival times, landings and take-offs. The apron management service shall ensure that the apron area is kept clean by airport maintenance and that established aircraft clearance distances are available at the aircraft stand. The apron management unit may also provide a marshalling service and a follow-me service. The unit staff will also be responsible for the maintenance of discipline and compliance with procedures relating to the control of vehicles.

4. Whichever method of operating an apron management service is provided, the need for close liaison between the aerodrome operator, aircraft operator and ATS is paramount. Stand allocation, aircraft arrival or departure time, start-up clearances, dissemination of information to operators, notification of work in progress and non-availability of facilities, security arrangements and the availability of safety services, are all items of vital importance to both ATS and the aerodrome operator. The operational efficiency and safety of whichever system is adopted, depends very largely upon this close co-operation.

4.8.4 Apron management service responsibilities and functions

1. Aircraft stand allocation

   The aerodrome operator normally retains over-all responsibility for aircraft stand allocation although for operational convenience and efficiency a system of preferred user stands may be established. Instructions shall clearly state which stands may be used by which aircraft or groups of aircraft. Where considered desirable, a preferred order of use of stands shall be laid down. Apron management staff shall be given clear guidance on the stand occupancy times to be permitted and the steps to be taken to achieve compliance with the rules.

2. Aircraft arrival / departure times

   Foreknowledge of arrival and departure times scheduled, estimated and actual is required by ATS, apron management, terminal management and the operators. A system shall be established to ensure that this information is passed between all interested parties as quickly and efficiently as possible.

3. Start-up clearances

   Normally the ATS unit gives these. Where an apron management service operates its own radio communication on the apron area, procedures will need to be established between the apron management service and the ATS unit to ensure the efficient co-ordination and delivery of such clearances.

4. Dissemination of information to operators

   A system shall be established to ensure the efficient distribution of relevant information between apron management, ATS and operators. Such information could include notification of work in progress, non-availability of facilities and low visibility procedures.

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

5. Security arrangements

In addition to normal security arrangements there are security requirements which are of interest to many parties who operate on the apron. These would include contingency plans for such eventualities as baggage identification on the stand, bomb warnings and hijack threats.

6. Availability of safety services

The rescue and firefighting services (RFF) are normally alerted to an incident on the movement area by ATS. However, at aerodromes where aircraft on the apron area are controlled by the apron management service, a communication system needs to be established to alert the RFF when an incident occurs in the apron area of responsibility.

7. Apron discipline

The apron management service will be responsible for ensuring compliance with regulations relating to the apron by all parties.

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

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

8. Aircraft parking/docking guidance system

The apron guidance system provided will depend upon the accuracy of parking required and the types of aircraft operating on the apron. The simplest form of stand guidance, where precise accuracy is not required, will comprise stand identification and centre line paint markings. The apron management service shall monitor all paint markings to ensure that they are maintained in a clean condition to retain maximum visibility. Where more accurate parking/docking is required then one of the guidance systems shall be installed. The apron management service shall monitor these systems and associated guidance lights to ensure that

9. Marshalling service

An aerodrome marshalling service shall be provided where parking, docking guidance systems do not exist or are unserviceable, and where guidance to aircraft parking is required to avoid a safety hazard and to make the most efficient use of available parking space. Proper training arrangements shall exist for marshallers and only those who have demonstrated satisfactory competence shall be permitted to marshal aircraft. Where aerodrome marshalling is provided, comprehensive instructions shall be written for marshallers including:

a) the absolute necessity for using only authorized signals. Copies of these shall be displayed at suitable points;

b) the need to ensure that prior to using the authorized signals the marshaller shall ascertain that the area within which an aircraft is to be guided is clear of objects which the aircraft, in complying with his signals, might otherwise strike;

c) the circumstances in which single man marshalling may be used and the occasions when assistance of wing walkers shall be employed;

d) the action to be taken in the event of an emergency or incident involving an aircraft and/or vehicle occurring during marshalling, e.g. collision, fire, fuel spillage;

A distinctive jacket shall be worn at all times.

The badly executed aircraft manoeuvre could lead to the need for use of excessive engine power for corrective action, with consequent risk of injury or damage from blast. If necessary, aircraft in these situations shall be signaled to close down engines and re-positioning is carried out by tractor.

10. Follow Me Service

At aerodromes where ground guidance (follow-me) vehilces are in use, local orders shall ensure that drivers are suitably trained in radiotelephony communication procedures, visual signals, taxiing speeds and the correct aircraft/vehicle spacings.

Aerodrome operators shall 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; and

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

11. Diversions

Contingency arrangements shallbe made at each airport to deal with the possibility of apron congestion due to a large influx of diverted aircraft. These arrangements shall include the setting up of liaison committee of all parties concerned to enable quick decisions to be made. Warning arrangements shall be made to alert operators to any approaching saturation of apron or terminal facilities. The apron management unit plays a key role in implementing such contingency arrangement for dealing with diversions and forecasting of saturation of facilities.

4.8.5 Training

1. The functions of the apron management service require that its staff be appropriately trained and authorized to carry out their respective responsibilities. This applies particularly to those responsible for the operation of an apron management centre or tower, to marshallers and to follow-me vehicle operators.

2. Staff operating an apron management centre or tower have the responsibility for managing and, at some aerodromes, controlling aircraft movement within their area of responsibility. To a considerable extent their function is similar to that of ATC control on the manoeuvring area and similar training of staff is required. As a minimum, the following shall be included in their training programme:

   a) ATS unit/apron management co-ordination;
   b) aircraft stand allocation procedures;
   c) start-up procedures;
   d) push-back procedures;
   e) gate holding procedures;
   f) taxi clearances; and
   g) en-route clearances.

3. Aircraft marshallers require training to ensure that they are properly qualified to direct aircraft movements. Their training shall focus on:

   a) signaling;

   b) aircraft characteristics, both physical and operating, that relate to manoeuvring of aircraft within the confines of the apron; and

   c) personal safety around aircraft and particularly engines.

4. At aerodromes where "follow me" vehicles are in use, local regulations shall ensure that drivers are suitably qualified in radiotelephony communication procedures, know visual signals and have a suitable knowledge of taxiing speeds and correct aircraft/vehicle spacing. A thorough knowledge of the aerodrome layout with an ability to find one's way in low visibility is important.

4.8.6 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.

4.8.7 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.

4.8.8 The aerodrome operator shall establish apron management procedures, and 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;
j) dissemination of information;
k) arrangement with Air Traffic Services;
l) arrangements for initiating engine start and ensuring clearance of aircraft push-back;
m) visual monitoring of aircraft parking stand to ensure that the recommended clearance distances are provided to an aircraft using the stand;
n) provision of radiotelephony communications facilities for communication among ground staff and with Air Traffic Services;

o) the dimensions of the parking stands, the largest aircraft reference code for each parking stand and the facilities for each aircraft stand (fuel hydrants, passenger boarding bridge, ground power units and A-Visual Docking Guidance System etc);
p) diversions;
q) Aircraft parking/docking guidance system
r) security arrangements
s) Aircraft arrival / departure times

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

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

4.8.11 **Blast precautions**

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

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

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.

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 shall be prepared to take appropriate action when necessary.

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

4.8.12 **Apron cleaning**

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

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.

4.8.13 **Aircraft pushbacks**

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.

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.

4.8.14 **Operation of air bridges**

1. The area used for the movement of the air bridge shall be kept free of vehicles and/or equipment to ensure its safe operation. Operators shall 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; and

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

4.8.15 **Vehicle movements**

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.

2. An overview of the topics that shall be covered in the airside vehicle rules is as follows:

   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.

4.8.16 The above procedures for apron management shall be approved by the Authority.

4.8.17 The aerodrome operator shall arrange for training for all concerned airside users on apron management. The training shall include elements as required by paragraph 4.8.

4.9 AERODROME INSPECTION PROGRAMME

4.9.1 The aerodrome operator shall establish an aerodrome inspection programme and shall provide:

(a) equipment for use in conducting the aerodrome inspection programme;

(b) procedures to ensure that qualified aerodrome personnel perform the aerodrome inspection programme;

(c) a reporting system to ensure prompt correction of unsafe aerodrome conditions noted during any inspection; and

(d) procedures for reporting to Air Traffic Services after conducting aerodrome inspection.

4.9.2 The aerodrome operator shall keep a record of any deficiencies that could affect operational safety and mitigation measures.

4.9.3 The aerodrome operator shall keep a record of each inspection for a period of at least 1 year after the inspection.

4.10 AIRSIDE VEHICLE CONTROL

4.10.1 Airside Driving Codes and Rules

4.10.1.1 Safety Rules on the Airside

The aerodrome operator shall ensure that the following safety rules are implemented in order to safeguard the safety of aircraft, personnel, drivers, vehicles and mobile equipment operating on the airside.

(a) Applicability of the airside safety rules

All drivers operating on the airside shall follow the safety rules listed at paragraph 4.10.1.1;

(b) Responsibilities of aerodrome operator, Air Traffic Services and Security

(i) The control of aircraft taxiing from runway to aircraft parking stands and vice versa comes under the Air Traffic Services;

(ii) The control of the airside with regard to vehicles, drivers and handling operations on the apron and roadways is under the aerodrome operator; and

(iii) The security of the airside comes under the aerodrome operator and Police.

(c) Speed Limit on the airside

(i) Vehicles shall be driven within the speed limits indicated by road signs and road markings:

(ii) Drivers shall adhere to the following speed limits:

1. 5 km/h within 10 metres of an aircraft;

2. 20 km/h on airside roads and service roads;

3. 40 km/h on perimeter roads; and

4. 10 km/h in the baggage handling area.

(iii) The speed limit signs are the maximum speed for ideal conditions for that particular stretch of road and shall be reduced when visibility conditions deteriorate;

(iv) No overtaking is allowed where a continuous white line is painted in the centre of the roadway;

(v) Emergency vehicles such as fire vehicles, ambulance and police vehicles **on call** shall be given priority to move ahead quickly and safely. Any indication of their approach such as sirens or flashing lights shall prompt the driver to give way by moving to the left, slowing down or stopping if necessary;

(vi) 'Follow Me' vehicles with a flashing blue, red or yellow light signal, including the vehicles they escort are exempted from the speed limit when attending to an emergency. They may leave the established roadways if necessary; and

(vii) The vehicles described above, shall give way to taxiing and towing aircraft at all times.

(d) General Driving Conduct

(i) No Alcohol and Drugs;

(ii) No Smoking;

(iii) Exercise extra care and vigilance when driving;

(iv) Prohibit from using hand-held mobile phones;

(v) Maintain a wide berth from preceding traffic. Keep at least 2-second time gap with vehicle at front;

(vi) Secure properly the loads on vehicles; and

(vii) No unattended vehicle with running engine.

(e) Safety in the Vicinity of Aircraft

(i) When Aircraft is Stationary with Engines Running

1. Drivers and airside personnel shall be aware of the dangerous effects of jet blast injuries that could be caused by rotating propellers and potential ingestion when in close proximity to aircraft with its engine running;

2. They shall not cross in front or behind a taxiing aircraft that would subject themselves and or aircraft in danger;

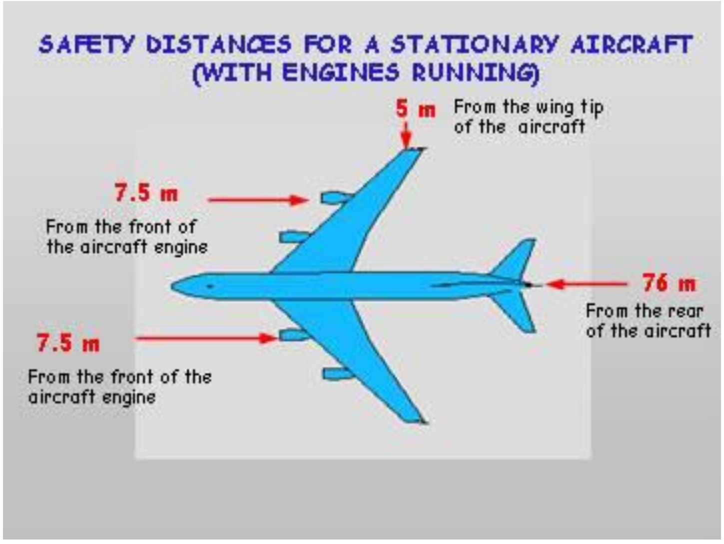
3. No driver shall drive a vehicle towards an aircraft with its engine running. An aircraft with its engine running will have its anti collision light on (displaying a flashing red light signal);

4. Any person, except maintenance staff working on a stationary aircraft with its engine running:

   (a) shall not pass within **7.5 metres** from the air intake of the aircraft engine;

   (b) shall not pass within **76 metres** from the rear of an aircraft jet engine; and

   (c) shall be at least **5 metres** clear from the wing tip of a parked aircraft.



(ii) When Aircraft is Taxiing

Personnel and vehicles shall give way to aircraft at all times irrespective of whether the aircraft is taxiing or on tow. Vehicles or personnel shall maintain a safety distance of 200 m in front of a taxiing and at least a distance equivalent to two aircraft lengths behind a taxiing aircraft.

(iii) When Aircraft Being Refuelled

1. Drivers shall not start their vehicles when within **15** metres of a refueling aircraft;

2. Drivers of vehicles shall keep clear of the aircraft engines and shall no pass within **2.5 metres** radius around the aircraft fuel tank vents; and

3. Drivers of vehicles shall not drive over any hose or bonding cable laid during aircraft refuelling.

(iv) Safety Around Aircraft Parked at the Stand

1. Do not drive behind an aircraft when its engines are running or when the aircraft anti-collision light is still on (flashing red light);

2. Do not approach an aircraft until the ground engineer gives the ‘thumb up’ signal when the aircraft has come to a complete stop, the wheels have been chocked and the engines shut down;

3. Do not walk or drive in front of an aircraft when its engines are running. Maintain at least 7.5 metres clearance of the front of its engine. Beware of engine ingestion and to keep clear of propellers;
4. Do not drive or park under aircraft or aircraft wings unless the vehicles are used for servicing the aircraft;

5. Do not obstruct the path of an aircraft waiting for push back;

6. Approach stationary aircraft at an angle and keep to the aircraft on the driver’s side (not meant for docking to aircraft);

7. Overtaking is strictly prohibited on aircraft stands;

8. Use a marshaller or guideman when reversing towards aircraft;
9. Do not leave vehicle unattended with the engine running near the aircraft;

10. Keep the passenger boarding bridge safety zone free of any obstruction. Do not stop or park in the passenger boarding bridge safety zone;

11. Deposit all Foreign Object Damage (FOD) in bins provided after handling of each flight;

12. Report all fuel, oil and other chemical spillages;

13. Wear high visibility safety vest at all times; and

14. To engage the handbrake whenever the vehicle is stationary.

(v) Vehicle entering a parking stand

(a) A vehicle shall never enter an aircraft parking stand when:

   1. Passenger boarding bridge operation lights are switched on;

   2. Aircraft docking guidance system is activated;

   3. Marshaller is on standby for an arrival aircraft;

   4. An aircraft is entering a parking stand; and

5. An aircraft inside the parking stand is on tow and its anti-collision beacons are switched on.

(b) Never operate vehicles under the wings or fuselage of the aircraft, except for access in connection with aircraft servicing;

(c) Vehicles shall not be driven or parked underneath the passenger boarding bridges;

(d) Vehicles shall not be driven or parked in the fuel pit/hydrant clearance area;

(e) When aircraft refuelling is in progress, vehicles on the parking stand shall not obstruct the emergency exit route in front of the refuelling vehicle;

(f) When two vehicles are converging, the vehicle on the left shall give way to the vehicle on the right;

(g) Whenever a vehicle is reversed, a look-out shall be provided to ensure the vehicle can be reversed safely;

(h) During aircraft departure push-back, vehicles shall keep away from the parking stand. With exception of the aircraft tractor, vehicles associated with servicing the departing aircraft shall wait inside the Equipment Staging Area within the parking stand;

(i) Vehicles shall give way to ground personnel; and

(j) All vehicles and equipment shall stop completely in front of the road edge line of the parking stand and to observe the traffic condition thoroughly before entering vehicular road in a safe manner.

(vi) Jet blast

1. All drivers and personnel shall exercise extra cautions when passing behind the aircraft to avoid any jet blast hazards; and

2. Drivers shall stop and wait if the aircraft engine(s) is / are running or until the aircraft has completely taxied out from the stand if the aircraft’s anti-collision beacons are switched on.

(f) Driving Areas and Safety Rules

(i) Airside Road

1. It is located in front of all aircraft parking stands. It is meant for movement of vehicles and equipment. All drivers shall ensure the height of their vehicles (including loads or equipment on tow) do not infringe the height restriction signs mounted on airside facilities and infrastructures;

2. The speed limit shall be **20 km/h**;

3. Drivers shall not use the aircraft parking stands as short cuts to get to their intended destination. Under no circumstances shall vehicles enter the aircraft stand outside the Equipment Staging Area (ESA) when aircraft is taxiing into the stand;

4. Tall vehicles e.g. catering trucks, travelling along the airside road in front of all Passenger Boarding Bridges shall immediately clear the airside road whenever an aircraft is approaching the stop position if the vehicle will obstruct the view of the marshaller or AVDGS;

5. Height restriction limit signs shall be installed on the Passenger Boarding Bridges and at the underpasses. Tall vehicles exceeding the respective height restriction limits indicated by such signs shall use the service road or other alternative roads;

6. Tall vehicles (those capable of extending or rising) shall be driven in the retracted or lowered position and shall use the service roads and avoid those infrastructures with height restrictions;

7. Stop signs painted on airside roads outside the Baggage Handling Areas shall serve to give uninterrupted flow to tractors towing baggage containers into and out of the Baggage Handling Areas. All drivers are to give way to such tractors. Nonetheless, these tractor drivers shall also ensure traffic on these roadways have stopped before proceeding;

8. Drivers shall follow designated vehicular routes defined by ground markings, unless the vehicle is operating inside an aircraft parking stand;

9. Vehicles shall not enter a parking stand as shortcut or to overtake vehicles; and

10. Vehicles travelling on the vehicular routes shall keep to the left. A vehicle overtaking another shall do soon the right hand side of the vehicle being overtaken. No overtaking unless safe to do so.

(ii) Service road

1. It is located behind aircraft parking stands;

2. The speed limit on the service road shall be **20 km/h**;

3. Tall vehicles (including load) exceeding the maximum height allowed on the airside road and for other agreed safety reasons, are allowed to use the service road; and

4. Vehicles using the service road:

   (a) shall move away from the road and hold at the edge of the stands and wait for the aircraft on the taxiway to clear; or

   (b) shall wait till the aircraft has been fully pushed back from its stand onto the taxiway and taxied off before joining the service road to continue their journey.

(iii) Perimeter Road

1. It is located near the fences that surround the airside; and

2. The speed limit on the perimeter roadways is 40 km/h.

(iv) Manoeuvring Area

1. The manoeuvring area (excludes the apron) is reserved for flight operations, e.g. take-off, landing and taxiing of aircraft. Walking or driving on the manoeuvring area is only allowed after getting positive clearance from Control Tower and aerodrome operator;

2. A vehicle not equipped with a two-way radio communication system shall not enter the runway or taxiway. In the event that a radio communication failure occurs, the driver of the affected vehicle shall leave the manoeuvring area immediately while looking out and giving way to aircraft. He shall also look out for light signals from the direction of Control Tower and react accordingly. They are:

(a) Continuous GREEN Light directed at the vehicle - the driver is authorised to enter and drive on the runway or taxiway;

(b) Continuous RED Light directed at the vehicle - the driver shall stop the vehicle immediately;

(c) Intermittent RED Light is directed at the vehicle - the driver shall drive the vehicle clear of the runway or taxiway immediately;

(d) Intermittent GREEN Light is directed at the vehicle - the driver whose vehicle has been ordered to stay clear of the runway or taxiway may return to the runway or taxiway; and

(e) Intermittent WHITE Light is directed at the vehicle, the driver is to return at once to his starting point.

3. If the driver does not understand any of the light signal directed at his vehicle by the Control Tower, the driver shall not enter the runway or taxiway and to stay clear of any parts of these areas.

(g) Crossing Runways

(i) Drivers shall not cross a runway under any circumstances unless positive permission has been given and acknowledged by the Control Tower. Appropriate signage and marking shall be provided on road;

(ii) Drivers proceeding to any part of the manoeuvring area shall obtain prior approval from the Control Tower before proceeding to their destinations; and

(iii) Drivers entering the manoeuvring area shall stop at the point of entry and ascertain that there is no aircraft movement before entering the manoeuvring area.

(h) Crossing taxiways/taxilanes

(i) Only authorised vehicles are allowed to cross the taxiways/taxilanes. This is to minimise interaction between aircraft and vehicles;

(ii) Drivers of vehicles shall stop before the stop line at the respective junction and look both left and right to ensure there is absolutely no aircraft taxiing or about to taxi, before proceeding;

(iii) All drivers shall comply with all traffic signs and markings, including traffic light signals if provided, at the taxiway/taxilane crossing;

(iv) No vehicle is allowed to stop in any part of the taxiway/taxilane crossing. In the event of a vehicle breakdown within the taxiway, the driver shall ensure it is reported to Control Tower immediately. The vehicle shall not be left unattended;

(v) All airside organisations shall ensure that their drivers are familiar with the rules and regulations governing the use of all roads that cross the taxiways; and

(vi) Never overtake an aircraft.

(i) Vehicle on runway or taxiway

(i) All drivers on the runway or taxiway shall drive the vehicle on the LEFT SIDE of the runway/ taxiway;

(ii) Drivers shall not leave their vehicles unattended on the runway or taxiway; and

(iii) All drivers shall maintain the yellow flashing light signal switched on at all times when operating on the runway/ taxiway.

(j) Driving within the baggage handling area

(i) Only baggage tractors and baggage trolleys are allowed to enter the baggage handling area. Signage shall be provided for height limit allowed;

(ii) Baggage tractors shall move within the vehicular lanes indicated by arrows;

(iii) Tractors and trolleys when not in use, shall be positioned clear of the vehicular lanes;

(iv) Littering is an offence in the baggage handling areas;

(v) The speed limit in Baggage Handling Area shall be 10 km/h;

(vi) Container doors/flaps shall be secured when on tow;

(vii) Baggage containers and trolleys are to be parked only at designated areas; and

(viii) All drivers are to switch on the headlight whenever driving in the Baggage Handling Areas at night and when there is poor light conditions.

(k) Parking of vehicles

(i) Vehicles on the airside may only be parked in marked vehicle parking areas;

(ii) On apron areas, vehicles and equipment may only park within the defined equipment parking areas;

(iii) As a safety measure and to minimise accidents involving reversing vehicles, drivers shall park their vehicles nose out facing the airside road. All drivers shall exercise caution when reversing their vehicles from parking lots into the vehicular traffic lane;

(iv) Vehicles shall not be parked in a way that will obstruct aircraft or other vehicles or in a way that causes danger, obstruction or undue inconvenience to other users; and

(v) Any unattended vehicle can be removed by Police.

(l) Vehicle lightings

(i) Yellow Flashing Light

Vehicles on the airside shall display a yellow flashing light at its highest point during the hours of darkness and during low visibility. Vehicles without yellow flashing light shall have follow me vehicle; and

(ii) **Vehicle Lights**

Vehicle headlights (dipped or low-beamed), tail lights and yellow flashing light shall be switched on during the hours of darkness or during low visibility in day time (e.g. heavy rain) on the airside. Driving with high beam headlights is prohibited except on perimeter road. Headlights shall be dipped if there is oncoming traffic.

(m) Driver's responsibility

(i) Drivers in the course of duties are not allowed to consume alcohol, or for an adequate period of time before coming on duty. The same applies to medicine or drugs which may impair the ability of the driver;

(ii) Drivers shall make sure that their vehicles are roadworthy before driving. Any abnormality discovered that would compromise safety to themselves and others, shall be reported to their management immediately;

(iii) Passengers may be transported only in vehicles designed for that purpose. No person other than the driver shall travel in any vehicle in the airside unless he is seated in a passenger seat provided in the vehicle or is standing in a section of the vehicle which has been constructed for standing. Drivers are also reminded that they are responsible for the safety of the passengers in their vehicle;

(iv) All vehicles shall have seat belts installed for the driver and front seat passenger. The driver and front seat passenger shall fasten their seat belts when the vehicle is in motion;

(v) Aircraft passengers shall have priority over all vehicular traffic;

(vi) Drivers shall check that loads and trailers are properly secured before moving off so as not to cause a hazard to other traffic or personnel;

(vii) Forklift drivers shall ensure that the extended 'forks' are raised at least 10 cm above the road level while travelling on the road; and

(viii) Pedestrian crossing signs shall be installed before the pedestrian crossings at the airside road. Vehicles and equipment shall reduce speed and stop before the crossing and give way to pedestrians.

(n) Towing rules

(i) A tractor is allowed to tow a maximum of 3 container trailers/baggage trolleys or 3 pallet dollies at any one time;

(ii) No vehicle shall be towed by another vehicle unless a suitable tow bar is used for that purpose;

(iii) Drivers shall secure their loads before moving off;

(iv) If defects on the trailers or dollies are spotted during towing, the driver shall tow the containers/cargoes to the nearest equipment staging area and replace the faulty trailer/dolly before continue to tow. The driver shall report the defect immediately to his office to remove the equipment from staging area; and

(v) No reversing is allowed.

(o) No Smoking

(i) Smoking is prohibited on the airside; and

(ii) Signages shall be posted.

(p) Foreign Object Debris (FOD)

(i) No person shall place, discharge or deposit any refuse or litter at the ramp except in the Foreign Object Damage (FOD) bins provided;

(ii) All ground handling agents engaged in the servicing or handling of aircraft shall inspect the aircraft stands to ensure that no foreign objects or materials are left on the parking stand before every arrival and after every departure. Items that are potential safety risks are those that may be ingested by aircraft engines or can cause damage to aircraft tyres. Examples of such items are bolts and nuts from ground equipment, plastic bags or sheeting;

(iii) The aircraft path to the stop bar is clear of debris before the arrival and pushback of the aircraft; and

(iv) Before commencement of driving, the drivers shall inspect their vehicles to ensure that the loads are properly secured to prevent them from falling off the vehicle.

(q) Instruction from aerodrome operator's authorised officer

Drivers shall comply with any direction or verbal instruction given by any authorised officer from the aerodrome operator who is responsible of safety on the airside;

(r) Reporting of airside incident/accident

(i) All drivers shall report immediately any accident/incident to their management and aerodrome operator;

(ii) The details of a person alleged to have been driving or in charge of any vehicle at the time of an accident or to have committed an offence, shall be provided to the aerodrome operator;

(iii) All personnel shall report immediately to the aerodrome operator any airside incident/accident they witness;

(iv) For accidents with casualties, medical services shall be informed;

(v) All persons involved in an accident and witness/es shall remain at the scene of the accident until an officer from the aerodrome operator arrives. If witnesses cannot stay at the scene due to other urgent duties, they shall report to the aerodrome operator immediately upon accomplishing their duties;

(vi) Drivers involved in accident shall not remove vehicle/equipment until permission has been granted by aerodrome operator or Police except in situation where it endangers aircraft movement; and

(vii) In case of an accident/incident, the aerodrome operator shall carry out an investigation to find the root causes and to prevent recurrence. All concerned stakeholders shall coorperate with the aerodrome operator in the interest of safety at the aerodrome.

(s) Follow me

Any vehicle without a valid pass to the airside, shall request for “follow me” services from the aerodrome operator.

(t) Vehicle Breakdown

In the event of a vehicle breakdown in the airside, the driver shall:

(i) inform the aerodrome operator immediately;

(ii) try to push the vehicle to the side of the roadway or any area that will not cause obstruction to other traffic;

(iii) inform the company maintenance section to repair or tow the vehicle away as soon as possible;

(iv) not leave the vehicle unattended;

(vi) ensure that aircraft or vehicles are not obstructed by such breakdown; and

(vii) Servicing or repairing of vehicles on airside operational are prohibited.

(u) Procedure in event of spillage

(i) Aviation Fuel

1. Fuel spillage covering an area of approximately 4m**2** or more constitutes a hazard and shall be brought to the immediate attention of the Aerodrome Operator and Rescue and Firefighting Services;

2. Do not drive through the spilt liquid;

3. If spillage is from an underground fuel pit, alert the fuel company immediately, aerodrome operator and Rescue and Firefighting Services. Fuel cut-off switch at the affected section of the fuel hydrant system shall be cut off;

4. Do not start the engine of motorised equipment within spill areas until it is cleaned up;

5. Cordon off the spillage area;

6. Divert road traffic;

7. No ground equipment / vehicle shall be permitted to come within 15 metres of the spillage area; and

8. Arrange cleaning as per established procedures.

(ii) Hydraulic Oil Spill

1. The driver responsible for the spillage shall mop up the affected area with an absorbent material (except sawdust). The absorbent material shall then be disposed off safely; and

2. For heavy oil spillage, scrubbing of the affected area is required. Contact the aerodrome operator and Rescue and Firefighting Services.

(iii) Sewerage spill

1. The driver responsible for the spillage shall mop up the affected area with an absorbent material. The absorbent material shall then be disposed off safely; and

2. For heavy sewerage spillage, scrubbing of the affected area is required. Contact the aerodrome operator.

(v) Refuelling of vehicle

Refueling of diesel powered engine vehicles or equipment at the apron area shall take place only at a designated refueling facility. The following safety procedures shall be followed:

(i) Display sign 'Refuelling in Progress' on top of the refuelling truck and place safety cone to caution other vehicles;

(ii) Additional fire extinguisher;

(iii) Plug the leakage to stop the dripping;
(iv) Clean the spillage immediately;

(v) No Smoking;

(vi) No mobile phone; and

(vii) In the event refuelling is necessary for a vehicle that is stationed near a parked aircraft, the ground handling agent has to tow the particular vehicle away to another designated area for refueling for safety purposes.

(w) Use of communication devices (mobile phones etc)

(i) Using communicating devices while driving within the airside is prohibited; and

(ii) They shall stop their vehicle outside the road or holding strip if they wish to use any communication equipment.

(x) General rules for pedestrians

(i) Jaywalking in the apron is prohibited. All pedestrians shall not walk across the apron taxiway except workers carrying out works where approval has been obtained and where that portion of the taxiway is closed for works;

(ii) Pedestrian shall use pedestrian crossings or walk paths where available and look out for traffic at all times. Ensure vehicles stop before crossing the road;

(iii) Pedestrian shall comply with traffic signs and signals;

(iv) Any airside organisation which requires outside personnel or contractors to their premises shall abide by the terms and conditions associated with the issue of airport pass and the general rules applicable to pedestrians and workers in the airside.

They shall escort the outside personnel and ensure they adhere strictly to the rules and regulations governing the airside;

(v) Pedestrian shall not cross in front or behind a taxiing aircraft; and

(vi) Any personnel who had been approved to work at certain portions of the manoeuvring area, shall not stray outside the demarcated approved area of works. Permission shall be obtained from Air Traffic Controller if personnel are required to go beyond the approved boundaries

(y) Airside safety markings

1. APRON MARKINGS

(i) Apron Safety Line

This line, drawn in red, provides a clear boundary between aircraft stand and taxiways. Width is at least 10 cm.

This line depicts the area that shall remain free of staff, vehicles and equipment when an aircraft is taxiing (or being towed) into position or has started engines in preparation for departure. Once all engines have been shut down and the anti collision light has been switched off, vehicles may cross the line to service the aircraft.

The size of this area depends on the type of aircraft using the stand position. The area shall be dimensioned to allow for a safety zone around jet engine intakes which shall be kept free to avoid suction dangers.

(ii) Equipment Parking Area

This is a closed area, demarcated by a white line (minimum 10 cm width), is meant for parking of ground handling vehicles / equipment. It is used for long-term parking and the equipment / vehicles shall not protrude beyond the white demarcated lines. This marking is used to delineate an area within which vehicles and equipment can park freely without infringing any stand areas or taxiways, including taxiway strip surfaces;

(iii) Equipment Staging Area

This is an area set outside the aircraft parking stand to position ground handling equipment on standby prior to the arrival of the aircraft. This area is located on the starboard side of each aircraft stand and marked by white outline (minimum 10 cm width) before the Apron Safety Line of the aircraft parking stand. Only ground handling equipment is allowed to be positioned at the equipment staging area **20 minutes** before the Estimated Time of Arrival of aircraft. All equipment shall be removed immediately after completion of aircraft handling. All aircraft handling vehicles and non-motorised equipment (eg. baggage trolleys, pallet dolleys etc) whether loaded or empty, which are involved with handling of aircraft, shall be properly lined up in an orderly manner within the equipment staging area.

(iv) No Parking Area

A no parking area for vehicles is indicated by red hatching within a red border. The width of the red hatched marking shall be at least 10 cm width and the separation between the red hatching shall be 0.5 to 1.0 metre.

(v) Passenger Boarding Bridge Safety Zone

Red hatched lines (no parking or stopping within this area). The red hatching defines safety areas that shall remain clear at all times. Vehicles shall not park or hold in these areas. The width of the red hatched marking shall be at least 10 cm width.

(vi) Passenger Boarding Bridge Wheel Position

The area under a passenger boarding bridge shall be kept free of vehicles and equipment to ensure the safe operation of the bridge. Wheel positions shall be provided for the bridge itself using a red border (minimum 10 cm width) square or circle and the inside painted white, to locate the bridge in a safe position when not in use and to allow aircraft to enter the stand safely.

(vii) Fuel Pit

Located on all aircraft stands. It is the point of fuel uplift for the aircraft. The marking shall consist of red box with red hatching.

2. ROAD MARKINGS

(i) Road markings

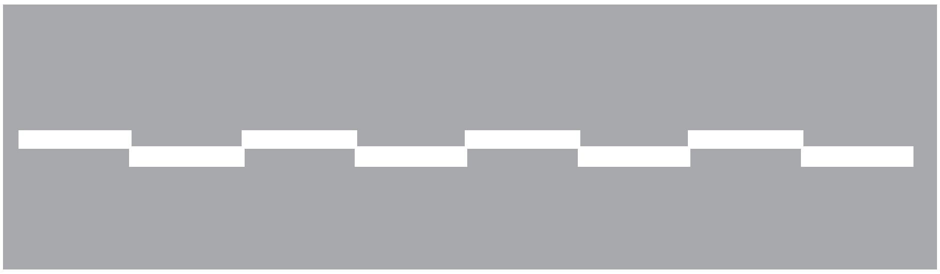
All airside/service road markings including road edge and centre lines, shall conform to national regulations;

(ii) Vehicle limit line

Where a service road is also the limit of vehicle activity on an apron, this shall be shown with a double white line. This indicates "**DO NOT CROSS**". The width of each white line shall be minimum 10 cm and the separation between the two lines shall be 10 cm.

(iii) Road Edge Marking for Taxiway/Taxilane Crossing.

The drawing below shows the recommended marking where a service road crosses a taxiway or aircraft stand taxilane. A separate sign may indicate that vehicles are required to stop. The vehicle stop line shall be located at a safe distance from the taxiway/taxilane centre line, according to the wingspan of the largest category of aircraft using the taxiway/taxilane.



(iv) Pedestrian Crossing

Colour and dimensions of markings shall conform to national regulations.

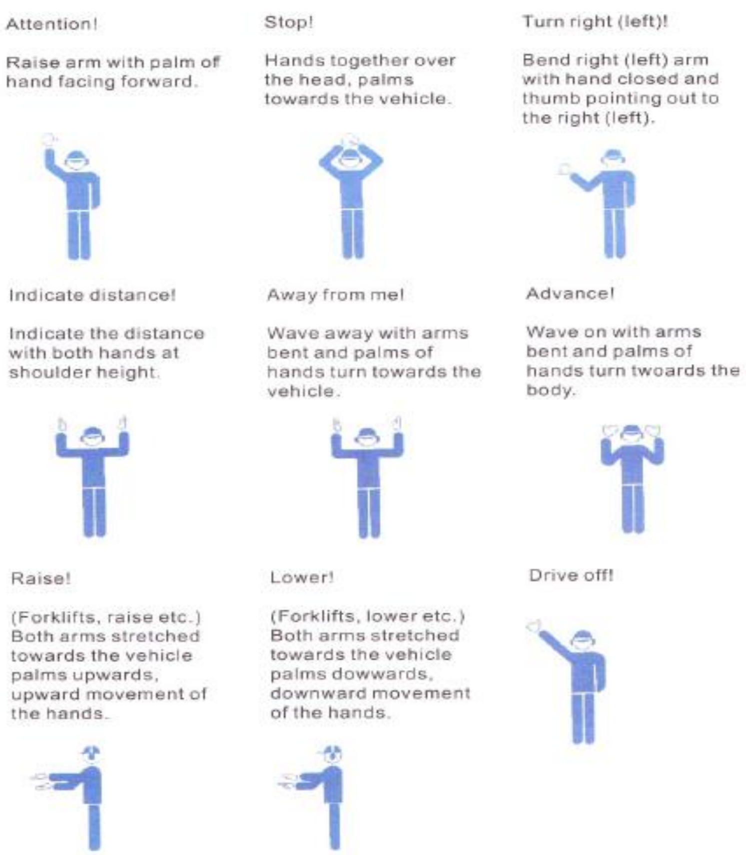
(v) Pedestrian Pathway

Colour and dimensions of markings shall conform to national regulations.

(vi) Yellow box marking

Area on the road where vehicle shall not stop. Demarcated by yellow box and yellow hatching. Width of yellow box and yellow hatchings shall be at least 10 cm width.

(z) Hand signals to guide vehicles



(aa) Seat Belt

Drivers and passengers shall fasten their seat belts when the vehicle is in motion.

(ab) High Visibility Vest

All personnel entering/performing work on airside shall wear the high visibility vest. The high visibility vest shall be imprinted with the respective organisations' logo or name for easy identification.

(ac) Airside Safety Training

All airside users shall follow Airside Safety Training consisting of the following elements:

(i) geography of the aerodrome;

(ii) aerodrome signs, markings and lights;

(iii) radio communication procedures and terms and phrases used in aerodrome control including the ICAO spelling alphabet;

(iv) familiarization;

(v) Airside Driving Rules;

(vi) Safety procedures on the airside;

(vii) Emergency Procedures;

(viii) Reporting of emergency procedures;

(ix) Incident/accident reporting;

(x) Runway Incursions;

(xi) Aircraft Stand Operations;

(xii) Apron safety management; and

(xiii) rules of air traffic services as they relate to ground operations; rules and procedures.

(ad) Apronworthiness Certificate

All vehicles on the airside shall possess an apron worthiness certificate issued by the aerodrome operator. The requirements for an apronworthiness certificate are as follows;

(i) fire extinguisher;

(ii) type C beacon light (low intensity and yellow flashing (60-90 fpm)). The beacon shall be placed on the top of the vehicle and be visible from all azimuths;

(iii) reflectorised markings at the back and where necessary;

(iv) flame trap/spark arrestor;

(v) company's identification (logo or name). The company's identification shall be conspicuously displayed on both sides of the vehicle (front door);

(vi) grid map of appropriate size;

(vii) an information card showing height and width of vehicle, turning radius, speed limit allowed, no smoking warning and apron help lines;

(viii) vehicle identification number on both sides of the vehicle;

(ix) reversing buzzer; and

(x) condition of body of vehicle. The body of the vehicle shall not have any loose and damaged parts.

Note:

1. Contents of the vehicle shall be limited to items that will not compromise airside safety/security and be subject to checks/searches as applicable; and

2. All vehicles accessing the maneuvering area shall maintain radio communication with Control Tower. The vehicle shall be fitted with appropriate radio equipment or the driver shall have in his possession a hand held radio equipment.

(ae) Operating Fork-lift Trucks

(i) Do not carry any loads;

(ii) Fork arms shall be lowered to the lowest practicable position and covered with a safety protective box preferably painted with yellow and black stripes;

(iii) Keep the mast tilted back slightly to ensure stability;

(iv) Operate only by own company authorized and trained person; and

(v) Do not carry passenger at any time.

(af) Driving during Low Visibility Conditions

In the event of low visibility conditions on the aerodrome, the following restrictions shall be applied:

(i) Vehicular movements on the aprons shall be reduced to the minimum;

(ii) Entry to the manoeuvring area shall be prohibited;

(iii) Maximum driving speed shall be reduced;

(iv) A wider berth shall be kept from aircraft and other vehicles; and

(v) Headlamps shall be switched on.

(ag) Switch-off Engines of Idling Vehicles / Ground Services Equipment (GSE)

Drivers and equipment operators shall immediately switch-off the engines of the idling vehicle or GSE except when

(i) Vehicle stopped for active boarding or alighting of passengers;

(ii) Emergency and recovery vehicle;

(iii) GSE requires engine power for provision of ancillary services;

(iv) Aerodrome passenger bus and crew bus with airline passenger and flight crew onboard;

(v) GSE on stand-by before aircraft chock-on; and

(vi) GSE servicing the aircraft.

(ah) Training Requirements

(a) To ensure safety of all personnel engaged in airside activities and driving, the aerodrome operator shall provide minimum training. The objective of training is to ensure that required personnel are provided with requisite skills and knowledge on airside driving rules;

(b) The elements of training programme shall cover all elements detailed in paragraph 4.10.1. The training programme and associated training materials shall be approved by the Authority;

(c) The training shall be a combination of theoretical and practical skill to verify the personnel understanding of the task being trained;

(d) The trainer delivering the training shall have followed a training course in Apron Safety Management and Airside Driving. The trainer shall possess relevant instructional techniques, effective communication skills and be able to conduct theoretical and practical assessments;

(e) All training records shall be documented and made available for review by the authorized person of the organization and by the Authority; and

(f) To maintain ongoing competence, all personnel engaged in airside driving shall undergo recurrent training every three years.

4.10.2 Airside Driving Codes and Rules Manual

The aerodrome operator shall submit an Airside Driving Codes and Rules Manual to the Authority for approval. The Airside Driving Codes and Rules Manual shall be consistent with paragraph 4.10.1 and shall include procedure for the following:

(a) Applicability of the airside safety rules;

(b) Responsibilities of aerodrome operator, Air Traffic Services and Security;

(c) Speed limit on the airside;

(d) General Driving Conduct;

(e) Safety in the Vicinity of Aircraft;

(f) Driving Areas and Safety Rules;

(g) Crossing Runways;

(h) Crossing taxiways/taxilanes;

(i) Vehicle on runway or taxiway;

(j) Driving within the baggage handling area;

(k) Parking of vehicles;

(l) Vehicle lightings;

(m) Driver’s responsibility;

(n) Towing rules;

(o) No Smoking;

(p) Foreign Object Debris (FOD);

(q) Instruction from aerodrome operator’s authorised officer;

(r) Reporting of airside incident/accident;

(s) Follow me;

(t) Vehicle Breakdown;

(u) Procedure in event of spillage;

(v) Refuelling of vehicle;

(w) Use of communication devices (mobile phones etc);

(x) General rules for pedestrians;

(y) Airside safety markings and signs including runway/taxiway markings and signages;

(z) Hand signals to guide vehicles;

- (aa) Seat Belt;
- (ab) High Visibility Vest;
- (ac) Airside Safety Training;
- (ad) Apronworthiness Certificate;
- (ae) Operating Fork-lift Trucks;
- (af) Driving during Low Visibility Conditions; and
- (ag) Switch-off Engines of Idling Vehicles / Ground Services Equipment (GSE).

4.10.3 Airside Vehicle Licence

4.10.3.1 Scope and Applicability

(a) The Airside Vehicle Licence shall apply to all motor vehicle drivers driving in the secondary subzone of the Security Restricted Area of the aerodrome. The different types of Airside Vehicle Licence shall be categorized according to the unladen weight and specific uses of the vehicles by Police;

(b) The secondary subzone of the Security Restricted Area of the aerodrome shall be subdivided into different zones including maneuvering area, apron and airside road and drivers shall drive only in the zone allocated;

(c) The validity of the Airside Vehicle Licence and the renewal criteria shall be determined by the Authority; and

(d) The fees for the Airside Vehicle Licence shall be determined by the Authority.

4.10.3.2 Legal Requirements

(a) The legal requirements to be eligible for an Airside Vehicle Licence shall be as follows:

1. A valid Driving Licence issued under the Road Traffic Act authorizing him to drive a motor vehicle of that category or description;

2. A valid training certificate issued by the licensed aerodrome operator on successful completion of airside safety training, certifying that he has the required knowledge and competence to drive a motor vehicle on the airside of the aerodrome; and

3. An Aviation Security Identification Card issued under the Civil Aviation (Security) Regulations 2008.

(b) Training requirements shall be as follows:

1. The applicant shall have followed successfully the required training in operating the motor vehicle for which an Airside Vehicle Licence is required. The training to be undertaken shall take into account initial, on- the-job (OJT) and recurrent training. This requirement shall not be applicable for licences for private car, van 2.5 tons, goods vehicle (excluding rescue and firefighting vehicles), bus and tractor.

(i) Initial training shall be carried out by an instructor (vehicle operation) approved by the Authority. Initial training shall consist of theoretical and practical training and a period of supervised OJT.

Initial training shall adequately address at least the following topics:

(a) Operating instructions of the motor vehicle as per operations manual;

(b) Actions and elements of the motor vehicle;

(c) Operational safety of motor vehicle; and

(d) Emergency and manual operating procedures.

On successful completion of the initial training on the operation of the motor vehicle, the applicant shall be issued with a training certificate by the agency operating the vehicle.

(ii) Refresher training shall take place after a period of not more than 3 years. Refresher training shall be consistent with the motor vehicle operator duties being performed and shall consist of theoretical, practical and OTJ training.

Refresher training shall be conducted by an instructor (vehicle operation) approved by the Authority.

Refresher training shall adequately address the following topics:

(a) Review of past and new operating instructions of the motor vehicle as per operations manual;
(b) Any modification in actions and elements of the motor vehicle;
(c) Review of Operational safety of motor vehicle; and
(d) Review of emergency and manual operation procedures.

On successful completion of the refresher training on the operation of the motor vehicle, the applicant shall be issued with a training certificate by the agency operating the vehicle.

2. The applicant shall follow successfully the airside safety training approved by the Authority. The training to be undertaken shall take into account initial, on site and recurrent training.

   (i) Initial training shall be carried out before application is made for an Airside Vehicle Licence. Initial training shall consist of theoretical training and on site training.

   The initial training shall be conducted by an instructor (airside safety) approved by the Authority.

   The initial training shall be followed by written and practical examination set by the instructor (airside safety).

   Initial training shall adequately address at least the following topics:

   (a) geography of the aerodrome;
   (b) aerodrome signs, markings and lights;
   (c) radio communication procedures and terms and phrases used in aerodrome control including the ICAO spelling alphabet;
   (d) aerodrome familiarization;
   (e) airside Driving Rules;
   (f) safety procedures on the movement area;
   (g) emergency procedures;
   (h) reporting of emergency procedures;
   (i) incident/accident reporting;
   (j) runway incursions;
   (k) aircraft stand operations;
   (l) apron safety management; and
   (m) rules of air traffic services as they relate to ground operations; aerodrome rules and procedures;

   On successful completion of the initial airside safety training, the applicant shall be issued with a training certificate by the licensed aerodrome operator.

   (ii) Refresher training shall take place after a period of not more than 3 years. Refresher training shall be consistent with airside operations and safety and shall consist of classroom training.

   The refresher training shall be conducted by an instructor (airside safety) approved by the Authority.

Refresher training shall adequately address the following topics:

(a) Review of geography of the aerodrome;
(b) Review of aerodrome signs, markings and lights;
(c) Review of radio communication procedures;
(d) Review of Airside Driving Rules;
(e) Review of safety procedures on the movement area;
(f) Review of emergency procedures;
(g) Review of incident/accident reporting; and
(h) Review of aircraft stand operations.

On successful completion of the refresher airside safety training, the applicant shall be issued with a training certificate by the licensed aerodrome operator.

3. The above trainings shall enable the applicant to:

(i) get to know the motor vehicle operating procedures;
(ii) become aware of operational safety on the aerodrome;
(iii) avoid damage to aircraft and other equipment or structure on the aerodrome; and
(iv) to improve safety on the airside.

4.10.3.3 Approval by the Authority

(a) The training course delivered by the instructor (vehicle operation), shall be approved by the Authority;

(b) The instructor (vehicle operation) shall be approved by the Authority.

The instructor (vehicle operation) shall:

(i) have a minimum of 3 years' experience in operation of the vehicle;

(ii) have followed a training course on the operation/driving of the vehicle, delivered either by the manufacturer of the vehicle or any other recognized person/organization;

(iii) possess relevant instructional techniques;

(iv) possess effective communication skills; and

(v) be able to conduct theoretical and practical assessments.

(c) The training course delivered by the instructor (airside safety), shall be approved by the Authority; and

(d) The instructor (airside safety) shall be approved by the Authority.

The instructor (airside safety) shall:

(i) have a minimum of 3 years' experience in airfield operations, airside safety rules, aircraft stand operations and emergency operations;

(ii) have followed a training course on apron safety management;

(iii) possess relevant instructional techniques;

(iv) possess effective communication skills; and

(v) be able to conduct theoretical and practical assessments.

4.10.3.4 Records

Records of application of Airside Vehicle Licence and training shall be maintained and made available by the agency operating the vehicle and aerodrome operator for inspection by the Authority.

4.10.3.5 Exemption

The Authority may, in relation to such class of persons as it may determine, exempt every person of that class from complying with this requirement.

4.10.4 Airside Vehicle Permit

4.10.4.1 Scope and Applicability

(a) The Airside Vehicle Permit shall apply to all motor vehicles (cars, vans and specialized equipment to be used on the apron) used in the secondary subzone of the Security Restricted Area of the aerodrome. The different types of Airside Vehicle Permit shall be categorized according to the unladen weight and specific uses of the vehicles by Police;

(b) The secondary subzone of the Security Restricted Area of the aerodrome shall be subdivided into different zones including maneuvering area, apron and airside road and vehicles shall operate only in the zone allocated;

(c) The validity of the Airside Vehicle Permit and the renewal criteria shall be determined by the Authority; and

(d) The fees for the Airside Vehicle Permit shall be determined by the Authority.

4.10.4.2 Legal Requirements

(a) The legal requirements for an Airside Vehicle Permit are as follows:

1. A policy of insurance in relation to the use of the motor vehicle in respect of third party risks;

2. An apron worthiness certificate in relation to the use of the motor vehicle, issued by the licensed aerodrome operator; and

3. A maintenance certificate of the motor vehicle issued by a person/organization recognised by the Authority.

(b) An apron worthiness certificate shall be issued by the aerodrome operator if the motor vehicle satisfies the following requirements.

1. fire extinguisher;

2. type C beacon light (low intensity and yellow flashing (60-90 fpm)). The beacon shall be placed on the top of the vehicle and be visible from all azimuths;

3. reflectorised markings at the back and where necessary;

4. flame trap/spark arrestor;

5. company's identification (logo or name). The company's identification shall be conspicuously displayed on both sides of the vehicle (front door);

6. updated grid map of appropriate size;

7. an information card showing height and width of vehicle, turning radius, speed limit allowed, no smoking warning and apron help lines;

8. vehicle identification number on both sides of the vehicle;

9. reversing buzzer; and

10. condition of body of vehicle. The body of the vehicle shall not have any loose and damaged parts.

Note: Contents of the vehicle shall be limited to items that will not compromise airside safety/security and be subject to checks/searches as applicable.

(c) All vehicles accessing the maneuvering area shall maintain radio communication with Control Tower. The vehicle shall be fitted with appropriate radio equipment or the driver shall have in his possession a hand held radio equipment.

4.10.4.3 Approval by the Authority

The person from the aerodrome operator issuing the apron worthiness certificate of the motor vehicle prior to issue of the apron worthiness certificate and person issuing the maintenance certificate, shall be acceptable to the Authority. The person issuing the apron worthiness certificate and maintenance certificate shall be a mechanical engineer and have at least three years of experience in the field.

4.10.4.4 Records

Records of application for an Airside Vehicle Permit, policy of insurance, apron worthiness certificate and maintenance certificate shall be maintained by the aerodrome operator and the agency operating the vehicle and made available for inspection by the Authority and aerodrome operator.

4.10.4.5 Exemption

The Authority may, in relation to such class of persons as it may determine, exempt every person of that class from complying with this requirement.

4.11 PROTECTION OF NAVIGATION AIDS (NAVAIDS)

The aerodrome operator shall maintain procedures to:

(a) prevent and control the construction of facilities on the aerodrome that would adversely affect the operation of any electronic or visual navigation aid or air traffic service facility on the aerodrome;

(b) protect the Navaids against vandalism and theft. These areas shall be protected by a fence and inspected periodically by the security units;

(c) prevent as far as it is within the aerodrome operator’s control, any interruption of visual or electronic signals of navigation aids;

(d) identify Instrument Landing System (ILS) critical areas by signs and procedures shall be established to prevent inadvertent entry into ILS critical areas by a pedestrian or a vehicle;

(e) maintain power to the navaids during all maintenance and construction activities. Prior to conducting any excavation work, the power cables shall be located and avoided;

(f) arrange for the supply and installation of signs warning of hazardous microwave radiation;

(g) ensure that activities or works under his direct or indirect control do not have an adverse impact on the safe operation of navigational aids;

(h) ensure that drawings are available to indicate the critical/sensitive areas of ILS and protection areas of other electronic and visual navaids to be protected;

(i) control of activities in the vicinity of navaids installations;

(j) control of ground maintenance in the vicinity of these installations;

(k) obtain clearance from Air Traffic Services for access to sensitive/critical areas of navaids and for major works involving a large amount of equipment or tall equipment that can affect the navaids;

(l) give prior notification to the Air Traffic Services on work activities in the vicinity of the navaids which might affect the signals to and from these facilities;

(m) inform Air Traffic Services of proposed excavation works in the vicinity of the facilities;

(n) ensure that vehicles and plant shall not enter the navigation aid restricted areas of the airside or any other adjacent locations without prior permission from Air Traffic Services. Vehicles crossing near the navigation aids shall maintain a speed of not more than 30 km per hour to avoid signal interference;

(o) ensure that concerned airside users and contractors are briefed on the safety procedures for the protection of navaids;

(p) inform airside users and contractors that work within the following areas can be expected to cause interference with the relevant navigational aids:

    (i) Localizer - from 360 metres in front to 10 metres behind the localizer aerial, and 90m either side of the runway centreline;

    (ii) Glide path - from glidepath building, an area extending 700 m directly in front of the building towards the landing aircraft, at a width of 175 m towards the associated runway centreline; and

    (iii) VOR - within a radius of 150 m of the VOR.

(q) protect the line of sight path of VHF/UHF equipment against construction works; and

(r) to ensure that the procedure for the protection of navaids shall be approved by the Authority.

4.12 AERODROME CONDITIONS REPORTING

4.12.1 The aerodrome operator shall notify the Authority/AIS immediately (for the issue of a NOTAM as applicable), of any aerodrome operational condition or defect at the aerodrome that may affect the safe operation of aircraft.

4.12.2 Aerodrome conditions that may affect the safe operation of aircraft are:

(a) construction and maintenance activities on movement and safety areas;

(b) surface irregularities and deterioration of movement (pavement and markings) and safety areas;

(c) accumulation of water on movement areas;

(d) unserviceability of any lighting system, visual aids for air navigation/obstructions/denoting restricted areas, Airbridges, electrical generator sets, Visual Docking Guidance System, Ground Power Units;

(e) non-availability of rescue and firefighting capability;

(f) incorrect/inadequate runway/taxiway/apron surface markings, lighting system and signage; and

(g) any other condition that may adversely affect the safe operation of aircraft.

4.12.3 All aeronautical data furnished by the aerodrome operator to the Authority to be published in the AIP shall be accurate.

4.12.4 Any change to the aerodrome physical characteristics, facilities and equipment shall be reported to the Authority.

4.12.5 The aerodrome operator shall submit to the Authority an aeronautical study of the impact of the change in the aerodrome physical characteristics, facilities and equipment on aircraft operations.

4.12.6 On receipt of the request for the change, the Authority shall study the change and carry out a risk assessment of the impact of the change on aircraft operations and ensure that the change conforms to ICAO standards. Accordingly, the Authority may approve the change or restrict aircraft operations.

4.13 NON-COMPLYING CONDITIONS

4.13.1 Whenever any requirement of this manual cannot be met, the aerodrome operator shall limit aircraft operations as warranted by the circumstances;

4.13.2 The aerodrome operator shall report to the Authority any condition that he feels can warrant the closing of all or a portion of the aerodrome; and

4.13.3 The aerodrome operator shall carry out an aeronautical study of the non-complying condition and submit to the Authority.

4.14 CHANGES TO AERODROME OPERATOR'S ORGANIZATION:

4.14.1 The aerodrome operator shall ensure that the Aerodrome Manual is amended as necessary to reflect the current operational situation.

4.14.2 The aerodrome operator shall ensure that Aerodrome Manual amendments are distributed to each holder of the manual without delay and provide the Authority with a copy of each amendment to the manual as soon as practicable after its incorporation into the Aerodrome Manual.

4.14.3 Where the aerodrome operator proposes to make a change to any of the following, prior notification to and acceptance by the Authority is required:

(a) The Chief Executive;

(b) The listed senior persons; and

(c) The Aerodrome Manual.

4.14.4 The Authority may prescribe conditions under which an aerodrome operator may operate during or following any of the changes specified in paragraph 4.14.3.

4.14.5 Where any of the changes referred to in this manual requires an amendment to the aerodrome licence, the aerodrome operator shall forward the request for amendment to the Authority as soon as practicable.

4.14.6 The aerodrome operator shall make such amendments to the aerodrome manual as the Authority may consider necessary in the interest of safety.

4.15 DISABLED AIRCRAFT REMOVAL

4.15.1 Introduction

(a) An aircraft can become immobilised on the manoeuvring area for many reasons including an accident, an excursion from the runway or taxiway, a mechanical failure through loss of hydraulic pressure or blown tires. A disabled aircraft removal plan is designed to ensure removal of the immobilised aircraft in a timely manner without further damage to the aircraft and enabling the area concerned to be returned to active service as soon as possible;

(b) Ultimately it is the aircraft operator’s responsibility to remove the aircraft. However, the efficiency of such a task can be improved if a separate plan is developed to coordinate all agencies involved in the aircraft’s removal. The plan shall be part of the AEP; and

(c) The disabled aircraft removal plan shall outline the roles and responsibilities of the main agencies involved who will be in charge of coordinating the removal, and the communications system for activation of the plan.

4.15.2 The aerodrome operator shall have a plan and procedures for the removal of a disabled aircraft on or adjacent to the movement area. The plan and procedures shall include the following:

(a) make suitable arrangements to ensure the prompt arrival of the appropriate general recovery equipment and of any experts whose presence may be required for the removal operation; and

(b) ensure that all the airlines using the aerodrome have made adequate plans and arrangements either separately or conjointly. Plans and standard operating procedures (SOPs) to be submitted to the aerodrome operator.

4.15.3 The disabled aircraft removal plan shall be based on the characteristics of the aircraft that may normally be expected to operate at the aerodrome and shall include, amongst others, the following:

(a) list of equipment and personnel on or in the vicinity of the aerodrome which would be available for the removal operation. The list shall include information on the type and location of the heavy equipment and average time to get the cranes;

(b) agencies involved in the plan including aerodrome operator, aircraft operator, aircraft maintenance organizations, rescue and firefighting, aviation fuel company, security providers and specialist equipment or resource providers;

(c) information on access routes to all parts of the aerodrome;

(d) arrangements for the rapid receipt of aircraft recovery equipment kits locally or from outside the country;

(e) manufacturer's data pertaining to aircraft recovery for the various types of aircraft using the aerodrome;

(f) arrangements with the fuel companies to ensure that the defuelling of the aircraft can be done at short notice;

(g) advance arrangements to be made to obtain the services of aircraft removal equipment and crews through agreements with local and foreign agencies;

(h) inventory of locally available general recovery equipment;

(i) local airline representatives shall have a clear definition of their responsibility for the arrangement for their disabled aircraft removal;

(j) procedures and techniques for the disabled aircraft removal;

(k) the roles of the aerodrome operator, holder of the aircraft licence of registration and other stakeholders;

(l) arrangements for notifying the holder of the licence of registration;

(m) arrangements for liaising with the air traffic control unit;

(n) the names, role and telephone numbers of persons responsible for arranging for the removal of disabled aircraft.

(o) a list of resources available locally, or location of specialist removal equipment for the aircraft, shall be contained in the plan with up to date telephone numbers for contact personnel. Examples of resource requirements may include:

(i) Specialist equipment designed for lifting or towing of an aircraft;
(ii) Facilities for defuelling the aircraft;
(iii) Cranes or winches for lifting and pulling;
(iv) Diggers for creating temporary pathways for aircraft wheels and recovery equipment;
(v) Aggregate, metal or wood merchants for providing material to stabilise pathways or create working platforms;
(vi) Trucks and trailers for transport of materials or aircraft;
(vii) Barges and salvage experts for aircraft recovery in water; and
(viii) Lighting for removal during hours of darkness

(p) the plan shall give an indicative timeframe in which the equipment can be made available on site to assist with management planning of the recovery process, once the plan is activated;

(q) procedure for clearing of wreckage or recovery of aircraft; and

(r) means for maintaining security for such operations.

4.15.4 The disabled aircraft removal plan shall be approved by the Authority.

4.16 HANDLING OF HAZARDOUS MATERIALS

4.16.1 Particulars of the procedures for the safe handling and storage of hazardous materials (Jet fuel, inflammable liquids and gases, corrosive liquids, compressed gases and radioactive materials) on the aerodrome, shall include the following:

(a) arrangements for special areas on the aerodrome to be set up for the storage of inflammable liquids and other hazardous materials;

(b) the methods to be followed for the delivery, storage, dispensing and handling of hazardous materials;

(c) safe storage, away from sources of ignition, incompatible substances (such as oxidisers) and mechanical damage;

(d) adequate ventilation to remove flammable vapours or gases;

(e) dispensing and decanting in a way which reduces spills and releases;

(f) use of equipment specifically designed for use with flammable substances;

(g) good housekeeping to remove flammable residues;

(h) adequate procedures for dealing with emergencies and spillages, including training, information and instruction for staff;

(i) arrangements for dealing with radioactive substances;

(j) commercially supplied hazardous substances shall have certain health and safety information on the container and that suppliers of substances have to make available other relevant information on a safety data sheet;

(k) The following general precautionary measures shall be taken during aircraft fuelling operations:

a) aircraft fuelling operations shall be done outdoors;

b) bonding and/or grounding, as appropriate, shall be done;

c) aircraft fuelling vehicles shall be positioned so that:
1) accessibility to aircraft by RFF vehicles is not interrupted;
2) a cleared path is maintained to permit rapid removal of fuelling vehicles from an aircraft in an emergency;
3) they do not obstruct evacuation from occupied portions of the aircraft in the event of a fire; and
4) the vehicle engines are not under the wing;

d) all vehicles performing aircraft servicing functions other than fuel servicing (e.g. baggage trucks, etc.) shall not be driven or be parked under aircraft wings while fuelling is in progress;

e) open flames and lighted open flame devices shall be prohibited on the apron and in other locations within 15 m of any aircraft fuelling operation. Included in the category of open flames and lighted open flame devices are the following:

1) lighted cigarettes, cigars, pipes;
2) exposed flame heaters;
3) welding or cutting torches, etc.; and
4) flare pots or other open flame lights

f) cigarette lighters or matches shall not be carried or used by anyone while engaged in aircraft fuelling operations;

g) extreme caution shall be used when fuelling during lightning and electrical storms. The fuelling operations shall be suspended during severe lightning disturbances in the immediate vicinity of the airport;

h) when any part of an aircraft undercarriage is abnormally heated, the airport RFF service shall be called and fuelling shall not take place until the heat has dissipated; and

i) portable fire extinguishing equipment suitable for at least initial readily available, and there shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill. It shall be ensured by regular inspection and maintenance that this equipment is maintained in a fully serviceable condition.

4.16.2 **Fuel Storage Areas**

The Fuel Storage areas and Unloading/Loading areas shall:

(a) be fenced and posted with signs to reduce chance of unauthorized entry and/or tampering. The Fuel Storage areas and Unloading/Loading areas shall be under security control on a 24 hour basis and shall not be left unattended;

(b) be posted with "NO SMOKING" signs;

(c) be free of materials, equipment, functions, and activities that could be ignition sources;

(d) be equipped with automatic fire detection and fire fighting systems, water hydrants and accessible fire extinguishers;

(e) have electrical equipment, switches, and wiring that are explosion proof and reasonably protected from heat, abrasion, or impact which could cause an ignition source;

(f) have piping, filters, tanks, and electrical components that are electrically bonded together and interconnected to an adequate ground;

(g) be equipped with bond/ground wire with appropriate clip for grounding tankers and mobile fuellers;

(h) be equipped with a marked emergency cutoff capable of stopping all fuel flow with one physical movement. The emergency cutoff shall be located outside the probable areas and near the route that normally is used to leave the probable spill areas or to reach the fire extinguishers provided for protection of the area; and

(i) have underground piping that is reasonably protected from damage by surface vehicles.

4.16.3 **Fuel Distributing System**

The following are required for a fuel distributing system:

(a) procedures are in place for the maintenance and handling of the fuel hydrants on the aerodrome;

(b) all fuelling equipment (fuelling pumps, meter hoses and nozzles) shall be in good operating conditions and free of fuel leaks;

(c) all fire extinguishers shall be sealed, charged and inspected manually;

(d) all fuel service operations shall be suspended when there are lighting discharges in the immediate vicinity of the aerodrome;

(e) regular and periodic maintenance and cleaning of fuel installations and equipment are carried out;

(f) no aircraft shall be refuelled or defuelled while aircraft engines are running or the aircraft is in a hangar or enclosed space;

(g) no person shall smoke or permit any open flame around any aircraft undergoing refuelling and near refuelling points;

(h) when fuel spills occur, fuelling shall be stopped and the spilled fuel shall be absorbed with a suitable material and washed with water;

(i) during fuel handling operations in connection with any aircraft, no less than two carbon dioxide or approved dry chemical fire extinguishers shall be immediately available in case of emergency;

(j) refuelling staff wear appropriate clothing. Garments shall be made of fabric other than silk, polyesters, nylon with wool, or other static generating fabrics. Shoes shall not contain taps, hobnails, or other material that could generate sparks on pavement;

(k) all fuel systems and mobile fuellers are bonded between aircraft, tankers, or fuellers, before commencing and during all fuel transfer operations;

(l) before opening any aircraft or mobile fueller tank or commencing any fuelling operation, and at all times during fuel transfer, a bonding wire is connected between mobile fueller and loading station or between fueller and the aircraft being fuelled;

(m) each fuel handling vehicle shall be conspicuously marked in letters of contrasting colour with the word 'FLAMMABLE' on both sides and rear of the fuel tank;

(n) mobile fuellers shall be equipped with a system capable of overriding all other controls and stopping all fuel flow with one physical movement. Emergency fuel cutoffs shall be boldly marked. Mobile fuellers shall also be equipped with a tank bottom outflow cutoff valve that can block fuel flow in the event of piping rupture or valve failure;

(o) fuel tanks on mobile fuellers shall be equipped with gasket dome covers, which contain an emergency vapour pressure relief valve and are adequate to prevent fuel spillage during vehicle movement;

(p) mobile fuellers shall be equipped with bonding wires/clamps to facilitate prompt, definite electrical connection to the aircraft being fuelled;

(q) fuel systems on mobile fuellers shall have electrical continuity between all metallic or conductive components;

(r) fuel system piping on mobile fuellers and cabinets shall be reasonably protected from impact/stress that could cause fuel spillage;

(s) all vehicles performing aircraft servicing functions other than fuel servicing shall not be driven or be parked under aircraft wings while fuelling is in progress;

(t) aircraft batteries shall not be installed or removed nor shall battery chargers be connected, operated or disconnected;

(u) connection of ground power generators shall not be done during this period;

(v) electric tools, drills or similar tools likely to produce sparks shall be used during fuelling process;

(w) fuelling shall not be carried out during lightning and electrical storms; and

(x) when any part of an aircraft undercarriage is abnormally heated, the RFF shall be called and fuelling shall not take place.

4.16.4 **Refuelling with Passengers on Board**

Fuelling shall normally be carried out without passenger on board of the aircraft. However, the aerodrome operator shall establish procedures to ensure that the following measures are taken and procedures put in place in case of emergency while refuelling with passengers on board:

(a) rapid evacuation of passengers from the aircraft is possible;

(b) ensure that the ground area into which passengers would evacuate is kept clear of equipment, vehicles, escape slides and obstacles;

(c) where passengers are embarking or disembarking during refuelling their route shall avoid areas where fuel vapour is likely to be present and this movement shall be under the supervision of a responsible person;

(d) if, during refuelling, the presence of fuel vapour is detected in the aircraft interior, or any other hazard arises, refuelling and all cleaning activities using electrical equipment within the aircraft shall be stopped until conditions permit resumption;

(e) when aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow the use of a sufficient number of exits for expeditious evacuation and a ready escape route from each of the exits to be used in an emergency;

(f) passengers shall be warned that refuelling will take place and that they shall not smoke, operate switches or otherwise produce sources of ignition;

(g) the illuminated “No smoking” signs and exit lighting shall be switched on; and

(h) aircraft equipped with integral stairs shall have them deployed, or if aircraft stairways are used, these shall be positioned at each of the main doors normally used for passenger embarkation or disembarkation which shall be open or ajar and free from obstruction.

4.16.5 A competent personnel designated by the aerodrome operator, shall supervise the observance of the correct fuelling procedures together with all the safety measures and liaise with the fuel supplier's operatives.

4.16.6 A 'STOP' button close to each hydrant fuelling point to stop the flow of fuel in case of emergency and fire extinguishers shall be provided.

4.16.7 Whilst refuelling is in progress, passengers shall not remain inside a helicopter and the engines and rotors shall not be running.

4.16.8 **De-fuelling of an Aircraft**

The following procedures shall be followed while de-fuelling an aircraft:

(a) before de-fuelling is commenced, samples shall be taken from the drain cocks of each aircraft tank involved in the de-fuelling operation. Unsatisfactory samples do not preclude de-fuelling, but will call for particular attention and thoroughness in the cleaning of vehicles and tank installation after disposal of the fuel;

(b) until satisfactory quality checks have been completed, fuel removed from an aircraft shall be segregated from uncontaminated fuel, preferably by de-fuelling into an empty fuelling vehicle or storage tank. This potentially contaminated fuel shall be checked for water, sediment and compatibility, in order to ensure that any resultant blend with existing contents of the next receiving installation meets the appropriate product specification; and

(c) an aircraft shall not be defuelled with passengers on board and while embarking/disembarking.

4.16.9 Procedures shall be established to prevent fuel ignition from other heat sources e.g. aircraft Auxiliary Power Unit exhausts, overheated wheel brakes, jet efflux from other aircraft etc.

4.16.10 The use of any equipment with the potential to create or induce a source of ignition shall be identified and excluded from any Fuelling Zone. Equipment maintenance, repairs, and testing procedures, including the operation of switches, radios and other devices, with the potential to create a source of ignition within the Fuelling Zone, shall be deferred until fuelling has finished.

4.16.11 The means for alerting the aerodrome RFFS shall be readily available.

4.16.12 Portable Electronic Devices shall be prohibited near refuelling points on the apron.

4.16.13 The aerodrome operator shall ensure that all personnel involved in the processes of receiving, storing and dispensing of fuel are suitably trained or experienced in fuel handling, fire safety course, control of access to fuel storage, fire safety in fuel storage areas and fire safety in fuel trucks, fuelling pits/hydrants and fuelling cabinets.

4.16.14 **Detection and Prevention of Fuel Contamination**

The following measures shall be taken and appropriate procedures put in place regarding the detection and prevention of fuel contamination:

(a) Sampling checks shall be made throughout the fuel handling, storage and distribution process to ensure that the fuel is free from water and solid particle contamination, is of the appropriate grade, and is in a state fit for use by aircraft;

(b) When fuel has been delivered into a fuel installation a settling period shall be taken before a sample is taken;

(c) Fuel samples shall be taken and retained for a certain period of time:

(i) immediately before receipt into the fuel installation;

(ii) after receipt of fuel into the fuel installation (after settling time);

(iii) each day before the first delivery from the fuel installation;

(iv) after prolonged heavy rainfall;

(v) after de-fuelling;

(vi) after vehicle washing; and

(vii) immediately prior to fuelling an aircraft.

All sampling equipment shall be kept in a scrupulously clean condition.

(d) All samples shall be kept in a cool room and stored out of daylight and properly labelled (grade of fuel, date and time of sample and reason of sample); and

(e) All fuel tanks and pipelines shall be labelled and colour coded and marked for different grades of fuel.

4.16.15 Records of the following shall be kept for a period of 12 months:

(a) all deliveries into fuel installations;

(b) particulars of fuel samples; and

(c) particulars of the maintenance, associated rectification and cleaning of the fuel installation including inspections and tests, pressures, purging, equipment and filter checks and hose inspections.

All records shall be made available to the Authority and aerodrome operator for verification.

4.16.16 Fuel shall be considered unfit for use in aircraft if a visual examination shows any of the following:

(a) more than a trace of solid sediment/suspension (rust, sand, dust and scale);

(b) globules of water;

(c) cloudiness; and

(d) a positive reaction to water-finding paste, paper or a chemical detector.

4.16.17 If the storage and delivery of aircraft fuel is handled by a third party/fuelling company, the aerodrome operator shall ensure that the abovementioned conditions are strictly adhered to by the third party/fuelling company.

Regular audits will be carried out by the Authority and the aerodrome operator. The third party/refuelling company is required to permit the Authority and aerodrome operator to carry out inspections and audits of installations and safety procedures to ensure that fuel is being safely stored and distributed. All required documents will have to be submitted to the Authority/aerodrome operator upon request.

4.16.18 The aerodrome operator shall establish procedures to ensure safe handling of hazardous materials on the airside as detailed in chapter 4.16. The procedures shall be approved by the Authority. The aerodrome operator shall arrange for the provision of training to concerned airside users on handling of hazardous materials and safety implications.

4.17 INSPECTION OF THE AERODROME MOVEMENT AREA AND OBSTACLE LIMITATION SURFACES

4.17.1 The aerodrome operator shall have procedures to carry out daily inspection of the aerodrome movement area and obstacle limitation surfaces.

4.17.2 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).

4.17.3 Movement area inspections shall be 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).

4.17.4 Several types of inspections shall be 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.

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

4.17.6 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.

4.17.7 Faults in the lighting systems shall normally be detected via monitoring. Monitoring by visual display on the lighting control panel in the ATS unit shall 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.

4.17.8 Unplanned inspections shall also be carried out to ensure the safety of operations. These circumstances shall 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.

4.17.9 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 parts thereof; and
g) status of obstacles outside the aerodrome boundary.

4.17.10 An inspection programme of the movement area shall commensurate with the size and complexity of the aerodrome, along with the objectives set in 4.17.9 shall be established by the aerodrome operator.

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

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

4.17.13 In conducting inspections, the aerodrome operator shall consider the following:

(a) Inspections shall be conducted when activities are at a relatively low operational level, as much as practicable. Some elements of inspection may also be considered during busier times in a way that does not raise net levels of safety risk, in order to identify critical systems weaknesses (e.g. slips, lapses and violation of Standard Operating Procedures);

(b) Ensure that standard checklists are used and that the checklists are maintained for a set period of time following inspections or audits;

(c) Observe airside safety rules in order not to contribute to undesirable occurrences such as runway incursions;

(d) Adhere to the prevailing procedures prescribed for low visibility operations and vehicular movements restrictions;

(e) Adhere to communication procedures and listen out on the established communication channels;

(f) Use approved standard phraseologies and ensure positional awareness at all times;

(g) Coordinate with air traffic services and obtain permission before entering aircraft manoeuvring areas. On entering the runway, a positive entry call shall be made. On leaving the runway, ATC shall be advised when the inspection vehicle is clear of the runway strip;

(h) It is essential to maintain a listening watch on the appropriate R/T channel during any runway inspection;

(i) If, during an inspection, ATC requires the inspection team to clear the runway, the vehicle shall move outside the protected area of the runway or the runway strip. It shall then remain outside the protected area of the runway or the runway strip while awaiting re-entry instructions;

(j) Clearance shall be obtained before crossing any runways;

(k) On final completion of a runway inspection the inspection team shall advise ATC of the fact and report the state of the runway; and

(l) The time of commencement and completion of the inspection shall be noted and included in the Record of Inspection Log. Copies of all inspections for last 12 months shall be maintained.

4.17.14 Where applicable and required by prevailing safety situation, an aerodrome operator may initiate special inspections as follows:

(a) Inspections carried out after a complaint, such as from Air Traffic Control or an aircraft in relation to visual navigation aids;

(b) Inspections carried out after a report, during continuous surveillance, such as FOD on a pavement;

(c) Inspections carried out following an accident or incident;

(d) Pavement evaluations, including friction measurement;

(e) Inspections carried out during construction, or even daily maintenances, such as PAPI units being damaged or knocked out of alignment during grass cutting;

(f) Weather related inspections that may raise risk levels, such as runways becoming contaminated in heavy rain, or dust-storms;

(g) Wildlife inspections possibly by qualified wildlife contractor;

(h) Obstruction surveys, possibly by qualified surveying contractor; and

(i) Airside security inspections (in coordination with the security agency, as appropriate).

4.17.15 Inspection of the movement area shall be carried out at least twice where the aerodrome reference code number is 3 or 4. The frequency and detail of inspections may be increased from the minimum specified, depending on the traffic expected and the type of inspection being performed. The frequency of aerodrome inspections shall be commensurate with the level of risk identified in the aerodrome safety management system (SMS).

4.17.16 Any unsafe condition or deficiency during the inspections shall be immediately reported and prompt actions shall be taken to correct the unsafe conditions.

4.17.17 Any unsafe condition shall also be reported to the Control Tower and request for NOTAM, if required, shall be sent to Aeronautical Information Services.

4.17.18 Follow up and corrective actions

(a) The inspection and audit processes shall be linked to and coordinated with the aerodrome maintenance programme, to ensure correction of deficiencies noted during inspection. It may be necessary to categorize the safety concerns in terms of the associated levels of risk;

(b) A corrective action plan with activities and timeframes shall be developed for all identified deficiencies and shall be implemented with a view to resolve safety concerns within the shortest time possible; and

(c) The aerodrome operator shall ensure that there is a system of follow-up of corrective actions to establish that planned activities are being implemented as per the corrective action plan.

4.17.19 The inspection checklist shall include at least the following:

(a) Paved areas (Runway, Apron and Taxiway)

1. cracks and surface variances;
2. oil and fuel spills;
3. markings;
4. signage;
5. lights;
6. pavement surface conditions;
7. grass on shoulders;
8. FODs and loose debris; and
9. water accumulation

(b) Runway/taxiway strips, runway end safety areas and Runway/Taxiway Strips

(i) hazardous humps, depression and variation from normal smooth surface;

(ii) object and obstructions; and

(iii) grass level

(c) Aerodrome Works (safety measures)

Presence of obstacles in the Obstacle Limitation Surfaces at and near the aerodrome. Obstacles to be properly marked and lighted.

(d) Windsocks

(e) Fuel hydrants and fire fighting facilities

(f) Visual Docking Guidance System

(g) Airbridge

(h) Visual Approach Slope Indicator

(i) Ground Power Units

(j) Parking of aircraft (type of aircraft and related parking stand dimensions) and equipment on apron (chocks, ground equipment and vehicles);

(k) Wildlife;

(l) Apron operations; and

(m) Obstacles.

4.17.20 The procedure for carrying out inspection of the aerodrome movement area shall be approved by the Authority.

4.17.21 Procedure for Inspection of Movement Area

a) 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.

b) 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.

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

d) Runway inspections shall 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.

e) 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.

4.17.22 Reporting

a) 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 shall also be informed.

b) If unserviceability is found during an inspection, but which does not affect the use of the runway, it shall be reported to the entity in charge of aerodrome maintenance;

c) An inspection log shall include:

i. description and exact location of the failure;
ii. 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;
iii. identifying the person/entity responsible for undertaking the task and/or further action; and
iv. identifying the timescale by which it shall be completed.

4.17.23 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.

A log shall be kept for all inspections, and shall 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.

4.17.24 Daily Inspections (Level 1)

1. Level 1 inspections shall be 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.

2. Additional Level 1 inspections, particularly relating to the runway, shall be carried out depending on local circumstances, the aerodromes hazard identification and analysis, and the safety risk assessment process.

3. Standard inspection routes shall be defined and followed so that an area cannot be forgotten.

4. Inspection personnel shall report anything that affects safety and the serviceability of the following:

   i. 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.

ii. 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.

iii. 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.

iv. Aerodrome lighting

a) All runway approach lighting (including any Category III supplementary systems) shall be inspected every evening at dusk prior to night operations and any defects reported;

b) all runway lighting shall be checked as soon as practicable after the lighting has been switched on. Individual light outages and circuit failures shall be reported;

c) all taxiway lighting shall be checked as soon as practicable and shall 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 shall 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.

v. 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 shall 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.

5. When conducting routine daily inspections, general attention shall be paid to the following points:

a) general cleanliness with particular attention to FOD which could cause engine ingestion damage. This shall include debris from runway maintenance operations or excessive grit remaining after runway gritting. Any build-up of tire rubber deposits shall 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 can cause aircraft damage shall be reported immediately for inspection by maintenance services and, if the damage is sufficiently serious, the area shall remain closed to aircraft pending the results of such an inspection;

c) after rain, flooded areas shall 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.

6. The extremities of the runway shall 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.

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

8. Zones outside the aerodrome boundary

   i. 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.

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

   iii. 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.

4.17.25 Regular Inspections (Level 2)

1. Level 2 inspections shall 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 shall be carried out on foot, thus enabling a far more comprehensive assessment.

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 shall be inspected in detail at defined, regular intervals. Level 2 inspections shall be carried out at a time that best suits the stand demand, runway in use or other operational requirements.

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

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

5. Inspection teams shall report anything that affects the serviceability and safety of the items below.

6. Runways

Runways shall be inspected in detail every three month. Typically, the runway shall 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 shall be inspected during the cycle. The inspections shall record cracks, general break-up and any other surface failure, particularly if there are signs of debris. Special attention shall be paid to the touchdown zones and other areas highly trafficked by aircraft. The touchdown zones shall also receive particular attention to assess the degree of rubber build-up that may affect the runway surface friction co-efficient. Attention shall 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 shall be inspected to ensure compliance with Annex 14, Volume I requirements. All runway markings shall be inspected for conspicuity, particularly in the touchdown zones where rubber deposits may have blackened certain markings. A selection of light fittings shall be inspected for general safety, particularly with regard to the torque setting of the fixings. The regularity of testing shall 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) shall also be inspected. Attention shall be given to its general bearing strength, the nature of the surface, any obstacle that shall be frangible and any other features that could cause damage to an aircraft, shall 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 shall be analysed for their 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 shall 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.

7. Taxiways

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

a) Surfaces. All taxiway surfaces including any hard shoulders shall be inspected. Surfaces shall be inspected for cracks, deterioration and debris.

b) Signs, markings and lights. All taxiway paint markings shall be inspected and any repainting requirements noted. All signs shall be checked for their conspicuity and stability, particularly where they may be affected by jet blast. A selection of taxiway light fittings shall be verified for general safety.

c) Surrounding areas. All taxiway strips and associated grass or other paved areas shall 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.

8. Aprons and stands

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

a) Surfaces. All aprons, stands and associated equipment parking areas shall 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 shall 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) shall be checked for correct functionality and conspicuity.

c) Surrounding areas. All service roads and equipment parking areas supporting each stand shall 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 shall also be inspected for general cleanliness and parking discipline.

d) Equipment. When installed, all emergency telephones shall be checked for serviceability.

4.18 APRON SAFETY MANAGEMENT

The aerodrome operator shall ensure that procedures are established in order to ensure safety of aircraft, vehicles and persons on the apron. The aerodrome operator shall submit an Apron Safety Manual to the Authority for approval. The Apron Safety Manual shall include procedures for the following:

(a) Operation of the parking stand

(i) the rules and procedures are set for safeguarding the arrival and departure movements of aircraft on stands and for the dissemination of information;

(ii) the aircraft stand remains serviceable, clean and free from obstruction when arrival of the aircraft in the parking stand is imminent;

(iii) the stand is appropriate for the aircraft type with appropriate wingtip clearance;

(iv) the airbridge is fully retracted and correctly parked with the drive wheels in the parking box before the arrival of the aircraft. These actions shall be completed by the handler before the VDGS is switched on. Switching on the VDGS will signify to the aircraft commander that these actions have been completed and it is safe for the aircraft to enter the stand. Once the VDGS is switched on, the stand shall remain under supervision until the aircraft arrives on stand in order to ensure that it remains safe for use by the aircraft. If for any reason the stand becomes ‘unsafe’ or unattended before the aircraft has arrived on stand, the VDGS shall be switched off;

(v) a competent person is nominated to control and manage the various states of the operation and shall be clearly identified to all staff working on the stand. The competent person shall be working to an agreed plan for the turnaround and shall have sufficient authority to control the activities around the aircraft. The supervisor shall be present throughout the arrival, handling and departure procedures;

(vi) only when the aircraft has stopped, the wheel chocks are in place, the engines have run down and the aircraft anti-collision beacon has been extinguished, can the airbridge be driven from its parking position and docked to the aircraft;

(vii) the aircraft passenger door shall remain closed until the airbridge had been docked, the canopy has been lowered on to the fuselage and the autoleveller device has been set;

(viii) the airbridge operator shall remain in attendance in the cab until passenger disembarkation is completed;

(ix) procedures are in place to indicate that it is safe for vehicles, equipment and people to approach the aircraft, the order in which they shall approach the aircraft and the positions they shall take to ensure that everyone can get to and from the aircraft safely without damaging the aircraft and the clear and rapid egress for aircraft refuelling;

(x) the VDGS is switched off when the aircraft is safely parked on the stand;

(xi) appropriate procedures are available if the need for 'Stop Short' arises;

(xii) the stand is free from obstruction by vehicles and equipment before push-back commences;

(xiii) the aircraft passenger door shall be closed, airbridge canopy and autoleveller shall be retracted, airbridge safety barrier erected and airbridge fully retracted with drive wheels placed in the parking box before pushback starts;

(xiv) the aerodrome operator shall be responsible for safeguarding the arrival and departure movements of aircraft on stands and for the dissemination of information to airline operators;

(xv) where a Visual Docking Guidance System (VDGS) is provided, the aerodrome operator shall arrange for the stopping guidance element to be calibrated and indicated, for all selected user aircraft, in a clear and unambiguous manner. The azimuth guidance shall be regularly checked for accuracy. Such systems shall be subject to daily serviceability checks and the results of such checks be recorded;

(xvi) when turnaround operations have been completed and the aircraft is ready to depart, the aerodrome operator and ground handler shall ensure that the stand is free from obstruction by vehicles and equipment before push-back commences;

(xvii) before leaving the stand, the ground handling staff shall ensure that the VDGS is switched off;

(xviii) ground equipment shall be/remain parked in the equipment staging areas provided. Service vehicles and baggage trolleys shall hold clear and equipment such as ground power units or any other equipment with cables or hoses shall be fully retracted and stowed. The stand shall be clear of all obstructions when an aircraft is in motion;

(xix) handling staff operator shall be responsible for the parking/docking operation once the aircraft has entered the stand. Where a marshaller is responsible for guiding the aircraft on to the stand, instructions shall clearly indicate the point at which responsibility is transferred from the marshaller to the handling staff;

(xx) no person shall guide an aircraft unless trained and qualified to carry out the functions of a marshaller;

(xxi) the marshller shall wear a distinctive fluorescent identification vest to allow the flight crew to identify that he or she is the person responsible for the marshalling operation;

(xxii) daylight-fluorescent wands, table-tennis bats or gloves shall be used for all signalling by all participating ground staff during daylight hours. Illuminated wands shall be used at night or in low visibility;

(xxiii) the marshller shall ascertain that the area within which an aircraft is to be guided, is clear of objects;

(xxiv) staff shall be aware of the dangers of the movement of aircraft flaps and other underwing devices when an aircraft is on stand. These areas shall be avoided by staff and vehicles and equipment shall not be driven or parked in such a way so that the damage due to flap or other control surface movements is avoided;

(xxv) except where full self maneuvering is permitted, a marshalling service shall be provided automatically on stands not equipped with VDGS or where the VDGS, or other stand facilities are unserviceable; and

(xxvi) to reduce noise and contamination from oil and exhaust emissions, the running of all types of engines on the apron shall be kept to the minimum necessary to maintain operational needs. Where Fixed Ground Power Units are provided on stands, they shall be used in preference to other forms of auxiliary power. The running of aircraft Auxiliary Power Units (APUs) and engine driven Ground Power Units shall be strictly controlled to the minimum operational requirement.

(b) Visual Docking Guidance System (VDGS)

(i) the stopping guidance element is calibrated and indicated for all selected user aircraft in a clear and unambiguous fashion;

(ii) the azimuth guidance is regularly checked for accuracy;

(iii) such system is subject to daily serviceability checks, the results of which shall be recorded;

(iv) details of the VDGS available at the aerodrome shall be promulgated in the AIP;

(v) the VDGS provides both directional and stopping guidance; and

(vi) a preventive maintenance programme is set up.

(c) Marshalling Service

(i) when a stand is not equipped with VDGS or latter is unserviceable or not calibrated for a particular type of aircraft, a marshalling service shall be provided;

(ii) only trained and experienced marshallers in regular marshalling practice shall be permitted to marshal aircraft unsupervised. The marshallers shall be fully conversant with the standard marshalling signals listed in the Civil Aviation Regulations; and

(iii) in certain circumstances, such as a non-standard taxiway routing or on request from a visiting pilot, unfamiliar with the aerodrome, and/or in poor visibility, a 'Follow Me' vehicle shall lead the pilot to a marshaller or his parking place directly.

(d) Passenger Airbridge Operations/Maintenance

(i) the bridge is operated by trained personnel;

(ii) standard operating procedures (SOPs) for airbridges are developed. These shall include emergency backoff and wind-off procedures. Instructions for emergency back-off action shall be displayed in the airbridge cab and in the case of manual wind-off, at the point of operation;

(iii) procedures that are specific to the stand or airbridge shall normally be placarded at the airbridge control position. This is particularly important if the procedures relate to different configurations for particular aircraft types;

(iv) in the event of an emergency whilst the aircraft is on stand, the airbridge shall remain attached or be re-attached to the aircraft until all passengers and crew have evacuated the aircraft;

(v) a careful check is made to ensure that no vehicles or equipment are parked beneath or in the manoeuvring area of the airbridge and the airbridge shall be free of debris and correctly parked before an aircraft enters the stand. If bridges are not fully retracted for any reason, aircraft shall be Stopped Short;

(vi) airbridges are fitted with an audible warning and flashing lights which operate whenever the speed control is operated and the bridge is moving;

(vii) whenever an airbridge is moved, a 'look out' shall be positioned on the apron to assist the bridge operator;

(viii) all bridges are fitted with an interlocked safety barrier and will not move unless the barrier is correctly positioned across the mouth of the bridge;

(ix) all airbridges are fitted with a safety canopy and an autoleveller device. The canopy shall provide fire and weather protection for bridge users and the autoleveller compensates for trim changes experienced during aircraft refuelling and the loading and unloading of passengers;

(x) the airbridge operator shall ensure that the autoleveller is engaged before loading or unloading the aircraft. Whenever the airbridge is docked to the aircraft, the autoleveller shall remain engaged;

(xi) before retracting the airbridge, the canopy shall be disengaged from the aircraft door;

(xii) in the event of the loading or unloading of very heavy cargo, the airbridge shall be withdrawn from the aircraft as the rapid trim changes may be beyond the capability of the autoleveller system;

(xiii) when bridges are not being used for passenger loading or unloading they shall be retracted into their parking box and closed down;

(xiv) parking boxes are painted on the apron to indicate to all concerned with aircraft arrivals and departures, the correct parking positions for the airbridges. Both wheels of the bridge shall be within the box whenever the bridge is in the parked position;

(xv) the aircraft passenger door is to remain closed until the airbridge has been correctly docked and shall be closed before the bridge is retracted;

(xvi) the airbridges shall not be moved when passengers are on the airbridge;

(xvii) if an airbridge is unserviceable or cannot be fully retracted the stand shall be withdrawn from use or, if practicable, allocated to aircraft types that can safely be stopped short of the airbridge for passenger steps to be used. The need to STOP SHORT shall be indicated to the aircraft;

(xviii) all incidents/accidents involving injury to personnel, damage to aircraft and airbridge shall be reported to the Authority;

(xix) the extendable portion of rail-drive airbridges shall be highlighted by conspicuous marking (such as retroflective chevrons) to indicate to pilots, drivers and apron staff that the bridge is extended;

(xx) the aerodrome operator shall establish a programme of preventative maintenance including inspection by competent and trained technical people. Daily inspection shall be carried out and records kept. The following shall be included in the preventive programme:

(a) the structural integrity of the airbridge, including components vulnerable to catastrophic failure and the potential for water ingress to cause corrosion to the walkway or its control and drive systems. Moving parts and gears shall be properly maintained;

(b) the electrical safety of the airbridge and the potential for electrical failure to cause uncommanded or unexpected movement;

(c) the mechanical integrity of the drive and control systems of the airbridge, including the condition of the hydraulic fluid and the components on which it impinges;

(d) the conditions of wheels and tyres;

(e) the devices for detecting obstructions (if any); and

(f) a formal reporting system for airbridge faults. The procedure shall include immediate response activities by engineering and airfield operations staff, where necessary withdrawing the airbridge from service until remedial action is taken, to maintain safe aircraft and passenger handling.

(xxi) passengers move in a controlled safety zone on their way from the boarding gate in the terminal to their seat in the plane;

(xxii) airbridges shall not be left unattended when passengers are being embarked or disembarked;

(xxiii) unauthorized access to the airbridge shall not be allowed;

(xxiv) access to the airbridge and aircraft door shall be controlled by the designated security agency;

(xxv) before the aircraft enters the stand, the drive wheels of an apron-drive bridge shall be positioned in the marked parking box provided or, in the case of a rail-drive aerobridge, shall be fully retracted;

(xxvi) before the aircraft enters the stand, it shall be confirmed that the stand is set up for the approaching aircraft type;

(xxvii) the aerobridge cab shall be adjusted vertically and in azimuth to suit the incoming aircraft type; and

(xxviii) To avoid damage during departure and to maintain the prescribed safe clearance from the bridge, the following precautions shall be observed before the aircraft push back:

(a) aircraft passenger door shall be closed;

(b) bridge canopy and auto-leveller shall be retracted;

(c) bridge safety barrier shall be erected or the doors shall be closed;

(d) apron drive bridge shall be withdrawn and the drive wheels placed in the parking box provided;

(e) rail drive bridge shall be fully retracted; and

(f) check shall be made that there are no vehicles, equipment or personnel obstructing the movement of the aerobridge before it is moved. A check shall also be made to confirm that the ground equipment is configured to meet any specific settings for the aircraft type.

(e) Aircraft Chocking

Aircraft chocks shall be used to prevent the movement of an aircraft whilst on the ground and the following measures are put into place:

(i) Aircraft Arrival

1. all engines shall be spooled down, anti-collision lights off and all propellers stopped before the chocking process begins;

2. chocks shall be positioned on an aircraft according to aircraft manufacturer recommendations; and

3. once the chocks are in place, stand in clear view of the flight deck and use the appropriate recognised hand signal to confirm ‘chocks in’.

(ii) Aircraft Departure

Pushback

1. chocks shall only be removed at the request of the aircraft commander; and

2. ensure that all chocks are removed before pushback commences.

Powerback

1. when requested by the aircraft commander, the appointed personnel will remove the chock positioned aft of the nose wheel; and

2. the chock forward of the nose wheel shall remain in position until the aircraft has powered away.

Free Standing Aircraft

1. chocks shall only be removed at the request of the crew;

2. one chock shall normally remain forward of the nose wheel until the engine start sequence has been completed and the ‘chocks away’ signal is received from the flight deck. Single engine propeller driven aircraft shall remain chocked forward of the main wheels until the ‘chocks away’ signal is received from the flight deck;

(iii) only trained and authorised personnel or trainees under supervision are allowed to chock or unchock aircraft;

(iv) operating procedures and safe working practices shall be followed at all times;

(v) correct number and type of chocks shall be available;

(vi) when not in use, chocks shall be safely stowed in a designated storage area and not left in the apron area;

(vii) Chocks shall not be removed from the aircraft until clearance is given by the authorised person;

(viii) In the event of high wind conditions additional chocking/other measures shall be taken to secure the aircraft; and

(ix) Chocks when positioned shall be parallel to the wheel axle and only lightly touching the tyres.

(f) Aircraft Push-Back Operations

Procedures shall be established for push back operation in which an aircraft is pushed backwards from its parking gate by a tug to a position on the taxiway where it can safely move off under its own power and also ensure that:

(i) all safety procedures are followed during push back operations;

(ii) communications during the pushback will come in the form of hand signals or headset communications;

(iii) during the pushback the captain passes control of his aircraft to the pushback crew;

(iv) the correct bypass pin shall be used for appropriate aircraft type;

(v) the bypass pin shall be marked as serviceable;

(vi) the correct towbar shall be used for the appropriate aircraft type and the towbar and bypass pin properly labelled;

(vii) the correct tug shall be used for the appropriate type of aircraft;

(viii) towbars shall always be pulled behind the tug when driving to and from the aircraft, never pushed;

(ix) a guide person (usually the headset operative) is required for this operation, using recognised hand signals;

(x) the headset operative shall walk along with the tug during push back;

(xi) the pushback shall continue at a safe walking pace, and any changes of direction (turns) shall be kept to the minimum necessary to achieve the final positioning of the aircraft at the release point;

(xii) the limits marked on the nose leg or fuselage shall not be exceeded when turning the aircraft;

(xiii) push back is carried out strictly using aircraft stand lead in/lead out/turning lines markings;

(xiv) tugs, towbars and bypass pins shall be handled with great care;

(xv) only trained and authorised personnel or trainees under instruction may perform the pushback operation;

(xvi) all tug drivers shall be qualified to drive aircraft tugs in all weather conditions. They shall be trained in these procedures and certificated as competent;

(xvii) operating procedures and safe working practices are followed at all times; and

(xviii) all push-back crew members shall wear high visibility garments.

(g) Aircraft Power Back Operations

(i) power-back manoeuvres carried out at the aerodrome are conducted safely, in accordance with an agreed procedure and with minimum disturbance to other apron users;

(ii) any pilot intending to use power-back shall be trained and experienced in the procedure;

(iii) the aircraft anti-collision beacon(s) shall be switched on before the engines are started;

(iv) the power-back manoeuvre shall be guided by a trained power-back marshaller, provided by the airline, using standard power-back marshalling signals. Wing walkers shall be employed to safeguard the rearward movement of the aircraft, particularly wing tip clearances, to prevent collisions with other aircraft or vehicles or personnel;

(v) the minimum engine power settings shall be used, sufficient to get/keep the aircraft moving;

(vi) at no time during the power-back manoeuvre shall the aircraft's wings sweep adjacent parking stands, whether or not they are occupied; and

(vii) procedures, training and personal protective equipment shall be employed which ensure the safety of these personnel during power back operations.

(h) Self Manoeuvring of Aircraft on the Apron

(i) stand entry routes, parking positions and departure routes shall be marked with standard paint markings, in accordance with the appropriate standards;

(ii) buildings and installations adjacent to self-manoeuvring stands shall be constructed to withstand the engine blast or be protected by blast screening;

(iii) vehicles and equipment shall not be placed in a position where they can be affected by blast; equipment parking areas shall be protected by blast screens or located remote from the stands;

(iv) passenger areas and apron staff working areas shall be protected by blast screens. Passengers shall not be subjected to blast, excessive noise or fumes;

(v) safety instructions shall be issued, specifying the maximum aircraft sizes to be permitted on individual stands so as to ensure that the prescribed safe clearances are maintained. Pilots shall also be required to exercise caution and use the minimum engine power settings needed to complete a satisfactory manoeuvre;

(vi) self-manoeuvring stands shall be inspected regularly and kept clear of any FOD in order to minimise the risk of ingestion; and

(vii) self-manoeuvring on open, unmarked aprons shall be subject to special procedures and a marshalling service shall be available at all times on aircraft arrival. The aerodrome operator shall determine which combination of aircraft stands and conditions require a marshalling service on departure.

(i) Dead Aircraft Handling

(a) a trained staff member occupies the flight deck to control the brakes, monitor radio contact between tug/aircraft and ATC and control the aircraft's anti-collision light;

(b) whilst an aircraft is under tow, the tug driver is responsible for the safety of the aircraft. It shall be remembered that, irrespective of any instructions issued by ATC, the tug driver is responsible at all times for ensuring that the aircraft does not collide with vehicles, aircraft, buildings or other obstructions;

(c) when towing an aircraft, it is particularly important to be aware of the extent of the extremities, such as wingtips of the aircraft and their proximity to obstructions. In the event that a tug driver is unsure whether there is sufficient space for an aircraft under tow to be moved safely, he or she shall safely bring the aircraft to a stop and request assistance. If the aircraft stops on the manoeuvring area for this reason, the driver shall advise ATC;

(d) for safety reasons it is important that the number of persons on board (POB) the aircraft is known for local ground movements; and

(e) when an aircraft is being towed during the hours of darkness or low visibility, it shall display those lights which would be required when flying, i.e. navigation lights.

(j) Multiple Push Back Procedures

(a) approval for start of 'push-back' normally rests with ATC; and

(b) the parking stands have the necessary separation distance.

(k) Engine Hazards

There is a clear operational need for the running of aircraft engines on apron areas. The associated safety hazards caused by exhaust blast, vibration, fumes, turning propellers and rotors and the intake suction of jet engines are well recognised. As part of the safety management system, rules and procedures for safe engine running on the aerodrome are promulgated and understood by flight crews and ground staff.

(i) Blast, Vibration, Noise and Fumes

(a) engine running on the apron and adjacent taxiway areas shall be limited to the minimum necessary to meet aircraft operating needs;

(b) vehicles and personnel shall not pass behind running engines. Staff shall not approach running engines unless it is part of their job function and is necessary for the task at hand;

(c) the aircraft's anti-collision beacon(s) are illuminated to indicate to handling staff that aircraft engines are running or are about to be started. However, the absence of such illumination shall not be regarded as proof that the engine is safe to approach and the presence of blast and engine noise may not be immediately obvious to a driver in a vehicle or a person wearing ear defenders;

(d) blast screens shall be provided to protect buildings, installations and vehicle and staff areas that are vulnerable to blast;

(e) thrust levers shall not be exercised for any purposes when the arriving aircraft is on stand, unless specifically approved by the aerodrome operator;

(f) the number of engines started before push-back commences shall be the minimum to meet technical and passenger-service needs;

(g) during start up and push-back, engine power settings shall not normally exceed ground idle;

(h) wide body aircraft shall not normally be permitted to start more than one engine until the aircraft is aligned with the centreline of the taxiway/taxilane and ground personnel are clear of the aircraft;

(i) rules and procedures for safe engine running on the aerodrome shall be promulgated and understood by flight crew and handling staff;

(j) when turning on to a stand, it is desirable that the flight crew use the minimum power needed to carry out a normal arrival manoeuvre;

(k) aircraft anti-collision beacon(s) shall remain on until engines have run down or propellers/rotors have stopped rotating;

(l) during start up and push-back, engine power settings shall not normally exceed ground idle; and

(m) the aerodrome operator shall establish a programme to educate all apron users on the hazards and requirements associated with FOD and to stress the responsibilities of all personnel employed on the apron to minimise risks from FOD.

(ii) Engine Run Test

(a) engine runs and check starts shall be controlled and only carried out with the prior approval;

(b) where possible, engine runs shall be carried out on agreed, selected and prepared remote areas, preferably equipped with engine baffles/detuners and blast fence;

(c) engine runs at above idle power shall not be permitted in cul-de-sacs or, for example, in areas where the jet efflux would impinge on stands, equipment areas or stand areas;

(d) engine runs approved on stands in regular use in apron areas shall be limited to check starts and idle power only;

(e) where engine running is permitted on the apron, a remote area shall be chosen where the jet-blast will not affect other apron areas and busy taxiways;

(f) engine runs shall be safeguarded by Airfield Operations staff who shall arrange for any roads to be closed and, if needed, sections of taxiway;

(g) the area behind and adjacent to the cone of the blast shall be clear of equipment and the ground shall be firm and without loose tarmac, stones or other material;

(h) airfield staff shall inform Control Tower of any engine run;

(i) engine runs shall be controlled and only carried out with the prior approval of the aerodrome operator and Control Tower; and

(j) the aerodrome operator shall establish a programme to educate all apron users on the hazards and requirements associated with FOD and to stress the responsibilities of all personnel employed on the apron to minimise risks from FOD.

(iii) Fumes and Noise

(a) to prevent an unacceptable noise nuisance and build-up of fumes, the running of engines in the direct vicinity of buildings, workplaces and congregations of staff or passengers shall not be approved;

(b) where workplaces, such as cargo-sheds and engineering facilities, have to open directly on to stand areas, a specific risk assessment is required to determine how best to operate all facilities safely and without risks to health, in respect of noise and fumes;

(c) policies and procedures shall be developed to minimise the effects of engine noise, vibration and fumes on their local population. The concentration of fumes present in an aerodrome area is in direct relation to the time engines are run, the type of engine and power settings used and the strength and direction of the surface wind;

(d) where fixed electrical ground power units are provided on the stands, aircraft operators shall make full use of these facilities to minimise the need for (Aircraft Power Units) APUs or mobile units which generate high levels of noise;

(e) where existing noisy ground support plant is used, it shall be engineered to minimise noise output. In some instances, this may require retrospective remedial action, e.g. partial enclosure, to reduce noise emission;

(f) the areas in which hearing protection is required shall be marked and warning notices displayed; and

(g) personnel working near areas exposed to high level of noise shall wear hearing protection equipment.

(iv) Suction - Ingestion

(a) danger zones and safe distances around aircraft engines shall be designated for each type of aircraft; and

(b) personnel and equipment shall not be allowed in danger zones of running jet engine as they will expose themselves to the risk of being sucked in, almost invariably resulting in serious or fatal injury.

The intake suction of jet engines is a hazard, even at idle power, and the flow characteristics of air into an engine are such that items can be picked up from in front of, from below, and from the sides of the intake. Even small items ingested can damage the engine, but the larger engines are quite capable of ingesting large objects from several metres away with catastrophic effect.

(v) Foreign Object Debris (FOD)

(a) as part of the safety management system, instructions, services, facilities and initiatives shall be set up to combat the risks arising from FOD;

(b) a programme is set up to educate all apron users on the hazards and requirements associated with FOD and to stress the responsibilities of all personnel employed on the apron to minimise risks from FOD;

(c) programmes are set up for the regular apron sweeping, cleaning and inspection, including rapid reaction to fuel and other liquid and chemical spillages;

(d) facilities are provided for the disposal of solid and liquid aircraft waste and FOD protection. They shall pay particular attention to such prime FOD generators as contractors' areas and baggage facilities;

(e) all vehicles and equipment used on the aprons shall be maintained in a clean and serviceable condition, not only for reasons of safe vehicle operation but also to minimise the leakage of fluids and depositing of FOD from these vehicles;

(f) rules and arrangements shall be in place for the removal of hazards from the apron such as abandoned vehicles and equipment;

(g) ensure all rubbish are collected and put into secure rubbish bins before being disposed of in an off airside location;

(h) ensure any rubbish skips located on airside have a secure lid to prevent any material escaping;

(i) ensure building sites and cargo operations prone to producing FOD have specific procedures to contain their site;

(j) ensure vehicle and equipment utilizing the airside undergo regular maintenance to ensure no loose objects that could cause FOD;

(k) ensure all airside operators practice good housekeeping by cleaning their designated areas regularly throughout each day;

(l) ensure ground handling agents engaged in the servicing or handling of aircraft inspect the aircraft stands to ensure that no foreign objects or materials are left on the parking stand before every arrival and after every departure; and

(m) ensure drivers inspect their vehicles to ascertain that the loads are properly secured to prevent them from falling off the vehicle.

'Foreign Object Debris' (FOD) are a potential source of catastrophic damage to aircraft - particularly engines. FOD can also be a tripping or slipping hazard resulting in injury to personnel and passengers.

(vi) Propellers

(a) instructions are issued to safeguard apron operations around propeller driven aircraft;

(b) apron staff shall be alert to the dangers of running propellers and shall be stimulated by suitable awareness campaigns;

(c) safeguarding of 'propeller areas' is included in airline and apron operating procedures;

(d) suitable apron layouts and facilities are available to provide proper clearances for the operation of propeller aircraft types, with particular emphasis on ground clearance for propeller tips and the proximity of airbridges and other ramp equipment when the aircraft is at, or approaching, its parking position. Stands at which this cannot be achieved shall not be used for propeller aircraft; and

(e) passengers shall not be allowed to walk on the apron when propellers are turning. Where it is operationally essential to have the propellers turning, passengers shall be effectively controlled.

(vii) Rotors

(a) helicopter operations shall be segregated from fixed-wing apron operations where possible;

(b) standard clearances for rotors are provided for helicopter adjacent parking stands;

(c) the approach path to the helicopter stands in hover and hover-taxi mode shall not interfere with taxiing or parked aircrafts;

(d) apron users shall be familiar with risks associated with tail and main rotors;

(e) passengers shall not be allowed to walk on the apron when rotors are turning;

(f) staff, vehicles and ground equipment shall remain well clear of the rotor disk until it has come to rest;

(g) suitable signs shall be provided to warn drivers and apron staff that they are approaching an area where helicopter operations are handled; and

(h) all airside drivers and handling staff shall be briefed to maintain a good look-out and also shall be trained to look upwards as well as horizontally to detect and give way to helicopter movements.

(l) Hazards to Passengers on the Apron

At aerodromes, passengers may have to walk across the apron between the terminal building and the aircraft. This may expose passengers to hazards such as vehicles moving across the apron.

(i) passengers shall not be permitted to roam free;

(ii) where possible, permanent traffic routes, e.g. aerodrome roads or taxiways, do not dissect the path between the terminal and the aircraft;

(iii) where this is not possible, safe routes marked on the apron surface (including safe crossing points for the apron roads) and clear, unambiguous signs to indicate the route to be followed, shall be provided. Positive control of vehicular traffic is required from the airline or handling agent; co-ordination and co-operation with the aerodrome operator is necessary;

(iv) safe routes to be indicated by the use of moveable barriers and chains (‘Tensator’ type devices) to create a temporary safe route across the apron for passengers to follow. When not in use, it is important that such equipment is properly stowed to ensure that it does not become a source of FOD;

(v) routes to the aircraft shall not pass below aircraft wings or beneath fuel vents, or close to propellers or rotors of the aircraft they are boarding/disembarking or those of aircraft on adjacent stands;

(vi) routes shall also be clear of vehicular traffic around the aircraft, electrical cables, fuel hoses and other ramp equipment;

(vii) restrictions shall be placed on the running of aircraft engines in the vicinity of passengers and positive measures shall be taken to protect them from excessive engine noise and jet blast;

(viii) staff shall be positioned on the apron to ensure that passengers follow a safe path to the terminal/aircraft. Passengers shall be led from the aircraft or terminal;

(ix) passengers shall be informed of the safe route they shall follow into the terminal/aircraft, e.g. by public announcement before they leave the aircraft/terminal;

(x) for remote stands or stands in a different location to the terminal lounge, passengers shall be transported to the aircraft by bus;

(xi) consideration shall be given to unusual circumstances, such as evacuation of terminal buildings or aircraft, in which passengers and other members of the public may be required to enter airside areas. Procedures shall ensure that responsible persons who are familiar with the hazards that exist in airside areas are present to supervise passengers and members of the public as soon as practicable wherever there is emergency egress. Consideration shall also be given to methods by which aircraft movement and other sources of hazard may be stopped in areas in which passengers and members of the public may congregate with limited supervision;

(xii) the aerodrome operator, the airline operator and ground handlers all have responsibility for ensuring that the movement of passengers is strictly supervised and controlled;

(xiii) the aerodrome operator shall ensure that the layout and marking of airside areas are proper and conspicuous so as to enable safe movement of passengers to and from the terminal areas;

(xiv) passenger routes to the aircraft shall not pass below aircraft wings or beneath fuel vents, or close to propellers of the aircraft they are embarking/disembarking or those of aircraft on adjacent stands. Routes shall also be clear of vehicular traffic around the aircraft, electrical cables, fuel hoses and other ramp equipment;

(xv) restrictions shall be placed on the running of aircraft engines in the vicinity of passengers and positive measures shall be taken to protect them from excessive engine noise and jet blast;

(xvi) the airline /ground handler staff and aerodrome operator shall be so positioned on the apron to ensure that passengers follow a safe path to the terminal/aircraft;

(xvii) for remote stands or stands in a different location to the terminal lounge, passengers shall be transported to the aircraft by bus; and

(xviii) whenever passengers have to walk across the apron, there shall be sufficient staff to ensure that passengers do not wander away from safe routes. There shall be clear responsibility amongst the airline, the aerodrome operator and the ground handler on provision of staff to supervise and/or escort passengers across the apron.

(m) Vehicles Striking Aircraft and/or People

Airside vehicles constitute an ever present hazard to both people and aircraft and extreme vigilance is necessary for all those working airside.

(i) a safe system of work shall be developed and shall include the following:

(a) traffic rules governing such issues as speed limits, especially on approach to aircraft and in the vicinity of people;

(b) correct vehicle maintenance, especially of safety critical components such as brakes and steering;

(c) driver training and refresher training;

(d) driving standards;

(e) competence/attitude of drivers;

(f) apron management system;

(g) provision of assistance and/or audible warning devices for reversing vehicles;

(h) procurement of suitable vehicles, e.g. vehicles offering good driver vision;

(i) regular monitoring of standards;

(j) safe parking of vehicles in such a way as to prevent interference with aircraft manoeuvring or other aerodrome users;

(k) encouragement of good practice;

(l) the provision and wearing of high visibility clothing;

(m) aerodrome signage;

(n) vehicular and pedestrian activity on the airside shall be kept to a minimum. Vehicles on the airside shall be limited to those necessary to support the operation of aircraft services, cargo and passenger services, emergency services and maintenance of the aircraft;

(o) vehicles on the movement area shall be limited to those necessary for the inspection and maintenance of the movement area. The vehicular traffic, where required, shall be carefully controlled at the s;

(p) separate routes, preferably one way, be designated for movement of vehicles on airside. These routes shall be provided with adequate lighting and unambiguous markings;

(q) complete segregation of aircraft, pedestrians and vehicles in all areas of the aerodrome shall be ensured. Alternatively, the layout area may be reorganized so that the interaction of pedestrians, aircraft and vehicles is minimized or the frequency of high risk activities such as reversing are reduced. Any changes to the layout of an aerodrome which affect safety of aircraft operations shall be approved by the Authority. The aerodrome operator shall prepare a complete traffic plan for safe operations of ground handling and vehicular activities at the aerodrome and disseminate the same to all concerned;

(r) where more than one organisation is engaged in attending an aircraft, effective coordination and cooperation of contractors is essential to prevent vehicles striking people, other vehicles, equipment or aircraft;

(s) vehicles operating on maneuvering area shall be radio-equipped or escorted by a radio-equipped vehicle; and

(t) prior approval shall be obtained from the aerodrome operator for operating a non- owned vehicle on the movement area.

(ii) where more than one company is attending an aircraft, effective co-ordination and cooperation of contractors is essential to prevent vehicles striking people, other vehicles, equipment or aircraft.

(n) Signs, Markings and Guidance

(a) signs, surface paint markings and guidance shall be provided for the safe movement of aircrafts to the parking stands;

(b) regular audits shall be undertaken to remove redundant markings and signs and to ensure compliance with the standards;

(c) signs shall be clear in format, clear in the message they convey, in clean condition and positioned to give the clearest indication of the intended information;

(d) signs shall be clearly readable at night, particularly warning signs such as vehicle height restrictions and those marking the approaches to the Aircraft Manoeuvring Area;

(e) in remote locations where area lighting is not provided, point lighting or retroflective signs shall be used although care shall be taken to avoid creating any lighting effects that may cause confusion to pilots or drivers;

(f) yellow markings are used for the guidance of aircraft;

(g) white markings are used for the guidance of vehicles, equipment and staff;

(h) fixed obstructions that represent an obstruction to aircraft or vehicles, such as corners of buildings, airbridges and airside furniture, including lighting pylons, shall be painted in a colour(s) that make them prominent by day, by night and in reduced visibility; and

(i) all personnel working on the movement area shall wear high visibility clothing.

(o) Manual Handling

Manual handling is a term that applies to activities such as lifting, lowering, pushing, pulling or supporting a load by hand or bodily force. Common place manual handling activities in the industry include, for example, ground crew operations such as the loading or unloading of an aircraft and lifting tow bars onto and from aircraft or towing vehicles. The provision of assistance for incapacitated or disabled passengers is also necessary.

The best means of avoiding risk is to eliminate the hazard altogether, for example, by mechanised handling techniques. These include the use of ambulifts to assist the movement of incapacitated or disabled passengers onto the aircraft and handling aids for baggage.

The primary objective shall be to reduce the requirements for manual handling. It is good practice to review each stage of the baggage handling process with the aim of eliminating any unnecessary stages.

(i) proper planning of new and refurbished facilities can provide significant reductions in the risk of injury, as well as increasing efficiency;

(ii) the entire handling operation (where possible, from the first moment a bag is handled by a worker to the last) is examined and whether a change of process or equipment could eliminate any stages of manual handling, is considered;

(iii) handling systems shall be integrated with each other where possible. Different pieces of equipment shall be compatible with each other and positioned to prevent unnecessary handling between, for example, security scanners, conveyors, dollies and aircraft loading equipment;

(iv) conveyors of a suitable height shall be used to minimise the risk of injury from lifting or lowing items to or from such equipment;

(v) the environment in which manual handling is undertaken shall be considered. Floors shall be dry and adequately maintained. There shall be sufficient space to allow people to turn whilst handling, if such turning is unavoidable. There shall be no gaps between equipment that result in people having to throw baggage. Lighting shall be sufficient to allow tasks to be carried out safely. Ambient temperature shall be kept at a reasonable level (e.g. in baggage halls), or warm clothing provided where this is not possible (e.g. on the apron);

(vi) automated systems are properly maintained to minimize consequential poor manual handling techniques;

(vii) training is relevant to the tasks that people are undertaking; and

(viii) general indication of the weight of each bag is provided. This could be achieved by the attachment of a ‘heavy bag’ label at check in with instruction and training given to employees on how to deal with such baggage.

(p) Work Equipment and Machinery.

Work equipment includes every item on the apron, including vehicles, specialist equipment such as cargo loaders, fixed equipment such as airbridges and Ground Power Unit and hand tools.

The hazards to health and safety and aircraft safety from work equipment can arise when it is moved, installed, used, maintained or dismantled. They include hazards from:

- Machinery
- Hot or cold surfaces
- Instability (collapsing or overturning)
- Objects or people falling or being ejected from the equipment
- Disintegration, deterioration or malfunctions in the equipment or its controls
- Improper use of the equipment.
- Fire or overheating.

The ground handlers shall ensure that:

(a) the equipment is suitable (i.e. with regard to its initial integrity, the place where it will be used and the purpose for which it will be used);

(b) the equipment is maintained in a safe condition;

(c) the equipment is inspected in certain circumstances to ensure that it is, and continues to be safe for use. Any inspection shall be carried out by a competent person and a record kept until the next inspection and longer if the inspection results are used for monitoring serviceability trends;

(d) the risks created by the use of the equipment are eliminated, where possible or controlled by taking appropriate ‘hardware’ measures, e.g. providing suitable guards, protection devices (such as buffers to surfaces which interface with the aircraft), markings and warning devices (such as Emergency Stop buttons), and taking appropriate ‘software’ measures, such as following safe systems of work (e.g. ensuring maintenance is only performed when equipment is shut down) and providing adequate information, instruction and training;

(e) people using work equipment have received adequate training, instruction and information for the particular equipment;

(f) companies and their staff shall ensure that where mobile work equipment is used for carrying people or objects, it is suitable for this purpose (i.e. there is proper seating and stowage areas). In some cases, measures may need to be taken to reduce the risks to the operator, any other people being carried, anyone else who might be affected (such as passersby) and aircraft. This may include measures to prevent the work equipment rolling over, or people or objects being thrown from the equipment (i.e. seatbelts or other restraints). The measures shall be based on the findings of a risk assessment;

Lifting Equipment

(g) all lifting equipment and lifting operations (except those done solely by manual effort without assistance from equipment) shall be according to standard operating procedures;

(h) all lifting equipment shall be strong and stable enough for the particular use and marked to indicate safe working loads;

(i) all lifting equipment shall be positioned and installed to minimise any risks;

(j) all lifting equipment shall be used safely, i.e. the work is planned and organised, and is performed by competent and trained people;

(k) all lifting equipment shall be subject to ongoing thorough examination and regular inspection by competent people. All inspections shall be logged;

The following shall be considered to be lifting equipment:

(i) catering vehicles, ambulifts and other hi-loaders;

(ii) cargo loaders;

(iii) mobile elevating work platforms;

(iv) lifting platforms on toilet and potable water servicing vehicles and refuelling vehicles; and

(v) forklift trucks.

Aircraft equipment

(l) Aircraft equipments such as ULDs etc. shall be inspected before use to ensure its serviceability;

(m) Unserviceable equipment having protruding bolts, torn metal, damaged doors etc. shall be tagged, isolated and reported for maintenance action;

(n) Maximum floor loads and maximum weights for pallets and containers shall not be exceeded; and

(o) Aircraft floor locks for pallets and containers shall be secured to prevent the load shifting during flight.

(q) Falls and Falling Objects

Access to external elevated levels on and around aircraft will be required when aircrafts are on the stand. Such work includes catering, cargo and baggage handling at the aircraft hold doors, some cleaning activities and maintenance.

(i) there shall be suitable and effective measures to prevent any person falling a distance likely to cause personal injury;

(ii) measures shall be taken to prevent people or aircraft being struck by falling objects;

(iii) personal protective equipment shall be provided to all people working on the apron;

(iv) assistance is given to drivers for guiding access equipment to be used in close proximity to the aircraft to ensure correct positioning. Drivers shall also make allowance for the change in height of an aircraft during loading/unloading as this might cause the aircraft to touch the access equipment resulting in damage to the aircraft;

(v) suitable access equipment shall always be used to gain access to heights. Work from surfaces such as vehicle cabs, roofs of buildings and equipment is not acceptable. Mobile elevating work platforms often provide flexible and safe means of access to heights. They shall be used in accordance with a safe system of work and procedures which minimise the risk of injury and damage to the aircraft;

(vi) work at heights above two metres shall only be undertaken from equipment fitted with guardrails to all sides;

(vii) toeboards and/or other protective devices (e.g. a personal belt to which tools can be attached) are necessary if there is a risk of objects falling and damaging the aircraft or injuring people working below. It shall be remembered that even if falling objects do not directly cause injury or aircraft damage, they can become a source of Foreign Object Debris, or may cause people to trip and be injured; and

(viii) regular inspection is carried out to ensure that any deterioration in the equipment which may affect health and safety or aircraft safety is detected and rectified in good time. This inspection shall be carried out by people with sufficient knowledge, experience and training to identify and prioritise defects. The results of inspections shall be recorded and kept until at least the next inspection and longer if the inspection results are used for monitoring serviceability trends.

(r) Access to Aircraft Doorways

(i) proper planning, safe systems of work and instruction and training are required to ensure that aircraft doors are opened in such a way that no one is exposed to the risk of a fall and the risk of damage to the aircraft is minimised;

(ii) airlines shall ensure that they do not require aircraft doors to be opened in a manner which exposes people to unnecessary risk;

(iii) where the aircraft has outwards opening doors, which may foul the access equipment during opening and closing, employers shall establish whether the safest option, for both the worker and the aircraft, is to open the door from inside. This will require co-operation and co-ordination with the airline operating the aircraft;

(iv) there shall be a safe system of work in place for opening the door, and employees shall be given information, instruction and training on the task. The platform on which the employee is standing shall not have any defects that are likely to cause them to slip, trip or fall. Secure handholds shall also be provided;

(v) when doors are left open, suitable means to prevent a fall shall be in place. These include placing aircraft steps at the doorway;

(vi) any equipment which interfaces with the aircraft surfaces shall be approved by the aircraft manufacturer; and

(vii) extra care is taken during over-wing access. Lightweight fall restraint devices incorporating a lanyard and harness shall be used for such access.

(s) Inadequate Lighting, Glare, and Confusing Lights

(i) during darkness and periods of low visibility, apron areas shall be provided with a good standard of lighting of sufficient coverage and brilliance to enable pilots and ramp staff to operate safely and effectively;

(ii) care shall be exercised to ensure that no lighting installation can give distracting or confusing signals to pilots or cause dazzle or glare for any people on the airfield, including ATC staff in the visual control room;

(iii) every workplace has suitable, sufficient and uniform lighting to ensure people can work safely;

(iv) to avoid dazzle, vehicles on the aprons shall used dipped headlights whenever vehicle lights are required;

(v) any lighting used on the apron shall not conflict with aircraft guidance systems and if coloured lights are used they shall not be capable of confusion with colour coded aviation lights;

(vi) illuminated stand designator signs shall, where possible, be prominently placed at a standard position at the head of stand to give unambiguous indication to pilots of stand location/identification;

(vii) where the location of lighting for aerodrome landside sites, is visible from the airfield, the levels of brilliance and direction of any light display shall be such that there is no glare or dazzle to confuse or distract pilots or ATC staff;

(viii) lighting of non-aerodrome sites in the vicinity of aerodromes shall be subject to permission from the Authority;

(ix) the mounting height, brilliance and mounting angles of the luminaries shall achieve the illuminance and fall of light required without causing dazzle to pilots and other persons;

(x) the layout of mounting pylons shall be such that overlapping cover is provided which does not give rise to areas of deep shadow, such as on the ‘lee side’ of a large aircraft;

(xi) floodlighting, including mobile equipment, in contractors’ work areas shall be strictly controlled and subject to regular checks to ensure that glare/dazzle are eliminated;

(xii) Traffic lights controlling crossings of taxiways/taxilanes shall be clearly identifiable to vehicle drivers but shall be shielded from the vision of pilots; and

(xiii) Apron lighting shall be regularly checked for damage and disturbance of the settings of the luminaires.

(t) Electrical Hazards

There are a variety of sources of electrical hazards on the apron, including lighting, fixed or mobile electrical ground powers units, power supplies to other apron equipment (such as airbridges) and the aircraft itself.

(i) proper means of isolation shall always be provided to electrical systems. These shall be lockable. Where possible, isolators shall be designed so that people cannot gain access to parts which carry dangerous electrical currents unless the power is switched off;

(ii) redundancy is designed into systems where isolation would cause severe inconvenience (for example, as with the AGL system), so that one circuit can be isolated and worked on safely, whilst the second circuit keeps vital services operating;

(iii) electrical equipment shall always be used safely. Plugs shall be used with the sockets for which they were designed. Circuits shall not be overloaded, and shall be suitable for the environment in which they are used. Cables shall not be left in positions where they could be damaged;

(iv) GPUs shall not be used with the interlock bypassed. The bypass is intended for maintenance purpose only;

(v) all electrical systems shall be properly maintained. This will require a programme of inspection and test to identify defects before they become a source of danger. It also requires everyone promptly to report to their employer, and/or the operator or owner of the equipment, any defects they discover during the course of their work. All maintenance of electrical systems shall be carried out by competent and trained people to an adequate standard; and

(vi) personnel use appropriate protective equipment and tools.

(u) Slips and Trips

Slips and trips are results of accidents to people and aircrafts at aerodromes and include the following:

(i) obstructions;
(ii) loose items including FOD, improperly stowed cables etc;
(iii) defects in walkways, stairs and other areas;
(iv) spillages;
(v) improper design and constructions; and
(vi) poor maintenance of surfaces.

Aerodrome maintenance programmes shall be developed by the aerodrome operator to discover areas in need of attention before they become a source of danger. Airlines and ground handlers shall assist, for example by reporting parts of the apron which have been damaged, or are becoming excessively worn.

(v) Adverse Weather Conditions

Adverse weather conditions may affect the safety of aircraft operations, principally strong surface winds, low visibility conditions and crosswind components. Landing/take off of aircrafts may be precluded by crosswind components.

As part of the safety management system, aerodrome operators shall issue information about the precautions to be taken in anticipation of these conditions and with emphasis on the safety requirements for apron operations.

(w) Faults and Defects

(i) comprehensive fault reporting procedures shall be promulgated and maintained for all apron equipment and installations provided by the aerodrome. Clear instructions shall be issued and repeated by notice at main installation sites;

(ii) details of all reported faults and their rectification shall be recorded for audit purposes;

(iii) faults involving aircrafts and ground equipment shall be reported to the Authority for filing an MOR; and

(iv) all employers shall ensure that there are systems in place to enable staff to report defects and faults in company equipment. Action shall be taken on these reports, within in a timescale which reflects the seriousness of the defect or fault and the risk to people and/or aircraft.

(x) Movement Area Inspections

The requirement for inspections and maintenance of airfield facilities is implicit in the aerodrome licensing process. The Aerodrome Manual shall contain the requirements and accountabilities for the inspection and auditing of all the safety systems airside on a systematic basis. The results shall be recorded/ reported and fed back into the safety management system.

Aerodrome operators shall maintain inspection schedules for all apron equipment and facilities it provides. The results of these inspections shall be recorded. Serviceability/availability records shall be maintained on the principal systems for audit and management purposes.

(y) If the ground handling works are done by a third party/ground handlers, the aerodrome operator shall ensure that the abovementioned conditions are strictly adhered to by the third party/ground handlers.

Regular audits will be carried out by the Authority and the aerodrome operator. The third party/ground handlers will be required to permit the Authority and aerodrome operator to carry out inspections and audits of equipment and safety procedures. All required documents will have to be submitted to the Authority/aerodrome operator upon request.

(z) Personnel Protection

(i) As manual handling of baggage and material is the primary cause of personnel injuries, sufficient risk assessment of the manual handling task shall be conducted by the ground handlers and appropriate control put into place;

(ii) Hearing protection shall be used in noise-intensity areas such as on the apron;

(iii) Outer garments containing reflective material and high visibility colours shall be worn by personnel whose duties require airside access;

(iv) On arriving aircraft, all personnel shall remain clear of the propellers, engine inlets and exhausts until the engines have spooled down or propellers stop turning;

(v) On departing aircraft, as soon as the anti-collision lights are 'ON', personnel shall remain clear of propellers, engine inlets and exhausts;

(vi) The surface of the apron shall be kept free of any objects that might cause damage to aircraft or equipment; and

(vii) Personnel shall not walk between ULDs which are being transported by vehicles.

(aa) Load Handling

Recognised lifting techniques shall be utilised at all times to reduce the risk of personnel injury. Following precautions shall be taken while handling the load:

(i) Loads shall not be lifted by metal strapping normally used to bind the heavy shipments;

(ii) All loads shall be set down rather than dropping to avoid personnel injury and/or damage to the aircraft;

(iii) While moving pallets/containers, body parts shall be kept clear of stops/locks/guides;

(iv) While handling live animals, exposed body parts shall be kept clear of the interior of the containers; and

(v) Laid down guidelines shall be followed while handling dangerous goods.

(ab) Aircraft Loading and Unloading Operations

(i) Special precautions shall be observed to prevent damage that may result from the following:

(a) Exceeding aircraft floor load limitations;

(b) Inadequate tie-down and failure to fasten separation nets and door nets;

(c) Loading cargo on seats in the passenger cabin;

(d) Incorrect opening or closing of door and operation of cargo doors during strong or gusty wind conditions; and

(e) Mishandling of catering equipment.

(ii) During loading and unloading operations, full allowance shall be made for vertical movement of aircraft when the ground support equipment is positioned/ operated at the aircraft;

(iii) Care shall be exercised to avoid damage to the doors or their openings;

(iv) The loading of any item bulk/ULDs onto an aircraft shall be undertaken according to written load instruction to ensure correct weight and balance requirements;

(v) ULDs shall be cross checked by unit number with the load instructions, while loading;

(vi) The condition of the load including ULDs shall be checked prior to loading in order to protect leaking or otherwise damaged items. ULDs with any evidence of leaking contents shall not be loaded;

(vii) The handling of dangerous goods shall be undertaken with particular care to ensure that the integrity of the packaging is not adversely affected. Dangerous goods which are damaged shall not be loaded. Loading and stowage of dangerous goods shall conform to relevant regulations/standards;

(viii) Spills of any sort in the holds shall be reported immediately as it may result in damage to the aircraft floor or wiring;

(ix) Any spillage on the apron e.g. fuel, oil hydraulic liquids, etc. shall be reported immediately and the area cleaned;

(x) While maneuvering large or heavy items within the holds, crow bars and similar implements shall not be used directly upon the aircraft floor;

(xi) When loading pallets or containers, it shall be ensured that the edges are either guided by the side rails or fit under the stocks/ locks/guides and that the height of the pallet allow for the sufficient clearance in the door opening; and

(xii) During manual handling of pallets/containers, full control shall be exercised as their impact against locks and stops at high speed may cause damage.

(ac) Fire Protection and Prevention

(i) Location of fire fighting equipments, fire alarms, etc. shall be known to the ground personnel;

(ii) If fire is detected in a parked aircraft, the persons on board shall be immediately evacuated;

(iii) If the fire is detected on any ground support equipment, it shall be controlled utilizing the apron fire extinguishers or extinguishers on the equipment. As soon as practicable, the equipment shall be removed from the vicinity of the aircraft; and

(iv) Personnel shall have knowledge of types of fire-fighting equipment available and trained on their use.

(ad) Use of marker cones

(i) Marker cones shall be used to create safety buffer around specific areas on aircraft that are susceptible to ground damage;

(ii) Cones shall be positioned near each wing tip, in front of all wing mounted engines and in front of other areas near the aircraft that are in conflict with the normal flow of equipments during handling operations. Marker cones shall be positioned on an aircraft according to aircraft manufacturer recommendations; and

(iii) Cones shall be removed just prior to the aircraft departure and stored in a designated storage area.

(ae) Ground Support Equipment Operations

(i) Ground support equipment shall be operated only by adequate trained, qualified and authorized personnel;

(ii) Use of portable devices like mobile phones are not permitted while operating the vehicles;

(iii) Equipment shall not move across the path of taxiing aircraft or embarking and disembarking passengers. Aircraft and ground personnel shall always have the right-of-way;

(iv) Apron equipment shall be positioned within the equipment staging area with parking brakes ‘ON’ prior to the arrival of the aircraft;

(v) The passenger boarding bridge shall always be in fully retracted position prior to the aircraft arrival;

(vi) During bridge operations only the bridge operator shall be in bridgehead. For safety reasons, all other staff shall maintain sufficient distance from the bridgehead;

(vii) Equipment including passenger boarding bridges, shall not move from their safe position until it has come to a complete stop, chocks are positioned, engines shut down, anti collision beacons switched-off and ground/flight deck contact established;

(viii) Equipment approaching or leaving the aircraft shall not be driven at a high speed;

(ix) Attachment fittings/boarding bridges and platforms shall be correctly deployed;

(x) Ground equipment with interfaces with the aircraft passenger doors (e.g. passenger steps, catering vehicles, etc.) shall have platforms of sufficient width which will allow the aircraft doors to be opened/closed with the equipment in place and the safety rails deployed;

(xi) Prior to movement of any ground support equipment, a walk around check shall be carried out;

(xii) Hoses and cables on equipment shall be properly stowed before the unit is moved;

(xiii) Elevating devices shall not be driven in the elevated position except for final positioning;

(xiv) Unserviceable equipment shall be clearly tagged ‘out of service’ and immediately sent for repair;

(xv) While positioning equipment, care shall be exercised to ensure adequate clearance of vehicles, aircraft and other equipment;

(xvi) Standard hand signals shall be used to guide ground support equipment. The guide person shall be positioned so that clearances can be accurately judged;

(xvii) No vehicle shall be allowed to tow more than three carts, pods, or containers/baggage or pallet dollies at any one time. When left disconnected or parked, all dollies or group of dollies shall be left with the parking brakes ON;

(xviii) No vehicle shall be towed by another vehicle unless a suitable tow bar is used for that purpose; and

(xviv) The aircraft shall be towed only by trained and qualified personnel at a certain speed.

(af) Aircraft Fuelling Interface

As ground handling operations take place simultaneously with the aircraft fuelling, these activities shall be compatible to ensure the safety and integrity of the operation. The ground handling personnel shall strictly follow the procedure during refueling of aircraft as contained in refueling procedure.

(ag) Training Requirements

(a) To ensure safety of all personnel engaged in apron activities, the aerodrome operator shall provide minimum training. The objective of training is to ensure that required personnel are provided with requisite skills and knowledge on apron safety management;

(b) The elements of training programme shall cover all elements detailed in paragraph 4.18. The training programme and associated training materials shall be approved by the Authority;

(c) The training shall be a combination of theoretical and practical skill to verify the personnel understanding of the task being trained;

(d) The trainer delivering the training shall have followed a training course in Apron Safety Management. The trainer shall possess relevant instructional techniques, effective communication skills and be able to conduct theoretical and practical assessments;

(e) All training records shall be documented and made available for review by the authorized person of the organization and by the Authority; and

(f) To maintain ongoing competence, all personnel engaged in airside activity shall undergo recurrent training every three years.

4.19 OBSTACLE CONTROL

4.19.1 The aerodrome operator shall define, on the basis of the intended use of a runway i.e. take-off or landing and type of approach, a series of obstacle limitation surfaces at and around the aerodrome, that define the limits to which objects may project into the airspace.

4.19.2 The aerodrome operator shall set out procedures for:

(a) monitoring of obstacles in the obstacle limitation surfaces; and

(b) notifying the Authority of the nature and location of obstacles and any subsequent removal of obstacles for action as necessary, including amendment of the AIS publications.

4.19.3 Obstacle survey of the obstacle limitation surfaces shall be carried out regularly (every 2 years) to identify obstacles which can endanger aircraft operation safety.

4.19.4 The identified obstacles shall be removed or reduced in height.

4.19.5 Where it is impractical to eliminate an obstacle, it shall be appropriately marked and lighted.

4.19.6 Any equipment or installation located on runway/taxiway strips and safety areas considered as fixed obstacles, shall be of minimum practicable mass and height and be sighted in such a manner as to reduce the hazard to aircraft to a minimum. Additionally, any such or installation which is fixed at its base shall incorporate frangible mountings.

4.19.7 The aerodrome operator shall ensure that temporary obstructions due to construction works are adequately marked and lighted and reported to the AIS section.

4.20 CONDUCT OF AERONAUTICAL STUDIES

4.20.1 Introduction

4.20.1.1 An aeronautical study is a study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety. Such a study includes a systematic identification and analysis of safety hazards and an assessment of risks and possible mitigation measures. A comprehensive aeronautical study allows both the aerodrome operator and the Authority to be convinced that safety and regularity of operations of aircraft are not compromised in any way;

4.20.1.2 An aeronautical study is most frequently undertaken during the planning of a new facility, or during the licensing of an existing aerodrome or subsequently, when the aerodrome operator applies for an exemption, as a result of development or a change in the aerodrome standards specified in MCARs, Aerodrome Licensing Manual and the Civil Aviation Regulations;

4.20.1.3 Aerodrome operators shall consult their stakeholders, senior management and affected divisions/departments in their organisations prior to the conduct of an aeronautical study. These consultations would allow the proposed deviation to be viewed from different perspectives and the different parties involved would be aware of the proposed deviation. The aeronautical study shall be submitted to the Authority for consideration of acceptance;

4.20.1.4 Conduct of Aeronautical Studies is a means to identify alternative measures to achieve an equivalent or acceptable level of safety by means other than full compliance with a specific requirement;

4.20.1.5 It is acknowledged that there could be cases where full compliance with requirements cannot be achieved, and for which a deviation from a regulatory requirement will have to be sought. A safety case based on the same principles as an Aeronautical Study shall accompany any application for a deviation. It is important to note that the preferred option shall always be to seek compliance with the requirements. In order to achieve an equivalent or acceptable level of safety by other means, one shall usually establish mitigating measures that affect the efficiency and usability of the aerodrome;

4.20.1.6 One of the purposes of the aeronautical study is to determine levels of operational safety, service or procedures that shall apply at a particular location. The decision to undertake this type of study may be triggered by any one or more of a wide range of factors including changes to:

- the number of movements;
- the peak traffic periods;
- the ratio of IFR to VFR traffic;
- the type of operations - scheduled, General Aviation (GA), training, etc;
- the types, and variety of types, of aircraft using the aerodrome (jet, turbo-prop, rotary, etc);
- aerodrome layout;
- aerodrome management structure;
- runway or taxiway and associated manoeuvring areas; and
- operations of a neighbouring aerodrome or adjacent airspace.

Feedback about any changes shall be sought from aviation stakeholders including pilots, individuals and other representative groups as part of the study.

An aeronautical study may be initiated by the Authority, an aerodrome operator or another interested party, such as an air traffic service provider or air operators. The Authority can assist in identifying whether an aeronautical study is required and the appropriate methodology for the aeronautical study and in reviewing the aeronautical study.

4.20.1.7 If the aerodrome cannot meet the requirements, it needs to conduct Aeronautical studies and Risk Assessment which will address an alternative means of compliance. Consequently, the responsibility of justifying an application by means of an Aeronautical Study rests with the aerodrome operator;

4.20.1.8 Both aerodrome and flight operational expertise is needed. In some cases, ATS and/or PANS – OPS expertise shall be involved. Finally, depending on the complexity of the issue, specialists on risk analysis may have to be brought in to assess the degree of risk resulting from the aeronautical study;

4.20.1.9 An aeronautical study may contain many elements. However, risk assessment, risk mitigation and risk elimination are key components. Additionally, there may be aviation system constraints. The goal of risk management in an aeronautical study is to identify risks, and take appropriate action to minimise risk as much as is reasonably practicable. Decisions made in respect of risks shall balance the technical aspects of risk with the social and moral considerations that often accompany such issues. These decisions may have significant impact on an aerodrome’s operation and for an effective outcome there shall be a level of consensus as to their acceptability among the key stakeholders;

4.20.1.10 Aerodrome operator shall note that the Authority may choose to participate in the conduct of an aeronautical study as an observer where appropriate; and

4.20.1.11 The Aeronautical Study shall focus solely on matters that affect the safety and efficiency of airspace use and the safety of persons and property on the ground. It is not the role of the Authority to deal with matters relating to noise or other environmental issues, the effect on lifestyle or property values, or the effect on other services in the area such as roads, railways etc.

4.20.2 Objectives

The objectives of an aeronautical study shall be as follows:

(a) To study the impact of deviations from regulations and requirements;

(b) To present alternative solutions to ensure the level of safety remains acceptable;

(c) To estimate the effectiveness of each alternative; and

(d) To recommend operating procedures/restrictions or other measures to compensate for the deviation.

4.20.3 Steps of an Aeronautical Study

An Aeronautical Study implies a systematic and documented approach to a problem. It consists of the following steps:

(a) A description of problems and objectives;
(b) Selection of procedures, methods and data sources;
(c) Identification of hazards;
(d) An analysis of causal factors, severity and likelihood;
(e) Risk assessment;
(f) Identification of possible mitigating measures;
(g) An estimation of the effectiveness of mitigating measures;
(h) Choice of mitigating measures; and
(i) Presentation of results.

4.20.3.1 A description of problems and objectives

The first step of any risk analysis is to define the deviation and the objective of the exercise. The case study will be to identify the safety implications of not complying (in full) with a certain requirement or requirements. The objective will be to identify suitable mitigating measures, which will address these safety implications. Thus, it is important to understand which hazards and scenarios the requirement(s) in question are designed to protect against.

4.20.3.2 Selection of Procedures, methods and data sources

A main issue is whether the study shall follow a quantitative or qualitative approach. The answer will to a large extent dependent upon the data-sources available. A qualitative approach based on common sense and qualified expert opinion will probably, in many cases, yield results that are far better than nothing, and better than a quantitative approach based on a limited set of unrepresentative or unreliable data. Even if it is possible to carry out a quantitative approach, qualified expert opinion is necessary, particularly in the conduct of hazard identification and risk analysis.

4.20.3.3 Identification of hazards

Hazards are any situation or condition that has the potential to cause damage or harm. The basic question one shall ask is: what can go wrong, and where?

Examples of 'what' include, but are not limited to:

- Aircraft colliding with terrain, aircraft, vehicles or objects.
- Aircraft landing in front of the runway threshold (landing short)
- Aircraft running off the far end of the runway or veering off the side of the runway.
- Aircraft colliding with, or ingesting wildlife or foreign objects debris

Examples of 'where' include, but are not limited to:

- During flight (approach, landing, balked landing, take-off, climb-out)
- On the ground (Runway, taxiway, apron, strips, RESAs, or outside these areas)

The key is to identify hazards that the requirement in question is designed to protect against.

4.20.3.4 An analysis of causal factors, severity and probability

4.20.3.4.1 Causal factors

The basic questions are:
- why can it go wrong,
- what is the consequence if it does go wrong and
- how likely is it that it will go wrong?

Examples of 'why' include, but are not limited to:

- Lack of guidance (non-visual aids, lights, markings, signs, charts)
- Confusing guidance (non-visual aids, lights, markings, signs, and charts).
- Inaccurate obstacle surveys and obstacle publications
- Inaccurate aeronautical data
- Insufficient protected areas (strips and RESAs)

- Insufficient separation distances
- Insufficient surface widths
- Insufficient maintenance programmes

In some cases, these factors can contribute to an accident and in other cases they can increase the consequences of an incident so that it becomes an accident.

4.20.3.4.2 **Safety Risk Probability** (How likely is it that it will occur?)

This is a probability issue. How often is it likely to occur within a certain number of movements? The Table below gives the probability levels and their description.

Likelihood	*Meaning*	*Value*
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

4.20.3.4.3 Safety Risk Severity

What are the (potential) consequences if it occurs? The severity of the occurrence is better described by using the table below.

Severity	*Meaning*	*Value*
Catastrophic	— Equipment destroyed — Multiple deaths	A
Hazardous	— A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely — Serious injury — Major equipment damage	B
Major	— A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency — Serious incident — Injury to persons	C
Minor	— Nuisance — Operating limitations — Use of emergency procedures — Minor incident	D
Negligible	— Few consequences	E

4.20.3.5 Risk Assessment

4.20.3.5.1 Risks are the potential adverse consequences of a hazard, and are assessed in terms of their severity and probability;

4.20.3.5.2 Thus, for each hazard resulting from the non-compliance, one can now describe the risk by placing the combination of severity and probability in the Risk Assessment Matrix shown below;

Risk probability		Risk severity				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

4.20.3.5.3 The index obtained from the safety risk assessment matrix shall then be exported to a safety risk tolerability matrix as shown below that describes the tolerability criteria; and

Tolerability description	Assessed risk index	Suggested criteria
Intolerable region	5A, 5B, 5C, 4A, 4B, 3A	Unacceptable under the existing circumstances
Tolerable region	5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Acceptable based on risk mitigation. It may require management decision.
Acceptable region	3E, 2D, 2E, 1B, 1C, 1D, 1E	Acceptable

Risk index range	Description	Recommended action
5A, 5B, 5C, 4A, 4B, 3A	High risk	Cease or cut back operation promptly if necessary. Perform priority risk mitigation to ensure that additional or enhanced preventive controls are put in place to bring down the risk index to the moderate or low range.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Moderate risk	Schedule performance of a safety assessment to bring down the risk index to the low range if viable.
3E, 2D, 2E, 1B, 1C, 1D, 1E	Low risk	Acceptable as is. No further risk mitigation required.

4.20.3.5.4 As can be seen from the risk classification matrix, risk reduction measures can aim towards either reducing the likelihood of an occurrence, or reducing the probability of an occurrence.

4.20.3.6 Identification of possible mitigating measures

4.20.3.6.1 The first priority shall always be to seek measures that will reduce the likelihood of an occurrence (i.e. accident prevention). When contemplating mitigating measures, it is always necessary to look to the intent of the requirement that is not (fully) complied with.

4.20.3.6.2 Examples of mitigating measures include, but are not limited to:

(a) Publication in the AIP as a minimum;
(b) Aerodrome operational procedures are in some cases relevant. One example is to restrict traffic on a parallel taxiway if runway/taxiway or taxiway/taxiway separation distance is insufficient;
(c) Infrastructure and/or additional visual and/or non-visual aids;
(d) Operational restrictions that might be necessary. These may include restrictions on all-weather operations, increased spacing between aircraft (in the air or on the ground);
(e) revision of the system design;
(f) changes to staffing arrangements;
(g) training of personnel to deal with the hazard;
(h) development of emergency and/or contingency arrangements and plans;

(i) Restrictions on aircraft operators that might be necessary, such as:

(i) Operations restricted to operators/crew who can demonstrate special competence;
(ii) Requirements that aircraft carry special equipment or certifications; and
(iii) Requirements that operator sets for special wind limits.

(j) ultimately, ceasing operation

4.20.3.6.3 Mitigating measures usually means reduced usability for an aerodrome. Safety and usability is a balancing act.

4.20.3.6.4 Risk Register

The aerodrome operator shall maintain a risk register for safety assessment of an aeronautical study. The risk register shall be constantly updated throughout the aeronautical study life cycle. A sample risk register of an aeronautical study is as shown below.

No.	**Type of operation or activity**	**Generic Hazard**	**Specific components of the hazard**	**Hazard related consequences**	**Existing defences to Control risk(s) and risk index**	**Further action to reduce risk(s) and resulting risk index**
1.0	*Aircraft operation*	*Operation of Code 4F aircraft in <name of >. Code F aircraft using runway for landing and takeoff….*	Larger Winspan	*Wing tip collision at <parking bay numbers>.* *Loss of control of aircraft during pushback/towing operations.*	Use of wing walkers; *Aircraft to taxi at <speed value>.* *Training of staff for pushback/towing operations;* *Restrictions on other aircraft movements within <parking bay number>* *Safety risk index: 3C* *Safety risk tolerability: Tolerable*	*Conduct trials to study the effectiveness of the implementation.* Resulting risk index: 2E *Safety risk index: 2D* *Safety risk tolerability: Acceptable*

4.20.3.7 An estimation of the effectiveness of mitigating measures

The mitigating measures shall be fed back into the consideration listed earlier in order to evaluate their relevance and effectiveness in reducing risk.

4.20.3.8 Choice of mitigating measures

If one or more measures enable the risk to be sufficiently reduced, one can recommend a choice, bearing in mind that the preferred option shall be accident prevention, and prepare the final report. Thus the final description shall recommend mitigating actions and list the consequences and their probabilities when these are taken into account.

4.20.3.9 Presentation of results

4.20.3.9.1 The work shall be documented in such a way that it is possible to see what has been done. The steps referred to above shall be identifiable.

Other key issues:

(a) What essential assumptions, presuppositions and simplifications have been made? and

(b) Any uncertainty about the results due to the choice of and availability of methods, procedures and data sources shall be discussed.

4.20.3.9.2 The results of the study shall emphasize which undesired event contributes the most to risk, and factors influencing these undesired events. Recommendations for measures to mitigate risk, their character and their estimated effect shall be stated.

4.20.4 Acceptance by the Authority

The Aeronautical Study and Risk assessment results need to be submitted to the Authority for review and approval.

a) The Authority establishes the type of safety assessments that are subject to approval or acceptance and determines the process used for that approval/acceptance.

b) Where required in para a) above, a safety assessment subject to approval or acceptance by the Authority shall be submitted by the aerodrome operator prior to implementation.

c) The Authority analyses the safety assessment and verifies that:

1) appropriate coordination has been performed between the concerned stakeholders;

2) the risks have been properly identified and assessed, based on documented arguments (e.g. physical or Human Factors studies, analysis of previous accidents and incidents);

3) the proposed mitigation measures adequately address the risk; and

4) the time frames for planned implementation are acceptable.

Note.— It is preferable to work with a team of the Authority's operational experts in the areas considered in the safety assessment.

d) On completion of the analysis of the safety assessment, the Authority:

a) either gives formal approval or acceptance of the safety assessment to the aerodrome operator as required in para a) above; or

b) if some risks have been underestimated or have not been identified, coordinates with the aerodrome operator to reach an agreement on safety acceptance; or

c) if no agreement can be reached, rejects the proposal for possible resubmission by the aerodrome operator; or

d) may choose to impose conditional measures to ensure safety.

e) The State should ensure that the mitigation or conditional measures are properly implemented and that they fulfil their purpose.

4.20.5 Exemption

The Authority, where satisfied with the results of the aeronautical study, equivalent level of safety and mitigating measures provided, may offer an exemption to the compliance within the provision of the regulations.

4.20.6 Review of mitigating measures

The effectiveness of the mitigating measures shall be reviewed through periodic reviews of the measures on a safety case basis.

4.20.7 Approval of Deviations

(a) In some instances, the only reasonable means of providing an equivalent level of safety is adoption of suitable procedures and to require, as a condition of licensing, that cautionary advice be published in the appropriate AIP/Aerodrome Manual;

(b) All exemptions shall be reviewed regularly by the aerodrome operator in order to assess its continued validity and determine whether the cause can be removed;

(c) Exemptions against applicable regulations and requirements, shall be reviewed in order to determine if a change in the notification status of differences to regulations and requirements shall be filed;

(d) All aeronautical studies shall be submitted to the Authority following a non-compliance and all exemptions shall be approved by the Authority;

(e) The Authority may apply various procedures for validation or acceptance of the items that are submitted. Though in most cases the final aeronautical study approval process is based on the approval of the appropriate validation case, some interim review may be needed;

(f) The Authority shall disseminate, via the AIP, of information concerning alternative measures, operational procedures and operation restrictions implemented at the aerodrome; and

(g) The Authority is required to notify to ICAO of any non compliance with ICAO SARPs.

4.21 GROUND SERVICING OF AIRCRAFT

(a) Fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft, and there shall be a means of quickly summoning the rescue and fire fighting service in the event of a fire or major fuel spill; and

(b) When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

(i) the use of a sufficient number of exits for expeditious evacuation; and

(ii) a ready escape route from each of the exits to be used in an emergency.

4.22 MANDATORY OCCURRENCE REPORTING (MOR)

4.22.1 The objectives of the Mandatory Occurrence Reporting (MOR) System, as required by the Safety Management System, shall be as follows:

(a) to ensure that the hazardous or potentially hazardous incidents and defects are reported (hereinafter referred to as occurrences);

(b) to enable an assessment to be made by those concerned of the safety implications of each occurrence, both in itself and in relation to previous similar occurrences, so that any necessary action can be initiated;

(c) to ensure that knowledge of these occurrences is disseminated so that persons and organizations may learn from them;

(d) to use the reported information to improve the level of safety and not to attribute blame;

(e) to identify those occasions where routine procedures have failed; and

(f) to enable the collation and assessment of relevant incident and accident reports in order to identify adverse trends or to address deficiencies in the interest of aviation safety. The objective is to use reported information to improve the level of aviation safety and not to attribute blame.

4.22.2 In relation to all mandatory occurrence reports, including those raised by its own personnel, the aerodrome operator shall:

(a) evaluate each occurrence report received;

(b) report the occurrence to the Authority;

(c) make such checks, as it considers necessary to ensure that other organizations are taking any necessary remedial and preventative action in relation to reported occurrences;

(d) take such steps to persuade other aviation organizations to take any necessary remedial and preventative action in relation to reported occurrences;

(e) assess and analyze the information reported to it in order to detect safety problems which may not be apparent to individual reporters;

(f) make available the information derived from occurrence reports; and

(g) make available the results of studies of the data provided to those who will use them for the benefit of aircraft and aerodrome safety.

4.22.3 The aerodrome operator shall ensure that all reportable occurrences that are hazards to the safety of aircraft and aerodrome operations, aerodrome facilities and equipment, aircraft passengers and people on the aerodrome shall be reported to the Authority using the Mandatory Occurrence Reporting Form, Appendix 7. The aerodrome operator shall establish procedures for implementing mandatory/voluntary occurrence reporting;

4.22.4 The Mandatory Occurrence Report shall be submitted to the Authority within 96 hours of the reportable occurrence in writing.

4.22.5 The following shall be considered as mandatory reportable occurrences:

(a) objects on the movement and safety areas;

(b) defects/malfunctioning of any lighting system, visual aids and obstruction lights;

(c) wildlife hazards on the aerodrome;

(d) fuel spillage and failure/malfunction/defect of fuel storage and distribution system;

(e) loading of incorrect fuel quantities;

(f) contamination of aircraft structure, systems and equipment arising from the carriage of baggage or cargo;

(g) incorrect loading of passengers, baggage or cargo, likely to have significant effect on aircraft mass and/or balance;

(h) incorrect stowage of cargo containers likely to endanger aircraft, its equipment or occupants/people working on ground;

(i) accidents and incidents with dangerous good;

(j) aerodrome emergencies;

(k) incorrect/inadequate runway/taxiway/apron surface markings and signage;

(l) collision or risk of collision between aircrafts, vehicle or ground equipment/object;

(m) take off or landing or parking or taxiing incidents/accidents;

(n) jet and propeller blasts incidents/accidents;

(o) fire, explosion, smoke or toxic fumes on the aerodrome;

(p) incidents/accidents associated with the operation of a helipad;

(q) any other condition that may adversely affect the safe operation of aircraft;

(r) occurrences involving injury to a person;

(s) runway incursion;

(t) aircraft collisions;

(u) aircraft damage; and

(v) damage due to FOD.

4.22.6 The Mandatory Occurrence Report shall, as far as possible, contain the following information:

(a) type, series and registration marks of the aircraft;

(b) name of the aircraft operator;

(c) date and time of the reportable occurrence;

(d) name of agencies, persons involved in the incident/accident;

(e) details of equipment/vehicles involved and their agencies involved in the incident/accident;

(f) if the person making the report has instituted an investigation into the reportable occurrence, whether or not this has been complete;

(g) a description of the reportable occurrence, including its effects on aircraft operations and any other relevant information;

(h) actions taken; and

(i) preventive actions taken to prevent recurrence ie training and recurrent training of staff, any change in operational/maintenance/inspection procedures, change of physical characteristics, modification / replacement of aerodrome facilities /equipment etc.

4.22.7 The aerodrome operator shall not disclose the name of the person submitting the report or of a person to whom it relates unless required to do so by law; or the person concerned authorizes disclosure. Shall any safety follow-up action arising from a report be necessary, the aerodrome operator shall take all reasonable steps to avoid disclosing the identity of the reporter or of those individuals involved in any reportable occurrence. It is fundamental to the purpose of the reporting of incidents and accidents, that the knowledge gained from the investigation of these occurrences is disseminated so that we may all learn from them. The aerodrome operator shall ensure that relevant safety information deriving from the analysis of reports, which have been subjected to misidentifications, is made available to all parties, so that they can be used for improving safety.

4.22.8 The aerodrome operator shall make sure that its personnel report all events and emerging hazards to a designated officer. The reporting system shall be simple, confidential and convenient to use and shall be complemented with a non-punitive disciplinary policy. These attributes, accompanied by efficient follow-up mechanisms acknowledging to the reporter that a report has been received, investigated and acted upon, will encourage the development of a reporting culture. The results shall be distributed to the individual involved and the population at large.

In order to have an effective reporting system, the following shall be implemented by the aerodrome operator:

(a) the aerodrome operator has a non-punitive disciplinary policy in place;

(b) employees clearly understand what they shall report;

(c) all reports are confidential and analysed; and

(d) individuals are provided feedback on their reports in a timely fashion;

4.22.9 All occurences require appropriate investigation in order to:

(a) establish their root cause, that is the underlying initial contributing factor(s) that caused the event, and identify actions to minimize the chance of recurrence;

(b) satisfy any regulatory requirements for reporting and investigation as per the Civil Aviation Regulations and Aerodrome Licensing Manual;

(c) provide a factual record of the circumstances of the event or hazard to allow others to learn from the situation; and

(d) categorize the underlying causes and establish the appropriate remedial and continuous improvement action.

4.22.10 An aerodrome operator's safety reporting system, in general, shall encompass the following fundamental elements:

(a) systems for reporting hazards, events or safety concerns;

(b) systems for analyzing data, safety reports and any other safety related information;

(c) methods for the collection, storage and distribution of data;

(d) corrective action and risk reduction strategies; and

(e) on-going monitoring and Confirmation of the effectiveness of corrective action.

4.22.11 Once a safety event report has been investigated and analyzed, or a hazard identified, a safety report outlining the occurrence, and if available, the results of a hazard assessment, a corrective action plan shall be prepared, outlining how the aerodrome operator proposes to correct the deficiencies documented in the findings. Depending on the findings, the corrective action plan might include short-term and long-term corrective actions. As an example:

(a) **Short-Term Corrective Action** - This action corrects the specific issue specified in the audit finding and is preliminary to the long-term action that prevents recurrence of the problem. Short-term corrective action shall be completed by the date/time specified in the corrective action plan; and

(b) **Long-Term Corrective Action** - Long-term corrective action has two components. The first element involves identifying the root cause of the problem and indicating the measures to be taken to prevent a recurrence. These measures shall focus on a system change. The second component is a timetable for implementation of the long-term corrective action. Long-term corrective action shall include a proposed completion date.

4.22.12 All safety related information shall be disseminated throughout the organisation. Keeping current on safety provides better background for understanding aspects of the organization's safety condition and developing novel solutions to difficult problems. Another aspect of information dissemination is feedback on safety reports submissions. Employees shall be notified when a safety report is received or when a potential safety threat is discovered. Further information shall be provided pursuant to investigation, analysis and corrective action. In this way the entire organization becomes aware of safety issues and understands that the organization is actively seeking to address these issues.

4.22.13 Voluntary reporting of safety occurrences which may not be reported under the mandatory reporting provisions, shall also be implemented. The aerodrome operator shall encourage voluntary reporting. A voluntary report is made by a person not required to report legally. Voluntary reports are processed in a similar way to mandatory reports. A "just culture" and an open reporting system shall be implemented for an effective reporting culture. A "Just Culture" is defined as an atmosphere of trust in which people are encouraged for providing essential safety-related information.

4.22.14 The aerodrome operator shall establish procedure for reporting of occurrences as described at paragraph 4.22. The procedure shall be approved by the Authority.

4.23 ISSUE OF NOTAMS

4.23.1 A NOTAM contains any important information that could affect the safety of of aircraft operations or information that is required by the pilot to conduct safe operations. NOTAM is issued when there is not sufficient time to publish information and incorporate it into the Aeronautical Information Publication or for changes of short duration.

4.23.2 A NOTAM can only be issued for a maximum of 90 days. If the change or condition is to last more than 90 days, an amendment to the Aeronautical Information Publication will also be required. Permanent changes or events longer than 90 days' duration shall be forwarded directly to Aeronautical Information Services. Aeronautical Information Services will then publish an AIP supplement or amendment and request any NOTAM that may be required.

4.23.3 A request for NOTAM action shall be initiated by the aerodrome operator to the Authority when the following conditions occur:

1. establishment, closure or significant changes in operation of aerodrome/heliport or runways;

2. establishment, withdrawal or significant changes made to visual aids;

3. interruption of or return to operation of major components of aerodrome lighting systems;

4. occurrence or correction of major defects or impediments in the manoeuvring area;

5. changes to and limitations on availability of fuel;

6. establishment, withdrawal or return to operation of hazard beacons marking significant obstacles to air navigation;

7. presence of hazards which affect air navigation (including obstacles, military exercises, displays, races and major parachuting events outside promulgated areas);

8. erecting or removal of, or changes to, obstacles to air navigation in the take-off/climb, missed approach, approach areas and runway strip;

9. establishment or discontinuance (including activation or deactivation) as applicable, or changes in the status of prohibited, restricted or danger areas;

10. significant changes in the level of protection normally available at an aerodrome for rescue and firefighting purposes;

11. presence of water on the movement area;

12. outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

13. maintenance works on runway, apron and taxiway;

14. change in regulations or rules that require immediate action such as prohibited areas for search and rescue;

15. the presence of hazards that affect air navigation including obstacles, military exercises, displays, races, major parachuting events outside promulgated sites;

16. the erection, removal of or changes to significant obstacles to air navigation in the take-off/climb, approach, and missed approach areas, and runway strip;

17. any change from the published category of rescue and fire fighting services available at an aerodrome; and

18. any other operationally significant circumstance.

4.23.4 Information that relates to an aerodrome or heliport and its vicinity and does not affect its operational status does not require the issue of a NOTAM. If the information is not of direct operational significance, it shall be disseminated during pre-flight briefing or other local contact with aircraft operators and pilots. The following information does not need to be notified by NOTAM:

(a) routine maintenance work on aprons and taxiways that do not affect the safe movement of aircraft;

(b) runway marking work, when aircraft operations can be safely conducted on other available runways or the equipment used can be removed when necessary;

(c) partial failure of aerodrome lighting facilities where such failure does not directly affect aircraft operations;

(d) partial temporary failure of air-ground communications when suitable alternative frequencies are available and are operative;

(e) lack of apron marshalling facilities and road traffic control; and

(f) any other information of a similar temporary nature that does not affect the safe operation of aircraft.

4.23.5 NOTAM can be requested by completing a NOTAM Request Form and sending it to the Aeronautical Services. The details to be submitted shall be as follows:

(a) contact details of NOTAM originator; and

(b) NOTAM details.

(i) **NEW** if it concerns a NOTAM containing new information;

(ii) **REPLACE** if it concerns a NOTAM replacing a previous NOTAM;

(iii) **CANCEL** if it concerns a NOTAM cancelling a previous NOTAM;

Note: If the NOTAM is replaced or cancelled, indicate the number of current NOTAM;

(iv) **Location** - Specify the location of the activity which is the subject of the NOTAM to be issued;

(v) **Valid from Time** This is the ten-figure date-time group (YYMMDDhhmm) representing year, month, day, hour and minute at which the NOTAM comes into effect;

(vi) **Valid to Time** Ten-figure date-time group (YYMMDDhhmm) representing year, month, day, hour and minute at which the NOTAM expires (The period of validity shall not exceed 90 days);

(vii) **Daily Schedule** This item, if included, contains the specified schedule or period(s) during which an occurrence takes place. This field is optional and need only be completed as and when required; and

(viii) **NOTAM Text** The NOTAM text contains information on the hazard, status of operation or condition of the facilities reported on. Abbreviations may be used where appropriate.

4.23.6 The aerodrome operator shall establish procedure for the issue of NOTAM as described at paragraph 4.23. The procedure shall be approved by the Authority.

4.24 OBLIGATIONS TO RESTRICT CERTAIN AIRCRAFTS

4.24.1 The Aerodrome Operator shall ensure that procedures are developed to negate aircraft operators from operating at their aerodrome when such aircraft operators cannot meet the requirements, or are subject to:

(a) a ban based upon the origin of registry as notified by the Authority; or

(b) a cease and desist order as notified by the Authority; or

(c) when the aircraft is subject to a grounding order as notified by the Authority; or

(d) when the aerodrome physical characteristics are not appropriate for a type of aircraft

The Aerodrome Operator shall monitor and ensure that third parties at the aerodrome comply with such procedures; and

4.24.2 The procedures required by Clause 4.24.1 shall include immediate notification to the Authority of actions taken against such aircraft or aircraft operators

4.25 REPORTING STATISTICAL INFORMATION

4.25.1 The aerodrome operator shall provide statistical information to the Authority to permit an overview of Civil Aviation activity in Mauritius on a monthly basis.

4.25.2 The statistical information provided to the Authority shall include:

(a) number of passengers embarking/disembarking/transiting at the aerodrome;

(b) number of domestic/international departures and arrivals;

(c) amount of cargo in tonnes embarking/disembarking/transiting at the aerodrome; and

(d) all occurrences on the aerodrome including incidents, accidents, bird strikes, wildlife, etc

4.26 RUNWAY SAFETY PROGRAMME

4.26.1 The aerodrome operator shall develop a runway safety programme to improve runway safety and shall include the following runway safety issues:

- Design and maintenance of the runway;
- Markings, signs and lightings;
- Standard operating procedures for staff– missing, inappropriate or incomplete procedures;
- Birds and wildlife;
- Foreign object debris (FOD);
- Incursions & excursions (by aircraft); and
- Incursions (other than by aircraft).

4.26.2 RUNWAY INCURSION/EXCURSION PREVENTION PROGRAMME

4.26.2.1 Introduction

(a) Runway safety shall be a key priority for aerodrome operators, aircraft operators, and air traffic services (ATS). The prevention of both runway incursions and excursions shall 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;

(b) Improving runway safety on an aerodrome shall be a collaborative process, with the primary objective being to develop a runway safety action plan that shall identify and address safety issues through effective hazard identification
and risk mitigation;

(c) 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;

(d) Runway Safety Event Causal Factors

The following list provides a common list of causes of runway safety events:

i. weather;
ii. runway surface conditions (contamination);
iii. aerodrome design;
iv. longitudinal runway slopes;
v. conditional clearances;
vi. multiple line-up procedures;
vii. runway crossing procedures;
viii. simultaneous use of intersecting runways;

ix. late issuance or late changes of departure clearances;
x. inadequate, improper or non-standard phraseology;
xi. concurrent use or use of more than one language for ATS communication;
xii. radio frequency congestion;
xiii. English language competence;
xiv. excessive pilot workload;
xv. excessive controller workload;
xvi. work in progress; and
xvii. distraction (pilot, controller, driver, etc.).

(e) With the growth in traffic volume, runway incursions/excursions have been showing a growing trend all over the world and have raised a considerable safety concerns. Prevention of runway incursions/excursions has become a priority area. Runway incursions have sometimes led to serious accidents with significant loss of life. Although it is not a new problem, with the predicted growth of air traffic, the actual numbers of incidents are likely to rise, unless controlled and monitored with preventative actions;

(f) Runway safety programmes have a common goal — to reduce hazards and mitigate and manage residual risk in air transportation. Runway operations are an integral part of aviation. The hazards and risks associated with runway operations need to be managed in order to prevent runway incursions that may lead to accidents; and

(g) The aerodrome operator shall establish a runway incursion/excursion prevention programme to prevent runway incursions that may lead to incidents/accidents and to develop an action plan for runway safety, advise management as appropriate on potential runway incursion issues and ecommended strategies for hazard removal and mitigation of the residual risk.

4.26.2.2 Elements of runway incursion prevention programme

The runway incursion prevention programme shall include the following elements.

4.26.2.2.1 Factors responsible for runway incursions are as follows:

(a) As traffic volume increases, the likelihood of a runway incursion increases more rapidly when capacity-enhancing procedures are in effect than when they are not;

(b) If traffic remains the same, the potential for a runway incursion increases when capacity enhancing procedures are put into operation;

(c) Many aerodrome improvement projects have resulted in a more complex aerodrome layout which, together with inadequate aerodrome design standards, signage, markings and lighting, and the lack of standard taxi routes and availability of improved aerodrome diagrams, has worsened the situation;

(d) Increasing environmental pressure can compromise safe air traffic control (ATC) practices by requiring too many configuration changes;

(e) Inadequate training;

(f) Poor infrastructure and system design; and

(g) Inadequate ATC facilities.

4.26.2.2.2 Establishment of Local Runway Safety Team

A runway incursion prevention programme starts with the establishment of local runway safety team. The requirement for establishing the runway safety team is given below:

(a) The aerodrome operator shall establish runway safety team;

(b) The runway safety team shall comprise of representatives from -

(i) Aerodrome operator;
(ii) Air Traffic Service provider;
(iii) Airlines or aircraft operators;
(iv) Helicopter operators including Police helicopter operators;
(v) National Coast Guard aircraft operators;
(vi) Any other groups with a direct involvement in runway operations;
(vii) Representatives of flight crew operating at the aerodrome;
(viii) Members from General Aviation community; and
(ix) the Authority (as observer).

Other members can be co-opted including:

(i) Subject matter experts (meteorologists, accident investigation etc);
(ii) Emergency response service providers;
(iii) Technical experts of controller and pilots association; and
(iv) Support services (catering, ground handling etc).

(c) The runway safety team shall be chaired by the aerodrome operator;

(d) The runway safety team shall have a terms of reference;

(e) The runway safety team shall identify runway related hazards. These shall include aerodrome design, markings, signs and lights, as well as relevant aerodrome operations and procedures;

(f) 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.

(h) 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;

(i) Procedures to collect, monitor, analyse and protect safety data and safety information shall be established to understand and improve runway safety performance;

(j) Information that could enhance runway safety, including identified hot spots and specific local procedures shall be communicated to the relevant users;

(k) The primary role of a runway safety team shall be to:

(i) Develop action plan for runway safety;
(ii) Identify potential runway incursion/excursion issues, and
(iii) Recommend strategies for hazard removal and mitigation of the individual risks.

(l) The team shall meet at least once in three months at aerodromes used for International Air Transport Services and once in six month at other aerodromes. Frequency of meetings may be increased keeping in view of traffic growth due to capacity enhancement.

4.26.2.2.3 Objectives of the runway safety team

The team shall establish the following goals to improve the safety of runway operations:

(a) To improve runway safety data collection, analysis and dissemination as required in the SMS;

(b) To check that signage and markings are compliant with requirements and visible to pilots and drivers;

(c) To develop initiatives for improving the standard of communications;

(d) To identify potential new technologies that may reduce the possibility of runway incursion;

(e) To initiate local awareness by developing and distributing runway safety education and training material to Air Traffic controllers, pilots, personnel driving vehicles on the air side and personnel working at aerodromes;

(f) All organizations involved in the RST shall 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;

(g) The primary role of the RST shall be to develop a runway safety action plan. This action plan shall, 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; and

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

4.26.2.2.4 Terms of reference for the runway safety team

The terms of reference for the runway safety team formed at individual aerodromes shall be:

(a) Analysing the safety data relating to the number, type, and severity of runway incursions;

(b) Considering the outcome of investigation reports in order to establish local hot spots or problem areas at the aerodromes;

(c) Working as a cohesive team to better understand the operating difficulties of personnel working in other areas and recommending areas for improvement;

(d) Ensuring the implementation of the runway incursion prevention programme;

(e) Identifying any local problem areas and suggesting improvements;

(f) Conducting a runway safety awareness campaign that focuses on local issues, e.g., producing and distributing local hot spot maps or other guidance material as considered necessary;

(g) Regularly reviewing the airfield to ensure its adequacy and compliance with regulatory requirements;

(h) Reviewing 'Runway Incursion Reporting Form';

(i) Reviewing issues related to

(i) Birds and wildlife; and

(ii) Foreign object debris (FOD).

4.26.2.2.5 Action items to be prepared and monitored by the Runway Safety Team

(a) The outcome of the meetings of the Runway Safety Team shall be the development of a plan containing action items for mitigating runway safety deficiencies. The action plan would be aerodrome specific and linked to a runway safety concern, issue or problem at that aerodrome;

(b) Each action item shall have a designated person or organization which is responsible for completing the relevant tasks. There may be more than one person or organization affected by an action item; in such cases head of the safety team, shall co-ordinate with such persons or organizations for the completion of all tasks associated with the action item;

(c) The effectiveness of the implemented and/or completed action items shall be assessed periodically. This can be accomplished by comparing the results of the initial analysis and the current runway incursion status. For example, if an action item was to provide training for controllers, pilots or vehicle drivers, the effectiveness of such training shall be evaluated by the team. If the analysis shows little or no improvement in the number, type or severity of runway incursions, the team shall re-evaluate the implementation of that action item;

(d) Education and awareness material such as newsletters, posters, stickers and other educational information are invaluable tools for reducing the risk of runway incursions. These shall be used by the runway safety teams for the guidance and education of controllers, pilots, vehicle drivers and personnel working at the aerodromes;

(e) Identification of Hot Spots. Suitable strategies shall be implemented to remove the hazard associated with hot spots. When this is not immediately possible, action shall be initiated by adopting strategies to manage and mitigate the risk. These strategies may include:

(i) Awareness campaigns;
(ii) Additional visual aids (signs, markings and lighting);
(iii) Use of alternative routings;
(iv) Construction of new taxiways, and
(v) The mitigation of blind spots in the aerodrome control tower.

(f) Aerodromes charts showing hot spots shall be produced by the aerodrome operator, checked regularly for accuracy, revised as needed, distributed locally and published in the Aeronautical Information Publication (AIP);

(g) Harmonize runway incursion prevention procedures with other stakeholders involved in runway operations; and

(h) Reviewing issues related to

(i) Birds and wildlife; and
(ii) Foreign object debris (FOD).

4.26.2.2.6 Contributory factors for runway incursions

Runway incursions can be divided into several recurring scenarios. Common scenarios include:

(a) An aircraft or vehicle crossing in front of a landing aircraft;

(b) An aircraft or vehicle crossing in front of an aircraft taking off;

(c) An aircraft or vehicle crossing the runway-holding position marking;

(d) An aircraft or vehicle unsure of its position and inadvertently entering an active runway;

(e) A breakdown in communications leading to failure to follow an air traffic control instruction; and

(f) An aircraft passing behind an aircraft or vehicle that has not vacated the runway.

4.26.2.2.6.1 Breakdown in communications

A breakdown in communications between controllers and pilots or airside vehicle drivers is a common factor in runway incursions and often involves:

(a) Use of non-standardized phraseology;

(b) Failure of the pilot or the vehicle driver to provide a correct read back of an instruction;

(c) Failure of the controller to ensure that the read back by the pilot or the vehicle driver conforms with the clearance issued;

(d) The pilot and/or vehicle driver misunderstanding the controller's instructions;

(e) The pilot and/or vehicle driver accepting a clearance intended for another aircraft or vehicle;

(f) Blocked and partially blocked transmissions; and

(g) Overlong or complex transmissions.

4.26.2.2.6.2 Pilot factors

(a) Pilot factors that may result in a runway incursion include inadvertent non-compliance with ATC clearances. Often these cases result from a breakdown in communications or a loss of situational awareness in which pilots think that they are at one location on the aerodrome (such as a specific taxiway or intersection) when they are actually elsewhere, or they believe that the clearance issued was to enter the runway, when in fact it was not;

(b) Other common factors include:

  (i) Inadequate signage and markings (particularly the inability to see the runway-holding position lines);

  (ii) Controllers issuing instructions as the aircraft is rolling out after landing (when pilot workload and cockpit noise are both very high);

  (iii) Pilots performing mandatory head-down tasks, which reduces situational awareness;

  (iv) Pilots being pressed by complicated and/or capacity enhancement procedures, leading to rushed behavior;

  (v) A complicated design where runways have to be crossed;

(vi) Incomplete, non-standard or obsolete information about the taxi routing to expect; and

(vii) Last-minute changes by ATC in taxi or departure routings.

4.26.2.2.6.3 Air traffic control factors

The most common controller-related actions identified in several studies are:

(a) Momentarily forgetting about:
(i) An aircraft;
(ii) The closure of a runway;
(iii) A vehicle on the runway; and
(vi) A clearance that had been issued.

(b) Failure to anticipate the required separation, or miscalculation of the impending separation;

(c) Inadequate coordination between controllers;

(d) A crossing clearance issued by a ground controller instead of an air/tower controller;

(e) Misidentification of an aircraft or its location;

(f) Failure of the controller to provide a correct read back of another controller's instruction;

(g) Failure of the controller to ensure that the read back by the pilot or the vehicle driver conforms with the clearance issued;

(h) Communication errors;

(i) Overlong or complex instructions;

(j) Use of non-standard phraseologies;

(k) Reduced reaction time due to on-the-job training: and

(l) Other common factors include:

1. Workload & distraction;
2. Inadequate training & experience level;
3. Lack of a clear line of sight from the control tower; and
4. Incorrect or inadequate handover between controllers.

4.26.2.2.6.4 Airside vehicle driver factors

The most common driver-related factors identified in several studies are:

(a) Failure to obtain clearance to enter the runway;

(b) Failure to comply with ATC instructions;

(c) Inaccurate reporting of position to ATC;

(d) Communication errors;

(e) Inadequate training of airside vehicle drivers;

(f) Absence of radiotelephony equipment;

(g) Absence of radiotelephony training;

(h) Lack of familiarization with the aerodrome;

(i) Lack of knowledge of aerodrome signs and markings; and

(j) Lack of aerodrome maps for reference in vehicles.

4.26.2.2.7 Recommendations for the prevention of runway incursions

The following shall be implemented for the prevention of runway incursions:

4.26.2.2.7.1 Communications

(a) The full aircraft or vehicle call sign shall be used for all communications associated with runway operations;

(b) Standard ICAO phraseologies be used in all communications associated with runway operations;

(c) Periodically it shall be verified that pilots, drivers and air traffic controllers are using standard ICAO phraseologies in all communications associated with runway operations;

(d) All communications associated with the operation of each runway (vehicles, crossing aircraft, etc.) be conducted on the same frequency as utilized for the take-off and landing of aircraft; and

(e) Short and simple messages be used in ATC communications.

4.26.2.2.7.2 Aircraft operators (pilots)

(a) Pilots be thoroughly trained on aerodrome signage, markings and lighting;

(b) Pilots shall never cross illuminated red stop bars when lining up on, or crossing, a runway unless contingency procedures are in use that specifically allow this;

(c) If lined up on the runway and held more than 90 seconds beyond anticipated departure time, pilots shall contact ATC and advise that they are holding on the runway; and

(d) Pilots shall turn on aircraft landing lights when take-off or landing clearance is received, and when on approach.

4.26.2.2.7.3 Air traffic service providers and air traffic controllers

(a) Safety management systems that are in accordance with local regulations shall be implemented;

(b) ATC shall, whenever practical, give ATC en-route clearance prior to taxi;

(c) Stop bars shall be switched on to indicate that all traffic shall stop and switched off to indicate that traffic may proceed;

(d) Aircraft or vehicles shall never be instructed to cross illuminated red stop bars when entering a runway. In the event of unserviceable stop bars that cannot be deselected, contingency measures, such as follow-me vehicles, shall be used;

(e) It shall be ensured that ATC procedures contain a requirement to issue an explicit clearance including the runway designator when authorizing a runway crossing or to hold short of any runway. This includes runways not in use;

(f) It shall be ensured that ATC procedures contain a requirement to include the runway designator when an instruction to hold short of any runway is issued;

(g) Standard taxi routes shall be developed and utilized to minimize the potential for pilot confusion;

(h) Where applicable, progressive taxi instructions shall be used to reduce pilot workload and the potential for confusion. Progressive taxi instructions shall not infer a clearance to cross a runway;

(i) Environmental constraints shall not compromise safety, e.g. regular, multiple changes to the runway configuration;

(j) It shall be ensured that runway safety issues are included in the training and briefings for ATC staff;

(k) Any hazards shall be identified and any risks associated with runway capacity enhancing procedures (intersection departures, multiple line-ups, conditional clearances, etc.), when used individually or in combination, shall be evaluated. If necessary, appropriate mitigation strategies shall be developed;

(l) When using multiple or intersection departures, oblique or angled taxiways that limit the ability of the flight crew to see the landing runway threshold or final approach area shall not be used; and

(m) Controllers shall be "head-up" for a continuous watch on aerodrome operations.

4.26.2.2.7.4 Aerodrome operators and vehicle drivers

(a) The aerodrome operators shall include the optimal use of perimeter taxiways, the avoidance of runway crossings, simplistic and logical taxi/runway layouts and other related elements in the design and location of the aerodrome infrastructure;

(b) It shall be ensured that signs and markings are maintained and are clearly visible, adequate and unambiguous in all operating conditions;

(c) During construction or maintenance, information about temporary work areas shall be adequately disseminated and temporary signs and markings shall be clearly visible, adequate and unambiguous in all operating conditions;

(d) A formal driver training and assessment programme shall be introduced;

(e) Formal communications training and assessment for drivers and other personnel who operate on or near the runway shall be introduced; and

(f) Identify potential new technologies that may reduce the possibility of a runway incursion.

4.26.2.2.7.5 Incident reporting and investigation

(a) It shall be ensured that all runway incursions are reported and investigated in sufficient detail to identify specific causal and contributory factors; and

(b) To enhance lesson learning, related runway safety data shall be shared with other aviation safety organisations.

4.26.2.2.7.6 Aeronautical information

(a) Time-critical aerodrome information that may affect operations on or near the runway shall be provided to pilots in “real time” using radiotelephony communications; and

(b) Providers of aeronautical databases and charts shall establish a process with aeronautical information services with the objective of ensuring the accuracy, timeliness and integrity of data. A process shall be put in place to allow users to provide feedback on the accuracy of aeronautical information.

4.26.2.2.7.7 Other measures

(a) New infrastructure and changes to existing infrastructure shall be designed so as to prevent runway incursions;

(b) Changes to manoeuvring area practices and procedures, including planned works and work in progress, shall take account of runway safety and may require consultation with the RST. A safety assessment shall be included for procedural and/or infrastructural changes on the manoeuvring area;

(c) The aerodrome operator shall designate taxiways in order to eliminate ground navigation errors and communication confusion.

(d) The aerodrome operator shall 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 shall be assessed and appropriately mitigated;

(e) Procedures for conducting runway inspections shall take account of runway incursion prevention;

(f) When relevant, the aerodrome operator shall produce aerodrome charts identifying runway incursion hot spots. These charts shall be periodically revised as needed, distributed locally to manoeuvring area drivers, and published in theAeronautical Information Publication (AIP);

(g) Safety risks associated with the identified hot spots shall be assessed or mitigated at the earliest opportunity;

(h) Runway incursion prevention shall 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.

(i) The RST shall 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.

j) The RST shall periodically review the provision and operational use of visual aids aimed at protecting the runway;

k) Aerodrome operators shall establish and implement a formal “manoeuvring area vehicle driver training and assessment programme” and periodically review driver guidelines;

l) Aerodrome operators shall ensure that all manoeuvring area vehicle drivers are briefed on the operational conditions of the manoeuvring area and also reminded that situational awareness is maintained throughout their shift;

m) Aerodrome operators shall ensure that procedures for the control of all vehicles on the manoeuvring area are developed and implemented in cooperation with air traffic control; and

n) Runway-holding positions shall be clearly marked, signed and, if required, lit.

4.26.2.2.8 Incident reporting and data collection

(a) All runway incursions shall be reported to the Authority under Mandatory Occurrence Reporting using the Runway Incursion Reporting Form, Appendix 6: and

(b) Since there are few reported runway incursions per thousand aircraft movements, such incidents may appear to be unique to a particular aerodrome. It is only by pooling data that patterns of common causal factors can emerge.

4.26.2.2.9 Classification of the severity of runway incursions

4.26.2.2.9.1 Severity classification

Severity of Runway Incursions shall be classified as follows:

Severity Classification	***Description***
A	A serious incident in which a collision is narrowly avoided.
B	An incident in which separation decreases and there is significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision.
C	An incident characterized by ample time and/or distance to avoid a collision.
D	An incident that meets the definition of runway incursion such as the incorrect presence of a single vehicle, person or aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.
E	Insufficient information or inconclusive or conflicting evidence precludes a severity assessment.

4.26.2.2.9.2 Objectives of Severity classification

(a) To produce and record an assessment of each runway incursion and probability of its recurrence;

(b) To determine the causal and contributory factors and to apply the appropriate risk mitigation measures;

(c) To assess any incident notification with due regard to its severity classification and start the investigation process; and

(d) For the purpose of global harmonization and effective data sharing.

4.26.2.2.10 Runway Excursion Prevention

(a) 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;

(b) 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 shall be clearly visible, contrasting with the surface, and maintained;

b) runway holding positions shall 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 shall be considered; and

d) the use of visual aids to indicate the runway distance remaining shall be considered.

(c) The timely removal of rubber deposits and other contaminants from the runway shall be undertaken to ensure that adequate friction is maintained;

(d) 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 shall be sited to give the best practicable indication of conditions along the runway and touchdown zones;

(e) Aerodrome operators shall ensure that the declared distances notified to the aeronautical information service (AIS) for publication in the AIP are correct;

(f) 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 shall also be given to measures taken to restrict access to intermediary runway entry points.

4.26.2.2.11 Runway Confusion

(a) The RST shall 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.

(b) The manoeuvring area shall 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.

The RST shall also include human factors and performance in the selection of the above mitigation measures above.

4.26.2.2.12 Suspension or Closure of Runway Operations

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

(b) 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 shall be ensured;

(c) The aerodrome operator, in collaboration with ATS, shall ensure that the planning of construction works on the runway is, as far as possible, undertaken during low traffic times of the day or year;

(d) 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);

(e) 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;

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 flooding on runway;

f) aircraft incident, e.g. tail scrape, aborted take-off, tire burst; and

g) full emergency or local standby.

(f) If runway operations shall be suspended for a longer period of time due to planned circumstances, consideration shall 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).

(g) Aerodrome operators shall 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 shall maintain a record of all activities;

(h) The aerodrome operator shall augment the testing of the written procedure through regular table-top exercises;

(i) The following list contains a chronological sequence of actions which shall 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 purposed 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);

h) in the case of an accident, the aerodrome operator shall consider whether the Authority and/or police shall be advised of the situation (in some cases, permission to clear debris may be required from Aircraft Investigation Team and/or law enforcement);

i) the aerodrome operator shall contact the relevant department, maintenance contractor and aircraft operator if relevant, to facilitate remedial works; and

j) the aerodrome operator shall notify the appropriate national aviation authority (depending on national requirements and arrangements).

(j) The aerodrome operator shall 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 shall be carried out before resuming normal operations.

(k) 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 shall be agreed to and documented.

(l) 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.

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

a) remedial works shall 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 shall have vacated the runway and shall 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 shall cancel the NOTAM (if published);

f) the ANSP shall promulgate the availability of the runway using ATIS and radiotelephony (if applicable); and

g) normal operations may resume.

4.26.2.2.13 Training

Pilots, air traffic controllers and vehicle drivers shall follow the following training (initial and refresher (every 3 years)) courses, as applicable:

(a) runway incursion programme;

(b) ICAO phraseologies;

(c) Communication techniques;

(d) Aerodrome familiarization; and

(e) Airside Driving Codes.

4.26.2.2.14 "Hot Spots" Identification, Removal and Promulgation

(a) Aerodrome operators, air navigation services providers (ANSPs) and other key stakeholders shall 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.

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

(c) If hot spots are identified, the recommended strategy shall 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.

(d) 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;

(e) A new hot spot may occur as a result of a change to the movement area or an operating procedure. An assessment shall 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.

(f) The assessment described above shall be repeated periodically to ensure its validity and take into account current aerodrome operating practices and design.

(g) 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 shall 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 shall be notified on the aerodrome chart in the AIP.

4.27 OVERLOADING OF PAVEMENTS

4.27.1 Introduction

(a) In theory an aircraft of a known mass and specified operating tyre pressure can operate on a pavement so long as the ACR (Aircraft Classification Rating) of the aircraft is less than or equal to the published PCR (Pavement Classification Rating) of the pavement, subject to tyre pressure limitation;

(b) If the ACR of the aircraft intending to operate on the pavement is greater than the PCR of the pavement the aerodrome operator will need to assess whether to allow the operation to take place. Similarly, if the tyre pressure of the aircraft intending to operate on a pavement exceeds the maximum allowable tyre pressure for the pavement;

(c) Aerodrome pavements are designed and consequently rated to be able to withstand a specific number of repetitions or loadings by the critical or design aircraft without needing major pavement maintenance. There may be times when aircraft imposing more severe loadings than that which the pavement was designed for will seek approval to operate. These operations will not be permitted without the approval of the aerodrome operator;

(d) Pavements can sustain some overload, that is, pavement ratings are not absolute. There may be good reason why overload operations shall be approved. For instance, the design traffic is operating at less than design capacity and limited overload may not reduce the life of the pavement or depending on the overload may only marginally reduce the life of the pavement. This reduction in pavement life may be preferred to the alternative of refusing a desirable operation or having to strengthen the pavement for infrequent operations;

Pavement Life

(e) Pavements are normally designed for a defined life and mix of traffic. The true life expectancy of a pavement is a direct function of:

(i) environmental factors;
(ii) quality of pavement material;
(iii) traffic distribution;
(iv) number of operations/repetitions of aircraft loading;
(v) aircraft characteristics - weight, tyre pressure wheel configuration; and
(vi) overload operations.

(f) At some stage in the life cycle of the pavement failure modes will start appearing. The pavement is a structure and like all structures which are exposed to repeated loadings will eventually fail. The pavement distress can be arrested by following planned maintenance practices in accordance with an established pavement management system;

(g) Naturally the consequences of repeated overloads may lead to the following failure conditions:

(i) excessive roughness caused by general loss of shape after repeated operations by heavy wheel loads;
(ii) cracking of the seal surface where deflections caused are high or compaction of the pavement material is poor;
(iii) surface rutting and cracking of the seal surface and stripping of aggregate due to high tyre pressure; and
(iv) high maintenance costs.

(h) In respect of aircraft operations:

(i) reduced braking characteristics by reducing the tyre/pavement interaction;
(ii) it may lead to an increase in the required operational length of runway;
(iii) has potential to increase structural fatigue to aircraft;
(iv) increase the likelihood of foreign object damage to aircraft structures from loose stones and material; and
(v) cause discomfort to passengers.

4.27.2 OVERLOAD GUIDELINES

(a) Using ACR vs PCR

1. The following are the pavement overload guidelines for an aircraft to use a pavement with an ACR higher than the reported PCR provided that:

(i) occasional movements on a flexible pavement by aircraft with an ACR not exceeding 10 per cent of the reported PCR shall not adversely affect the pavement;

(ii) occasional movements on a rigid pavement by aircraft with an ACR not exceeding 5 per cent of the reported PCR shall not adversely affect the pavement;

(iii) where the pavement structure is unknown a limitation of 5 per cent shall apply;

(iv) the annual number of overload movements shall not exceed approximately 5 per cent of the total annual aircraft movements;

(v) overload movements are not be permitted on pavements exhibiting signs of distress or failure;

(vi) overloading shall be avoided during periods when the strength of the pavement or subgrade could be weakened by water; and

(vii) the condition of the pavement shall be regularly reviewed; and

(viii) the necessary acceptance is obtained from the Authority.

2. The following overload guidelines are appropriate for the current practice in Australia and provide a balance between commercial demand and risk management for the aerodrome operator:

(i) The guidelines at 4.27.2 (a) (1) are conservative and make them appropriate for the major aerodromes receiving a large number of aircraft movements by heavy aircraft;

(ii) An overload by aircraft with an ACR up to but not exceeding 10 per cent of the reported PCR is generally considered acceptable provided:

1. the pavement is more than twelve months old;
2. the pavement is not showing signs of distress; and
3. overload operations do not exceed 5 per cent of the annual departures and are spread throughout the year.

(iii) An overload by aircraft with an ACR greater than 10 per cent or more than 10 per cent but not exceeding 25 per cent of the reported PCR requires regular inspections of the pavement by a competent person and there shall be an immediate curtailment of such overload operations as soon as distress becomes evident;

(iv) An overload by aircraft with an ACR greater than 25 per cent but not exceeding 50 per cent of the reported ACR may be undertaken under special circumstances including:

1. scrutiny of available pavement construction records and test data by a qualified pavement engineer; and

2. a thorough inspection by a pavement engineer before and on completion of the movement to assess any signs of pavement distress.

(v) Overloads by aircraft with an ACR greater than 50 percent of the reported PCR shall only be undertaken in an emergency; and

(vi) Overloads not exceeding 100 per cent shall only be considered in the case of small aeroplanes operating into aerodromes which do not show signs of pavement distress and where the pavement and subgrade material is not subject to moisture ingress.

(b) Using Pavement Life

An alternative to choosing the amount of overload which would be acceptable on a pavement is the impact on the life of the pavement from overload operations. If the reduction in pavement life is allowable by the pavement management system in place at the aerodrome the decision may be taken to allow the overload operations.

4.27.3 ACCEPTANCE OF PAVEMENT OVERLOADING

(a) Normally an aeroplane with an ACR value greater than the PCR of the aerodrome pavements or operating with a tyre pressure greater than that which the pavement is rated for, will not be permitted to operate at the aerodrome unless an acceptance of pavement overloading is obtained from the Authority for the period of operations. The acceptance of pavement overloading is issued under certain conditions;

(b) In combination with the overload guidelines described earlier the aerodrome operator shall also consider the following:

(i) The safety of the operation:

1. where overloading of the pavement is so severe that damage to aircraft is likely and the safety of the occupants is in doubt, pavement overloading shall not be allowed;

(ii) The probability of pavement damage:

1. majority of one-off operations requiring acceptance of pavement overloading, are not likely to cause pavement damage or may cause only minor damage in localised areas;

2. basis of pavement design;

3. report on pavement evaluation and condition;

4. data on aircraft usage;

5. reports on damage caused by previous operations;

6. overload operations shall not normally be permitted on pavements exhibiting signs of distress of failure;

7. are operations one-off, short term or long term; and

8. local conditions e.g. recent prolonged rainfall causing loss of subgrade strength;

(iii) The social and economic importance of the operation:

1. are alternative aircraft available;

2. are the operations for humanitarian or compassionate reasons e.g. urgent medical evacuation, flood or disaster relief. These are rarely refused unless there is doubt about the safety of the operation;

3. are the operations politically desirable e.g. Head of State visits, Ministerial flights etc;

4. are the operations of significant commercial importance to the community;

5. are the operations essential or desirable militarily.

(iv) The consequence of any pavement damage:

1. the cost of repairs to any pavement damage;

2. the resources available to repair any damage;

3. the disruption to routine operations caused by any damage or repairs; and

4. where the aerodrome operator considers that the damage resulting from aircraft operations under acceptance of pavement overloading, has been caused by the aircraft operator's carelessness or non compliance with the conditions of the acceptance of pavement overloading, the aerodrome operator shall consider seeking compensation directly from the aircraft operator for part or all of the repair costs involved;

(v) Other considerations:

1. are the physical characteristics of the aerodrome movement area suitable for the intended operations of the overloading aircraft, for example, parking and manoeuvrability.

(c) The aerodrome operator shall carry out an appropriate aeronautical study to evaluate the suitability of the existing PCR to be used for aircraft with a larger ACR and to determine the need for alternative measures, operational procedures and operational restrictions as mentioned above for the specific aeroplane concerned, while preserving safety, as required per paragraph 4.20; and

(d) Following the submission of the aeronautical study, the Authority will then decide what is acceptable as a measure, procedure or restriction.

4.28 NOTIFYING AND REPORTING INFORMATION TO AIRCRAFT OPERATORS

The aerodrome operator shall develop and implement procedures for briefing aircraft operators of the necessary safety and requirements to operate on the aerodrome. The briefing shall include at least the following:

(a) provision of up to date aerodrome information as contained in the AIP to be available to the flight crew;

(b) requirement for the aircraft operator to report flight or ground based incidents/accidents to the Authority, including bird strikes or near misses;

(c) apron safety management and fuelling requirements as per the Aerodrome Licensing Manual and Civil Aviation Regulations in force;

(d) any limitations/exemptions to aircraft operations; and

(e) requirements of the Aerodrome Emergency Plan.

4.29 PROVISION OF APPROPRIATE INFRASTRUCTURE AND SERVICES

4.29.1 The aerodrome operator shall ensure that the physical characteristics of the aerodrome, the obstacle limitation surfaces, the visual aids for navigation and for denoting obstacles and restricted use areas and the equipment, installations and services required for the aerodrome are according to Civil Aviation Regulations, Aerodrome Licensing Manual and MCAR requirements.

4.29.2 The aerodrome operator shall ensure that an Master Plan is available and latter caters for future needs for passenger terminal building construction/extension, building of new runways/aprons/taxiways and related equipment and facilities. The aerodrome planning process for implementation and modification of the Master Plan shall include thorough consultation with all the Authority/stakeholders and necessary approval from the Government is required.

4.29.3 The aerodrome operator shall ensure that existing facilities including physical characteristics and Pavement Classification Rating of runway/apron/taxiway, parking stands availability and aerodrome facilities and equipment and capacity of the passenger terminal building are reviewed on a regular basis to cater for new larger aircrafts and greater air traffic/passenger capacity.

4.30 NOTIFYING AND REPORTING INFORMATION TO THE AERONAUTICAL INFORMATION SERVICE

The aerodrome operator shall notify and report aeronautical data to the Aeronautical Information Service.

(a) Data to be supplied to the Aeronautical Information Service shall be as per paragraph 3.9.4;

(b) Notification of inaccuracies in Aeronautical Information Service publications;

The aerodrome operator shall review the issues of Aeronautical Information Publication (AIP), AIP Supplements, AIP Amendments and Notices to Airmen (NOTAMS) issued by the Aeronautical Information Service on initial receipt, thereof, and at regular intervals thereafter. Immediately after such reviews, the aerodrome operator shall notify the Aeronautical Information Service of any inaccurate information contained therein that pertains to the aerodrome;

(c) Notification of changes in aerodrome facilities, equipment, and level of service planned in advance.

The aerodrome operator shall submit a request for approval from the Authority in writing at least one month before any change to the aerodrome facility or equipment or the level of service at the aerodrome that has been planned in advance;

(d) Issues requiring immediate notification shall be forwarded to the Aeronautical Information Service; and

(e) Obstacle Data

The aerodrome operator shall notify the aeronautical information service, the geographical coordinates and the top elevation of all obstacles that penetrate the obstacle limitation surfaces. The information shall be kept up to date by periodic survey (every two years).

4.31 COORDINATION WITH THE AIR TRAFFIC SERVICES (ATS) SECTION

(i) The aerodrome operator shall ensure that coordination is carried out with the ATS section as required below during aerodrome/aircraft operations in order to ensure safety of aircraft operations:

(a) The condition of the movement area and the operational status of related facilities shall be monitored and information provided to the air traffic control tower to enable this unit to provide the necessary information to arriving and departing aircraft. Whenever water is present on a runway, a description of the runway surface conditions including the possible assessment of water depth, where applicable, shall be made available to ATS section; and

(b) Reports on matters of operational significance or affecting aircraft safety or performance shall be given, particularly in respect of the following:

1. Aerodrome emergencies and emergency alerting system;
2. Access of persons/vehicles to maneuvering areas;
3. Helicopter operations at helipads/heliports;
4. Runway inspections;
5. Presence of wildlife on maneuvering areas;
6. Unserviceability of aerodrome facilities including aerodrome ground lights, visual aids etc;
7. Allocation of aircraft parking stands;
8. Notification of changes in the status of essential facilities affecting aerodrome operations (Refer to paragraph 4.30);
9. Issue of NOTAM (Refer to paragraph 4.23);
10. Obstacle data and unserviceable obstruction light for onward transmission to pilot;
11. Reduction in aerodrome category of Rescue and Fire Fighting Service;
12. Any occurrence that may have an immediate impact on the safety of aircraft operations;
13. Notification to ATC when friction coefficient of the runway surface is below the standard;
14. Crossing of sensitive/critical areas of navigational aids by vehicles/persons;
15. Aerodrome works;
16. Rough or broken surfaces on a runway, a taxiway or an apron;
17. Water on a runway, a taxiway or an apron. Information that a runway or portion thereof which may be slippery when wet shall be made available to the air traffic control;

18. Failure of primary and secondary power supply;
19. Evacuation of passenger terminal building;
20. Isolated aircraft position. The aerodrome operator shall ensure that the air traffic control tower is advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities; and
21. Other temporary hazards, including parked aircraft.

(ii) The information shall be kept up to date and changes in conditions, reported without delay; and

(iii) The aerodrome shall maintain a procedure for coordination between Air Traffic Services and aerodrome operators including, among others, the following:

(a) modes of communication between Air Traffic Services and aerodrome operator to ensure proper coordination; and

(b) the persons from Air Traffic Services and aerodrome operator involved in the coordination process.

4.32 HUMAN FACTORS

4.32.1 Introduction

4.32.1.1 Human Factors is about people in their living and working situations; about their relationship with machines, with procedures and with the environment around them; and also about their relationships with other people. “Human Factors is concerned to optimize the relationship between people and their activities, by the systematic application of human sciences, integrated within the framework of systems engineering”.

4.32.1.2 The human sciences study the structure and nature of human beings, their capabilities and limitations, and their behaviours both singly and in groups. The notion of integration within systems engineering refers to the Human Factors practitioner’s attempts to understand the goals and methods as well as the difficulties and constraints under which people working in interrelated areas of engineering shall make decisions. Human Factors uses this information based on its relevance to practical problems.

4.32.1.3 The industry need for Human Factors is based on its impact on two broad areas, which interrelate so closely that in many cases their influences overlap and factors affecting one may also affect the other. These areas are:

(a) Effectiveness of the system:
- (i) Safety; and
- (ii) Efficiency

(b) Well-being of operational personnel**.**

4.32.2 Definition

4.32.2.1 Human Factors Principles mean principles which apply to aeronautical design, licensing, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

4.32.2.2 The human factors concept concerns the interaction between:

(a) People and people;
(b) People and equipment;
(c) People and the environment; and
(d) People and procedures.

4.32.3 Key Concepts of Human Factors

Three key concepts are involved in human factors understanding and eventual implementation. These are:

(a) Human-centred Automation,

Automated aids can be designed from a technology-centred perspective or from a human-centred perspective. A technology-centred approach automates whatever functions it is possible to automate and leaves the human to do the rest. This places the operator in the role of custodian to the automation; the human becomes responsible for the "care and feeding" of the computer. In contrast, a human centred approach provides the operator with automated assistance that saves time and effort; the operator's task performance is *supported*, not *managed*, by computing machinery.

(b) Situational Awareness

Situational awareness (SA), can be defined as the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future. Thus, the most important Human Factors issue in regards to human-technology interface is the ability of the human operator to maintain situational/system awareness. It is an established fact that human-technology interfaces have not always been intuitive. Non-intuitive, 'opaque' interfaces lead to operational complexity which often forces the operator to allocate increased attention to maintain an adequate mental model of the situation/system status. This becomes the breeding ground for loss of situational awareness, decreased system performance and eventually human error and safety breakdowns.

Elements of Situational Awareness

The elements listed below are highly dynamic and present subtle to large changes that may occur at short notice, and that can or will influence how an employee works or performs at any particular moment. How these changes interact with an employee's SA may only be recognized after having gained considerable experience in general, and at a specific location in particular:

(i) personal factors;
(ii) weather;
(iii) infrastructure;
(iv) individual differences;
(v) traffic;
(vi) operators and pilots;
(vii) environment;
(viii) navigational aids;

(ix) aircraft performance;
(x) equipment; and
(xi) adjacent units.

(c) Error Management

It has always been considered that human error was an individual trait that could be prevented by the right training, attitudes or by automating as many human tasks as possible. However, this has not been able to eliminate error. The aviation industry thus shifted its focus from *eliminating* error to *preventing* and *managing* error. Human error is recognized as an inevitable component of human performance. Complex socio-technological systems therefore shall take this into account by design. The concepts of *error tolerance* and *error resistance* in technology design best exemplify this new focus.

The following are some of the causes of error:

(a) Lack of Communication;
(b) Lack of Knowledge;
(c) Complacency;
(d) Distraction;
(e) Lack of Teamwork;
(f) Fatigue;
(g) Lack of Resources;
(h) Pressure;
(i) Lack of Assertiveness;
(j) Stress;
(k) Lack of Awareness; and
(l) Norms.

Error management has two components: *error reduction* and *error containment*. Error reduction comprises measures designed to limit the occurrence of errors. Since this will never be wholly successful, there is also a need for error containment — measures designed to limit the adverse consequences of the errors that still occur.

Error management includes:

(a) measures to minimize the error liability of the individual or team;
(b) measures to reduce the error vulnerability of particular tasks or task elements;
(c) measures to discover, assess and then eliminate error factors within the workplace;
(d) measures to diagnose organizational factors that create error-producing factors within the individual, the team, the task or the workplace;
(e) measures to enhance error detection;

(f) measures to increase the error tolerance of the workplace or system; and

(g) measures to make latent conditions more visible to those who operate and manage the system.

4.32.4 Need for Human Factors in Aerodrome Emergency Planning

4.32.4.1 The need for Human Factors is based on its impact on two broad areas, which interrelate so closely that in many cases their influences overlap and factors affecting one may also affect the other. These areas are:

(i) Effectiveness of the system

(a) Safety

The SHEL model provides a conceptual framework to help understand Human Factors. It illustrates the various constituents and the interfaces — or points of interaction — which comprise the subject. According to SHEL's model Human Factors elements can be divided into four basic conceptual categories:

Software**:** documentation, procedures, symbols, etc.

Hardware**:** machinery, equipment, etc.

Environment**:** both internal and external to the workplace

Liveware**:** the human element.

Liveware-Liveware (L-L)

Communication skills
Listening skills
Observation skills
Operational management skills; leadership and followership
Problem solving
Decision-making

Liveware-Hardware (L-H)

Scanning
Detection
Decision-making
Cockpit adjustment
Instrument interpretation/situational awareness
Manual dexterity
Selection of alternative procedures
Reaction to breakdowns/failures/defects
Emergency warnings

Workload; physical, allocation of tasks
Vigilance

Liveware-Environment (L-E)

Adaptation
Observation
Situational awareness
Stress management
Risk management
Prioritization and attention management
Coping/emotional control
Decision-making

Liveware-Software (L-S)

Computer literacy
Self-discipline and procedural behaviour
Interpretation
Time management
Self-motivation
Task allocation

(b) Efficiency

(1) Application of group interaction principles;
(2) The proper layout of aerodrome facilities, access points and performance of fire tenders promotes and enhances effectiveness;
(3) Properly trained and supervised fire crew members are likely to perform more efficiently; and
(4) From the perspective of efficiency, standard operating procedures (SOPs), are developed to provide the most effective methods of operations, and shall be regarded as a means of measuring the performance of all members involved in emergency exercise.

(ii) Well-being of operational personnel

(a) Fatigue

Fatigue may be considered to be a condition reflecting inadequate rest, as well as a collection of symptoms associated with displaced or disturbed biological rhythms. Acute fatigue is induced by long duty periods or by a string of particularly demanding tasks performed in a short term.

(b) Body rhythm disturbance.

Safety, efficiency and well-being are affected by the disturbed pattern of biological rhythms typical of today's long-working hours.

(c) Health and performance.

Certain pathological conditions — gastrointestinal disorders, heart attacks, etc. — have caused sudden failure on human performance.

(d) Stress

Stress can be found in many jobs, and the aviation environment is particularly rich in potential stressors. Of main interest is the effect of stress on performance. In the early days of aviation, stressors were created by the environment: noise, vibration, temperature, humidity, acceleration forces, etc., and were mainly physiological in nature. Today, some of these have been replaced by new sources of stress: irregular working and resting patterns and life events.

4.32.5 Human Factor in AEP

4.32.5.1 Aerodrome operator shall include basic human factor principles in procedures and processes for emergency response, including how people interact with tasks, other people, machines, information sources and the environment with the consideration that humans have limitations and capabilities.

4.32.5.2 The Aerodrome Emergency Plan shall observe Human Factors principles to ensure optimum response by all existing agencies like Rescue & Fire Fighting (ARFF) personnel, Air Traffic Services, security, engineers, aircraft operators, aerodrome operator & other external organisations participating in emergency operations.

4.32.5.3 All aerodrome stakeholders in developing policies, procedures and guidelines for Aerodrome Emergency Services shall take into account human factors principles as described below;

1. Developing checklists for agencies and operators (this then steers a person down a prescribed path or behaviour);
2. Clear labelling and signage for the Emergency Operations Centre (EOC) or control post components to reduce confusion (want to reduce thinking and opportunities for incorrect decisions);
3. Nominating a person who is responsible for the AEP (create ownership so it remains updated);
4. The layout of the AEP is important (this is critical to providing an effective and efficient plan);

5. The plan shall observe human factors principles to ensure optimum response by all existing agencies participating in emergency operations. The principles shall include:

   - Workload;
   - Capabilities (personnel, equipment and facilities);
   - Functions;
   - Fatigue;
   - Decision aids;
   - Environmental conditions and constraints;
   - Team versus individual performance; and
   - Training effectiveness;
   - Knowledge;
   - Experience;
   - Staffing including numbers;
   - Skill levels;
   - Organisational structure;
   - Safety and health aspects; and
   - Safety systems and protective equipment.

6. Need for adequate rest and breaks, especially in physically demanding roles, whilst sustaining continuity of response;

7. Provision of CARE (Caring Action in Response to Emergency), mental and psychological treatment for the survivors, ARFF personnel and emergency responding personnel;

8. Human factor principles in Rescue and Fire Fighting (ARFF) Services as follows:
   - A competent and professional ARFF service with a comprehensive and relevant set of training modules;
   - unit tactical plans of the ARFF service;
   - importance of building mutual trust and team coordination amongst staff during training;
   - live fire training is crucial in helping ARFF personnel acclimatise to a heat and smoke filled environment;
   - proficiency in the operation of fire vehicles and other rescue equipment;
   - design ergonomics of fire vehicles during the pre-fabrication stage in order to optimise human performance during training and operations;
   - design of a fire station so that the ARFF service is able to meet the stipulated response time in the event of an aircraft emergency;
   - effective communication amongst ARFF personnel, air traffic control and pilots. Type of communications equipment and the transmission of messages shall allow critical information to be conveyed, assimilated, processed and executed;

- ARFF personnel to be well acquainted with the different configurations of various aircraft types operating at the particular aerodrome;
- importance of teamwork and team coordination in ARFF operations;
- provision of appropriate personal protective equipment (PPE) such as self-containing breathing apparatus (SCBA), helmets, boots, protective clothing to ARFF personnel;
- appropriate physical fitness programme to condition them for the physical rigours of the job;
- noise that is omnipresent in an environment;
- fatigue is one important factor that directly affects human performance and is greatly influenced by the shift system of ARFF services. There shall be considerations to ensure that ARFF personnel can have sufficient rest despite the need to be on 24-hour operational readiness at most s; and
- skilled leadership is needed to understand and handle various operational, training and administrative situations.

4.33 FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT PROGRAMME

4.33.1 Introduction

a) The presence of FOD on an aerodrome movement area and adjacent areas poses a significant threat 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 at the very least increased maintenance and operating costs. FOD hazards can be reduced, however, through the implementation of a FOD management program and the effective use of FOD detection and removal equipment;

b) FOD can severely injure aerodrome and airline personnel or damage equipment. Types of potential damage include cutting aircraft tires being ingested into engines or becoming lodged in mechanisms affecting flight operations. Personnel injuries or even death can occur when jet blast propels FOD through the environment at high velocities.

c) 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.

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

e) 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.

4.33.2 The aerodrome operator shall implement a FOD Management Programme which shall commensurate with the assessed risks and to the local operating conditions. The FOD Management Programme shall comprise of the following five main areas:

(a) Sources of FOD;

(b) FOD prevention;

(c) FOD detection;

(d) FOD removal; and

(e) FOD evaluation.

4.33.3 **Sources of FOD**

(a) Typical FOD includes the following:

(i) aircraft and engine fasteners (nuts, bolts, washers, safety wire, etc.);
(ii) aircraft parts (fuel caps, landing gear fragments, oil sticks metal sheets, trapdoors, and tire fragments);
(iii) mechanics' tools;
(iv) catering supplies;
(v) airline items (nails, personnel badges, pens, pencils, luggage tags, soda cans, etc.);
(vi) apron items (paper and plastic debris from catering and freight pallets, luggage parts, and debris from ramp equipment);
(vii) runway and taxiway materials (concrete and asphalt chunks, rubber joint materials, and paint chips);
(viii) construction debris (pieces of wood, stones, fasteners and miscellaneous metal objects);
(ix) plastic and/or polyethylene materials; and
(x) natural materials (plant fragments and wildlife).

(b) FOD sources are as follows:

(i) FOD can be generated from personnel, aerodrome infrastructure (pavements, lights, and signs), the environment (wildlife etc) and the equipment operating on the airfield (aircraft, aerodrome operations vehicles, maintenance equipment, fueling trucks, other aircraft servicing equipment, and construction equipment);

(ii) FOD can collect both on and below ground support equipment stored or staged on the apron, particularly in apron areas. Jet blast can then blow FOD onto personnel or an aircraft. Jet blasts can also create runway FOD when an aircraft transitions from a relatively large-width runway onto a smaller-width taxiway. Outboard engines blow any loose dirt and materials from the shoulder and infield areas onto the runway. Also, 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 center of the runway or taxiway;

(iii) Helicopters that manoeuvre over freshly mowed or loose-dirt infield areas can also move FOD onto runways, taxiways, and ramps. In addition, the rotor wash from a helicopter can propel lightweight ground support equipment or materials staged nearby;

(iv) FOD is often more common during aerodrome construction activities; and

(v) Weather can also be the cause of FOD due to movement. 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.

4.33.4 FOD prevention

The aerodrome operator shall implement the following FOD prevention principles.

(a) **Awareness**

(i) A first step in implementing a successful FOD management program is making sure that applicable personnel are aware of the program's existence. An aerodrome's FOD management system shall be visible in all aspects of the aerodrome operation. Improvements in FOD safety will occur most efficiently if all aerodrome personnel are actively encouraged to identify potential FOD hazards, act to remove observed FOD, and propose solutions to mitigate those hazards. Some examples of organizational communication are:

1. FOD letters, notices and bulletins;
2. FOD lessons-learned;
3. FOD bulletin boards, safety reporting drop boxes, and electronic reporting through email; and
4. FOD discussion at employee staff meetings.

(ii) An effective FOD program shall also have the full support of management. Management’s commitment to FOD prevention shall be formally expressed in a statement of the organisation’s FOD policy. The statement will serve to formally establish the FOD management program. Posting this policy statement in conspicuous locations will help reinforce the organisation’s commitment to FOD prevention and help remind employees of their FOD management duties. Some key elements of an aerodrome operator’s FOD policy are:

1. An outline of the methods and processes that the organization will use to achieve desired safety outcomes; and

2. The organization’s policy concerning responsibility and accountability.

(iii) The aerodrome operator shall designate an accountable officer to manage the aerodrome operator’s FOD management programme and issues. The FOD officer shall:

1. Review and assess the aerodrome operator’s FOD management program and make necessary revisions;
2. Conduct scheduled and unscheduled evaluations/inspections of work areas to assess the effectiveness of the FOD management program;
3. Assure implementation of corrective actions for FOD prevention;
4. Assure that FOD incidents are thoroughly investigated and that incident reports are investigated;
5. Assure that causes of FOD incidents are thoroughly analyzed to identify corrective measures;
6. Notify affected contractor/tenant organizations and personnel of unique FOD prevention requirements;
7. Develop techniques and assign responsibilities for publication of special FOD prevention instructions;
8. Review results of the FOD incident investigations and evaluate the adequacy of corrective actions;
9. Evaluate the amount and kind of foreign objects found and how they were found (e.g. during daily inspections, by pilots, operations staff, etc.);
10. Review and approve FOD prevention training curricula, designate training personnel, and assure that /contractor/tenant personnel receive required training;
11. Assure that written procedures provide for adequate records attesting to the current status and adequacy of the FOD management program; and
12. Manage any additional program activities, including the scheduling of the FOD committee meetings, as required.

(iv) An FOD committee shall be set up to 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. The members and terms of the reference of the committee shall be defined;

(v) An effective safety culture including proper personal attitudes and corporate commitment will enable or facilitate the FOD management programme; and

(vi) The FOD management programme shall be actively supported by the senior management of all organizations operating on the movement area.

(b) **Training and education**

(i) The aerodrome operator shall implement a training programme to ensure that each individual having access to airside, shall understand their role in the prevention of FOD. FOD training programme shall typically contain the following features:

1. A documented process to identify training requirements;
2. A validation process that measures the effectiveness of training;
3. Recurrent training and education (to help maintain awareness); and
4. Human (and organizational) factors.

(ii) The following subject matter shall be included in the FOD training programme:

1. Overview of the FOD management program in place at the aerodrome;
2. Safety of personnel, aircraft and passengers;
3. Causes and principal contributing factors of FOD;
4. The consequences of ignoring FOD, and/or, the incentives of preventing FOD;
5. Practicing clean-as-you-go work habits, and the general cleanliness and inspection standards of work areas (including the apron and maneuvering areas);
6. Proper care, use, and stowage of material and component or equipment items used around aircraft while in maintenance or on surfaces;

7. Control of debris in the performance of work assignments (e.g. loose items associated with luggage, ramp equipment, and construction materials);
8. Control over personal items and equipment;
9. Proper control/accountability and care of tools and hardware;
10. Requirements and procedures for regular inspection and cleaning of aircraft and apron areas;
11. How to report FOD incidents or potential incidents;
12. Continual vigilance for potential sources of hazardous foreign objects;
13. FOD Detection procedures, including the proper use of detection technologies (if applicable); and
14. FOD Removal procedures.

(iii) Training requirements, activities and records shall be documented.

(c) Mitigation measures

An aerodrome's FOD prevention programme shall be tailored to mitigate the particular actions and activities that generate FOD. A few examples of these activities include:

(a) Aircraft Servicing. Aircraft and aerodrome stakeholders generate much of the FOD found in the apron, service roads, baggage makeup areas, and areas near flight kitchens. Agreements between air carriers and their support organizations shall specify which of the parties are responsible for cleaning various areas. Procedures to inspect the baggage loading and unloading areas every time an aircraft is serviced, shall be set up as luggage items (such as baggage wheels, zippers, and accessories) are common FOD items found in the apron;

(b) Aircraft Maintenance. Disposal of nuts, bolts, washers, safety wire, etc. and hand tools used in repair jobs, shall be accounted for. Aids in the control of these items shall include checklists, shadow boards, and cut out tool tray liners. All items shall be contained in a spill proof tote bag, tray or toolbox;

(c) Air Cargo. In cargo areas, there is a high potential for blowing debris such as cargo strapping and plastic. Procedures shall be established to contain such debris, possibly by installing (and monitoring) fencing where appropriate. FOD trapped by such fences shall be removed regularly;

(d) Construction.

1. Both airside and landside construction activities, as well as scheduled maintenance, shall be communicated to aerodrome users as early as possible. Specific FOD prevention procedures shall be established and employed for each construction project;

2. The designated routes of construction vehicles on the operational areas shall be examined, so as to avoid or minimize crossings of 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;

3. The following conditions shall apply for contractor:
   - Requiring contractors to cover all loads;
   - Requiring contractor to secure any lose items that could easily be blown;
   - Specifying whether any mechanical FOD removal devices will be required;
   - Specifying how monitoring for FOD hazards will be done; and
   - Requirements for inspecting tires prior to traversing areas where aircraft are located.

(e) Airfield Maintenance Operations.

(i) Mowing and other maintenance operations routinely disturb the vegetation and soil in areas adjacent to areas traveled by aircraft. Procedures shall be established to remove debris such as the use of an assigned airfield sweeper or personnel on foot using shovels to repair vegetation and soil;

(ii) Airfield lighting, pavement, and marking maintenance operations 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 shall include the use of airfield sweepers and inspection of the work site after the procedures are completed; and

(iii) Pavements. Asphalt and concrete pavements may be the most common source of FOD on an aerodrome. Therefore, effective pavement maintenance practices are critical to the mitigation of FOD.

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

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

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

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.

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

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

4.33.5 FOD Detection

While proper FOD awareness is fundamental for any successful FOD programme, the act of detecting FOD is one of the critical FOD operations that occur at an aerodrome. This process involves not only the identification of potential FOD causes and locations, but also the timely detection of any FOD on surfaces. The FOD detection programme shall make provisions for the following:

(a) **FOD risk assessment**

A FOD risk assessment shall enable an aerodrome operator to determine where unsafe FOD conditions exist.

(b) **FOD areas and operations**

The following areas and operations are typically prone to having FOD:

(i) Manoeuvering areas (runways and taxiways)

1. The portion of the runway used by aircraft to take off is where departing aircraft are most susceptible to FOD damage;

2. Deteriorating or neglected pavement can exhibit spalling or cracks. For example, pieces of concrete can break loose from pavements or FOD can develop from fatigue corner cracks and airfield markings. FOD associated with building materials, debris falling from construction vehicles or blown from the apron onto aircraft maneuvering areas. Broken pieces of pavement can collect at the edge of the apron and be carried onto the aircraft maneuvering area by the tires of vehicles;

3. Service roads that cross taxiways shall be monitored closely to prevent the vehicles using these roads from moving FOD onto the taxiways (especially in the case of construction operations);

4. Shoulders. Unpaved areas adjacent to pavement shall be stabilized to prevent FOD;

5. Pavement Joints. Special attention shall be paid to the cleaning of cracks and pavement joints as tests have shown that these are the main sources of foreign objects which are ingested;

6. Turf Areas. Turf grass and ditches collect and hold large amounts of light debris such as paper, cardboard, plastic, and various containers that trash often originate in terminal aprons, cargo ramps, and hangar ramps. This trash can blow back into areas traveled by aircraft unless collected in a timely manner;

7. Fence-lines. Fences can collect trash on windy days. This FOD shall be collected before the wind increases or shifts direction and the trash blows back on to areas traveled by aircraft.

(ii) Apron. Anywhere on the aircraft apron where ground vehicles operate.

(iii) Aircraft Servicing Operations

1. Refueling, catering, cabin cleaning, and baggage and cargo handling can produce broken materials;
2. Baggage pieces, including bag tags and wheels, can break off luggage and either fall onto the apron or collect in the door sill. Items collected in the door sill can damage the door or prevent it from properly closing. They can also be knocked out of the sills and onto the apron at the next station; and
3. Other areas where FOD is likely to collect include the ground at both ends of the conveyor, and the area between the baggage cart and the conveyor belt.

(iv) Cargo Operations

1. High potential for blowing debris such as plastic cargo wrappers; and
2. Fencing used to contain debris shall be cleaned regularly.

(v) Construction Operations.

1. The proximity of construction activities to operational areas presents a risk of debris; and
2. Regular and thorough cleaning of the construction site, including the construction haul routes, is expected. Particular attention shall be paid to construction vehicle routes that cross or are adjacent to active pavements.

(vi) Aircraft Maintenance Activities

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;
2. All tools shall 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.

(vii) Other activities. All vehicles shall be driven on clean, paved surfaces when possible. If a vehicle shall be driven on unpaved surfaces, the operator shall check the vehicle tires for foreign objects immediately after returning to the pavement.

(c) Detection methods and techniques

(i) Operational areas shall be inspected regularly, with additional inspections being made in construction areas and immediately after any aircraft or ground vehicle accident or incident or any spill of material which may cause slippery conditions. In addition to performing these inspections at the beginning of the day or shift, personnel in the operational areas shall practice a clean-as-you-go technique of looking for FOD during their normal shifts in the course of their regular duties. Inspections occurring at night, taking place after the runway is closed or before the runway is opened, also occur frequently. During night time inspections, personnel and vehicles shall be equipped with additional lights/lighting systems to better detect FOD;

(ii) As part of the FOD management program, the FOD officer may find it appropriate to reach out to airlines and pilots to leverage the aerodrome’s current FOD management efforts. For example, pilots could be asked to report to ATC and station operations any FOD they observe on runways and taxiways;

(iii) Encouraging the participation of aerodrome tenants in inspections will reinforce the concept that FOD prevention is a team effort and demonstrate the aerodrome operator's commitment to a debris-free environment;

(iv) The inspection of an aircraft stand shall be carried out prior to the arrival and departure of an aircraft, in order to detect and remove any FOD present;

(v) Aerodrome operators shall establish procedures for handling FOD matters in cooperation with the appropriate ATS unit;

(vi) 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;

(vii) 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 shall establish procedures for handling such matters in cooperation with the appropriate ATS unit;

(viii) 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 shall 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.

(ix) 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.

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

(xi) The aerodrome operator shall 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.

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

4.33.6 FOD removal

(a) Once FOD is detected, the next major operation of a FOD management program will occur: removing FOD from the aerodrome environment as soon as practicable. The most effective resource for FOD removal is the use of FOD removal equipment, especially in areas where FOD can be expected, such as near areas of construction. For removal of an isolated FOD object detected on a runway, manual removal will be the most efficient; and

(b) FOD Bins

(i) Designated FOD containers shall be conspicuously placed at all gates for the collection of debris. The containers shall be well marked, properly secured, and emptied frequently to prevent them from overflowing and becoming a source of FOD themselves;

(ii) “Closed-type” containers are preferable, given the opportunity for wind to dislodge the container contents. Consequently, “open-type” containers are not advised. Aerodrome operators shall ensure that FOD containers do not blow over during periods of high winds. This can be accomplished by using heavy trash cans or securing the containers to the ground with a tether or a weight. FOD containers shall also have placards stating that hazardous materials may not be deposited in them;

(iii) Suggested locations include: near all entry points to the operations area, in hangars, in aircraft tie-down and aircraft maintenance areas, and at each aircraft gate or baggage area. Central or well-known storage locations increase the likelihood that collected debris will be deposited by personnel;

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

(v) FOD removal operations shall be as follows:

a) assigning an airside sweeper(s) to work with maintenance crews and/or respond as required to reports of FOD; and

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.

4.33.7 FOD evaluation

(a) A consistent trend of small items, such as those coming from a particular entity or operation, or particularly large or hazardous FOD, may require detailed documentation for effective analysis and prevention efforts. Aerodrome personnel shall collect the following information, to the extent practicable, whenever FOD is collected:

(i) How the FOD object was detected;
(ii) Date and time of FOD detection and retrieval;
(iii) Description of FOD retrieved (category, size, color), and/or image (if available);
(iv) Location of FOD object (coordinates and reference to the AOA location);
(v) Possible source;
(vi) Name of personnel detecting / investigating FOD item; and
(vii) Operations and weather data during the FOD detection event.

(b) All personnel operating on the operations area shall report FOD occurrences to the FOD officer;

(c) Major FOD incidents and accidents shall be investigated by the aerodrome operator and report submitted to the Authority;

(d) The aerodrome operator shall maintain a record of the measures taken to fulfill the objectives of the FOD management system. These records may be required in the event of a formal investigation of an accident or serious incident, and can also be used to identify any trends, repeats, unusual conditions, etc., in order for corrective action to be initiated. Records can also provide quantitative data for future risk assessments, support the assessment of system operational history and assure operational capabilities; and

(e) An effective aerodrome FOD management programme evaluation shall:

(i) Systematically review the effectiveness of existing FOD-management procedures used by and air carrier personnel, including all available feedback from daily self-inspections, assessments, reports, and other safety audits;

(ii) Verify that the aerodrome is meeting identified performance indicators and targets;

(iii) Solicit input through a FOD system;

(iv) Communicate findings to staff and implement agreed-upon corrective procedures, mitigation strategies, and enhanced training programs; and

(v) Promote safety in the overall operation of the aerodrome by improving coordination between aerodrome staff, airlines representatives and stakeholders.

(f) All FOD identified and collected on the aerodrome shall be recorded, analysed and evaluated. When appropriate, an investigation shall be carried out to identify the source of the FOD;

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

(h) The FOD management programme shall be periodically reviewed and updated based on the data and trend identified through the evaluation of FOD collected on the aerodrome.

4.34 GLOBAL REPORTING FORMAT

4.34.1 Introduction

4.34.1.1 Global Reporting Format (GRF) is the methodology for assessing and reporting runway surface conditions and enables the harmonized assessment and reporting of runway surface conditions. GRF provides a correspondingly improved flight crew assessment of take-off and landing performance;

4.34.1.2 Movement areas are exposed to a multitude of climatic conditions and consequently a significant difference in the condition to be reported. The Runway Condition Report (RCR) describes a basic structure applicable for all these climatic variations and provides the flight crew with the information needed for safe operation of the aeroplane;

4.34.1.3 The Runway Condition Code (RWYCC) reflects the runway braking capability as a function of the surface conditions. With this information, the flight crew can derive, from the performance information provided by the aeroplane manufacturer, the necessary stopping distance of an aircraft on the approach under the prevailing conditions; and

4.34.1.4 GRF establishes a common language between all stakeholders in the system: aerodrome operators, aircraft operators, pilots, Air Traffic Services, Aeronautical Information Services, Meteorological Services and aircraft manufacturers.

4.34.2 GRF Process Outline

The GRF process shall be as follows:

a) Aerodrome operators shall assess the condition of the runway for each third of the runway and issue a Runway Condition Report (RCR) including also situational awareness of the surface conditions on the taxiways and aprons using the Runway Condition Assessment Worksheet at Appendix 15. This report shall contain the Runway Condition Code (RWYCC) and information, which describes the runway surface condition, type of contamination, depth, coverage for each third of the runway, etc. and other relevant information. This code is derived from the Runway Condition Assessment Matrix (RCAM). The aerodrome operator shall then relay the RCR to ATS/AIS;

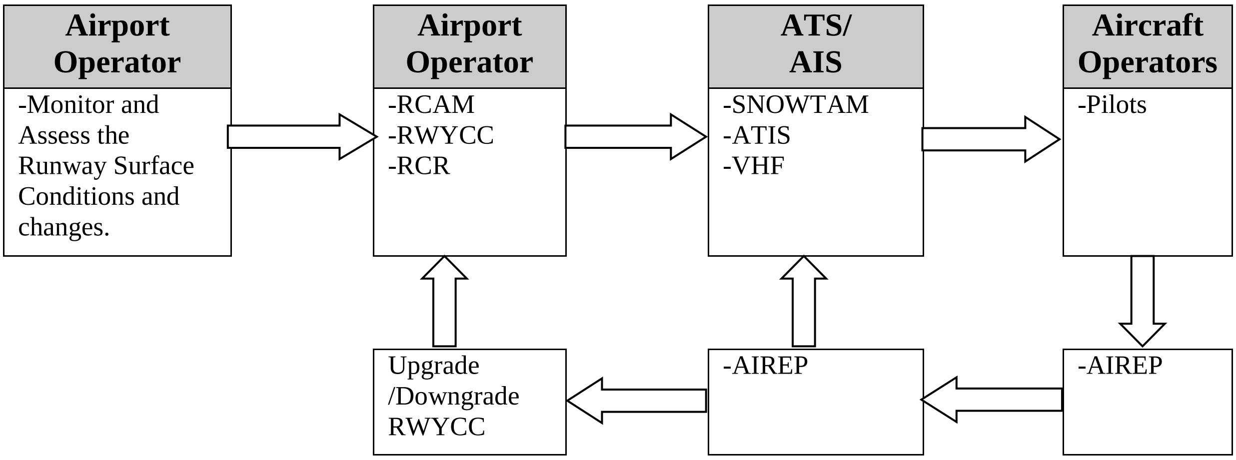
b) The assessment process shall include:
   i. assessing and reporting the condition of the movement area;
   ii. providing the assessed information in the correct format; and
   iii. reporting significant changes without delay.

c) ATS/AIS shall then transmit the RCR information to pilots by VHF radio, ATIS or by SNOWTAM depending on the RCR;

d) Depending on the RCR, the pilot shall assess the take-off and landing performance;

e) Pilot reports (AIREP) of runway braking action shall be taken into consideration as part of the ongoing monitoring process and RWYCC shall be upgraded/downgraded accordingly;

f) The GRF Information Flow shall be as indicated in the flow diagram below:



g) When a runway is wholly or partly contaminated with standing water, the information shall be disseminated through AIS (SNOWTAM) and ATS (VHF and ATIS); and

h) When a runway is only wet or slippery wet, the information shall be disseminated through ATS (ATIS and VHF) only.

4.34.3 Responsibilities of Stakeholders

4.34.3.1 Aerodrome Operator Responsibilities

The Aerodrome Operator shall be responsible for assessing aerodrome surface conditions and disseminating such information through ATS/AIS provider.

To fulfill this role, the aerodrome operator shall develop a procedure which shall include, amongst others, the following:

a) identify the methodology to be adopted to measure the percentage of coverage and depth of contaminant for each third of runways. The process shall also include data gathering for other parts of the movement area;

b) collection of data, production of RCR, dissemination of information to ATS/AIS, and updating of RCR.

c) identify personnel who shall be responsible for tasks highlighted at paragraph b) above;

d) develop training programmes related to runway surface condition reporting;

e) coordinate with the respective ATS/AIS provider to ensure seamless transmission of RCR;

f) inform all aerodrome users, particularly the General Aviation community and other operators on GRF implementation, ideally through established safety committees and Runway Safety Team;

g) conduct a safety risk assessment to address any potential concerns;

h) phraseology used in GRF; and

i) in conjunction with ATS/AIS provider, conduct system testing to ensure a smooth transition on target date.

4.34.3.2 ATS/AIS Provider Responsibilities

Depending on the situation, the RCR shall be disseminated by means of: a) SNOWTAM; b) ATIS, or c) radiotelephony (VHF). It shall be the responsibility of the ATS/AIS provider to ensure the timely availability of the RCR to aircrew and, to perform these tasks, the ATS/AIS service provider shall develop a procedure which shall include, amongst others, the following:

a) coordinate with the aerodrome operator to establish the appropriate methodology for the receipt of the RCR;

b) introduce new procedures for the implementation of GRF. This shall consider the receipt and forwarding of AIREPs to the aerodrome operator;

c) develop training programmes to include subjects related to GRF application, with interest groups mainly consisting of ATS management, Air Traffic Controllers and AIS personnel;

d) perform necessary updates to include the new SNOWTAM format;

e) conduct a safety risk assessment to address any concerns stemming pre implementation;

f) in conjunction with aerodrome operator, conduct system testing to ensure effective implementation on target date; and

g) update AIP as required.

4.34.3.3 The procedures at paragraphs 4.34.3.1 and 4.34.3.2 shall be approved by the Authority.

4.34.4 Operational Practice

4.34.4.1 Reporting, in compliance with the runway condition report, shall commence when a significant change in runway surface condition occurs due to water;

4.34.4.2 Reporting of the runway surface condition shall continue to reflect significant changes until the runway is no longer contaminated. When this situation occurs, the aerodrome shall issue a runway condition report that states the runway is wet or dry as appropriate; and

4.34.4.3 A change in the runway surface condition used in the runway condition report shall be considered significant whenever there is:

a) any change in the RWYCC;
b) any change in contaminant type;
c) any change in reportable contaminant coverage;
d) any change in contaminant depth; and
e) any other information, for example a pilot report of runway braking action, which according to assessment techniques used, are known to be significant.

4.34.5 Runway Condition Report (RCR)

The RCR shall consist of the following:

a) aeroplane performance calculation section; and

b) situational awareness section.

4.34.6 Aeroplane Performance Calculation Section

The following information shall be included in a string in the following order:

a) **Aerodrome location indicator:** a four-letter ICAO location This information is mandatory.

Format: nnnn
Example: FIMP, FIMR

b) **Date and time of assessment:** date and time (UTC) when the assessment was performed by the trained personnel. This information is mandatory.

Format: MMDDhhmm
Example: 09111357

c) **Lower runway designation number:** a two- or three-character number identifying the runway for which the assessment is carried out and reported. This information is mandatory.

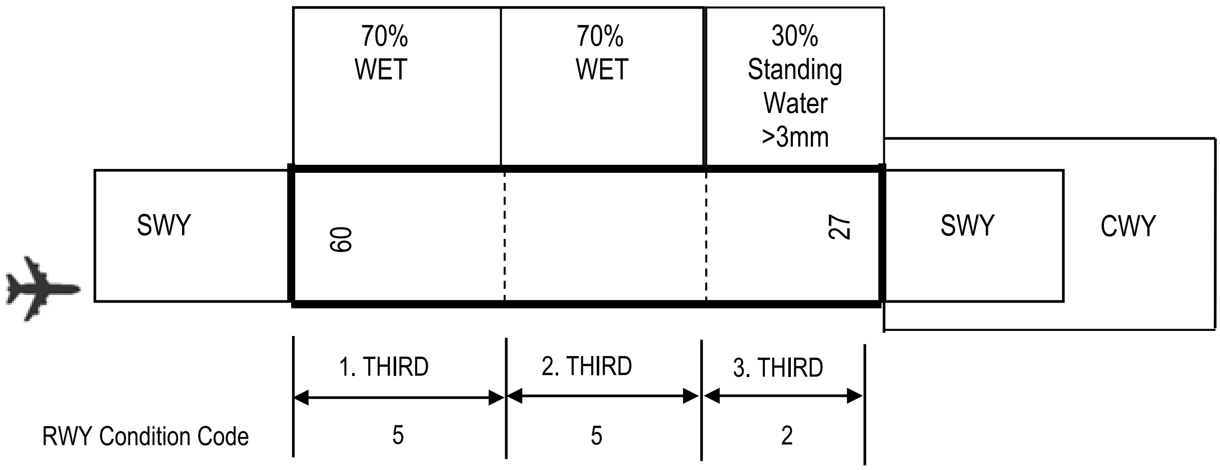
Format: nn[L] *or* nn[C] *or* nn[R]
Example: 14L, 12

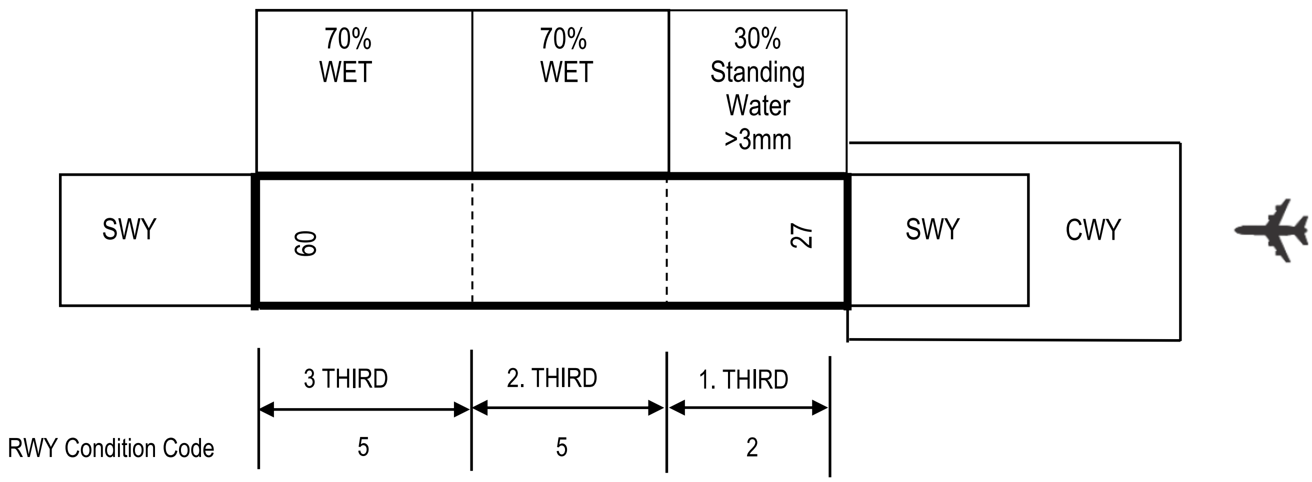
d) **Runway condition code for each runway third:** a one-digit number identifying the RWYCC assessed for each runway third. The codes are reported in a three-character group separated by a "/" for each third. The direction for listing the runway thirds shall be in the direction as seen from the lower designation number. This information is mandatory.

i. When transmitting information on runway surface conditions by ATS to flight crews, the sections shall, however, be referred to as the first, second or third part of the runway. The first part shall always mean the first third of the runway as seen in the direction of landing/takeoff;

ii. Direction for listing the runway thirds shall be from the lower designation number. When reporting to an arriving/departing aircraft, the first third shall be from the direction of operation of the aeroplane; and

iii. Runway thirds shall reflect the entire usable pavement length of the runway, inclusive of displaced threshold.





Format: n/n/n
Example: 5/5/2

Note 1.— A change in RWYCC from, say, 5/5/2 to 5/5/3 shall be considered significant;

Note 2.— A change in RWYCC shall require a complete assessment taking into account all information available; and

Note 3.— Procedures for assigning a RWYCC are available at paragraph 4.34.8.

e) **Per cent coverage contaminant for each runway third:** a number identifying the percentage coverage. The percentages shall be reported in an up-to-nine character group separated by a "/" for each runway third. The assessment shall be based upon an even distribution within the runway thirds using the table below.

Assessed per cent	Reported per cent
10 - 25	25
26 - 50	50
51 - 75	75
76 - 100	100

i. This information shall be conditional. It shall not be reported for one runway third if it is dry or covered with less than 10 per cent.

Format: [n]nn/[n]nn/[n]nn
Example: 25/50/100
NR/50/100 if contaminant coverage is less than 10% in the first third
25/NR/100 if contaminant coverage is less than 10% in the middle third
25/50/NR if contaminant coverage is less than 10% in the last third

ii. With uneven distribution of the contaminants, additional information shall be given in the plain language remark part of the situational awareness section of the runway condition report. Where possible, a standardized text shall be used.

Note.— When no information is to be reported, insert "NR" at its relevant position in the message to indicate to the user that no information exists (/NR/).

f) **Depth of loose contaminant: standing water for each runway third:** a two- or three-digit number representing the assessed depth (mm) of the contaminant for each runway third. The depth shall be reported in a six to nine character group separated by a "/" for each runway third as defined in table below.

Contaminant	**Valid values to be reported**	**Significant change**
STANDING WATER	04, then assessed value	3 mm up to and including 15 mm

Note 1.— For STANDING WATER, 04 (4 mm) shall be the minimum depth value at and above which the depth shall be reported. (From 3 mm and below, the runway third is considered WET).

Note 2.— Above 4 mm for STANDING WATER, an assessed value shall be reported and a significant change shall relate to observed change from this assessed value.

i. The assessment shall based upon an even distribution within the runway thirds as assessed by trained personnel. If measurements are included as part of the assessment process, the reported values shall still be reported as assessed depths, as the trained personnel have placed their judgment upon the measured depths to be representative for the runway third.

Format: [n]nn/[n]nn/[n]nn
Examples: 04/06/12 *[STANDING WATER]*

This information shall be conditional. It shall be reported only for STANDING WATER.

ii. Example of reporting depth of contaminant whenever there is a significant change:

1) After the first assessment of runway condition, a first runway condition report is generated. The initial report is:

5/5/5 100/100/100 NR/NR/NR WET/WET/WET
Note.— Water depth is 2 mm.

2) With continuing rain, a new runway condition report is required to be generated as subsequent assessment reveals a change in the runway condition code. A second runway condition report is therefore created as:

2/2/2 100/100/100 04/04/04 *STANDING WATER*/*STANDING WATER* /*STANDING WATER*

3) With even more precipitation, further assessment reveals the depth of precipitation has increased from 4 mm to 6 mm along the entire length of the runway. However, a new runway condition report is not required because the runway condition code has not changed (change in depth is less than the significant change threshold of 3 mm).

4) A final assessment of the precipitation reveals that the depth has increased to 8 mm. A new runway condition code is required because the change in depth from the last runway condition report (**second** runway condition code) i.e. from 4 mm to 8 mm is greater than the significant change threshold of 3 mm. A third runway condition report is thus created as below:

2/2/2 100/100/100 08/08/08 *STANDING WATER*/*STANDING WATER*/*STANDING WATER*

iii. For contaminants other than STANDING WATER the depth shall not be reported. The position of this type of information in the information string shall then identified by /NR/.

iv. When the depth of the contaminants varies significantly within a runway third, additional information shall be given in the plain language remark part of the situational awareness section of the runway condition report.

g) **Condition description for each runway third:** to be reported in capital letters, The condition type shall be reported by any of the following condition type descriptions for each runway third and separated by an oblique stroke “/”. This information is mandatory.

DRY
STANDING WATER
WET

Format: nnnn/nnnn/nnnn

Example: WET/STANDING WATER/STANDING WATER

h) **Width of runway to which the RWYCCs apply if less than published width :** is the two-digit number representing the width of cleared runway in metres. This information is optional.

Format: nn
Example: 30

If the cleared runway width is not symmetrical along the centre line, additional information is to be given in the plain language remark part of the situational awareness section of the runway condition report.

4.34.7 Situational Awareness Section

All individual messages in the situational awareness section shall end with a full stop sign. This is to distinguish the message from subsequent message(s).

The information to be included in this section shall consist of the following:

a) Reduced runway length

This information is conditional when a NOTAM has been published with a new set of declared distances affecting the LDA.

Format: Standardized fixed text
RWY nn [L] *or* nn [C] *or* nn [R] LDA REDUCED TO [n]nnn
Example: RWY 14L LDA REDUCED TO 2000.

b) Taxiway conditions

This information is optional.
Format: TWY [nn]n POOR
Example: TWY D POOR.

c) Apron conditions

This information is optional.
Format: APRON [nnnn] POOR
Example: APRON SOUTH POOR.

d) Authority-approved and published use of measured friction coefficient

This information is optional.
Format: *[Authority set format and associated procedures]*
Example: *[Function of Authority set format and associated procedures]*.

e) Plain language remarks using only allowable characters in capital letters

Where possible, standardized text shall be developed.
This information is optional.
Format: Combination of allowable characters where use of full stop « . » marks the end of the message.

Allowable characters:
A B C D E F G H I J K LM N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9
/ [oblique stroke] "." [period]" " [space]

An example of a complete information string prepared for dissemination is as follows:

FIMP	0217 0135	14R	5 / 2 / 2	100 / 50 / 75	NR/ 06 / 06	WET / STANDING WATER / STANDING WATER
Aerodrome	**Date & Time**	**RWY**	**RWYCC**	**% Coverage**	**Depth in mm**	**Contaminant**
Situational awareness section ***RWY 14R LDA REDUCED TO 2000. TWY E POOR. PARKING STANDS 9 TO 12 POOR).***						**Reduced RWY width in m (if applicable)** Nil

[COM header and Abbreviated header] (Completed by AIS)

GG EADBZQZX EADNZQZX EADSZQZX
170229 FIMPYNYX (SWEA0151 EADD 02170225)
SNOWTAM 0151

[Aeroplane performance calculation section]

FIMP 02170135 14R 5/2/2 100/50/75 NR/06/06 WET/ STANDING WATER/ STANDING WATER

[Situational awareness section]

RWY 14R LDA REDUCED TO 2000. TWY E POOR. PARKING STANDS 9 TO 12 POOR).

4.34.8 Runway Condition Code (RWYCC)

4.34.8.1 The RWYCC shall be determined through the assessment of the following criteria:

- The percentage of coverage of contamination for each third of the runway;
- The type of contaminant which is selected from the RCAM;
- The depth of contamination; and
- Surface air temperature (when applicable).

4.34.8.2 The assessed RWYCC shall be reported for each third of the runway determined by the table below:

Runway Condition Code (RWYCC)	***Runway Surface Description***
6	• **DRY**
5	• **WET** (The runway surface is covered by any visible dampness or water up to and including 3 mm depth)
3	• **WET** (“slippery wet” runway)
2	• **STANDING WATER** (More than 3 mm depth of water)

4.34.8.3 If 25 per cent or less area of a runway third is wet or covered by contaminant, a RWYCC 6 shall be reported.

4.34.8.4 If the distribution of the contaminant is not uniform, the location of the area that is wet or covered by the contaminant shall be described in the plain language remarks part of the situational awareness section of the runway condition report.

4.34.8.5 The RWYCC determined from table at paragraph 4.34.8.2 shall be appropriately downgraded considering all available means of assessing runway slipperiness.

4.34.8.6 Where available, the pilot reports of runway braking action shall be taken into consideration as part of the ongoing monitoring process, using the following principle:

a) a pilot report of runway braking action shall be taken into consideration for downgrading purposes; and

b) a pilot report of runway braking action can be used for upgrading purposes only if it is used in combination with other information qualifying for upgrading.

4.34.8.7 Table below shows the correlation of pilot reports of runway braking action with RWYCCs.

Pilot report of runway braking action	***Description***	***Runway condition code (RWYCC)***
N/A		6
GOOD	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal	5
MEDIUM	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced	3
MEDIUM TO POOR	Braking deceleration OR directional control is between medium and poor	2

4.34.9 Runway condition assessment matrix (RCAM)

4.34.9.1 The RCAM, as per table below, shall be used when assessing runway surface conditions. RCAM shall be used in compliance with the associated procedures of which there are two main parts:

a) assessment criteria; and

b) downgrade assessment criteria.

RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)			
Assessment criteria		**Downgrade assessment criteria**	
Runway condition code *(RWYCC)*	**Runway surface description**	**Aeroplane deceleration or directional control observation**	**Pilot report of runway braking action**
6	• DRY	---	---
5	• WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth)	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
3	• WET ("slippery wet" runway)	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	• STANDING WATER (More than 3 mm depth of water)	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR

4.34.9.2 The RCAM shall apply only to paved (asphalt and concrete) runway surfaces, and shall not apply to unpaved or partially paved surfaces.

4.34.9.3 The first column of RCAM shall be for Assessment Criteria that shall consist of a Runway Surface Description and a Runway Condition Code. The Runway Surface Descriptions in each category shall be linked to the corresponding Runway Condition Code based on their effect on aeroplane braking performance.

4.34.10 Downgrade Assessment Criteria

a) The RWYCC shall be initially determined through use of the RCAM;

b) The aerodrome operator shall consider downgrading a RWYCC when Runway Friction Index measurements (if available), pilot reports or other observations reveal that the runway surface is more slippery than the RWYCC that was initially determined;

c) The aerodrome operator shall exercise vigilance and downgrade the RWYCC when appropriate so that flight crews shall be provided with a RWYCC that best reflects the actual slipperiness of the runway;

d) A pilot report of braking action shall be taken into consideration for downgrading purposes; and

e) When previous pilot braking action reports have indicated GOOD or MEDIUM braking action, two consecutive pilot braking action reports of POOR shall indicate that surface conditions may be deteriorating. In this situation, the aerodrome operator shall conduct a runway assessment prior to the next operation.

4.34.11 Upgrade Assessment Criteria

An assigned RWYCC 5, 3 or 2 shall not be upgraded.

4.34.12 Training

4.34.12.1 Aerodrome Operator

Aerodrome operators shall ensure that their personnel are adequately trained to perform their duties and develop a training program for all personnel who shall assess and report runway conditions. This training program shall include:

a) Initial Training; and
b) Recurrent training (every 2 years).

The training programme shall be approved by the Authority.

4.34.12.1.1 Initial Training

For Initial Training, aerodrome operators shall utilise the requirements of paragraph 4.34 to develop and conduct training which shall include, amongst others the following:

a) aerodrome familiarisation, including aerodrome markings, signs and lightings;

b) NOTAM initiation procedures;

c) air traffic control procedures on the movement area;

d) aerodrome inspection procedures and techniques;

e) assessment and reporting of runway surface friction characteristics;

f) low visibility procedures;

g) basics of the Global Reporting Format (GRF);

h) Runway Condition Assessment Matrix Components (RCAM);

i) determination along with Downgrade and Upgrade of RWYCC;

j) Runway Condition Reporting (RCR);

k) measurement technique and assessment;

l) downgrade and Upgrade of Assessment Criteria

m) phraseology used in GRF; and

n) practical Exercises.

4.34.12.1.2 Recurrent Training

For Recurrent Training, aerodrome operators shall utilise the requirements of paragraph 4.34.12.2 to develop and conduct appropriate training for their personnel which shall:

a) focus primarily on the practical aspects of runway condition assessment and reporting;

b) include practical exercises; and

c) incorporate "lessons learned" from the previous year(s) operations.

4.34.12.2 ATS/AIS operator

ATS/AIS operator shall ensure that their personnel are adequately trained to perform their duties and develop a training program for all personnel who shall assess and report runway conditions. This training program shall include:

a) Initial Training; and
b) Recurrent training (every 2 years).

The training programme shall be approved by the Authority.

4.34.12.2.1 Initial Training

For Initial Training, ATS/AIS operator shall utilise the requirements of paragraph 4.34 to develop and conduct training which shall include, amongst others the following:

a) Procedure for GRF implementation;

b) RCR decoding;

c) SNOWTAM format;

d) R/T transmission of RCR;

e) Forwarding of AIREP to aerodrome operators; and

f) AIP information.

4.34.12.2.2 Recurrent Training

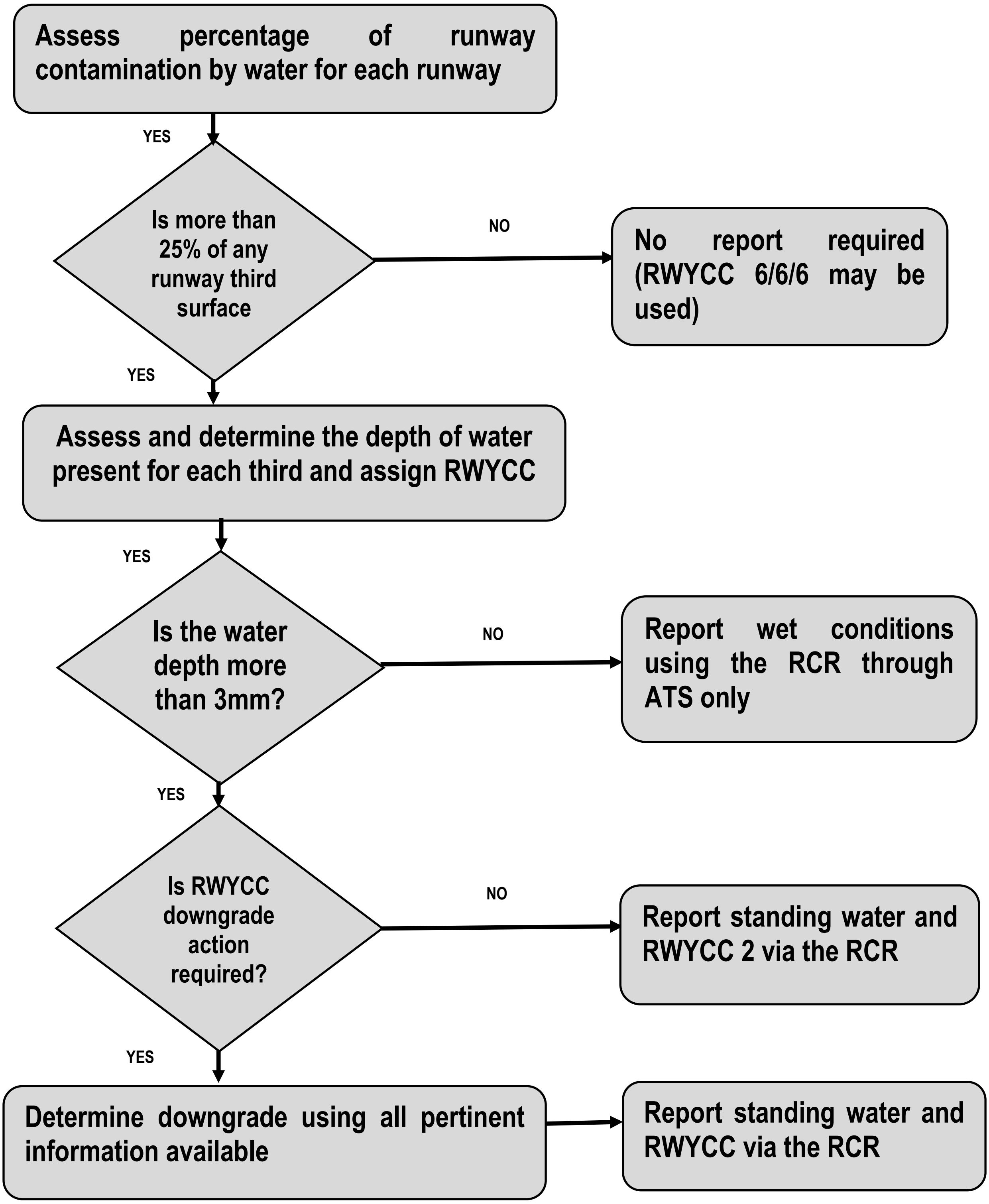
For Recurrent Training, ATS/AIS operator shall utilise the requirements of paragraph 4.34.12.2.1 to develop and conduct appropriate training for their personnel which shall:

a) focus primarily on the practical aspects of GRF reporting;

b) include practical exercises; and

c) incorporate “lessons learned” from the previous year(s) operations.

4.34.13 Process Flowchart for Runway Surface Condition Assessment



4.34.14 ATS and Aerodrome Operator Phraseologies

The following phraseologies, as applicable, shall be used by ATS and aerodrome operator while transmitting the RCR.

a) [(location)] RUNWAY (number) SURFACE CONDITION [CODE (three digit number)] followed as necessary by:

   i. ISSUED AT (date and time UTC);

   ii. STANDING WATER,WET, or DRY;

   iii. DEPTH ((depth of deposit) MILLIMETRES or NOT REPORTED);

   iv. COVERAGE ((number) PER CENT or NOT REPORTED);

   v. ESTIMATED SURFACE FRICTION (GOOD, or GOOD TO MEDIUM, or MEDIUM, or MEDIUM TO POOR, or POOR, or LESS THAN POOR);

   vi. AVAILABLE WIDTH (number) METRES;

   vii. LENGTH REDUCED TO (number) METRES;

   viii. TAXIWAY (identification of taxiway) SNOWBANK (number) METRES [LEFT, or RIGHT, or LEFT AND RIGHT] [OF or FROM] CENTRELINE;

   ix. TAXIWAY (identification of taxiway) POOR;

   x. APRON (identification of apron) POOR; and

   xi. Plain language remarks.

b) [(location)] RUNWAY SURFACE CONDITION RUNWAY (number) NOT CURRENT;

c) LANDING SURFACE (condition);

d) CAUTION CONSTRUCTION WORK (location);

e) CAUTION (specify reasons) RIGHT (or LEFT), (or BOTH SIDES) OF RUNWAY [(number)];

f) CAUTION WORK IN PROGRESS (or OBSTRUCTION) (position and any necessary advice);

g) BRAKING ACTION REPORTED BY (aircraft type) AT (time) GOOD (or GOOD TO MEDIUM, or MEDIUM, or MEDIUM TO POOR, or POOR);

h) TAXIWAY (identification of taxiway) WET or STANDING WATER;

i) TOWER OBSERVES (weather information);

j) PILOT REPORTS (weather information).

4.35 TRAINING AND COMPETENCE

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

4.35.2 This training shall be conducted by the aerodrome operator or third parties;

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

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

4.35.5 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;

4.35.6 Training objectives shall be identified to ensure that competence is achieved and maintained. Based on these objectives, the training programme shall 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;

4.35.7 A training programme shall 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 — Demonstration of continued competence is an alternative to recurrent training.

4.35.8 Refresher training shall 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;

4.35.9 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;

4.35.10 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;

4.35.11 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;

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

4.35.13 For a team or section to be recognized as competent, periodical audits or checks shall be carried out and recorded. All shortfalls shall 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.

4.35.14 Structure of a training programme shall include the following:

1. Initial Training

   Initial training shall be composed of theoretical and practical training modules. Personnel shall 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 shall 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 shall 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.

4.36 REDUCED RUNWAY LENGTH OPERATIONS

4.36.1 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 works in progress 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 work in progress 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);

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 work in progress are clearly understood and complied with;

g) provide markings and lights to clearly indicate the boundary of the safety zone and the work in progress area;

h) clearly mark, light and/or barricade any movement area that is to be used by persons involved in the work in progress, 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 a 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.

4.36.2 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 work in progress. 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 the aerodrome operator.

4.36.3 Monitoring the safety of the aerodrome and aircraft operations in proximity of the works shall 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.

4.37 SAFETY ASSESSMENTS FOR AERODROMES

4.37.1 A licensed aerodrome operator shall implement an SMS acceptable to the Authority that, as a minimum.

a) identifies safety hazards;

b) ensures that remedial action necessary to maintain safety is implemented;

c) provides for continuous monitoring and regular assessment of the achieved safety; and

d) aims to make continuous improvement to the overall safety of the aerodrome.

4.37.2 The safety assessment process shall address the impact of a safety concern, including a change or deviation, on the safety of operations at the aerodrome and shall take into consideration the aerodrome's capacity and the efficiency of operations, as necessary.

4.37.3 Basic Considerations

a) A safety assessment shall be an element of the risk management process of an SMS that shall be used to assess safety concerns arising from, inter alia, deviations from standards and applicable regulations, identified changes at an aerodrome , or when any other safety concerns arise.

   Note.— Changes on an aerodrome can include changes to procedures, equipment, infrastructures, safety works, special operations, regulations, organization, etc.

b) When a safety concern, change or a deviation has an impact on several aerodrome stakeholders, consideration shall be given to the involvement of all stakeholders affected in the safety assessment process. In some cases, the stakeholders impacted by the change will need to conduct a separate safety assessment themselves in order to fulfil the requirements of their SMSs and coordinate with other relevant stakeholders. When a change has an impact on multiple stakeholders, a collaborative safety assessment shall be conducted to ensure compatibility of the final solutions.

c) A safety assessment shall consider the impact of the safety concern on all relevant factors determined to be safety-significant. The list below provides a number of items that may need to be considered when conducting a safety assessment. The items in this list are not exhaustive and in no particular order:

a) aerodrome layout, including runway configurations; runway length; taxiway, taxilane and apron configurations; gates; jet bridges; visual aids; and the RFF services infrastructure and capabilities;

b) types of aircraft, and their dimensions and performance characteristics, intended to operate at the aerodrome;

c) traffic density and distribution;

d) aerodrome ground services;

e) air-ground communications and time parameters for voice and data link communications;

f) type and capabilities of surveillance systems and the availability of systems providing controller support and alert functions;

g) flight instrument procedures and related aerodrome equipment;

h) complex operational procedures, such as collaborative decision-making (CDM);

i) aerodrome technical installations, such as advanced surface movement guidance and control systems (A-SMGCS) or other air navigation aids;

j) obstacles or hazardous activities at or in the vicinity of the aerodrome;

k) planned construction or maintenance works at or in the vicinity of the aerodrome;

l) any local or regional hazardous meteorological conditions (such as wind shear); and

m) airspace complexity, ATS route structure and classification of the airspace, which may change the pattern of operations or the capacity of the same airspace.

d) Subsequent to the completion of the safety assessment, the aerodrome operator shall be responsible for implementing and periodically monitoring the effectiveness of the identified mitigation measures.

e) The Authority shall review the safety assessment provided by the aerodrome operator and its identified mitigation measures, operational procedures and operating restrictions and shall be responsible for the subsequent regulatory oversight of their application.

4.37.4 Safety Assessment Process

4.37.4.1 Introduction

a) The primary objective of a safety assessment shall be to assess the impact of a safety concern such as a design change or deviation in operational procedures at an existing aerodrome.

b) Such a safety concern can often impact multiple stakeholders; therefore, safety assessments often need to be carried out in a cross-organizational manner, involving experts from all the involved stakeholders. Prior to the assessment, a preliminary identification of the required tasks and the organizations to be involved in the process is conducted.

c) A safety assessment shall be initially composed of four basic steps:

a) definition of a safety concern and identification of the regulatory compliance;

b) hazard identification and analysis;

c) risk assessment and development of mitigation measures; and

d) development of an implementation plan for the mitigation measures and conclusion of the assessment.

4.37.4.2 Definition of a safety concern and identification of the regulatory compliance

a) Any perceived safety concerns shall be described in detail, including timescales, projected phases, location, stakeholders involved or affected as well as their potential influence on specific processes, procedures, systems and operations.

b) The perceived safety concern shall be first analysed to determine whether it is retained or rejected. If rejected, the justification for rejecting the safety concern shall be provided and documented.

c) An initial evaluation of compliance with the appropriate provisions in the regulations applicable to the aerodrome shall be conducted and documented.

d) The corresponding areas of concern shall be identified before proceeding with the remaining steps of the safety assessment, with all relevant stakeholders.

e) If a safety assessment was conducted previously for similar cases in the same context at an aerodrome where similar characteristics and procedures exist, the aerodrome operator may use some elements from that assessment as a basis for the assessment to be conducted. Nevertheless, as each assessment is specific to a particulasafety concern at a given aerodrome the suitability for reusing specific elements of an existing assessment shall be carefully evaluated.

4.37.4.3 Hazard identification

a) Hazards related to infrastructure, systems or operational procedures shall be initially identified using methods such as brain-storming sessions, expert opinions, industry knowledge, experience and operational judgement. The identification of hazards is conducted by considering:

a) accident causal factors and critical events based on a simple causal analysis of available accident and incident databases;

b) events that may have occurred in similar circumstances or that are subsequent to the resolution of a similar safety concern; and

c) potential new hazards that may emerge during or after implementation of the planned changes.

b) Following the previous steps, all potential outcomes or consequences for each identified hazard shall be identified.

c) The appropriate safety objective for each type of hazard shall be defined and detailed. This can be done through:

a) reference to recognized standards and/or codes of practices;
b) reference to the safety performance of the existing system;
c) reference to the acceptance of a similar system elsewhere; and
d) application of explicit safety risk levels.

d) Safety objectives shall be specified in either quantitative terms (e.g. identification of a numerical probability) or qualitative terms (e.g. comparison with an existing situation). The selection of the safety objective shall be made according to the aerodrome operator's policy with respect to safety improvement and is justified for the specific hazard.

4.37.4.4 Risk assessment and development of mitigation measures

a) The level of risk of each identified potential consequence shall be estimated by conducting a risk assessment. This risk assessment shall determine the severity of a consequence (effect on the safety of the considered operations) and the probability of the consequence occurring and will be based on experience as well as on any available data (e.g. accident database, occurrence reports).

b) Understanding the risks shall be the basis for the development of mitigation measures, operational procedures and operating restrictions that might be needed to ensure safe aerodrome operations.

c) The method for risk evaluation shall be strongly dependent on the nature of the hazards. The risk itself shall be evaluated by combining the two values for severity of its consequences and probability of occurrence.

d) Once each hazard has been identified and analysed in terms of causes, and assessed for severity and probability of its occurrence, it shall be ascertained that all associated risks are appropriately managed. An initial identification of existing mitigation measures shall be conducted prior to the development of any additional measures.

e) All risk mitigation measures, whether currently being applied or still under development, shall be evaluated for the effectiveness of their risk management capabilities.

f) In some cases, a quantitative approach may be possible, and numerical safety objectives can be used. In other instances such as changes to the operational environment or procedures, a qualitative analysis may be more relevant.

4.37.4.5 Development of an implementation plan and conclusion of the assessment

a) The last phase of the safety assessment process shall be the development of a plan for the implementation of the identified mitigation measures.

b) The implementation plan shall include time frames, responsibilities for mitigation measures as well as control measures that may be defined and implemented to monitor the effectiveness of the mitigation measures.

4.37.5 Approval Or Acceptance Of A Safety Assessment

a) The safety assessment conducted by the aerodrome operator shall be the core SMS function. Management approval and implementation of the safety assessment, including future updates and maintenance, shall be the responsibility of the aerodrome operator. The Authority may, for specific reasons, require the submission of the specific safety assessment for approval/acceptance.

b) The Authority shall analyse the safety assessment and shall verify that:

a) appropriate coordination has been performed between the concerned stakeholders;

b) the risks have been properly identified and assessed, based on documented arguments (e.g. physical or Human Factors studies, analysis of previous accidents and incidents);

c) the proposed mitigation measures adequately address the risk; and

d) the time frames for planned implementation are acceptable.

c) On completion of the analysis of the safety assessment, the Authority shall:

a) either give formal approval or acceptance of the safety assessment to the aerodrome operator ;

b) if some risks have been underestimated or have not been identified, coordinate with the aerodrome operator to reach an agreement on safety acceptance; or

c) if no agreement can be reached, reject the proposal for possible resubmission by the aerodrome operator; or

d) choose to impose conditional measures to ensure safety.

c) The Authority shall ensure that the mitigation or conditional measures shall be properly implemented and that they fulfil their purpose.

4.37.6 Promulgation Of Safety Information

a) The aerodrome operator shall determine the most appropriate method for communicating safety information to the stakeholders and shall ensure that all safety-relevant conclusions of the safety assessment are adequately communicated.

b) In order to ensure adequate dissemination of information to interested parties, information that affects the current AIP or other relevant safety information shall be:

a) promulgated in the relevant section of the AIP or automatic terminal information service (ATIS); and

b) published in the relevant aerodrome information communications through appropriate means.

4.38 Surface Movement Guidance And Controls Systems (SMGCS)

4.38.1 Requirement for Surface Movement Guidance And Controls Systems (SMGCS)

(a) A surface movement guidance and control system shall be provided at an aerodrome;

(b) The design of a surface movement guidance and control system shall take into account:

i. the density of air traffic;

ii. the visibility conditions under which operations are intended;

iii. the need for pilot orientation;

iv. the complexity of the aerodrome layout; and

v. movements of vehicles.

(c) The visual aid components of a surface movement guidance and control system, i.e. markings, lights and signs shall be designed to conform with the relevant specifications in 5.2, 5.3 and 5.4, respectively of MCAR, Aerodrome Design and Operations.

(d) A surface movement guidance and control system shall be designed to assist in the prevention of inadvertent incursions of aircraft and vehicles onto an active runway.

(e) The system shall be designed to assist in the prevention of collisions between aircraft, and between aircraft and vehicles or objects, on any part of the movement area.

4.38.2 Overview of Surface Movement Guidance and Control Systems

(a) **Meaning.** Surface Movement Guidance and Control Systems (SMGCS) are the provision of guidance to, and control of, all aircraft and ground vehicles on the aerodrome. A Surface Movement Guidance and Control Systems assist in safeguarding against unauthorised or inadvertent entry on to operational runways.

(b) **Composition**. A SMGC system comprises an appropriate combination of visual aids, non-visual aids, procedures, control, regulation, and management and information facilities frequency of operations. 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.

(c) **Governing Factors**. The SMGC system to be provided at an aerodrome depends primarily upon two operational conditions viz: the visibility conditions under which the aerodrome operator plans to maintain operations; and the traffic density.

(d) The objective of an SMGC system shall be to enable an aerodrome to operate safely in the intended condition and to prevent collisions between aircraft, between aircraft and ground vehicles, between aircraft and obstacles, between vehicles and obstacles, and between vehicles. An essential safety function of an SMGC system shall be to safeguard against unauthorised or inadvertent entry onto operational runways. Another important safety function of an SMGC system shall be to provide assistance to rescue and fire fighting vehicles in locating and proceeding to the site of an accident on the movement area.

(e) **Operational Requirements of SMGCS.** The system shall be appropriate to the visibility and traffic density and shall 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; 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 obstacle; 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;
iv. information to prevent collision with aircraft and groundvehicles; and

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.

(f) **Future Considerations.** All aerodromes require a SMGC system. However, each system shall 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.

4.38.3 An Aerodrome SMGCS System

(a) Visibility and Traffic Conditions

The visibility conditions under which the Aerodrome Operator 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. For the purpose of discussing SMGC systems, visibility and traffic conditions have been subdivided and defined according to the terms indicated in Para 4.38.6. Whenever these terms are used in this paragraph, they have the meanings given to them in Para 4.38.6.

(1) Visibility Conditions

a. 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;

b. Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and an intersections by visual reference, but sufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance; and

c. Visibility less than 400m RVR (low visibility operations)

(2) Traffic Density (in mean busy hour)

a. **Light**. Not greater than 15 movements per runway or typically less than 20 to 35 total aerodrome movements; and

b. **Medium.** Of the order of 16 to 25 movements per runway or typically between 20 to 35 total aerodrome movements; and

c. **Heavy.** Of the order of 20 movements per runway or typically more than 35 total aerodrome movements.

(b) Basic Equipment Requirement

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

(1) Minimum Equipment Requirements for SMGC Systems for all Aerodromes

a. Markings

i. Runway Centreline
ii. Taxiway Centreline
iii. Taxi-holding Position
iv. Taxiway Intersection
v. Apron
vi. Restricted Use Area

b. Lighting

i. Runway Edge
ii. Taxiway Edge
iii. Obstacle
iv. Restricted use areas

c. Signs

i. Mandatory Signs
ii. Information Signs

d. Other

i. aerodrome chart
ii. aerodrome control service
iii. signalling lamp
iv. radiotelephony equipment

(c) Basic Procedural/Administration Requirements

Procedures are an important and integral part of SMGC systems and they are implemented partly by the Aerodrome Operator, 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 systems and shall therefore be implemented at all aerodromes:

a. Aerodrome operator

i. designation of taxiways
ii. movement area inspections
iii. regulation of ground staff conduct on the movement area
iv. regulation of ground staff radiotelephony procedures
v. periodic electrical monitoring of SMGC aids
vi. initiation of amendment of aerodrome chart as necessary
vii. apron management

b. Air Traffic Services

i. designation of taxiways
ii. provision of air traffic control services
iii. use of radiotelephony procedures and phraseology
iv. use of signalling lamp
v. monitoring of SMGC aids

c. Pilot

i. adherence to ground movement traffic rules and regulations
ii. use of radiotelephony procedures and phraseology.

(d) Matching Aids to Aerodrome Conditions

(1) Para 4.38.5 lists the 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 above but also the additional aids needed to ensure safe and expeditious movement of aircraft under different traffic and density conditions.

(2) Para 4.38.5 and 4.38.6 list the visual docking guidance system as an essential aid for a few combinations of traffic and visibility conditions. A visual docking guidance system may be used in other situations as well. In evaluating the need for a visual docking guidance system the following factors merit consideration:

a. the number of aircraft using the aircraft stand
b. weather conditions
c. space available on the apron
d. precision required at the parking position
e. availability and cost of alternative means.

(3) Signs are a basic aid. They serve an important function in informing a pilot and reducing RTF communications. The number and quality of signs provided at an aerodrome is a variable which is not reflected in the Appendix. As traffic increases or visibility decreases improvements in the signs provided as well as the lighting and electronic aids used for guidance and control are required.

(4) Charts are another aid which cannot be precisely specified. Until recently, only an aerodrome chart was defined in Annex 4. This is now recognized as insufficient, as more information about the aerodrome is often required than can be shown on the aerodrome chart. Accordingly, a ground movement chart is specified and when this too is incapable of showing all information an apron parking/docking chart is required. As the provision of these charts is related to the complexity of the aerodrome and not visibility or traffic conditions only one entry, “Charts”, is included at 4.38.5. The aerodrome

operator shall assess the number of charts required in accordance with the amount of information required to be shown.

(e) Matching Procedures to Aerodrome Conditions

(1) Para 4.38.6 lists 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 Para 4.38.3(c) but also the additional procedures needed to ensure safe and expeditious movement of aircraft under different traffic and visibility conditions.

(2) It is to be noted that Para 4.38.6 has been devoted to apron management procedures. This has been done to conveniently isolate applicable procedures for the case where it is intended to establish a self-contained apron management unit. If no separate apron management unit is established, responsibility for these procedures will rest, in part, with the ATS unit and, in part, with the Aerodrome Operator.

(f) Review of System and Improvement

(1) Regular reviews of the SMGC systems shall be carried out to ensure that the system is fulfilling its intended task, and to assist the aerodrome operator 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.

(2) In all cases, the SMGC systems will need to be reviewed under one or more of the following circumstances:

a. the volume of traffic increases significantly;
b. operations in lower visibility conditions are planned; and
c. the aerodrome layout is changed, i.e. new runways, taxiways, or aprons are brought into operation.

(3) It is also conceivable that ATS restructuring of the airspace surrounding the aerodrome, or other external circumstances, may affect the flow of traffic to and from the aerodrome, and consequently the pattern of movements on the runways, thereby influencing the SMGC systems requirements.

(4) Apart from traffic movement counts, the extent to which increased traffic volume is causing a deterioration of the effectiveness of the SMGC systems may be determined by the appearance of the following symptoms:

a. a marked increase in the loading on the communications channels used for SMGC;

b. an increase in the number of problems occurring at crossing points and runway/taxiway intersections, requiring intervention by the controller and thereby contributing to the increase in radio communications; and

c. the occurrence of bottlenecks, congestion and delays in surface traffic movements.

(5) A marked need for increased vigilance in the visual surveillance of surface traffic movements, generated by the number of movements occurring simultaneously throughout the aerodrome complex.

4.38.4 DIVISION OF RESPONSIBILITIES

(a) Introduction

The ability of SMGCS to achieve required objective in an aerodrome would depend on the timely performance of duties and responsibilities necessary for the effective and smooth functioning of associated aids and procedures by assigned personnel. The disciplines mostly involved in SMGCS are pilots, apron management, airside drivers, Aerodrome Operator and air traffic services.

(b) Air Traffic Services.

(1) Use of radiotelephony procedures and phraseology. Radiotelephony as the primary means of communication between ATS and aircraft, surface vehicles and rescue and fire fighting vehicles operating on the manoeuvring area.

(2) When aircraft and vehicles operate outside the manoeuvring area but under the guidance of an ATS unit is preferable that detailed written procedures governing their operation be employed.

(3) Issue of taxi clearance to facilitate SMGC.

(4) Determination of taxi routes to be followed. ATS and the aerodrome operator shall determine jointly the routings to be taken by aircraft and vehicles.

(5) Monitoring of SMGC system aids. This monitoring may take the form of visual surveillance of lights, taking into account reports from pilots, and of electrical monitoring of electrical and electronic components of the system.

(6) Control of traffic other than aircraft on the manoeuvring area. When visibility reduces, it shall be at the discretion of the air traffic controller to restrict movements of vehicles as necessary. The amount of control over the movement of ground vehicles exercised by the aerodrome control service will increase as visibility reduces. With the exception of rescue and fire fighting vehicles responding to an emergency, the controllers shall ensure that aircraft receive priority and are not hindered by the movement of vehicles.

(7) Operation of visual guidance and control aids. The appropriate aerodrome control service will be responsible for operating the visual components of the control system, including stop bars, taxiway centre line lights and routing designators. That unit will also need to ensure that the lights are illuminated at the appropriate time.

(8) Division of responsibility between controller and pilot. Prevention of collision is a joint pilot/ATS responsibility with the controller always responsible for resolution of intersection conflicts. In the lower visibilities, the overall responsibility for the avoidance of collision becomes increasingly that of the ATS Unit.

(c) Apron Management Service.

(1) At aerodromes where management of traffic on the apron is not the responsibility of the air traffic control unit, there shall be an apron management service responsible for ensuring the safe movement of aircraft on the apron. All rules and regulations applicable to aircraft movements on the apron shall be consistent with the rules and regulations applicable to the manoeuvring area and close liaison between the apron management service and ATS unit is essential.

(d) Pilots.

(1) The pilot will respond to the instructions given by the apron management service and the air traffic control unit and follow the designated taxiway route.

(e) Aerodrome Operator

(1) Movement area inspections. The Aerodrome Operator will be responsible for conducting frequent inspections of the movement area to ensure that the areas intended for aircraft movement are kept un-obstructed and in good repair.

(2) Ground staff. The Aerodrome Operator and ATS will be responsible for the regulation and control, respectively, of ground staff on the movement area. The Aerodrome Operator will be responsible for ensuring that ground staff are properly trained particularly in RTF and monitored in its use.

(3) Servicing of SMGC aids. The Aerodrome Operator will normally be responsible for ensuring that all visual components of the SMGC system are kept serviceable. This will require frequent physical inspections of these visual components.

(4) Designation of taxiways and standard taxi routes. In conjunction with the ATS, the aerodrome operator will be responsible for the designation of taxiways and for the establishment of standard taxi routes applicable to the types of operations expected to take place at the aerodrome. This becomes particularly important for intended operations at busy aerodromes in low visibility conditions.

(f) Airside Drivers

(1) Drivers of ground vehicles must comply with aerodrome regulations and ATC instructions. Notwithstanding this, drivers are responsible for exercising due care and attention so as to avoid collisions between their vehicles and aircraft, and between their vehicles and other vehicles.

4.38.4 Runway Protection Methods And Equipment

(a) Introduction

This chapter outlines the operational problem for which runway protection has to be applied and gives some protection methods and equipment that can be used by the appropriate aerodrome and air traffic control (ATC) agencies to check and, if necessary, enhance their operating procedures.

(b) The Operational Problem

The runway is the first point of contact with the airport movement area for a landing aircraft and the last area during take-off. Much as it is used for take-off and landing by aircraft, it cannot be reserved for its exclusively use. Maintenance and service vehicles will need access to the runway and at most aerodromes certain vehicles and taxiing or towing aircraft will need to cross. This exposes aircraft and vehicles to the risk of collision and further increases this danger in operational conditions where there is pressure reduce runway occupancy time due to increasing capacity problems. There is therefore a need for adequate protection measures to be in place to guard against collision between aircraft and other objects.

(c) Types of Runway Encroachment

1. **Accidental Entry.** Entry to the runway by a vehicle whose driver has lost his way and somehow entered the manoeuvring area; the movement area must be fenced or otherwise protected against unauthorized entry, and shall be provided with controlled entry points. Although such a fence protects far more than the runway itself, it is the first and most important method of runway protection since it will keep out the driver to whom movement area signs and signals would be meaningless. Another aspect of the same problem is when a vehicle, which is authorized to enter the movement area, e.g. the apron, mistakenly strays onto the maneuvering area for which it has no clearance. To preclude accidental entry, a thorough briefing of all persons in charge of vehicles authorized to enter the movement area is necessary and they shall be familiar with all surface markings, signs and lights. Mistakes may occur but the provision of positive ground movement rules and regulations shall reduce the chances of mistakes occurring to a minimum.

2. **Mistaken Route.** An aerodrome can be a very confusing place, even to those who are familiar with its operation and topography. Changes in visibility or light intensity, the disappearance of familiar landmarks, use of a rarely employed taxiway or runway, even a change of aircraft type or vehicle, i.e. a different viewing aspect from cockpit or driving seat, can all contribute to mistakes being made in location identification and direction of movement. Obviously, the better the taxiway system is marked, the less likely that a mistake will be made, but at many large aerodromes errors of this kind can and do occur. A misrouting confined to taxiways can cause disruption, delays and considerable frustration but rarely causes a major incident; the danger comes with unauthorized movement on to an operational runway. It must be recognised that in restricted visibility or at night this can happen without the ATC controller being immediately aware that an unauthorized entry to a runway has taken place. Even with Surface Movement Radar (SMR) it is not feasible to monitor continuously every authorized movement on a busy aerodrome. Protection from this type of encroachment must rest solely on an operational runway being clearly and unmistakably marked as such from any point of access.

   Permanent marking as a runway may not be sufficient because non-operational runways can be used as a taxi route and entered without special clearance. Therefore, there must be some other positive method of indicating vthat a runway is active and taxi holding position lights and stop bars fulfill this function.

3. **Misunderstood Clearance.** This is probably the most common cause ofunauthorized entry to an operational runway and is also the most difficult toprevent. If a pilot or driver believes that he has clearance to enter a runway then, unless there is some obvious danger, he will proceed. The problem is compounded by the radiotelephone (RTF) broadcast system where all those on the frequency can hear the instructions that are passed. The fact that the controller, driver and pilot may be using a language which is not necessarily their mother tongue together with the pressures associated with a busy environment, are all factors which result in a misinterpretation of what is said.

Until the development of discrete data transfer between the controller and individual aircraft/vehicles on the aerodrome surface, the possibility of misunderstanding or misinterpretation will remain. It follows that in the interests of runway protection, communication methods must be such to reduce the likelihood of misunderstanding and the procedures used shall be such that they will not result in an aircraft or vehicle entering an operational runway without clearance. The most effective way of reducing the possibility of a misunderstood clearance which may result in an encroachment on to an operational runway is for verbal instructions to be associated with an appropriate visual signal such as the switching off of a stop bar and the switching on and off of taxiway centre line lights, beyond the stop bar.

(d) Runway Protection Methods

(1) The primary method of protection must be the provision of sufficient visual information to pilots and drivers that they are approaching an active runway inorder that they can conform to the recognised procedures. This visual information in the form of signs, surface markings and lighting equipment can be supported by more sophisticated non-visual electronic detection equipment where traffic density and airfield complexity increase risk of a possible infringement of the runway. The following are for use as runway protection aids:

a. taxi-holding position markings
b. stop bars
c. taxi-holding position lights
d. signs:
  i. holding position
  ii. taxiway/runway intersection
  iii. STOP
  iv. NO ENTRY

Details on the characteristics and installation of these aids is given in MCAR (Aerodrome Design and Operations).

(2) MCAR Design and Operations recommends the provision of taxi holding position lights (sometimes referred to as runway protection lights) which consist of two alternate flashing yellow lights. At present, these lights are only recommended for a precision approach runway Category III, but consideration is being given to recommending their provision at precision approach Category II runways. Nevertheless, the installation of these lights at all taxi holding positions regardless of the runway type shall be seriously considered as they are a very effective and reasonably inexpensive method of delineating an active runway in all visibility conditions.

(3) A further method of safeguarding a runway is the installation of switchable stop bars as described in MCAR Aerodrome Design and Operations, which are also a standard requirement for precision approach runways, Category III.

(e) Non Visual Electronic Protection Equipment

(1) The problem of continuing aerodrome operation at an acceptable level of safety and capacity in reduced visibility has led to the development of many techniques for non-visual surveillance. Many of these systems have been designed to monitor the whole of the movement area but can be scaled down to cover just the runway and its immediate environs where a more complex SMGC system cannot be justified. These techniques offer three basic forms of non-visual surveillance:

a. the use of radar sensors which produce a facsimile display of the runway and the immediate taxiways together with the operating traffic;

b. the use of linear sensors to monitor the entry and exit of traffic on defined divisions or blocks close to the runway, this being displayed on a suitable indicator; and

c. the use of small area sensors to indicate the occupancy of sectors close to a runway.

(2) Further guidance on the use of this equipment can be found in MCAR Aerodrome Design and Operations and ICAO Manual on Surface Movement Guidance and Control Systems

4.38.5 Guidance On Selecting SMGCS System Aids

VISIBILITY ……………..................... TRAFFIC DENSITY…………………………………….

	Remark	Traffic	Light			Medium			Heavy		
Aid **Condition**		Visibility	1	2	3	1	2	3	1	2	3
Apron markings			X	x	x	x	x	x	X	x	x
Runway centre line marking			X	x	x	x	x	x	X	x	x
Taxiway centre line marking			X	x	x	x	x	x	X	x	x
Taxi – holding position marking			X	x	x	x	x	x	X	x	x
Visual aids for denoting restricted use areas			X	x	x	x	x	x	X	x	x
Runway edge lights			X	x	x	x	x	x	X	x	x
Taxiway edge lights			X	x	x	x	x	x	x	x	x
Obstacle lighting			X	x	x	x	x	x	x	x	X
Signs			X	x	x	x	x	x	x	x	X
Taxiway intersection marking			X	x	x	x	x	x	x	x	X
Charts,(aerodrome, movement, apron)			X	x	x	x	x	x	x	x	X
Aerodrome control service			X	x	x	x	x	x	x	x	X
Signalling lamp			X	x	x	x	x	x	x	x	X
Radiotelephony equipment			X	x	x	x	x	x	x	x	X
Taxi – holding position lights					x		x	x	x	x	X
Clearance bars					x		x	x	x	x	X
Electrical monitoring system for lights				x	x		x	x	x	x	X
Taxiway centre line lights					x			x			X
Stop bars					x		x	x		x	X
Selective switching capability for taxiway centre line lights								x			X
Selective switching capability for apron taxiway centre line lights								x			X
Surface Movement Radar (SMR)								x		x	X
Aircraft stand manoeuvring guidance lights					x			x			X
Runway clearance aid					x			x		x	X
Secondary power supply					x		x	x		x	X
Visual docking guidance system					x			x		x	X

4.38.6 Guidance on Selecting Procedure Component of SMGCS

Condition Procedure	Traffic: Light			Medium			Heavy		
Visibility	1	2	3	1	2	3	1	2	3
Aerodrome Operator	x	x	x	x	x	x	x	x	x
Periodic electrical monitoring of SMGC aids	x	x	x	x	x	x	x	x	x
Designation of taxiways	x	x	x	x	x	x	x	x	x
Movement area inspection and reporting	x	x	x	x	x	x	x	x	x
Regulation of ground staff conduct on the movement area	x	x	x	x	x	x	x	x	x
Initiation of amendment of aerodrome charts as necessary	x	x	x	x	x	x	x	x	x
Regulation of ground staff radiotelephony procedures	x	x	x	x	x	x	x	x	x
Establishment of standard taxi routes			x		x	x	x	x	x
Low visibility movement area protection measures			x			x			x
Continual electrical monitoring of SMGC aids			x			x			x
ATS									
Visual monitoring of SMGC aids	x	x	x	x	x	x	x	x	x
Use of radiotelephony procedures and phraseology	x	x	x	x	x	x	x	x	x
Use of signalling lamp	x	x	x	x	x	x	x	x	x
Control of other than aircraft traffic on the manoeuvring area	x	x	x	x	x	x	x	x	x
Operation of lighting aids	x	x	x	x	x	x	x	x	x
Determination of the taxiway route to be followed			x		x	x	x	x	x
Application of sequencing procedure			x	x	x	x	x	x	x
Initiation and termination of low visibility procedures			x			x			x
Application of separation criteria			x			x			x
Continual electrical monitoring of SMGC aids	x	x	x	x	x	x	x	x	x
Monitoring of surface movement on SMR			x			x		X	x
Selective switching of taxiway centre-line lights						x			x
Selective switching of stop bars			x		x	X		x	x
Pilot									
Adherence to ground movement traffic rules and regulations	x	x	x	x	x	x	x	x	x
Use of radiotelephony procedures and phraseology	X	X	X	X	X	X	X	X	X
Apron Management									
Apron regulations and procedures	X	X	X	X	X	X	X	X	X
Emergency procedures	X	X	X	X	X	X	X	X	X
Communication procedures with ATS	X	X	X	X	X	X	X	X	X
Stand allocation and information	X	X	X	X	X	X	X	X	X
Apron security procedures	X	X	X	X	X	X	X	X	X
Operation of lighting and docking aids			X			X			X
Provision of discrete RTF channel						X	X	X	X
Low visibility procedures			X			X			X
See Appendix A for further information on visual aids	X	X	X	X	X	X	X	X	X

Visibility and Traffic Conditions associated with SMGCS

Visibility	Visibility Condition 1	Visibility sufficient for the Pilot to taxi and to avoid collision with other traffic on taxiway and at intersection by visual reference and for personnel of control units to exercise control over all traffic on the basis of visual surveillance.
	Visibility Condition 2	Visibility sufficient for the pilot to taxi and avoid collision with other traffic on taxiways and at intersections by visual reference but sufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance.
	Visibility Condition 3	Visibility less than 400m in RVR (low visibility operation).
Traffic Density	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 and 35 total aerodrome movements.
	Heavy	Of the order of 26 or more movements per runway or typically more than 35 total aerodrome movement.

4.39 INFORMATION SECURITY MANAGEMENT SYSTEM (Applicable as from 16 October 2025)

The aerodrome operator shall establish, implement and maintain an information security management system in order to ensure the proper management of information security risks which may have an impact on aviation safety.

4.40 COMPETENCE OF PERSONNEL AT CERTIFIED AERODROMES

4.40.1 General

a) This chapter sets the regulatory requirements regarding the appointment of specific aerodrome safety, maintenance, operational and management personnel. It also establishes a framework to obtain formal DCA acceptance of the person prior to the individual taking up responsibilities and accountabilities of the position;

b) An aerodrome operator shall ensure that there are an adequate number of qualified and skilled personnel to perform activities for aerodrome operation and maintenance.

c) Such qualifications and number of personnel are established: firstly, prior to certification of an aerodrome; and secondly, during any change to Aerodrome Post Holders at an aerodrome which is already certified.

4.40.2 Key Post Holders At A Certified Aerodrome

An aerodrome shall will have a number of key management personnel. The following are positions which shall be referred to as Aerodrome Post Holders in relation to Aerodrome Certification are as follows:

i. Accountable Manager (Chief Executive Officer/Airport Manager)
ii. Head of Aerodrome Safety and Compliance (responsible for safety management and compliance with the regulatory requirements);
iii. Head of Aerodrome Operations;
iv. Head of Aerodrome Maintenance;
v. Head of Aerodrome Emergency Services (Chief Fire Officer)

4.40.3 Personnel Requirements at a Certified Aerodrome

a) An Aerodrome Operator under the certification process and prior to the grant of an Aerodrome Certificate and on an on-going basis shall engage, employ or contract: Aerodrome Post Holders to include the following:

i. Chief Executive Officer/Airport Manager - a senior person who has the authority within the Aerodrome Operator's organization to ensure that all activities undertaken by the organization can be financed and carried out in accordance with the requirements prescribed by the Regulations;

ii. Head of Aerodrome Safety and Compliance - a person who shall be the responsible individual and focal point person for the development and maintenance of an effective safety management system and compliance with the regulations;

iii. Head of Aerodrome Operations – a senior person who is responsible for ensuring that the aerodrome and its operation comply with the requirements of these Regulations. Such nominated person or persons shall be ultimately responsible to the Accountable Manager;

iv. Head of Aerodrome Maintenance – a senior person who is responsible for ensuring that the aerodrome’s maintenance programmes for safety critical infrastructure comply with the requirements of these Regulations. Among the maintenance responsibilities include the pavements, visual aids and electrical systems;

v. Head of Aerodrome Emergency Services (CFO) – a senior person who is responsible for ensuring that the aerodrome’s emergency services comply with the requirements of the Regulations. Such nominated person or persons shall be ultimately responsible to the Accountable Manager; and sufficient and appropriately qualified personnel to manage, operate and maintain the aerodrome and its services and facilities, taking into account the structure of the organization and the number of personnel employed, in accordance with the requirements of these Regulations.

4.40.4 The Aerodrome Operator shall inform the Authority prior to any changes of Aerodrome Post Holders.

4.40.5 The Aerodrome Operator shall update its Aerodrome Manual including the organizational structure with respect to the accepted Aerodrome Post Holders.

4.40.6 Where the Authority has prescribed a competency certification requirement or medical standards for operations or maintenance personnel, the Aerodrome Operator shall employ only those persons possessing such certificates or meeting such medical and fitness requirements.

4.40.7 The Aerodrome Operator shall implement a programme to maintain the competency of the safety critical personnel including training.

4.40.8 Criteria For Assessment Of Aerodrome Operation Post Holders

During the assessment process which under normal circumstances will be conducted during an on-site verification of aerodrome manual. DCA will inquire the post holders capabilities in areas that includes:

a) understanding and knowledge the roles and responsibilities of the operator and regulatory authority, the regulatory framework and specifically Safety Management System requirements;

b) information from the nominated person concerning his knowledge on work area;

c) enforcement methodology of the DCA;

d) the roles and responsibilities of the Aerodrome Post Holder;

e) competence requirement of the nominated person in relation to present personal status and experience presented in their curriculum vitae or equivalent documentation;

f) discussion concerning depth of knowledge and understanding of the applicable legislation and regulations;

g) understanding of aviation in general and for the specific nominated post, how operators/activities at the aerodrome;

4.40.9 Obligations of aerodrome operator on competence of operational personnel

An aerodrome operator shall ensure that all technical and operational personnel are competent and skilled in their areas of jurisdiction.

a) It is also imperative that the aerodrome operator provides continuous and relevant training to acquaint all personnel with the current operational practices and remain competent on their responsibilities in line with the regulatory requirements

b) It is also imperative that the aerodrome operator shall provide continuous and relevant training to acquaint all personnel with the current operational practices and remain competent on their responsibilities in line with the regulatory requirements.

4.40.10 Requirements for Aerodrome Operation Post Holders

POSITION	ASSESSMENT CRITERIA
CHIEF EXECUTIVE OFFICER / AIRPORT MANAGER	**Performance Criteria**
	a) Full control of the human resources required for the operations authorized to be conducted under the operations approval certificate (e.g. Aerodrome Certificate)
	b) Full control of the financial resources required for the operations authorized to be conducted under the operations approval certificate (e.g. Aerodrome Certificate)
	c) Final authority over operations authorized to be conducted under the operations approval certificate (e.g. Aerodrome Certificate)
	d) Direct responsibility for the conduct of the organization’s affairs
	e) Final responsibility for all safety issues
	Knowledge Criteria
	a) Knowledge and understanding of the documents that prescribe relevant aerodrome safety standards
	b) Understanding of the requirements for competence of aerodrome management personnel, so as to ensure that competent persons are in place
	c) Knowledge and understanding of safety, quality, and security management systems related principles and practices, and how these are applied within the organization
	d) Knowledge and understanding of the key issues of risk management within the aerodrome operational aspects
	e) DCA regulatory framework
	f) State Safety Programme and Aerodrome SMS
	g) Aerodrome Certification Process
	h) DCA Regulatory Oversight Process
	i) DCA Enforcement Procedure
HEAD OF SAFETY AND COMPLIANCE	**Performance Criteria**
	a) Responsible individual and focal point for the development and maintenance of an effective safety management system;
	b) Ensure that processes needed for the SMS are established, implemented and maintained
	c) Reportable directly to the Accountable Manager on the performance of the SMS and on any need for improvement
	d) Ensure safety promotion throughout the organization

POSITION	ASSESSMENT CRITERIA
	e) The role of the safety manager should be to: i. facilitate hazard identification, risk analysis, and management; ii. monitor the implementation and functioning of the safety management system, including the necessary safety actions; iii. manage the safety reporting system of the aerodrome; iv. provide periodic reports on safety performance; v. ensure maintenance of safety management documentation; vi. ensure that there is safety management training available, and that it meets acceptable standards; vii. provide advice/mitigation measures on safety matters; and viii. initiate and participate in internal occurrence/accident investigations.
	Knowledge Criteria
	a) Practical experience and expertise in aerodrome operations, maintenance or similar area
	b) Knowledge of the Aerodrome Manual
	c) Comprehensive knowledge of the applicable requirements in the area of aerodromes
	d) DCA Regulatory framework
	e) Aerodrome SMS and State Safety Programme (SSP)
	f) DCA Aerodrome Certification Process
	g) Knowledge of DCA Technical Guidance Material
	h) Knowledge of MCARs and related ICAO Documents (Aerodromes)
	i) Managing Findings and Recommendations (F&R), preparation and implementation of corrective action plan (CAP) from the certification/continuing surveillance of j) aerodrome
	k) Implementation of Aerodrome emergency plan
	l) Implementation of Wildlife Hazard Management
	m) Aerodrome Projects Management
	n) Aerodrome Engineering
	o) DCA Regulatory Oversight Process
HEAD AERODROME OPERATIONS	**Performance Criteria**
	a) Ensure that aerodrome certificating requirements are met, and that the aerodrome operates in accordance with certificate conditions and regulatory requirements
	b) Accountable for day-to-day aerodrome operations
	c) Ensure an understanding by the aerodrome

POSITION	ASSESSMENT CRITERIA
	management of the certification requirement for and status of the Aerodrome Manual
	d) Responsible for the management of the operational services and maintenance of the aerodrome
	e) Analyze auditing findings and inspections to the DCA, and initiate actions
	f) Use feedback from auditing and inspections to recommend appropriate changes to movement areas
	g) Safety management procedures and ensure implementation
	h) Monitor airside planning and development for compliance
	i) Develop proactive working relationships with aerodrome users/third parties
	j) Ensure that aerodrome certification requirements are met, and that the aerodrome operates in accordance with certificate conditions and statutory requirements.
	Knowledge Criteria
	a) Practical experience and expertise in aerodrome operations or maintenance (or similar area) respectively
	b) Comprehensive knowledge of the applicable requirements in the area of aerodromes
	c) Appropriate level of knowledge of safety and quality management
	d) Knowledge of the Aerodrome Manual
	e) DCA Regulatory Framework
	f) Safety Management System/State Safety Programme
	g) DCA Aerodrome Certification Process
	h) Aerodrome Projects
	i) DCA Regulatory Oversight Process
	j) DCA Enforcement Procedure
HEAD AERODROME MAINTENANCE	**Performance Criteria**
	a) Ensure that aerodrome certification requirements are met, and that the conditions of the aerodrome facilities are accurately reported (Aerodrome Manual/AIP) in accordance with the regulatory requirements
	b) Ensure aerodrome facilities are commensurate with the types and frequency of aircraft in accordance with legislative requirements
	c) Ensure that maintenance policies, procedures and training are compatible with the aerodrome operational requirements
	d) Ensure understanding of regulatory requirements related to electrical systems
	e) Ensure understanding of regulatory requirements related to aeronautical ground

POSITION	ASSESSMENT CRITERIA
	lighting and other visual aids such as markings and signage
	f) Ensure understanding of regulatory requirements related to aerodrome pavements
	g) Ensure understanding of role as related to aerodrome reporting systems to include hazard identification, defect identification and reporting of safety critical information to the aerodrome Air Traffic Service Unit
	h) Ensure basic understanding of aerodrome wildlife hazard management
	i) Ensure understanding of requirement for corrective and preventive maintenance programme of the aerodrome facilities, equipment and installations
	j) Ensure understanding of competency standards and evaluation programme for maintenance staff maintaining safety critical assets or working in safety critical areas (including both technical and operational competencies as necessary)
	k) Ensure understanding of [MAS] : Aerodrome Maintenance
	Knowledge Criteria
	a) Qualified in the role with appropriate education, experience and/or certification
	b) Practical experience and expertise in aerodrome maintenance
	c) Comprehensive knowledge of the applicable requirements in the areas of electrical systems, aeronautical ground lighting and pavements
	d) Knowledge of the Aerodrome Manual operational requirements
	e) Knowledge of applicable ICAO guidance materials such as the Aerodrome Design Manual
	f) DCA Regulatory Framework g) Safety Management System/State Safety Programme
	h) DCA Aerodrome Certification Process (Part IV of the Regulations)
	i) Aerodrome Projects
	j) DCA Regulatory Oversight Process
	k) DCA Enforcement Procedure
	l) Process for the reporting and follow-up of accidents, incidents and emergencies on the aerodrome
HEAD AERODROME EMERGENCY SERVICES	**Performance Criteria**
	a) Ensure that aerodrome certificating requirements are met, and that the aerodrome operates in accordance with the regulatory requirements in the provision of Aerodrome Emergency Services
	b) Ensure emergency fire and rescue facilities

POSITION	ASSESSMENT CRITERIA
	are compatible with sizes, types and frequency of aircraft in accordance with regulatory requirements
	c) Ensure that rescue and firefighting policies, procedures and training meet regulatory requirements and are commensurate with aerodrome operations
	d) Ensure that procedures for auditing driver training programmes are to established standards
	e) Ensure the use of communication protocols and procedures is in accordance with regulations
	f) Assess the feasibility of continuing aerodrome operations in an emergency situation
	g) Ensure appliances and equipment meet all regulatory requirements
	h) Establish an effective Command & Control System
	Knowledge Criteria
	a) Qualified in the role with appropriate education, experience and/or certification
	b) Practical experience and expertise in aerodrome AES
	c) Comprehensive knowledge of the applicable regulatory requirements in the areas of Aerodrome Emergence Services and aerodromes
	d) Knowledge of MCAR and ICAO document
	e) Knowledge of the Aerodrome Manual
	f) DCA Regulatory Framework
	g) Safety Management System/State Safety Programme
	h) DCA Aerodrome Certification Process
	i) DCA Regulatory Oversight Process
	j) DCA Enforcement Procedure
	k) Process and procedure for the reporting and follow-up of accidents, incidents and emergencies on the aerodrome

COMPETENCY CHECKLIST FOR AERODROME TECHNICAL PERSONNEL

REQUIREMENTS
1. Reporting Officer Has the reporting officer possesses the following attributes? a) sound knowledge of the physical characteristics of the aerodrome movement area, the aerodrome obstacle limitation surfaces, aerodrome markings, lighting and ground signals and essential aerodrome safety equipment; b) an understanding of the aerodrome information included in AIP; c) the ability to carry out a serviceability inspection of the aerodrome; d) a knowledge of the aerodrome emergency procedures; and e) a knowledge of the NOTAM system and the ability to carry out aerodrome reporting procedures.
2. Airside Drivers Does the airside drivers operating vehicles and ground equipment, hold an appropriate license to operate in entering the movement area?
3. Airside Drivers Is the driver of a vehicle on the movement area appropriately trained for the tasks to be performed and comply with instructions issued by: a) the aerodrome controller when on the maneuvering area; and b) the appropriate authority when operating on the apron?
4. Aerodrome Technical Inspectors Is operator of a certified aerodrome ensure that a person or persons with appropriate technical qualifications and experience conducts an aerodrome technical inspection? In particular: a) the movement area, other pavements and drainage is inspected by a person who has a recognized degree, diploma or certificate in civil engineering or appropriate technical experience; and b) the lighting and electrical facilities is inspected by a person who has a recognized degree, diploma or certificate in electrical engineering or a licensed electrician; and c) the obstacle limitation surfaces is inspected by a person who: d) is technically qualified or experienced in surveying; and e) has a sound knowledge and understanding of the standards and survey procedures for obstacle limitation surfaces.
5. Aerodrome Safety Inspectors Does a person apply to DCA for approval to conduct aerodrome safety inspections as Aerodrome Safety Inspectors? DCA approve a person if the person has: a) a recognized degree, diploma or certificate in civil engineering, surveying or a related field and a sound knowledge of the parts of these Regulations and the standards, practices and procedures that are applicable to the operation and maintenance of aerodromes; or b) other qualifications, knowledge and experience that DCA considers suitable for conducting an aerodrome safety inspection; and c) the capability, if the approval is given, to perform properly the aerodrome safety

REQUIREMENTS
inspection function.
6. Wildlife Personnel Is the wildlife personnel responsible for preparing a WHMP a suitably qualified person such as an ornithologist or a biologist?
7. Persons Involved with Aerodrome Safety Functions Are persons involved with aerodrome safety functions possess essential competencies which include: a) inspect and report on the physical characteristics and conditions of the aerodrome; b) inspect and report on aerodrome lighting systems; c) inspect and report on the OLS; d) initiating a NOTAM; e) use of radio, and f) supervise the safety of aerodrome works?
8. Work Safety Officer Is works safety officer for the aerodrome works has not been trained, in accordance with aerodrome standards, to perform the works safety officer’s functions?

ASSESSMENT OF OPERATIONS AND MAINTENANCE PERSONNEL CHECKLIST

QUESTIONNAIRE
1. Does the officer possess basic qualifications to carry out assigned responsibilities?
2. Does the officer have the required knowledge and experience on the job (OJT) to perform the responsibility at the expected level of competence?
3. Does the officer have the required tools and equipment to carry out the operation in line with job specification?
4. Does the officer have a job description?
5. Is there a personnel roster that indicates satisfactory workload for each officer?
6. Are the officers adequately and regularly trained to discharge the responsibility optimally?
7. In demonstrating operations and maintenance competence, is the knowledge, skills and experience required to inspect aerodrome movement area, obstacle limitation surface, marking, signs and lights, for conducting or supervising aerodrome works, for using the portable radio and completing the NOTAM forms displayed?.
8. Are the officers’ refresher trainings at such duration/interval to guarantee currency on the job?
9. Does the officer have adequate knowledge of the working documents available for the performance of his duties?

4.41 MANAGEMENT OF CONFLICTS BETWEEN LAND USE OR ENVIRONMENTAL REQUIREMENTS AND AVIATION AUTHORITIES TO ENSURE THAT AVIATION SAFETY IS NOT COMPROMISED.

1.0 REVIEW OF SAFETY IN AND AROUND AERODROMES

1.1 Emerging trends

Rapidly increasing traffic volumes and forecasts of continued growth into the next decades put a strain on aerodrome capacity. At the same time, public tolerance of the environmental effects of air traffic around aerodromes such as noise, air pollution and third party risk would appear to have decreased. These conflicting trends lead aerodromes, airlines, air traffic control organizations and the aircraft and equipment industry to devise new technologies and innovative ways of operating aerodromes and aircraft in order to meet both the capacity demands and the environmental limitations. Safety is not the objective of these developments; it is a mere constraint. Consequently, new hazards emerge and existing hazards become difficult to contain unless adequate attention is given to safety aspects in this combination of emerging trends. In addition, a new dimension, third party risk, presented itself as a safety concern is growing. Aerodromes are hubs in the air transport system. Consequently, their presence causes a convergence of air traffic over the area surrounding the aerodrome. For the population living in the vicinity of an aerodrome this implies involuntary exposure to the risk of aircraft accidents. Although the probability of an accident per flight is very small local risk levels around aerodromes are higher than one might expect. This is caused by the fact that, while the probability of an accident per take-off or landing is very small, the number of landings and take-offs is often very large. The resulting annual probability of an accident at a typical large aerodrome is therefore much greater than the small probability of being involved in an aircraft accident as a passenger. In addition, accidents tend to happen during the take-off and landing phases of flight and hence close to an aerodrome. Safety data from studies show that approach and landing phase accidents account for a significant proportion of fatal air transport accidents. This environmental effect is of growing significance to aerodromes safety responsibility and decision making on aerodrome development and land-use planning for aerodrome regions.

1.2 The safety evidence

Aerodromes play an important role in the safety of air traffic. An analysis of accidents shows some of these accidents involved at least one aerodrome related factor in the causal chain leading up to the accident. Aerodrome related factors in this case are taken as those factors which are specific to the aerodrome environment but are not necessarily owned by the aerodrome. To this end, the different aerodrome related causal factors categorized are:

• Lighting and marking (approach lighting, sign lighting, stop bar lighting, etc.)

• Runways and taxiways (runway length, obstructions, taxiway surface condition, etc.)

• Information (aerodrome hazard notifications, weather reports, runway information etc.)

• External hazards fog, turbulence, etc.)

• Apron and ramp (apron/ramp congestion, apron/ramp surface condition, etc.)

• ATC operations and procedures (approach procedures, communication phraseology use, separation judgment, etc.)

• Aerodrome - other (aerodrome structures, T-VASI/PAPI, etc.)

All parties interacting around the aerodrome are part of the problem and consequently part of the potential solution. Gaining further insight into the causal background of risk around aerodromes is hampered by the fact that there is little systematic collection of accident and incident data concerning air transport incidents occurring or originating on the ground, either in ground operations or maintenance. Within the accident information which is being collected, a general lack of attention to the organisational factors and corporate culture factors in data collection taxonomies is present which further impedes deeper insight. The evidence presented here sheds light on the safety problems associated with aerodromes and provides information on the broad categories of accident causal factors which are currently a threat to safety at aerodromes. It is expected however that new developments and changes in traffic volume will have an influence on the nature of these accident casual factors. This chaoter will examine how these factors will change as a result of new developments, in particular technological and operational, and in view of the predicted growth in traffic volume.

1.3 The institutional framework

1.3.1 The regulatory framework

Aerodromes are regulated in accordance with Civil Aviation Regulations and Aerdorome Licensing Manual requirements. In addition, the regulations regarding aerodromes prescribe, what an aerodrome should have as equipment and infrastructure. DCA regulateS adherence to these requirements.

1.3.2 The organizational framework

Aerodromes are complex multi-organizational systems, with diverse safety standards and practices. Frequently, there is a lack of integration amongst aerodrome users with regard to these safety requirements. In view of the multi-organizational nature of risks in the operation of aerodromes, the lack of a mechanism to integrate the safety requirements of the different actors in and around the aerodrome has a detrimental effect on safety. Such a mechanism is difficult to establish since the respective actors in the overall aerodrome organization are subject to different regulatory regimes. These include aircraft maintenance, flight operations, ground handling including fueling, security services, airside services and air traffic control. Even where some of these processes are frequently done by the same organization, they are usually subject to different management systems, different training standards and exhibit a different safety culture.

2.0 AERODROME SAFETY PRIORITIES

The following critical safety issues shall be addressed in order to prevent an increase in the aerodrome-related safety deficiencies which may result from operational and technological developments.

2.1 Safety concerns resulting from operational developments

2.1.1 The wind and turbulence environment of aerodromes

The wind and turbulence environment at aerodromes is a matter of growing concern. Aerodromes tend to attract corporate real estate. Offices and other buildings are increasingly being located in the immediate proximity of runways. The wind turbulence caused by these buildings has been such that in some cases aircrews have temporarily lost control of the aircraft shortly before touchdown or shortly after lift-off resulting in serious incidents. Due to the large monetary value of building space at aerodromes, the pressure to allow such building activities will continue to grow. The current obstacle clearance criteria do not provide adequate protection. A lack of understanding of the turbulence aerodynamics and aircraft dynamic responses to turbulence upsets hampers the development of appropriate regulation.

2.1.2 Wake vortex

Wake vortex constraints govern the minimum required distance (separation) between aircraft lined up in sequence on the approach to the runway. During peak capacity operations, this distance effectively determines runway capacity and thus aerodrome capacity. Capacity constraints lead air traffic control organizations and aerodromes to considering a reduction in separation minima from the current minima under certain conditions. At the same time, the future arrival of Very Large Aircraft gives rise to a possibly worsening wake vortex environment at aerodromes.

2.1.3 Safety of noise abatement procedures

Environmental constraints, and in particular the noise issue, are increasingly may become the limiting factor in aerodrome capacity. This, in turn, leads to Air Traffic Services service provider to develop advanced arrival and departure procedures such as Continuous Descent Approaches, Reduced Flap Approaches, Delayed Gear Approaches, etc. Such procedures may bring about a reduction in safety margins and therefore need close scrutiny. In addition, there are workload concerns and error proneness concerns. Also, the pressure to maximize noise preferential runway utilization leads to the consideration of relaxed crosswind limitations by aerodrome operator which may put aircrews close to controllability limitations. In addition, controller workload concerns with regard to the advanced procedures must be carefully considered, particularly when utilizing mixed modes.

2.2 The safety implications of new technologies

2.2.1 Enhanced and Synthetic Vision systems

Enhanced and Synthetic Vision Systems are increasingly finding their way onto civil flight decks to allow operations under reduced weather minima. Although such systems are attractive alternatives to conventional systems, verifiability may pose a safety concern. These systems offer a potential safety improvement, but when utilized to reduce operational minima may pose safety problems. A safety concern related to these technologies lies in the fact that emergency response units may have trouble locating an accident aircraft on the aerodrome in zero visibility conditions.

2.2.2 Very Large Aircraft

The introduction of Very Large Aircraft will give rise to problems of compatibility with the existing design and infrastructure in aerodromes. Such aircraft are likely to require more ground service equipment at stands than current aircraft. Problems of access to ground service equipment in congested aerodrome apron environments may increase the risk of aircraft damage, which has the potential to compromise flight safety.

2.3 Disaster management plans

Air accidents frequently occur near, rather than at, aerodromes. Therefore, integrating the activities of local and aerodrome emergency services becomes a major issue for planning. Regulatort requirements require major accident simulations and exercises on regular annual basis. However, this requirement does not encompass planning for potential accidents outside the aerodrome limits. Furthermore, experience of major disasters has highlighted the importance of planning to manage the traumatic aftermath of major disasters for survivors, relatives and operational personnel. Planning for an effective response to disaster at or near an aerodrome places a particular requirement for co-ordination between emergency services, for both short term and long term response; it should encompass such aspects as the accessibility of potential accident sites near the aerodrome to emergency vehicles. Experience has also shown the critical importance of effective and comprehensive debriefing following emergency exercises. Such debriefing should include all staff who have a role in the disaster response and is essential if the organization is to evaluate its preparedness and to learn how to improve its disaster planning

3.0 MANAGING RISK

3.1 A common framework for risk management

A common, high safety standard at an aerodrome cannot be achieved by any single actor since the level of safety at the aerodrome is to a large extent governed by the interaction of multiple organizations. An integrated safety management system involving all organizations operating at the aerodrome is thus required. In this system, the aerodrome itself, the main airlines, a representative of all other airline operators, ground handling providers, refueling services, and the air traffic control work together to improve safety. To that end, parties have to establish a Terms of Reference, have regular meetings and use a common operational aerodrome information collection system. All participating organizations will be connected to this system and enter information on air and ground incidents into a common database. This information exchange, the regular meetings and common objectives provide the necessary premises for the early identification of safety bottlenecks, the design of achievable corrective measures and their effective implementation.

3.2 A common methodology for risk assessment

In order to promote fair competition and equally high levels of safety, there should be a common frame of reference for the assessment of new procedures and technologies with regard to safety. While current regulations provide adequate guidance for airworthiness assessments of systems, they do not adequately support the procedural aspects of the safety assessment of new technologies and advanced procedures. In fact, a commonly accepted method which specifically addresses the human operator and the procedural aspects in an appropriate manner does not yet exist.

3.3 A common framework for managing the risks to third parties

Increasing traffic volumes stretch the air transport infrastructure to its limits and require a considerable increase in available aerodrome capacity. Increases in aerodrome capacity usually necessitate new or improved runways and terminals, and changes in route structures and traffic distributions. Such developments bring about the need to prepare environmental impact statements that also address the issue of third party risk. This has led to considerable progress being established in methods and models for the calculation of third party risk around aerodromes. The results of these calculations often carry a high political charge and form (part of) the basis of far-reaching and very costly infrastructural developments. In order to secure the wellbeing of citizens, but also in support of fair competition among aerodromes, legislation in this regard is necessary. A further reason for urgent action is the fact that apart from legislation on noise, there is still relatively little national aerodrome legislation and particular legislation on land use around aerodromes.

4.0 Areas requiring further study

Effective policy making on several of the safety concerns identified in this advisory circular is impeded by a lack of essential knowledge. In order to bridge those gaps in knowledge the following issues require further study:

i. The establishment of common methods and tolerability criteria for third party risk.

ii. The development of adequate methods and models to incorporate the role of human operator and procedural aspects in formal safety assessments.

iii. The safety aspects of new technologies such as enhanced and synthetic vision systems, Head Up displays for civil cockpits.

iv. Airport wind and turbulence environments and their dynamic effects on aircraft in take-off or landing.

v. The operation of safety systems in a multi-organizational environment

vi. Methods of analysis of organizational precursors of accidents and incidents

vii. Evaluation of planning for disasters

5.0 Mandatory actions

In order to effectively address the safety priorities discussed above, the following actions would be required.

i. Mandatory airport licensing including a requirement to establish, maintain and ensure adherence to an integrated safety management programme.

ii. Mandatory collection of data on ground-based incidents, with appropriate emphasis on organizational and corporate culture factors.

iii. Mandatory inclusion of third party risk in Environmental Impact Statements for airports.

iv. The development of common standards for the safety assessment of operations.

Chapter 5

Aerodrome Security

CHAPTER 5: AERODROME SECURITY

5.1 APPLICABILITY

5.1.1 The Authority is the designated appropriate aviation security agency for Mauritius. This chapter prescribes aviation security rules applicable to aerodromes licensed under the Civil Aviation(Security) Regulations 2019.

5.2 REQUIREMENTS OF SECURITY - SECURITY DESIGNATED AERODROMES

Barrier Requirements:

5.2.1.1 The aerodrome operator shall, provide safeguards to prevent unauthorized access to any security area within their aerodrome.

5.2.1.2 The safeguards required by paragraph 5.2.1.1 shall

(a) consist of fences, gates, doors and other barriers between public and security areas with adequate locking or control systems; and
(b) ensure control of any duct, drain or tunnel giving access to the security area or security areas.

5.3. GENERAL RESPONSIBILITIES OF THE AERODROME OPERATOR

5.3.1 The aerodrome operator shall:

(a) Establish, implement and maintain a written security programme approved by the Authority and appropriate to meet the requirements of the National Civil Aviation Security Programme;

(b) Coordinate the implementation of security controls by various entities at the operated by him;

(c) Comply with the provisions of the National Civil Aviation Security Programme;

(d) Integrate into the design and construction of new facilities and alterations to existing facilities at s, design requirements, including architectural and infrastructure-related requirements necessary for the implementation of the security measures contained in the National Civil Aviation Security Programme;

(e) Supervise the movement of persons and vehicles on the airside to control access to security restricted areas;

(f) Screen a proportion of persons other than passengers being granted access to security restricted areas, together with items carried. The proportion shall be determined in accordance with risk assessment carried out by the Authority;

(g) Screen originating passengers of commercial air transport operations and their cabin baggage prior to boarding an aircraft;

(h) Establish measures for transit operations to protect transit passengers and cabin baggage from unauthorised interference.

(i) Screen transfer passengers of commercial air transport operations and their cabin baggage prior to boarding an aircraft except in cases where the Authority has permitted otherwise;

(j) Protect passengers and their cabin baggage which have been screened, from unauthorised interference from the point of screening until they board the aircraft. If mixing or contacts do take place, re-screen the passengers concerned and their cabin baggage before boarding an aircraft;

(k) Screen originating hold baggage prior to being loaded into an aircraft engaged in commercial air transport operations;

(l) Screen transfer hold baggage prior to being loaded into an aircraft engaged in commercial air transport operations except in cases where the Authority has permitted otherwise;

(m) Protect all hold baggage to be carried on aircraft engaged in commercial air transport operations, from unauthorised interference from the point it is screened or accepted into the care of the aircraft operator, whichever is earlier, until departure of the aircraft on which it is to be carried. If the integrity of the hold baggage is jeopardised, the hold baggage shall be re-screened before being placed on board an aircraft; and

(n) Take such measures, not inconsistent with these regulations, as deemed fit and expedient, towards ensuring that the aerodrome has developed and tested contingency plans and procedures for responding to and aircraft related emergencies appropriate for the nature and scale of operations at the aerodrome.

5.3.2 Other Responsibilities

5.3.2.1 The aerodrome operator shall draw up and implement an Airport Security Programme in line with the National Civil Aviation Security Programme, and ICAO Annex 17 together with the relevant guidance manual of ICAO on aviation security.

The Airport Security Programme shall be a written statement of the measures to be adopted by the aerodrome operator at the aerodrome to safeguard Civil Aviation against acts of unlawful interference, and shall be submitted to the Authority for approval, prior to implementation.

5.3.2.2 The Airport Security Programme shall include:

(a) a map identifying restricted and controlled zones at the aerodromes;
(b) a list of measures designed at preventing the introduction, by any means whatsoever, on board an aircraft or in a Security Zone, of weapons, explosives, or any dangerous devices which may be used to commit an act of unlawful interference;
(c) a list of response procedures for security staff to occurrences and threats;
(d) a list of procedures for the screening of air passengers and their baggage, and other persons;
(e) a list of measures for the access, control and movement of persons and vehicles on the aerodrome and contingency plans of action and emergency plans to deal with any situation which may jeopardize aviation security at the aerodrome;
(f) appropriate coordination measures with the various organizations based at the aerodrome on the question of security;
(g) arrangements for monitoring implementation of security by stakeholders;
(h) measures designed to ensure that architectural and infrastructure-related requirements necessary for the optimum implementation of international AVSEC measures are integrated in the design and construction of new facilities at international aerodromes;
(i) an appropriate security training programme for the aerodrome personnel;
(j) such other measures as the Authority may direct, in respect of procedures for the protection of the aerodrome and its facilities.
(k) co-ordinate matters of security among the various departments or entities involved in the running of the aerodrome;
(l) monitor the implementation of the Security Programme;
(m) make reports to the Authority on the current state of security measures and procedures in force at the aerodrome and on any security issues which cannot be resolved at the level; and

(n) ensure that basic minimum security measures and procedures in force at the aerodrome are adequate to meet threats with regard to normal situations and are under constant review for periods of heightened tension and emergency situations.

5.4 PHOTOGRAPHY/FILMING ON THE AERODROME

Only personnel authorized by the Authority may take photographs or do filming within the aerodrome premises.

Chapter 6

Heliports

CHAPTER 6: HELIPORTS

6.1 APPLICABILITY

6.1.1 The use of aerodromes (Heliports) in Mauritius is governed by the regulations 107 of the Civil Aviation Regulations. This chapter prescribes the requirements to be met by any person operating a heliport for public use.

6.2 LICENSING OF HELIPORTS

6.2.1 For commercial and public air transport operation by helicopter, a heliport that complies with the requirements of the MCAR – Heliports, shall be required;

6.2.2 No person shall operate an aerodrome (heliport) in Mauritius unless:

(a) he holds a licence to that effect; and

(b) he operates the aerodrome in accordance with terms and conditions of the licence.

6.2.3 The licensing of an aerodrome (heliport) in Mauritius is governed by Regulation 103 of the Civil Aviation Regulations. Regulation 103 of the Civil Aviation Regulations provides that an application for a licence to operate an aerodrome in Mauritius shall be made to the Minister;

6.2.4 On receipt of an application, the Minister may:-

(a) direct the applicant to furnish any additional information that he may require; and

(b) where he is satisfied, having regard to:

(i) the applicant's previous conduct and experience;

(ii) his equipment, organization and staffing;

(iii) the arrangement that he proposes to make to ensure that the aerodrome and its aerodrome traffic zone are properly maintained and safe for use by helicopter; and

(iv) the physical characteristics of the aerodrome (heliport) and its surroundings;

that the applicant is competent and the heliport safe for use by helicopter, grant the licence subject to such conditions as he thinks fit to impose.

6.2.5 A licence under this regulation shall remain in force for the period specified in the licence and may be renewed for such further period as the Minister thinks fit;

6.2.6 The Minister may, under this regulation issue a licence for public use in respect of any heliport;

6.2.7 Where a licence for public use is issued under this regulation in respect of a heliport, the heliport shall be made available, at all times when it is available for take-off and landing of helicopter, to all users on equal terms and conditions;

6.2.8 The holder of a licence issued under this regulation shall: -

(a) at the request of any interested person, furnish information concerning the terms of the licence; and

(b) in the case of a licence for public use, cause to be notified the times during which the heliport will be available for take-off and landing of helicopter engaged on flights for the purpose of public transport of passengers or instruction in flying.

6.2.9 The procedures adopted by the Authority for issue of a heliport licence shall normally take the following sequence:

(a) dealing with the expression of interest by an intending applicant for the aerodrome licence;

(b) receipt and registration of the application (applications form and Heliport Manual);

(c) assessment of application and Heliport Manual by the Authority;

(d) technical inspection of the heliport;

(e) approval of the Heliport Manual;

(f) analysis of the findings and monitoring of the related corrective actions plans;

(g) grant/refusal of the Heliport Licence; and

(h) promulgation of the status of the licensing of the heliport in the AIP.

6.2.10 Application Grant/Renewal for a Heliport Licence

The application for the grant/renewal of a heliport licence shall be made in writing on prescribed form, specimen given as per Appendix 13 for a Heliport Licence. The application shall be accompanied by the Heliport Manual and information on the ownership of the project including activities, shareholding structure and details of directors of the company.

6.3 Heliport Manual

The Heliport Manual shall include, amongst others, the following:

a) Project brief including ownership of the project;

b) Preface signed by the Accountable Executive;

c) Purpose and scope of the manual;

d) Applicable legislations for a heliport;

e) Type of operation (private or public) and condition for the use of the heliport;

f) Procedure for promulgation of heliport information in Aeronautical Information Publication (AIP) and issue of NOTAM;

g) Obligations of the heliport operator;

h) Type (largest) of helicopter the heliport is designed;

i) Limitations of the heliport;

j) Document control, amendments and distribution;

k) Contact details;

l) Services and facilities available at the heliport;

m) technical specifications of the heliport including dimensions of heliport, approach and take off paths, markings and touchdown and lift off area based on the largest type of helicopter for the design of the heliport. The technical specifications shall also include, as applicable, dimensions of:

   i. Touchdown and lift off area (TLOF);
   ii. Final Approach and Take Off (FATO);
   iii. Safety Areas and outer slope protection;
   iv. Obstacle Limitation Surfaces (Approach/take off/transitional surfaces);
   v. H-Marking, FATO marking, Air Taxiway marking;
   vi. Air taxiway;

vii. Air Taxilane;
viii. Helicopter parking stand and protection areas;
ix. Slope of TLOF and parking stand;
x. Aiming point;
xi. Lightings; and
xii. HAPI and SAGA.

n) location plan and a site plan of the heliport including any trees, shrubs, buildings and structure within 250m of the proposed location of the heliport and their respective height above ground level and mean sea level. We would also require the height above mean sea level of the proposed location for the heliport and height contour of the approach/take off paths. The plans shall be endorsed by an approved land surveyor;

o) site plan showing dimensions of the heliport, markings, approach/take off paths, direction of approach/take off and direction of prevailing winds. The plan shall be endorsed by an approved land surveyor;

p) drawing showing the vertical profile of the approach and take off paths including the terrain, heliport and obstacles. The plan shall be endorsed by an approved land surveyor;

q) list of associated facilities/equipment (emergency and wind direction), a drawing to show their locations and emergency procedures in case of any accident/incident and emergency procedures;

r) The emergency procedure shall include, amongst others, arrangement, telephone facilities and telephone numbers of Department of Civil Aviation, Government Fire Services, Hospitals, emergency services and any other organisations;

s) safety procedures on ground during helicopter operations and inspection of heliports before landing and take off. Also, all ground personnel shall be fully conversant with these safety procedures and follow first aid training;

t) A Safety Notice Board (in both English and French) shall be posted near the heliport and shall be clearly visible to the passengers. The Safety Notice Board shall have safety instructions including the following:

(a) precautions to observe while approaching a helicopter; and

(b) precautions to observe while alighting from a helicopter.

The Safety Notice Board shall be posted outside the approach and take-off corridor and it shall be 1-1.5 metres high and 1-1.15 wide.

u) A safe waiting place shall be provided for the passengers. The waiting area shall be located outside the approach and take off corridor.

Safety procedure to ensure the safe helicopter operation at the heliport, shall include, amongst, the following:

(i) inspection of heliport before landing and take off to ensure that all Foreign Object Debris (FOD) have been removed;

(ii) An officer shall be available at the heliport before landing and take off to ensure that the heliport/approach and take off corridor are free from any obstructions and to inform emergency services in case of any incident/accident;

(iii) Safety precautions to be followed while embarking and disembarking the helicopter.

v) All ground personnel at the heliport shall be appropriately trained in first aid, handling of fire extinguishers and safety precautions to be followed while embarking and disembarking the helicopter;

w) Rescue and Firefighting : Premix foam level B : 90 L with foam discharge rate : 60 L/min and 23kg of dry chemical powder or 23 kg halogens or 45 kg of CO_2;

x) The following data shall be provided:

(i) elevation of the heliport above mean sea level; and

(ii) WGS-84 coordinates of the heliport.

Chapter 7

Appendices

APPENDIX 1(A)

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION

DCA FORM 601

APPLICATION FOR AERODROME LICENCE

(PUBLIC USE)

1. PARTICULARS OF THE APPLICANT (a) Full Name (b) Address (c) Phone/Facsimile (d) Position	(Give details as required to be shown in the licence) ……………………………..…………….. ………………………...………………… ………………………...………………… ……………………………………………	
2. PARTICULARS OF AERODROME (a) Name (b) Bearing and Distance from the Nearest Town (c) Geographical coordinates of the ARP	…………………………………………… ……………………………………….……... ...………………………………………… …………………………………………… …………………………………………… ……………………………………………	
3. PARTICULARS OF LICENCE (a) Period for which licence is required (b) Classification/largest type of aircraft to be operated at aerodrome (c) Any limitations or exemptions	……………………………………….……... …………………………………………… …………………………………………… ……………………………………………	
4. PARTICULARS OF TRANSPORT	Public transport of passengers	Instruction in flying
(a) Type and max. total weight authorized of the heaviest aircraft engaged on for the public transport.	……………………….. ……………………….. ………………………..	……………… ……………… ………………
(b) Expected average number of movements during the three busiest calendar months of the year (one movement = one take-off or one landing).	……………………….. ……………………….. ………………………...	……………… ……………… ………………
5. IS AERODROME TO BE USED FOR NIGHT FLYING?	…………………………………………… ……………………………………………	

6. ARE YOU THE OWNER OF AERODROME? IF NOT PLEASE STATE:	…………………………………………… ……………………………………………
(a) Details of rights you hold (b) Name and address of the owner or tenant	…………………………………………… ……………………………………………
7. Is the safe guarding measures are taken with local planning ministry to control new construction in vicinity of aerodrome which may cause obstacle.	…………………………………………… …………………………………………… ……………………………………

8. Give details of the approvals obtained from ministries as indicated below as applicable. Mention details of objection raised, if any:

	Name of the Ministry	**Reference of approval**
(a)	………………………………………………..	……………….…………………………….
(b)	………………………………………………..	..…………………………………………..
(c)	………………………………………………...	..…………………………………………..
(d)	………………………………………………..	…………………………………………....

9. Any other information	………………………………………………………………..… ……………………………………………………………………

10. LICENCE

I hereby certify that the foregoing information is correct in every respect and no relevant information has been withheld.

Date: ………………………………… Signature : ………………………….

Seal: ………………………………... Name : …………………………..

11. LIST OF ENCLOSURES

…………………………………

…………………………………

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…………………………………

APPENDIX 1(B)

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION DCA FORM 602		
APPLICATION FOR AERODROME LICENCE		
(ORDINARY USE)		
1. PARTICULARS OF THE APPLICANT (a) Full Name (b) Address (c) Phone/Facsimile (d) Position	(Give details as required to be shown in the licence) ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… …………………………………………	
2. PARTICULARS OF AERODROME (a) Name (b) Bearing and Distance from the Nearest Town (c) Geographical coordinates of the ARP Position	………………………………………… ………………………………………… ………………………………………… ………………………………………… …………………………………………	
3. PARTICULARS OF LICENCE (a) Period for which licence is required (b) Classification/largest type of aircraft to be operated at aerodrome	………………………………………… ………………………………………… ………………………………………… ………………………………………… …………………………………………	
4. PARTICULARS OF TRANSPORT	Public transport of passengers	Instruction in flying
(a) Type and max. total weight authorized of the heaviest aircraft engaged on for the public transport.	…………………… …………………… ……………………	…………………… …………………… ……………………
(b) Expected average number of movements during the three busiest calendar months of the year (one movement = one take-off or one landing).	…………………… …………………… ……………………	…………………… …………………… ……………………
4. IS AERODROMW TO BE USED FOR NIGHT FLYING? **5. ARE YOU THE OWNER OF AERODROME?** **IF NOTE PLEASE STATE:** (a) Details of rights you hold (b) Name and address of the owner or tenant	………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… …………………………………………	

6. Is the safe guarding measures are taken with local planning ministry to control new construction in vicinity of aerodrome which may cause obstacle.	…………………………………………… …………………………………………… …………………………………………… ……………………………………………

7. Give details of the approvals obtained from ministries as indicated below as applicable. Mention details of objection raised, if any:

	Name of the Ministry	**Reference of approval**
(a)	…………………………………………..…	……………………………………..…
(b)	…………………………………………….	……………………………………..…
(c)	…………………………………………..…	……………………………………..…
(d)	…………………………………………….	………………………………………..

8. Any other information ……………………………………………………
l …………………………………………………..…

9. LICENCE

I hereby certify that the foregoing information is correct in every respect and no relevant information has been withheld.

Date : ………………………………… Signature : …………………….
Seal : ………………………………... Name
: ……………………..

11. LIST OF ENCLOSURES

…………………………………
…………………………………
…………………………………

APPENDIX 1(C)

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION

AERODROME LICENSEE REPORT
DCA FORM : 603

1.Name and Address of Aerodrome: Telephone No: Fax No E Mail	
2. Name and Address of Licensee:	
3. Name & Status of the Officer in Charge of day operation of the aerodrome	
4. Name & Status of the Officer responsible for Aerodrome Safety (if different from above)	
Telephone No	
5. Name & Status of Officer Responsible for overseeing the day to day provision of RFFS	
Telephone No	
6. Provide the following details for the last 12 months	

Activity	List the largest Aircraft Type in each activity group	RFF Category of the aircraft	Category of RFF cover provided for that size of aircraft	Number of movements in busiest 3 months for that size of aircraft
Public Transport				
Flying Training				
Freight				

Other Aviation Activities within your Aerodrome Traffic Zone, not requiring the use of a licensed Aerodrome i.e. Gliding, Parachuting, Microlights	
7 EXEMPTIONS/VARIATIONS	
List all items that exist and/or agreed as Variations from DCA Aerodrome Licensing Manual/MCAR Aerodrome Design and Operations.	

8.	AERODROME MANUAL		
8.1	Does your Aerodrome Manual contain all the information required by DCA Aerodrome Licensing Manual and are all details correct as of today's date?	YES	NO
8.2	If not, indicate the changes		
9.	(a) **AERODROME EMERGENCY PLAN** **Does your Emergency Plan contain all the information required by DCA Aerodrome Licensing Manual and are all details correct as of today's date?** If not, indicate the changes When was your plan last reviewed and give brief details of any exercises carried out in the last eighteen months to check the procedures. (b) **SAFETY MANAGEMENT SYSTEM** Does your Safety Management System contain all the information required by DCA Aerodrome Licensing Manual and are all details correct as of today's date? If not, indicate the changes		
10.	**AERODROME INFORMATION** (AIP Entry) When was your plan last reviewed and give brief details of any exercises carried out in the last eighteen months to check the procedures.		
10.1	Are all details (including those regarding the runways/taxiways) as promulgated in the current AIP correct?	YES	NO
10.2	If not, indicate changes required:		

Page	Para	Comments

10.3	**How would you describe the condition of the runway surfaces? Give date and results of the last runway friction test.** Comments:
11.	**RUNWAY STRIP**:
11.1	Complete the table below. (Dimensions in metres)

Runway	Width Required	Width Available	Comments
(i) 14 or12			
(ii) 32 or 30			
*Strip Surface			
Bearing Strength			
List all Infringements in runway strips			

11.2 Date of last audit/inspection conducted by the licensee?			
12. **RUNWAY END SAFETY AREAS** (RESA) (as defined in MCAR Aerodrome Design and Operations) Complete the table below if RESAs are required/available: (dimensions in metres)			
Runway	Undershoot RESA	Overrun RESA	Comments on RESA Surface and Slope
14			
32			

13.	**OBSTACLE CHECK**: List all obstacles penetrating the obstacle limitation surfaces	
14.	**TAXIWAYS AND MANOEUVRING AREAS:**	
14.1	Date of last audit/inspection conducted by Aerodrome Licensee	
14.2	How would you describe the condition of the surfaces? Comments	
14.3	Do all strips and clearances comply with MCAR Aerodrome Design and Operations? If not, give details.	
15.	APRONS	
15.1	Date of last audit/inspection carried out by Aerodrome Licensee	
15.2	What is the condition of the aircraft parking surfaces? Comments	
15.3	What are the arrangements for the parking of essential Apron equipment?	
16.	FUEL	
16.1	Who has management of the fuel installation? If not the Licensee, complete rest of the questions in Section 16 below.	
16.2	Do you have any quality control & check procedures to ensure fuel quality? If not, do you ensure fuel quality?	
16.3	State the type of installation(s), date of last audit/inspection, and the date of last service	
17.	AERODROME MARKING AND SIGNALS	
17.1	Date of last audit/inspection conducted by Aerodrome Licensee	
17.2	Do all markings & signals comply with MCAR Aerodrome Design and Operations? If not, give details	
17.3	Indicate in table below which markings & signs are provided	

Runway Designation				**Remarks**
Runway Threshold				
Fixed Distance				

Runway Centreline				
Touchdown Zone				
Side Stripe				
Runway Edge				
Taxiway Designation				**Remarks**
Taxiway Edge				
Taxiway Centreline				
Taxiway Holding Positions				
Signs				
Apron Parking/Docking				
Boundary Markers				
Landing T/Wind Direction Indicator				
Obstacle Lighting/Marking				
Signals Areas/Markings				

18.	BIRD HAZARD CONTROL	
18.1	Who is responsible for bird hazard control?	
18.2	How many people are engaged in bird hazard control at any one time?	
18.3	If not a “dedicated” team, what duties/sections the bird hazard controllers are drawn from?	
18.4	How many of them have attended a formal bird hazard control training course?	
18.5	In summary how is bird hazard control undertaken?	
18.6	What are the team’s hours of operation?	
18.7	What are the major aerodrome equipment used?	
18.8	What are the main types of birds on your aerodrome	
18.9	Do you have any specific habitat problems on your aerodrome or in its vicinity?	
18.10	What is your aerodrome bird strike risk?	
18.11	How do you manage the airfield grass through the year?	
18.12	Do you have any long term policy to manage the bird hazard at your aerodrome	
18.13	Do you have any liaison with concerned Ministry on developments near your aerodrome which might attract birds?	

19.	**VISUAL LIGHTING AIDS:**					
		INDICATE TYPE OF LIGHTS (H1, M1 OR L1)				REMARKS
19.1	RUNWAY **14/32** or RUNWAY 12/30					
	Approach **14** or Approach 12					
	Approach 32					
	PAPI **14 or 12**					
	PAPI **32 or 30**					
	Runway Centreline Capacitor Discharge Sequential Lights					
	Runway Edge					
	Threshold					
	End					
	Touchdown Zone					
	Stopway					
19.2	TAXIWAY					
	Taxi Edge					
	Taxi Centreline					
19.3	Illuminated Sign					
19.4	Docking Guidance					
19.5	Flood Lighting					
19.6	Obstacles					
19.7	Beacon					
19.8	Other					
19.9	Does your lighting comply with MCAR Aerodrome Design and Operations criteria in all respects? If not, give details:					
19.10	Frequency of flight checks and date and result of last check conducted by aerodrome licensees					
19.11	Frequency of ground checks and date and result of last checks conducted by aerodrome licensee					
19.12	Is all the lighting system in working order? Provide brief detail of nay defects					
20.	**PROVISION OF RESCUE FIRE FIGHTING & MEDICAL SERVICES:** (OPERATIONAL DETAILS)					
20.1	Do your rescue and fire fighting meet the requirements set out in DCA Aerodrome Licensing Manual/ MCAR Aerodrome Design and Operations at all times? Comments:					

20.2	What is the RFF minimum manning level availability by numbers and rank for specified RFF Categories as promulgated in the Mauritius AIP? Are these level maintained all times? Comments:			
20.3	Is the RFF minimum manning level always available and able to respond instantaneously? Comments:	YES	NO	N/A
20.4	Are the movement areas always observed during licensed activities in order to initiate an instantaneous RFF response? Comments:	YES	NO	N/A
20.5	Does the aerodrome also operate RFF specialist appliances i.e. Rescue Boats/Domestic Ambulance etc? What are they? Comments:	YES	NO	N/A
20.6	What response times are achieved from fire stations and/or standby positions to the furthest critical points on the movement area? Comments:	YES	NO	N/A
20.7	What is the frequency of testing response times and are the times recorded for each appliance? Comments:	YES	NO	N/A
20.8	Are medical equipment & facilities available at your aerodrome and do they comply with minimum requirements? Comments:	YES	NO	N/A
20.9	Is respiratory protective equipment, personal protective equipment provided and maintained to comply with requirements? Comments:	YES	NO	N/A
20.10	Are adequate radio communications provided on all vehicles and does the communications system comply with DCA requirements? Comments:	YES	NO	N/A
20.11	**Vehicles**			

	1	2	3	4	5	6
Vehicle Registration						
Vehicle Type						
Water Capacity (in litres)						
Foam Capacity (in litres)						
Monitor Throw where appropriate (in metres)						
Discharge Rate Sideline (in litres/min)						

Discharge Rate Monitor (in litres/min)							
Automotive Test 0-80 KPH							

20.12	**ACCESS TO UNDERSHOOT/OVERSHOOT AREAS:**			
	Can the fire appliances gain access up to 100m from beyond the ends of each runway? Comments:	YES	NO	N/A
	Where there is a different environment, which negates an effective response of normal fire service appliances, what special equipment/facilities are provided? Comments:			
	Where marine rescue equipment is provided, are response time objectives clearly defined in the Aerodrome Manual? Comments:	YES	NO	N/A
21.	**TRAINING OF PERSONNEL**			
21.1	Do all personnel hold valid relevant Competence appropriate to the positions they hold?	YES	NO	N/A
21.2	Do you provide a comprehensive training programme in all functions expected of your RFF personnel?	YES	NO	N/A
21.3	Do all staff receive comprehensive First Aid training?	YES	NO	N/A
21.4	Do staff receive comprehensive Driver/Operator training?	YES	NO	N/A
21.5	Are adequate training records maintained of all training received?	YES	NO	N/A
22.	**INTERNAL SAFETY ASSURANCE**			
22.1	Does your aerodrome or organization have an internal safety assurance system? If not, how do you ensure safety? Comments:	YES	NO	N/A
22.2	Do you provide safety training to staff in functions expected of your personnel? Comments:	YES	NO	N/A
22.3	Do you conduct internal safety audits at your aerodrome? If yes, what is the frequency and last date of audit? Comments:	YES	NO	N/A

Signed : .... Date : ....

Name : ....

Designation : ....

Licensee/On behalf of : .... Seal : ....

APPENDIX 2(A)

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION	**DCA FORM 604**

AERODROME LICENCE FOR PUBLIC USE

1. **PARTICULARS OF LICENCE**

   LICENCE NO :

2. **PARTICULARS OF AERODROME**

   (a) NAME OF AERODROME :
   (b) LOCATION OF AERODROME :
   (c) LATITUDE/LONGITUDE :

3. **PARTICULARS OF AERODROME OPERATOR**

   (a) NAME OF AERODROME OPERATOR :
   (b) ADDRESS OF AERODROME OPERATOR :

4. **NIGHT OPERATION** :

5. **ANY EXEMPTIONS OR OPERATIONAL RESTRICTIONS** :

6. This Aerodrome Licence is issued pursuant to the grant of the Minister under the provisions of the Civil Aviation Act 1974, the Civil Aviation Regulations, as subsequently amended, and Aerodrome Licensing Manual in respect of the above named aerodrome as an aerodrome to be used for the take-off and landing of aircraft engaged on flights for the purpose of public transport of passengers.

7. This Licence is granted subject to the conditions specified in Schedule A, see overleaf, and may be suspended or cancelled at any time where the said aerodrome operator fails to comply with the conditions specified in Schedule A.

8. This Licence shall remain in force from **….** to **….** both dates inclusive unless surrendered, varied, suspended or revoked. This licence is not transferable.

DATE: **SIGNATURE**

SEAL **DIRECTOR OF CIVIL AVIATION**

SCHEDULE A

CONDITIONS OF AERODROME LICENCE

1. This aerodrome is licensed for public use and shall all times when it is available for take-off or landing of aircraft be so available to all persons on equal terms and conditions.

2. Terms and conditions of the aerodrome licence:

   1) ICAO Location Indicator :
   2) Aerodrome Reference Code;
   3) Critical Aeroplane Type;
   4) ARFFS Aerodrome Category;
   5) RWY 14/12 :
   6) RWY 32/30 :

3. The holder of this licence shall -

   (a) give to the Authority not less than 10 days' notice in writing of any intended change in the appointment or duties of the Chief Executive Officer;

   (b) notify the Authority of the times during which the aerodrome shall be available for take-off and landing of aircraft engaged on flights for the purpose of public transport of passengers;

   (c) make no change in physical characteristics of the aerodrome, including the erection of new installations or alterations to the existing installations, without the prior approval of the Authority;

   (d) inform the Authority, by the quickest available means, of any degradation in the facilities specified in aerodrome manual or any material change in the surface of the landing, area, manoeuvering area, the apron or in the obstructions characteristics of the approach; and

   (e) ensure that no aircraft shall take off or land at the aerodrome unless the medical, rescue and fire fighting facilities specified in the aerodrome manual are provided, maintained and ready for immediate turn-out whenever the aerodrome is available for operations.

4. The holder of this licence shall maintain the system of visual lighting aids to the standards that exist at the time of grant of this licence. All such lighting aids required for safe take-off and landing of aircraft at night, shall remain in operation at all times that they may be so required, provided that minor temporary unserviceability that does not affect the safety of operations shall not preclude the take-off or landing of aircraft.

5. Subject to Condition 1 above, nothing in this licence shall be taken to confer on any person the right to use the aerodrome without the consent of the Aerodrome Operator or the Authority.

6. The holder of this licence shall comply with the requirements of the Civil Aviation Act 1974, Civil Aviation Regulations, Aerodrome Licensing Manual and Mauritius Civil Aviation Requirements (MCAR) Aerodrome Design and Operations and Heliports and Civil Aviation (Security) Regulations 2019 and any other instructions issued by the Authority from time to time.

   The expressions used in this licence shall have the same respective meanings as in the Civil Aviation Regulations and in the said Aerodrome Licensing Manual.

APPENDIX 2(B)

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION
DCA FORM 605

AERODROME LICENCE FOR ORDINARY USE

1. **PARTICULARS OF LICENCE**
   (a) LICENCE NO. : ……………………………………
   (b) EFFECTIVE DATE : ……………………………………
   (c) VALIDITY PERIOD : ……………………………………
2. **PARTICULARS OF AERODROME**
   (a) NAME OF AERODROME : ……………………………………
   (b) LOCATION OF AERODROME : ……………………………………
   (c) LATITUDE/LONGITUDE : ……………………………………
3. **PARTICULARS OF AERODORME OPERATOR**
   (a) NAME OF AERODORME OPERATOR : …………………………………….
   (b) ADDRESS OF AERODROME OPERATOR : …………………………………….
4. **NIGHT OPERATIONS** : .……………………………………
5. **ANY EXEMPTIONS OR OPERATIONAL RESTRICTIONS:** : …………………………………….

6. The Director of Civil Aviation, referred as Authority, in exercise of powers conferred in him by the Minister under Civil Aviation Act 1974, the Civil Aviation Regulations and as per provisions in the Aerodrome Licensing Manual hereby certifies the above named aerodrome as an aerodrome to be used as a place for take-off and landing of aircraft engaged in flights for the purpose of ordinary use, subject to the conditions of the licence.

7. This Licence is granted subject to the conditions specified in Schedule A, see overleaf, and may be suspended or cancelled at any time where the said aerodrome operator fails to comply with the conditions specified in Schedule A.

8. This Aerodrome Licence will remain in force until it is surrendered, varied, suspended or revoked. The licence is not transferable.

DATE : …………………………..… SIGNATURE : ……………………….

SEAL (DIRECTOR OF CIVIL AVIATION)

cont…

CONDITIONS OF AERODROME LICENCE

1. This aerodrome is licensed for ordinary use and shall only be used by the Aerodrome Operator or by persons specifically authorized by him.

2. The holder of this licence under the regulations shall -

    (a) make no change in physical characteristics of the aerodrome including erection of new installations or alterations to the existing ones without prior approval of the Authority;

    (b) inform the Authority, by the quickest available means, of any degradation in the facilities specified in aerodrome manual; or material change in surface of the landing, manoeuvering area, apron; or in the obstructions characteristics of the approach.

3. No aircraft shall take-off or land at aerodrome unless the facilities specified in the aerodrome manual are provided, maintained, and ready for immediate turn out whenever the aerodrome is available for operations of the take-off and landing of an aircraft.

4. This aerodrome is licensed for the take-off and landing of aircraft at night. Therefore, the holder of the licence shall maintain the system of visual lighting aids to the standards that existed at the time of grant of this licence. All such lighting aids, required for safe landing and take-off of an aircraft in night, shall remain in operation at all time.

5. Subject to the condition 1 above, nothing in this licence shall be taken to confer on any person the right to use the aerodrome without the consent of the Authority or the Aerodrome Operator. The holder of this licence shall maintain the aerodrome manual in its full compliancy.

6. The holder of this licence shall comply with the requirements of the Civil Aviation Act 1974, Civil Aviation Regulations, Aerodrome Licensing Manual and Mauritius Civil Aviation Requirements (MCAR) Aerodrome Design and Operations and Heliports and Civil Aviation (Security) Regulations 2019 and any other instructions issued by the Authority from time to time.

7. Any public right of way crossing or bordering the landing area shall be adequately sign-posted with notices warning the public of danger from aircraft.

APPENDIX 3

DEPARTMENT OF CIVIL AVIATION – MAURITIUS DCA FORM 607

WILDLIFE STRIKE REPORTING FORM

To be completed for all strikes, including those where evidence is discovered by ground and overhaul personnel. Completed forms are to be sent to the Director of Civil Aviation, SSR International Airport, Mauritius.

Operator/Flight No. 01/02
Aircraft Make/Model 03/04
Engine Make/Model 05/06
Aircraft Registration 07
Date .... day .... month .... year 08
Local Time 09
UTC Time 10
Aerodrome Name 11
Runway Used 12
Location if En Route 13
Height AGL .... ft 14
Speed (TAS) .... kt 15
Phase of Flight 16

parked	☐	A	en route	☐	E
taxi	☐	B	descent	☐	F
take-off run	☐	C	approach	☐	G
climb	☐	D	Landing roll	☐	H

Part(s) of Aircraft 17

	Struck	Damaged
radome	☐	☐
windshield	☐	☐
nose (excluding above)	☐	☐
engine no. 1	☐	☐
2	☐	☐
3	☐	☐
4	☐	☐
propeller	☐	☐
wing/rotor	☐	☐
fuselage	☐	☐
landing gear	☐	☐
tail	☐	☐
lights	☐	☐
other (specify)	☐	☐

Effect on Flight 18
- none ☐
- aborted take-off ☐
- precautionary landing ☐
- engines shut down ☐
- other (specify) ☐

Sky Condition 19
- no cloud ☐
- some cloud ☐
- overcast ☐

Precipitation 20
- fog ☐
- rain ☐

Wildlife Species* 21

Number of Wildlife 22

	Seen	Struck
1	☐	☐
2-10	☐	☐
11-100	☐	☐
more	☐	☐

Size of Wildlife 23
- small ☐
- medium ☐
- large ☐

Pilot Warned of Wildlife 24

Yes ☐ No ☐

Remarks (describe damage, injuries and other pertinent information) 25

....
....
....
....
....

Reported by: ....

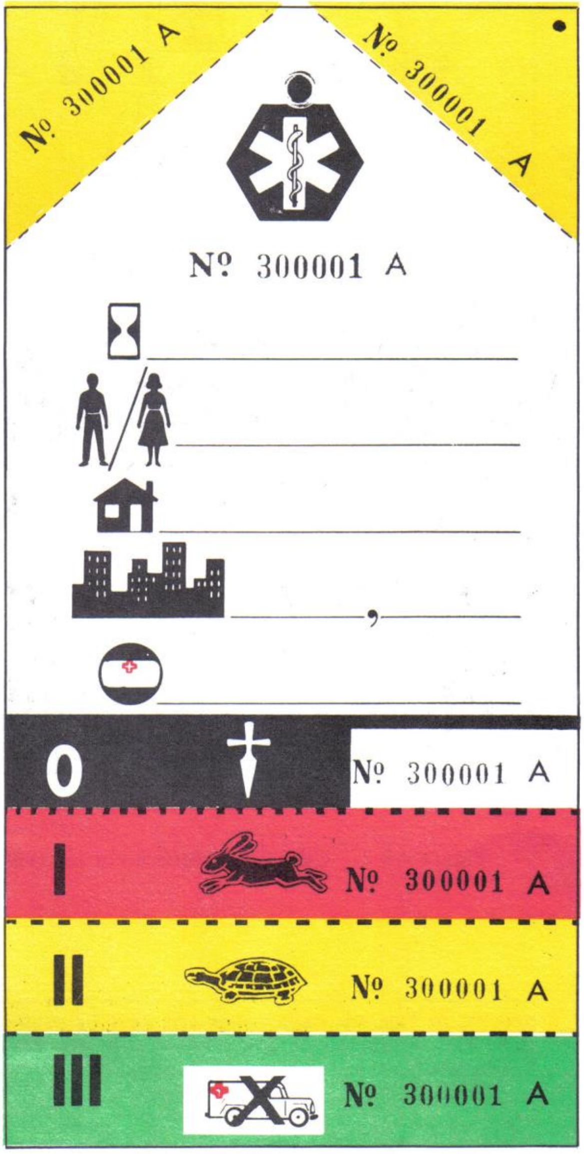
* Send photograph of wildlife remains to Director of Civil Aviation, SSRInternational, Mauritius if bird has not been identified.

THIS INFORMATION IS REQUIRED FOR AVIATION SAFETY

APPENDIX 4(A)

CASUALTY TAGS

Over the medical symbol is an eyelet with cord attached



Left corner is YELLOW and is perforated along line shown. Triangular piece has tag number and can be retained by the ambulance driver as a record of the victims delivered to hospital. If more than one hospital is used, tags should be kept separate for each.

Main part of tag is attached to the victim.

BLACK STRIPE
Deceased

RED STRIPE — Priority I
Rabbit — Immediate Care

YELLOW STRIPE — Priority II
Turtle — Delayed Care permissible

GREEN STRIPE — Priority III
X'ed out ambulance — minor care only needed

Right corner is YELLOW and is perforated along line shown. Triangular piece has tag number and cord in eyelet. It may be used to tie to locator pole or for first aid personnel to retain as a record of the victims treated.

Tag number

Space to enter time when victim first stabilized

Space to enter name of victim (if known)

Space to enter address of victim (if known)

Space to enter city and country of victim (if known)

Space to enter name or initials of first aid personnel who treated the victim

Tear off the three lower perforated parts if the victim is deceased

Tear off the two lower perforated parts if the victim is Priority I

Tear off the bottom perforated part if the victim is Priority II

Leave all perforated parts if the victim is Priority III

NOTE.— If the condition of the victim deteriorates, the indication should be changed accordingly.

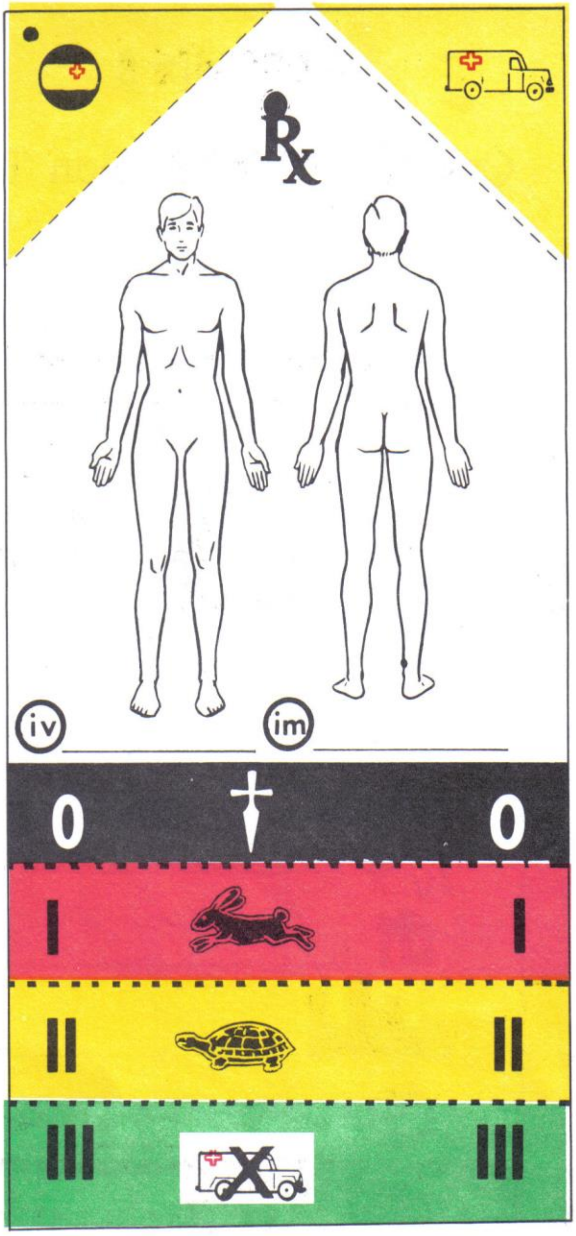
Figure A8-1. Casualty identification tag (recto)

See Figure 7-1 for explanations of the tear-off portions of the tag

Show location of initially identified injuries

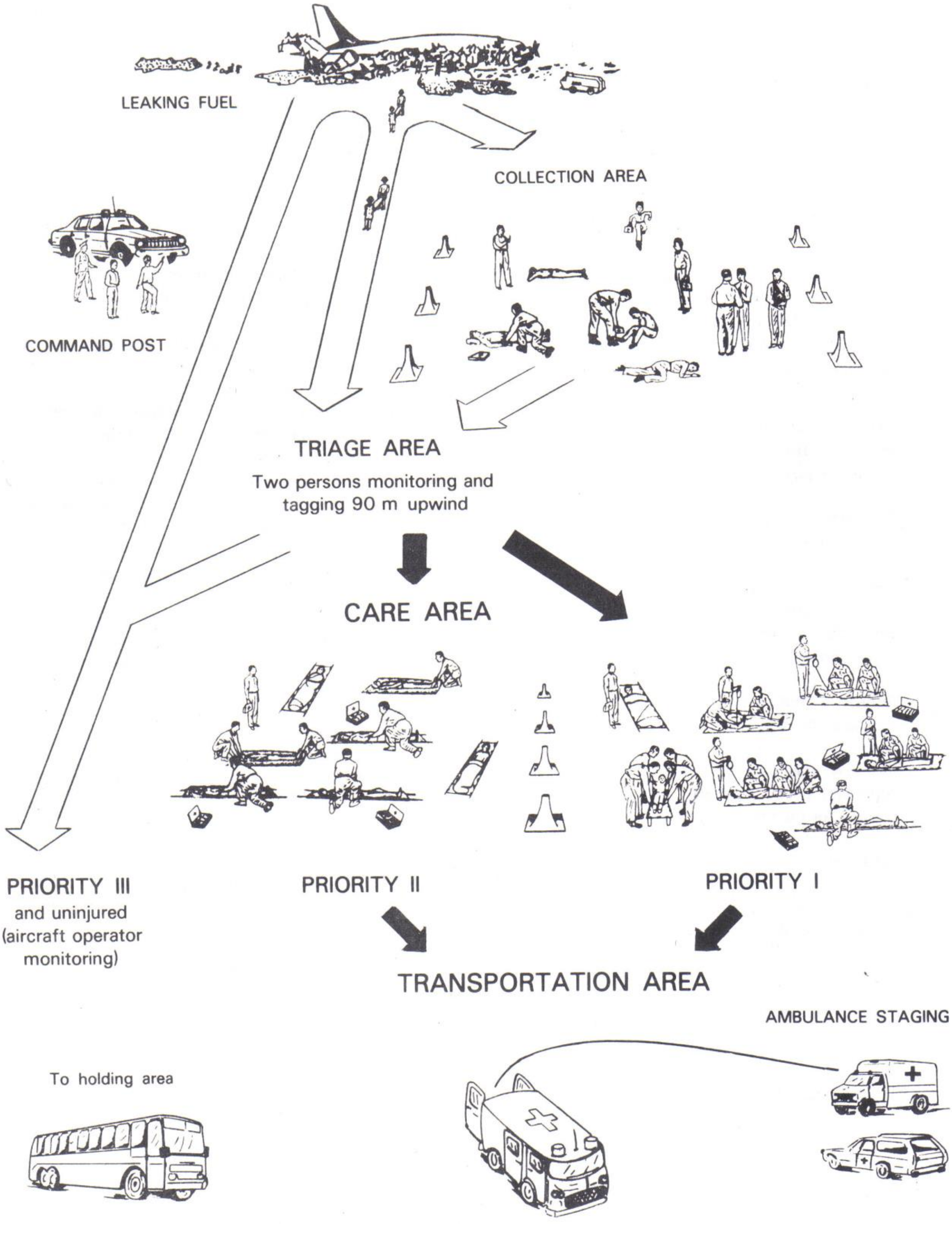
Record after IV the type of any intravenous injections administered to the victim

Record after IM the type of any intramuscular injections administered to the victim



APPENDIX 4(B)

TRIAGE AND MEDICAL CARE



APPENDIX 4(C)

DCA FORM 608

Name of

Date issued

Name of

EMERGENCY PLAN

LETTER OF EMERGENCY AGREEMENT

AGENCY: ***(Name and address)***

……………………………….

Endorses the ***Name of Aerodrome Emergency Plan***, associated emergency plan document dated ***(insert date),*** and attached procedures (in-house procedures of the agency and specific roles in the emergency plan as agreed) and agrees to comply with all the procedures and instructions, and fulfill all applicable responsibilities contained therein.

………………………………………
Signature of Authorized Representative

Date ………………………………….

APPENDIX 4(D)

EXERCISE PLANNING

D - 120 days	Supervisory personnel of participating agencies hold organizational meetings to outline aims, formulate the scenario, assign work tasks, and select emergency plan co-ordinators
D - 90 days	First progress report of arrangements
D - 70 days	First meeting of all participating agencies (individual committee representatives)
D - 60 days	Complete arrangements for full- scale emergency exercise site or staging area. Written scenario completed
D - 50 days	Training for moulage team begins. Second meeting of individual committee representatives. A moulage chairman can be selected from hospitals, rescue and fire fighting personnel, civil defence, military personnel, etc
D - 40 days	Arrangements for transportation, feeding, stretcher bearers and volunteer worker completed
D - 30 days	Third meeting of individual committee representative. A preliminary "warm up communication exercise is held
D - 21 days	Fourth meeting of individual committee representatives. Make-up for members who missed previous team training and arrangements for volunteer casualties completed
D - 14 days	Final meeting and briefing for all participants, including critique team
D - 7 days	Final meeting of supervisory personnel to review assignments
D - 0 days	**The exercise**
D + 1 to 7 days	A critique following the exercise so that all participants may hear the observers' reports
D + 30 days	Supervisory personnel meet to review written techniques submitted by observers and participants, revise procedures to correct mistakes and shortcomings indicated in the exercise

DCA FORM 609
APPENDIX 4(E)

EMERGENCY EXERCISE CRITIQUE FORM

Name of person…………………………………

GENERAL

1. Date and Time of Emergency …………..……..
(Day/Month/Year)

...………………………
(Local time – 24-hour clock)

2. Location of emergency ……………………….

……………………………………………………

3. Type of emergency …………………………...

……………………………………………………

RESCUE FIRE FIGHTING OPERATIONS

4. Time of emergency notification ……………………
(Local time – 24-hour clock)

5. a) First agency or individual to arrive at emergency

……………………………………………………...

b) Time of arrival ………………………………….
(Local time – 24-hour clock)

6. a) Arrival time of rescue fire fighting service at emergency …………………………....
(Local time – 24-hour clock)

b) Approximate number of fire personnel at site …………………………………………………..

c) Time and type of first fire protection action (foam, dry chemical, etc) ……………………….
(Local time – 24-hour clock)

……………………………………………………...
(Type)

7. a) Time first casualty from aircraft

………………………………….
(Local time – 24-hour clock)

b) How evacuated ………………………………….

……………………………………………………...

…………………………………………………..

c) Number of casualties evacuated from inside aircraft …………………………………………..

d) Time last casualty evacuated from aircraft

Comments: …………………………………..............

……………………………………………………...

……………………………………………………...

8. a) Number of injured ……………………………....

b) Number of non-injured ………………………….

c) Number of dead …………………………………

9. a) Time first casualty transported to triage area

…………………………………….
(Local time – 24-hour clock)

b) Time last casualty transported to triage area

……………………………………....
(Local time – 24-hour clock)

10. a) Name of other services participating in first aid

……………………………………………………...

……………………………………………………...

b) Who was in charge of these services?

……………………………………………………...

……………………………………………………...

c) How many persons involved? …………………..

11. a) Name of other organizations participating in rescue operation ………………………………...

……………………………………………………...

……………………………………………………...

……………………………………………………...

b) Number of persons involved ……………………

12. Was the moulage realistic? YES ☐ NO ☐

SECURITY

13. a) Time of emergency notification to police/security

………………………………………..
(Local time – 24-hour clock)

b) Who was first police/security officer to arrive at emergency site? …………………………………..
…………………………………………………….
…………………………………………………….

c) Time of arrival ……………………………………
(Local time – 24-hour clock)

14. a) Number of persons involved ……………………..

b) Did command of security at emergency site change at any time? YES ☐ NO ☐

If so, give sequence of command change and agency represented …………………………………………..

………………………………………………………..

………………………………………………………..

………………………………………………………..

………………………………………………………..

15. Was the traffic satisfactory controlled YES ☐ NO ☐

16. Was there any provision for the security of personal effects? YES ☐ NO ☐

17. Any special problems at accident site with security (spectators, etc)? ………………………………......

………………………………………………………

………………………………………………………

MEDICAL SERVICES

18. a) Who was first medical official to arrive at emergency site? …………………………………

…………………………………………………...

b) Time of notification ……………………………
(Local time – 24-hour clock)

c) How notified? …………………………………...

d) By whom? ………………………………………

e) Arrival time at emergency site …………………
(Local time – 24-hour clock)

19. a) Who was the medical co-ordinator in charge of medical care and evacuation of casualties?

…………………………………………………..

……………………….......................................

b) Time of notification ……………………………
(Local time – 24-hour clock)

c) How notified? …………………………………..

d) By whom? ………………………………………

e) Arrival time at emergency site …………………
(Local time – 24-hour clock)

20. a) Number of physicians responding ………………
b) Number of nursing personnel responding ………

21. a) Was a triage area designated emergency site? YES ☐ NO ☐

b) Was the triage areas located to expedite the flow of casualties? YES ☐ NO ☐

c) Were the casualties properly classified and tagged? YES ☐ NO ☐

22. How were medical and first aid personnel identified? …………………………………………
…………………………………………………......
………….……………………………………….....

23. a) What time were relief agencies (Red Cross, etc.) notified? ……………………………
(Local time – 24-hour clock)

b) How notified? …………………………………

c) By whom? ……………………………………..

d) Arrival time ……………………………………
(Local time – 24-hour clock)

e) Which agencies were participating? …………..

…………………………………………………

…………………………………………………

…………………………………………………

f) Number of personnel participating ……………

AMBULANCES

24. a) Time of notification to ambulances

…………………………………..

b) How notified? …………………………………

c) By whom? ……………………………………..

d) Name of ambulance company ………………...
………………………………………………

e) Time of arrival at accident site of first ambulance ……………………………………..
(Local time – 24-hour clock)

25. a) How many casualties did ambulance handle?

………………………………………………

b) Time of departure ……………………………..
(Local time – 24-hour clock)

c) Hospital ………………………………………..

d) Arrival time at hospital ……………………….
(Local time – 24-hour clock)

26. a) Was ingress or egress to accident site a problem YES ☐ NO ☐

If yes, explain: ……………………………………...
……………………………………………………...
……………………………………………………...
………………………………………………………

b) Were there any special problems driving from accident site to hospital? YES ☐ NO ☐

If yes, explain: ……………………………………...
……………………………………………………...
…………………………………………………......
………………………………………………………

HOSPITALS

27. Number of physicians responding …………………

28. Number of nursing personnel responding ………….

29. Number of other hospital personnel responding

………………………………………………………

30. Number of casualties received ……………………..

31. Kind of casualties received ………………………...
……………………………………………………...
……………………………………………………...
………………………………………………………

32. a) Time first alert was received …………………..
(Local time – 24-hour clock)

b) Time disaster message authenticated

………………………………………
(Local time – 24-hour clock)

c) Time first casualties arrived …………………...
(Local time – 24-hour clock)

d) Time first casualties were seen by a physician

…………………………
(Local time – 24-hour clock)

e) Time last casualties arrived …………………...
(Local time – 24-hour clock)

LEADERSHIP

33. Did leadership by on-scene commander cause people to take effective action? YES ☐ NO ☐

34. Were there any problems in the co-ordination of medical, fire, police or other service? YES ☐ NO ☐

If yes, explain: ……………………………………...
…………………………………………………......
……………………………………………………...
………………………………………………………

35. Was the general spirit of the participants conductive to the success of the exercise? YES ☐ NO ☐

36. Who demonstrated leadership? ……………………
………………………………………………………
………………………………………………………
………………………………………………………

PUBLIC INFORMATION

37. a) Time of notification to public information officer ……………………………
(Local time – 24-hour clock)

b) How notified? …………………………………

c) Arrival time ……………………………………
(Local time – 24-hour clock)

38. a) Who was the Public Relations Officer?

…………………………………………………

b) From what organization? ……………………...
…………………………………………………

39. What special problems were indicated? ……………
……………………………………………….......
………………………………………………….…
……………………………………………….......
……………………………………………………

COMMUNICATIONS AND CONTROL

40. Did the Command Post perform effectively? YES ☐ NO ☐

41. Did the emergency operations centre perform effectively? ☐ ☐

42. Was the personnel call system effective? ☐ ☐

43. Was the physical call system effective? ☐ ☐

44. Was the emergency message accurately received? YES ☐ NO ☐

45. Were communications with the hospitals effective? ☐ ☐

46. Were there any problems with internal communications? ☐ ☐

If yes, explain: …………………………………...
…………………………………………………...

47. What kinds of communications systems were used?
- a) two-way radio ☐
- b) telephone ☐
- c) walkie-talkie ☐
- d) messenger ☐
- e) other (Specify: ……………………..…) ☐

48.Comments on Triage and Medical Care
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

49. Comments on Ambulatory Survivors
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

50. Comments on Care of Fatalities
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

51. Comments on Preservation of Evidence by Investigation Team
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

52. Comments on Emergency Operations Centre
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

53. Comments on Mobile Command Post
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

54. Comments on media centre
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

55. Comments on staging area for relatives.
…………………………………………………………
…………………………………………………………
…………………………………………………………
…………………………………………………………

NARRATIVE

Make any comments that may be helpful in evaluating this exercise ……………………………………………..
…………………………………………………………...
…………………………………………………………...
…………………………………………………………...
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…………………………………………………………...

APPENDIX 5

APRON FLOODLIGHT ARRANGEMENT

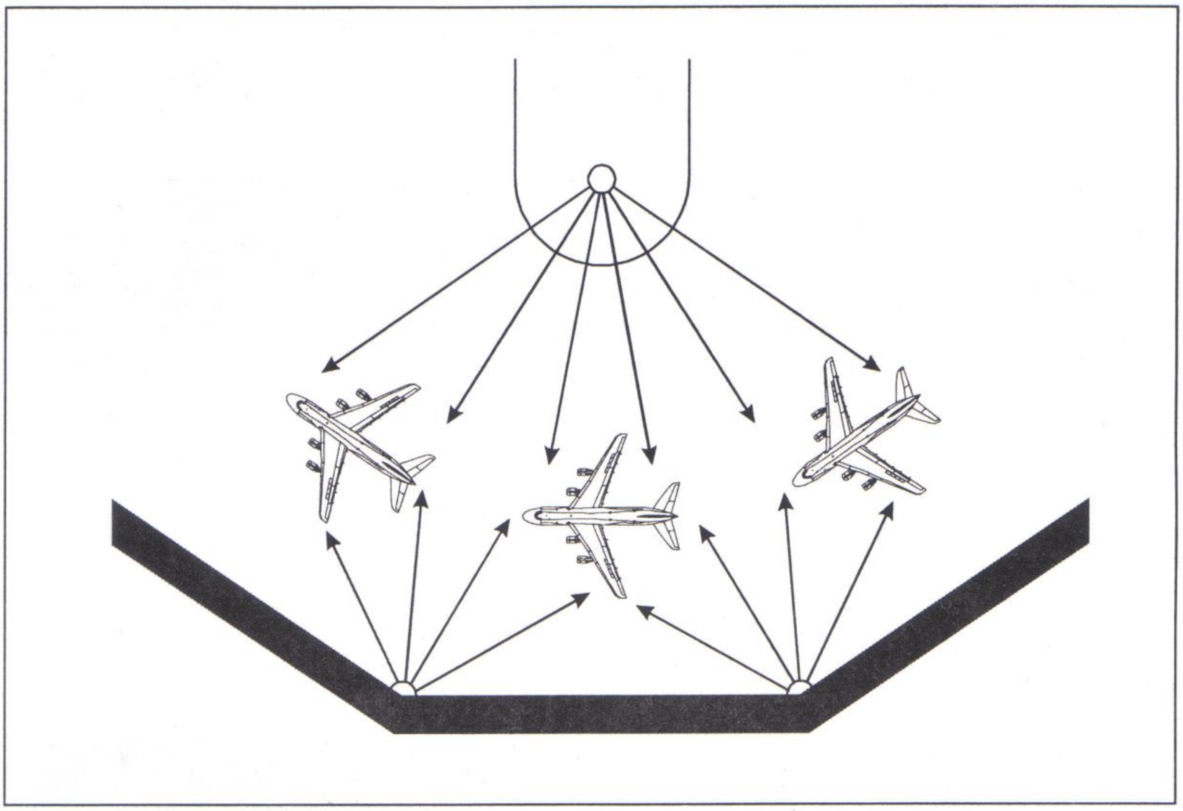

Figure 13-7. Typical floodlight arrangement and aiming for parallel parking

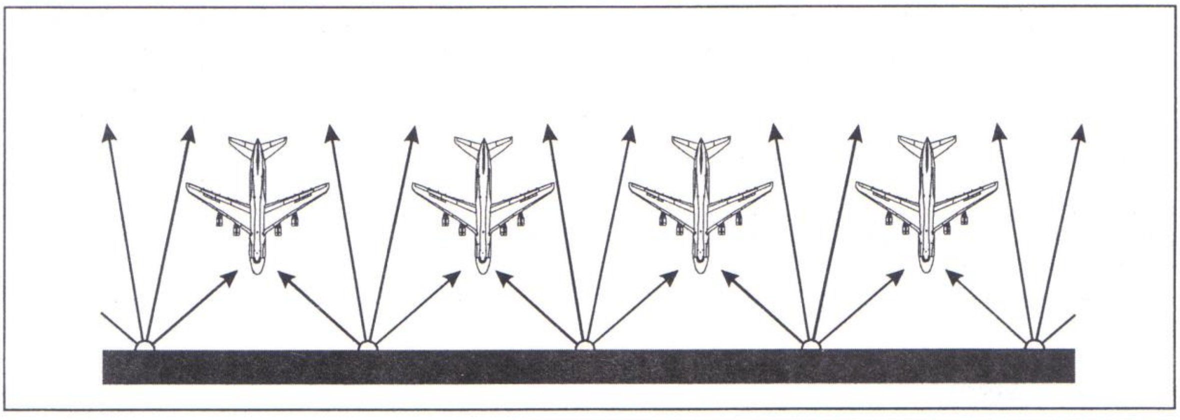

Figure 13-8. Typical floodlight arrangement and aiming for nose-in parking

APPENDIX 6

RUNWAY INCURSION REPORT FORM (DCA FORM 610)

Report No.: ....

A. Date/time of runway incursion (in UTC) (YYYYMMDDhhmm) Day ☐ Night ☐

B. Person submitting the report

Name: ....

Job title: ....

Telephone no.: ....

Facility/unit: ....

Date/time/place of completion of form: ....

C. ICAO aerodrome designator ....

D. Surface conditions *(Braking)* ....

....

....

E. Aircraft, vehicle or person involved in the runway incursion (indicate all those involved in the occurrence)

Aircraft 1: ....

Aircraft 2: ....

Aircraft 3: ....

Vehicle: ....

Person: ....

F. Weather conditions

Wind: .... Visibility: ....

Temperature (^{0}Celcius): .... Ceiling/cloud: ....

Additional Information:

....

....

....

....

G. Evasive action – Aircraft 1

No ☐

Yes ☐ Select from the list below as appropriate:

Cancelled take-off clearance	☐	
Rejected take-off	☐	distance rolled: ....
Rotated early	☐	
Delayed rotation	☐	
Abrupt stop	☐	
Swerved	☐	
Missed approach	☐	distance to runway threshold: ....
Other	☐	

H. Evasive action – Aircraft 2

No ☐

Yes ☐ Select from the list below as appropriate:

Cancelled take-off clearance	☐	
Rejected take-off	☐	distance rolled: ....
Rotated early	☐	
Delayed rotation	☐	
Abrupt stop	☐	
Swerved	☐	
Missed approach	☐	Distance to runway threshold: ....
Other	☐	

I. Evasive action - Vehicle

No ☐

Yes ☐ Select from the list below as appropriate:

Abrupt stop	☐
Swerved	☐
Other	☐

J. Closest proximity

Vertical (ft): .... Horizontal (m): ....

K. Communication difficulties

No ☐

Yes ☐ Select from the list below as appropriate:

Read back/hear back	☐
Blocked communication	☐
Confused call signs	☐
Aircraft on wrong frequency/no radio	☐
Non-standard phraseology	☐

L. ATC

Did ATC forget about:	Yes	No
An aircraft/person/vehicle cleared onto to cross a runway?	☐	☐
An aircraft on approach to land?	☐	☐
A runway closure?	☐	☐

M Description of the incident and relevant circumstances

1. A description or diagram of the geometry of the incident scenario:

Description:

....

....

....

....

....

....

Diagram:

2. A description of any evasive or corrective action taken to avoid a collision:

....

....

....

....

....

3. An assessment of the available reaction time and effectiveness of the evasive or corrective action:

4. An indication of whether a review of voice communication has been completed and the results of that review:

5. Initial assessment of severity:

Diagram:

2. A description of any evasive or corrective action taken to avoid a collision:

3. An assessment of the available reaction time and the effectiveness of the evasive or corrective action:

____
____
____
____
____

4. An indication of whether a review of voice communication has been completed and the results of that review:

____
____
____
____
____

5. Initial assessment of severity:

____
____
____
____
____

N. Aircraft details – Aircraft 1

Registration n____________ Call Sign:__________ SSR Code (if applical__________

Flight no: __________ Owner/operator______________________________

Aircraft 1 typ________________________

Flight details (select from the list below as appropriate):

Type of flight	*Flight rules*
General aviation ☐ Military ☐ Non-scheduled ☐ Scheduled ☐ Other ☐ Not applicable ☐	IFR ☐ VFR ☐

O. Aircraft details – Aircraft 2

Registration n____________ Call Sign: ___________ SSR Code (if applical___________
Flight nc________________ Owner/operator____
Aircraft 2 typ____________________________

Flight details (select from the list below as appropriate):

Type of flight	*Flight rules*
General aviation ☐ Military ☐ Non-scheduled ☐ Scheduled ☐ Other ☐ Not applicable ☐	IFR ☐ VFR ☐

P. Vehicle details – Vehicle 1

Registration no:__________ Call Sign: ____________ SSR Code (if applicable) ______
Flight no:__________ Owner/operator: __________________________________
Aircraft 2 type:________________________

Other details (select from the list below as appropriate):

Type of Vehicle	*Other:*
Runway inspection ☐ Wildlife Control ☐ Tugging/towing ☐ Fire brigade ☐ Maintenance ☐ Military ☐	

Q. Vehicle details – Vehicle 2

Registration no: ___________ Call Sign: _____________________________
Mobile no: _______________ Owner/operator: ______________________________
Vehicle 2 type: __________________________

Other details (select from the list below as appropriate):

Type of Vehicle		*Other:*
Runway inspection	☐	
Wildlife Control	☐	
Tugging/towing	☐	
Fire brigade	☐	
Maintenance	☐	
Military	☐	

R.

Report received by:____ _________________
(Name of Person) (date)

S.

Date when detailed investigation will com__________________________________

APPENDIX 7

MANDATORY OCCURRENCE REPORTING FORM (DCA FORM 611)

* This form shall be completed for any incident/accident involving persons, aircrafts, vehicles, equipment and fuel spills and reported to the Director of Civil Aviation.

1.	Brief Title:	....
2.	Name of Person filling the form	....
3.	Date of Incident: .... Time:	
	Day/Night:	
4.	Details of aircraft involved in incident/accident	....
5.	Details of vehicle involved in incident/accident	....
6.	Details of equipment involved	....
7.	Details of persons involved in accident/incident	....
8.	Location of incident/accident	....
9.	Weather Conditions	....
10.	Description of Occurrence	....
11.	Effect on aircraft/aerodrome operations	....
12.	Any document, regulations, licensing requirements or procedures relevant to the occurrence.	....
13.	Action taken by aerodrome operator:	....
14.	Preventive actions taken to prevent recurrence.	....
15.	If an investigation has been initiated?	....
16.	Comments	....
Name:	Date:	Signature: ....

APPENDIX 8

REMOVAL OF RUBBER DEPOSITS

Classification of rubber deposit accumulation	Estimated percentage of rubber covering pavement texture in touchdown zone of runway	Description of rubber covering pavement texture in touchdown zone of runway as observed by evaluator	Estimated range of Mu values averaged 150m segments in touchdown zone.	Suggested level of action to be taken.
Very light	Less than 5%	Intermittent individual tire tracks; 95% of surface texture exposed.	0.65 or greater	None
Light	6-20%	Individual tire tracks begin to overlap; 80-94% of surface texture exposed.	0.55 to 0.64	None
Light to medium	21-40%	Central 6m traffic area covered; 60-79% of surface texture exposed.	0.50 to 0.54	Monitor deterioration closely
Medium	41-60%	Central 12m traffic area covered; 40-59% of surface texture exposed.	0.40 to 0.49	Schedule rubber removal within 120 days
Medium to dense	61-80%	Central 15 foot traffic area covered; 30-69% of rubber vulcanized and bonded to pavement surface; 20-39% of surface texture exposed.	0.30 to 0.39	Schedule rubber removal within 90 days
Dense	81-95%	70-95% of rubber vulcanized and bonded to pavement surface; will be difficult to remove; rubber has glossy or sheen look; 5-19% of surface texture exposed.	0.20 to 0.29	Schedule rubber removal within 60 days
Very dense	96-100%	Rubber completely vulcanized and bonded to surface; will be very difficult to remove; rubber has striations and glossy or sheen look; 0-4% of surface texture exposed.	Less than 0.19	Schedule rubber removal within 30 days or as soon as possible.

Note. – With respect to rubber accumulation, there are other factors to be considered by the aerodrome operator: the type and age of the pavement, annual climatic conditions, time of year, number of wide-body aeroplanes that operate on the runways, and length of runways. Accordingly, the recommended level of action may vary according to conditions encountered at the aerodrome. The Mu ranges shown in the above table are from continuous friction-measuring devices that operate in the fixed braking slip mode. The Mu ranges are approximate and are to be used by the aerodrome operator only when these devices are not available. When the devices are available, the aerodrome operator shall conduct friction surveys on the runways to establish the actual rubber classification level.

APPENDIX 9

ALPHANUMERIC CODING FOR GROOVE CONDITION

Pavement surface treatment	Alpha code	Numerical coding with description
Groove type	H	0 – none 1 - sawed grooves 2 - plastic grooves
Groove condition	G	0 – uniform depth across pavement 1 - 10% of grooves not effective 2 - 20% of grooves not effective 3 - 30% of grooves not effective 4 - 40% of grooves not effective 5 - 50% of grooves not effective* 6 - 60% of grooves not effective 7 - 70% of grooves not effective 8 - 80% of grooves not effective 9 - 90% of grooves not effective

* When this level is exceeded, the aerodrome operator shall take corrective action to improve groove efficiency.

APPENDIX 10

SWITCHOVER TIME REQUIREMENTS OF SECONDARY POWER SUPPLY SYSTEM

Runway	Lighting aids requiring power	Maximum switch-over time
Non-instrument	Visual approach slope indicators[a]	See 8.1.4 and 8.1.9
	Runway edge[b]	
	Runway threshold[b]	
	Runway end[b]	
	Obstacle[a]	
Non-precision approach	Approach lighting system	15 seconds
	Visual approach slope indicators[a, d]	15 seconds
	Runway edge[d]	15 seconds
	Runway threshold[d]	15 seconds
	Runway end	15 seconds
	Obstacle[a]	15 seconds
Precision approach category I	Approach lighting system	15 seconds
	Runway edge[d]	15 seconds
	Visual approach slope indicators[a, d]	15 seconds
	Runway threshold[d]	15 seconds
	Runway end	15 seconds
	Essential taxiway[a]	15 seconds
	Obstacle[a]	15 seconds
Precision approach category II/III	Inner 300 m of the approach lighting system	1 second
	Other parts of the approach lighting system	15 seconds
	Obstacle[a]	15 seconds
	Runway edge	15 seconds
	Runway threshold	1 second
	Runway end	1 second
	Runway centre line	1 second
	Runway touchdown zone	1 second
	All stop bars	1 second
	Essential taxiway	15 seconds
Runway meant for take-off in runway visual range conditions less than a value of 800 m	Runway edge	15 seconds[c]
	Runway end	1 second
	Runway centre line	1 second
	All stop bars	1 second
	Essential taxiway[a]	15 seconds
	Obstacle[a]	15 seconds

a. Supplied with secondary power when their operation is essential to the safety of flight operation.
b. See Chapter 5, 5.3.2, regarding the use of emergency lighting.
c. One second where no runway centre line lights are provided.
d. One second where approaches are over hazardous or precipitous terrain.

APPENDIX 11

LIST OF COMMON HAZARDS AT AN AERODROME

A - Hazard Category	B - Main Components	C - Potential Consequences
Jet blast	Operating aircraft jet engines	• Blowing over vehicles, equipment, objects, particularly in the ramp area • Displacing people, particularly in the ramp area
FOD	FOD management, maintenance and construction activities, airside activities, pavement deterioration, aircraft operations and maintenance	• Jet blast of FOD striking people, aircraft, equipment, or infrastructure • FOD being ingested into the engines of operating aircraft • FOD damaging the aircraft during operations (e.g., accident with Concord aircraft)
Runway usage	ATC, aircraft, vehicles	• Runway incursions • Insufficient runway distance available for landing or taking off • Wrong runway usage • Aircraft undershoots and runway excursions • Lack of or misleading Notices to Airmen (NOTAMs)
Taxiway routings	Traffic control, weather conditions, communication, markings	• Routing errors with aircraft and vehicle collisions • Runway incursions • Low visibility • Incorrect phraseology • Human errors • Deficient marking and signing
Airside ground traffic	Traffic control, visibility and adverse weather conditions, communications, equipment maintenance	• Vehicles and aircraft running over people • Collisions in the non-movement areas • Runway incursions and collision with aircraft • Speeding of ground vehicles • Poor equipment maintenance and malfunctions • Human errors • Incorrect phraseology
Rescue and fire fighting	Deficient ARFF facilities and equipment, lack of appropriate access routes, poor planning and training, lack of appropriate materials and protective equipment, poor maintenance, poor emergency awareness	• Improper training can delay rescue and firefighting • Lack of appropriate access routes may delay operations • Inoperative equipment can restrict ARFF capabilities • Insufficient equipment and materials can restrict capability • Poor equipment maintenance may jeopardize effectiveness • Improper protective equipment may restrict rescue and firefighting operations • Level of protection lower than that required will restrict capability during major accidents • Lack of water rescue capability at s close to great stretches of water or swampy areas will restrict rescue capabilities • Inappropriate facilities that provide for rest, exercise, drill, training, etc. will pose restriction to staff working at the fire station • Delay to initiate operations will restrict occupant survivability • Poor communications procedures and equipment readiness will restrict ARFF capability
Crisis and contingency management (medical, disabled aircraft removal, etc.)	Planning and training, coordination, communications, equipment, procedures, command	• Delay to respond to emergencies and decrease in survivability • Delay to isolate the accident area • Delay to remove accident obstacles • Delay to inform other pilots and operators • Lack of coordination • Incorrect phraseology • Lack of appropriate equipment and procedures • Poor alerting services • Dated contact information • Loss of operational control • Unavailable resources • Command structure decay and delay

A - Hazard Category	B - Main Components	C - Potential Consequences
Adverse environmental conditions (night, low visibility, adverse wind conditions, precipitation)	Training and experience for adverse weather conditions, preparation and communication, visibility and lighting conditions, runway surface conditions, approach conditions	• Visual aid and electronic device malfunction or destruction • Aircraft and ground vehicle collisions • Increased aerial and surface condition hazards • Aircraft and vehicles running over workers and passengers • Aircraft overruns, veer-offs, and undershoots • Reduced emergency response capability
development, construction, and maintenance activities	Impact of construction on operations, impact of operations on construction, coordination (air traffic, apron management, security, etc.), access routing, communication (e.g., NOTAMs), FOD and dust control, construction signage, temporary airfield signage, interference with operations and NAVAIDS, off-peak construction, construction worker training and awareness, safety and emergency plans, construction quality, construction equipment maintenance, construction OSH compliance, location of existing installations	• Breakdown of construction equipment • Jet blast affecting construction area • FOD • Runway incursions • Malfunction of NAVAIDS • Damage to aircraft • Pilots, ATC, workers, and contractor unaware of construction and changed operation conditions • Accidental interference with existing installations • Equipment, stockpile, and construction location within airfield safety areas • Material stockpiles or construction equipment obstructing the view of ATC • Permitted times for construction not strictly followed • Displacement of construction equipment and materials by prop wash, jet blast, or wind • Edge and threshold lights for closed portions of a runway not properly disconnected or covered to prevent pilots use of the areas
Wildlife hazards (birds and other wildlife)	Fencing, wildlife detection systems and procedures, deterrent devices, wildlife management plan, training and equipment for wildlife control, minimization of attractants (through disposal of food and trash, garbage receptacles, and zoning)	• Bird and wildlife strikes to aircraft and vehicles • Loss of aircraft and vehicle control • Improper use of wildlife deterrent devices • Damage to perimeter fences • Poor field monitoring and reporting • Poor wildlife control
Security issues	Access control	• Runway incursions • Vandalism • Terrorism
Visual and non-visual aids for approach and landing	Adequacy and reliability, interference, runway approach area updates	• Inaccurate approach and landing • Unavailability of NAVAIDS • Collision with obstacles • Aircraft overruns and undershoots
Inspection and survey activities (internal and external)	Frequency, personnel training, equipment	• Failure to identify and report existing hazards • Runway incursions • Failure in communication procedures • Use of incorrect phraseology • Equipment malfunction
Protection of NAVAIDS and related sites	Fencing, vigilance, maintenance, zoning, signage	• Inoperative or damaged equipment • Interference to NAVAIDS from new developments in the area • Aircraft collisions • Failure to ensure a secure and safe area • closure
Obstacles	Signage, monitoring, awareness of pilots, and ATC	• Aircraft collision with obstacles • Vehicle and equipment collisions • Presence of unreported obstacles • Change in obstacle condition • Inaccurate location and elevation of obstacle

A - Hazard Category	B - Main Components	C - Potential Consequences
Fuel handling	Operating procedures, spillage control procedures, proximity of ignition sources, supervision and training, equipment compatibility, fuel storage	• Spillage • Misuse • Fire • Contamination • Damage to asphalt pavements • Environmental impacts • Improper handling and spillage control • Procedural violations • Vapor inhalation and ingestion • Downtime of resources
Hazardous materials handling	Handling procedures, spillage control procedures, supervision and training, storage	• Spillage • Environmental impacts • Damage to equipment • Improper handling and spillage control • Procedural violations • Human injuries • Downtime periods • closure
Passenger handling	Handling and control procedures, supervision, monitoring, operation of passenger bridges, operation of buses, evacuation procedures	• Vehicles striking passengers • Slips and trips • Unawareness of dangers • Inadvertent or deliberate damage to aircraft and equipment • Improper use of safe routes • Running aircraft engines • Speeding of passenger buses • Passenger deviating from their designated routes
Communications	Communication procedures, equipment maintenance, training	• Miscommunication • Incorrect use of communication devices • Incorrect phraseology • Impact on operations and emergency services • Equipment failure • Loss of coordination and control • Operator error • Loss of operations capabilities
reporting (Publication Information [AIP], NOTAMs, etc.)	Responsibility, up-to-date information	• Improper notification and update procedures • Delay in operations • Change in conditions • Failure to publish NOTAM • Runway incursions • Collisions
Apron management	rules and regulations, SOPs, access control, gate assignment, ramp congestion, turnaround times, infrastructure, technology available, and maintenance	• Aircraft assigned to incorrect gate • Collision between aircraft and vehicles • Inadequate lighting, glare, or confusing lights • Non-enforcement of rules, regulations, and SOPs • Lack of centralized and uniform management • Poor, misleading or non-standard markings • Poor supervision of ramp activities • Deficient coordination with ATC, tenants, and service providers • Low capacity of infrastructure • Malfunction of ground control equipment • Aircraft stands are not serviceable, clean, or free of obstructions • Passenger bridge not retracted or correctly parked • Non-availability of emergency equipment • Lack of functional check of the passenger bridge before utilization • Improper use of apron real estate and reduced capability • Delay of operations

A - Hazard Category	B - Main Components	C - Potential Consequences
Ground operations (marshalling, catering, towing, baggage handling, apron bridges, etc.)	rules and regulations, equipment parking, SOPs, supervision, pilot blind area, personal protection equipment (PPE), training, self-maneuvering operations	• Propeller blades striking people or equipment • Jet blast displacing materials and equipment, and striking people • People and objects being sucked by jet engine intakes • Unsafe aircraft towing • Pilot cannot perceive presence of equipment and/or people • Vehicles striking aircraft and/or people • Falls and falling objects • Inappropriate aircraft chocking • Activities start before aircraft engine shuts down • Hot aircraft brakes • Untrained aircraft Marshaller • Use of non-standard marshalling signals • Improper passenger bridge operation • Lack of emergency stop procedures • Improper parking location by vehicles and aircraft
Training and licensing	Competency training and evaluation, access requirements for movement, non-movement areas	• Poor training • Non-qualified workers performing activities at the ramp • Violations of rules and regulations • Failure to perform duties • Incorrect execution of procedures
Infrastructure, pavements (FOD, runway friction, roughness, pavement condition) Safety areas Markings Signs Lighting Electrical systems Engineered Materials Arresting Systems (EMAS)	Pavement management, marking, and lighting, aircraft arresting systems	• Deteriorated pavement • FOD • Inappropriate Pavement Condition Rating (PCR) • Poor runway surface friction condition, contaminated surface (rubber build-up, ponding, dirt), ungrooved pavement • Uneven or non-smooth pavement may damage aircraft equipment • Bumps, potholes, rutting • Excessive difference in elevation between adjacent areas • Malfunction of lighting system • Missing, unclear, or deteriorated markings • Lack of maintenance of aircraft arresting systems
Occupational health and safety	Equipment, procedures	• Improper procedures • Lack of PPE
Helicopter operations	Segregation, location, and type of operations	• Helicopter blades striking people, vehicles, and equipment • Rotor wash displacing objects
Equipment maintenance and conditions	ground equipment, visual aids, NAVAIDS, surface movement guidance and control	• Disruption of operations • Runway incursions • Runway excursions and undershoots • Collisions • Aircraft and vehicles striking people
Shift work	Effects on health, coordination, timing	• Fatigue • Lack of concentration • Human errors • Poor duty performance
Change in conditions	New equipment, new aircraft, new employee, new regulation, new SOP, new or withdrawal of services, new tenant	• Deficient risk assessment for new conditions • Deficient infrastructure to effect change • Untrained workers on new procedures • Employees unfamiliar with new workplace • Lack of coordination between services
Landside hazards	Landside traffic, parking, pedestrian crossings	• Vehicle collisions • Vehicles striking pedestrians • Accidents in parking areas

A - Hazard Category	B - Main Components	C - Potential Consequences
Passenger terminal hazards	Maintenance activities, electric carts (at larger terminals), equipment, people movers, escalators, elevators, spillages	• Slips, trips, and falls • Carts striking pedestrians • Hands, feet, clothing, or shoes that become entrapped in the escalator or people mover • Injuries caused by sudden stops, misleveling, and mechanical malfunctions of elevators

APPENDIX 12

SMS CHECKLIST

No.	Aspect to be analysed or question to be answered	Reference Aerodrome Licensing Manual	Answer	Remarks
SAFETY POLICY AND OBJECTIVES				
Management commitment				
1.1-1	Is there a safety policy in place?	3.10.3.1(a)	☐ Yes ☐ No ☐ Partial	
1.1-2	Does the safety policy reflect senior management's commitment regarding safety management	3.10.3.1(a)(i)	☐ Yes ☐ No ☐ Partial	
1.1-3	Is the safety policy appropriate to the size, nature and complexity of the organization?	3.10.3.1(a)(i)	☐ Yes ☐ No ☐ Partial	
1.1-4	Is the safety policy relevant to aviation safety	3.10.3.1(a)(i)	☐ Yes ☐ No ☐ Partial	
1.1-5	Is the safety policy signed by the accountable executive?	3.10.3.1(a)(v)	☐ Yes ☐ No ☐ Partial	
1.1-6	Is the safety policy communicated, with visible endorsement, throughout the organization.	3.10.3.1(a)(vi)	☐ Yes ☐ No ☐ Partial	
1.1-7	Is the safety policy periodically reviewed to ensure it remains relevant and appropriate to the organization.	3.10.3.1(a)(vii)	☐ Yes ☐ No ☐ Partial	
1.1-8	Have safety objectives been established to define what it aims to achieve in respect of safety outcomes?	3.10.3.1(d)	☐ Yes ☐ No ☐ Partial	
Safety Accountabilities and responsibilities				
1.2-1	Has the aerodrome operator identified an accountable executive who, irrespective of other functions, shall have ultimate responsibility and accountability, on behalf of the organisation, for the implementation and maintenance of the SMS?	3.10.3.2(a)(i)	☐ Yes ☐ No ☐ Partial	
1.2-2	Does the accountable executive have full control of the financial and human resources required for the operations authorized to be conducted under the operations licence?	3.10.3.2(b)(i)	☐ Yes ☐ No ☐ Partial	
1.2-3	Does the Accountable Executive have final authority over all aviation activities of his organization?	3.10.3.2(b)(i)	☐ Yes ☐ No ☐ Partial	

No.	Aspect to be analysed or question to be answered	Reference Aerodrome Licensing Manual	Answer	Remarks
1.2-4	Has the aerodrome operator identified and documented the safety accountabilities of management as well as operational personnel, with respect to the SMS?	3.10.3.2	☐ Yes ☐ No ☐ Partial	
1.2-5	Is there a safety review board for the purpose of reviewing SMS and safety performance?	3.10.3.3(g)	☐ Yes ☐ No ☐ Partial	
1.2-6	Is the safety review board chaired by the accountable executive or by an appropriately assigned deputy, duly substantiated in the SMS manual?	3.10.3.3(g)	☐ Yes ☐ No ☐ Partial	
1.2-7	Does the safety review board include relevant operational or departmental heads as applicable	3.10.3.3(g)	☐ Yes ☐ No ☐ Partial	
1.2-8	Are there safety action groups that work in conjunction with the safety committee (especially for large/complex organizations)?	3.10.3.3(h)	☐ Yes ☐ No ☐ Partial	
Appointment of key safety personnel				
1.3-1	Has the aerodrome operator appointed a Safety Manager to manage and oversee the day-to-day operation of the SMS?	3.10.3.3(a)	☐ Yes ☐ No ☐ Partial	
1.3-2	Does the Safety Manager have direct access or reporting to the accountable executive concerning the implementation and operation of the SMS?	3.10.3.3(a)	☐ Yes ☐ No ☐ Partial	
1.3-3	Does the Safety Manager responsible for administering the SMS hold other responsibilities that may conflict or impair his role as SMS manager?	3.10.3.3(c)	☐ Yes ☐ No ☐ Partial	
1.3-4	Is the SMS Safety Manager's position a senior management position not lower than or subservient to other operational or production positions?	3.10.3.3(a)	☐ Yes ☐ No ☐ Partial	
Coordination of emergency response planning				
1.4-1	Does the aerodrome operator have an emergency response/contingency plan appropriate to the size, nature and complexity of the organization?	3.10.3.4(a)	☐ Yes ☐ No ☐ Partial	
1.4-2	Does the emergency/contingency plan address all possible or likely emergency/crisis scenarios relating to the organization's aviation product or service deliveries?	3.10.3.4(d)	☐ Yes ☐ No ☐ Partial	

No.	Aspect to be analysed or question to be answered	Reference Aerodrome Licensing Manual	Answer	Remarks
1.4-3	Does the ERP include procedures for the continuing safe production, delivery or support of its aviation products or services during such emergencies or contingencies?	3.10.3.4(e)	☐ Yes ☐ No ☐ Partial	
1.4-4	Is there a plan and record for drills or exercises with respect to the ERP?	3.10.3.4(f)	☐ Yes ☐ No ☐ Partial	
1.4-5	Does the ERP address the necessary coordination of its emergency response/contingency procedures with the emergency/response contingency procedures of other organizations where applicable?	3.10.3.4(b)	☐ Yes ☐ No ☐ Partial	
1.4-6	Does the aerodrome operator have a process to distribute and communicate the ERP to all relevant personnel, including relevant external organizations?	3.10.3.4(g)	☐ Yes ☐ No ☐ Partial	
1.4-7	Is there a procedure for periodic review of the ERP to ensure its continuing relevance and effectiveness?	3.10.3.4(h)	☐ Yes ☐ No ☐ Partial	
SMS documetation				
1.5-1	Is there a top-level SMS summary or exposition document which is approved by the accountable manager and accepted by the Authority?	3.10.3.5	☐ Yes ☐ No ☐ Partial	
1.5-2	Does the SMS documentation address the organization's SMS and its associated components and elements?	3.10.3.5(a)	☐ Yes ☐ No ☐ Partial	
1.5-3	Is the aerodrome operator SMS framework in alignment with the regulatory SMS framework?	3.10.3.5(a)	☐ Yes ☐ No ☐ Partial	
1.5-4	Does the aerodrome operator maintain a record of relevant supporting documentation pertinent to the implementation and operation of the SMS?	3.10.3.5(b)	☐ Yes ☐ No ☐ Partial	
1.5-5	Does the aerodrome operator have an SMS implementation plan to establish its SMS implementation process, including specific tasks and their relevant implementation milestones?	3.10.3.5(a)	☐ Yes ☐ No ☐ Partial	
1.5-6	Does the SMS implementation plan address the coordination between the aerodrome operator's SMS and the SMS of external organizations where applicable?	3.10.3.5(a)	☐ Yes ☐ No ☐ Partial	
1.5-7	Is the SMS implementation plan endorsed by the accountable executive?	3.10.3.5(b)(viii)	☐ Yes ☐ No ☐ Partial	

No.	***Aspect to be analysed or question to be answered***	***Reference Aerodrome Licensing Manual***	***Answer***	***Remarks***
SAFETY RISK MANAGEMENT				
Hazard identification				
2.1-1	Is there a process for voluntary hazards/threats reporting by all employees?	3.10.4.1(k)(3)(e)	☐ Yes ☐ No ☐ Partial	
2.1-2	Is the voluntary hazard/threats reporting simple, available to all personnel involved in safety-related duties and commensurate with the size of the aerodrome operator?	3.10.4.1(k)(3)(g)	☐ Yes ☐ No ☐ Partial	
2.1-3	Does the SMS include procedures for incident/accident reporting by operational or production personnel?	3.10.4.1(k)(3)(d)	☐ Yes ☐ No ☐ Partial	
2.1-4	Is incident/accident reporting simple, accessible to all personnel involved in safety-related duties and commensurate with the size of the aerodrome operator?	3.10.4.1(k)(3)(d)	☐ Yes ☐ No ☐ Partial	
2.1-5	Does the aerodrome operator have procedures for investigation of all reported incident/accidents?	3.10.4.1(k)(4)	☐ Yes ☐ No ☐ Partial	
2.1-6	Are there procedures to ensure that hazards/threats identified or uncovered during incident/accident investigation processes are appropriately accounted for and integrated into the organization’s hazard collection and risk mitigation procedure?	3.10.4.1(k)(4)(i)	☐ Yes ☐ No ☐ Partial	
2.1-7	Are there procedures to review hazards/threats from relevant industry reports for follow-up actions or risk evaluation where applicable?	3.10.4.1(k)(4)	☐ Yes ☐ No ☐ Partial	
Safety risk assessment and mitigation				
2.2-1	Is there a documented hazard identification and risk mitigation (HIRM) procedure involving the use of objective risk analysis tools?	3.10.4.2	☐ Yes ☐ No ☐ Partial	
2.2-2	Are the risk assessment reports approved by departmental managers or at a higher level where appropriate?	3.10.4.2(m)	☐ Yes ☐ No ☐ Partial	
2.2-3	Is there a procedure for periodic review of existing risk mitigation records?	3.10.4.2(l)	☐ Yes ☐ No ☐ Partial	
2.2-4	Is there a procedure to account for mitigation actions whenever unacceptable risk levels are identified?	3.10.4.2(h)	☐ Yes ☐ No ☐ Partial	

No.	Aspect to be analysed or question to be answered	Reference Aerodrome Licensing Manual	Answer	Remarks
2.2-5	Is there a procedure to prioritize identified hazards for risk mitigation actions?	3.10.4.2(a)(iv)	☐ Yes ☐ No ☐ Partial	
2.2-6	Is there a programme for systematic and progressive review of all aviation safety-related operations, processes, facilities and equipment subject to the HIRM process as identified by the organization?	3.10.4.2	☐ Yes ☐ No ☐ Partial	
SAFETY ASSURANCE				
Safety performance monitoring and measurement				
3.1-1	Are there identified safety performance indicators for measuring and monitoring the safety performance of the organization's aviation activities?	3.10.5.2(c)	☐ Yes ☐ No ☐ Partial	
3.1-2	Are the safety performance indicators relevant to the organization's safety policy as well as management's high-level safety objectives/goals?	3.10.5.2(c)(vi)(4)	☐ Yes ☐ No ☐ Partial	
3.1-3	Do the safety performance indicators include alert/target settings to define unacceptable performance regions and planned improvement goals?	3.10.5.2(c)(vi)(5)	☐ Yes ☐ No ☐ Partial	
3.1-4	Is the setting of alert levels or out-of-control criteria based on objective safety metrics principles?	3.10.5.2(c)(vi)(5)	☐ Yes ☐ No ☐ Partial	
3.1-5	Do the safety performance indicators include quantitative monitoring of high-consequence safety outcomes (e.g. accident and serious incident rates) as well as lower-consequence events (e.g. rate of non-compliance, deviations)?	3.10.5.2(c)(vi)(7)	☐ Yes ☐ No ☐ Partial	
3.1-6	Are safety performance indicators and their associated performance settings developed in consultation with, and subject to, the civil aviation authority's agreement?	3.10.5.2(c)(vi)(4)	☐ Yes ☐ No ☐ Partial	
3.1-7	Is there a procedure for corrective or follow-up action to be taken when targets are not achieved and alert levels are exceeded/ breached?	3.10.5.2(c)(vi)(9)	☐ Yes ☐ No ☐ Partial	
3.1-8	Are the safety performance indicators periodically reviewed?	3.10.5.2(c)(vi)(3)	☐ Yes ☐ No ☐ Partial	
3.1-9	Is there an internal audit performed to assess the effectiveness of the SMS and identify areas for potential improvement?	3.10.5.2(b)	☐ Yes ☐ No ☐ Partial	

No.	***Aspect to be analysed or question to be answered***	***Reference Aerodrome Licensing Manual***	***Answer***	***Remarks***
3.1-12	Are there activities that shall provide sources to monitor and measure safety performance?	3.10.5.2(c)(vii)	☐ Yes ☐ No ☐ Partial	
3.1-13	Does the aerodrome operator have a system in place to foster a safety culture?	3.10.5.2(c)(viii)	☐ Yes ☐ No ☐ Partial	
3.1-14	Does the aerodrome operator have a system in place for safety data collection?	3.10.5.2(c)(ix)	☐ Yes ☐ No ☐ Partial	
3.1-15	Does the aerodrome operator have a system in place for safety data analysis?	3.10.5.2(c)(x)	☐ Yes ☐ No ☐ Partial	
The management of change				
3.2-1	Is there a procedure for review of relevant existing aviation safety-related facilities and equipment (including HIRM records) whenever there are pertinent changes to those facilities or equipment?	3.10.5.3(a)(i)	☐ Yes ☐ No ☐ Partial	
3.2-2	Is there a procedure for review of relevant existing aviation safety-related operations and processes (including any HIRM records) whenever there are pertinent changes to those operations or processes?	3.10.5.3(a)(ii)	☐ Yes ☐ No ☐ Partial	
3.2-3	Is there a procedure for review of new aviation safety-related operations and processes for hazards/risks before they are commissioned?	3.10.5.3(a)(ii)	☐ Yes ☐ No ☐ Partial	
3.2-4	Is there a procedure for review of relevant existing facilities, equipment, operations or processes (including HIRM records) whenever there are pertinent changes external to the organization such as regulatory/industry standards, best practices or technology?	3.10.5.3(a)(iv)	☐ Yes ☐ No ☐ Partial	
Continuous improvement of the SMS				
3.3-1	Is there a procedure for periodic internal audit/assessment of the SMS?	3.10.5.4(a)	☐ Yes ☐ No ☐ Partial	
3.3-2	Is there a current internal SMS audit/assessment plan?	3.10.5.4(b)	☐ Yes ☐ No ☐ Partial	
3.3-3	Does the SMS audit plan include the sampling of completed/existing safety risk assessments?	3.10.5.4(a)	☐ Yes ☐ No ☐ Partial	

No.	Aspect to be analysed or question to be answered	Reference Aerodrome Licensing Manual	Answer	Remarks
3.3-4	Does the SMS audit plan include the sampling of safety performance indicators for data currency and their target/alert settings performance?	3.10.5.4(c)(vi)	☐ Yes ☐ No ☐ Partial	
3.3-5	Does the SMS audit plan cover the SMS interface with subcontractors or customers where applicable?	3.10.5.4(e)	☐ Yes ☐ No ☐ Partial	
3.3-6	Is there a process for SMS audit/assessment reports to be submitted or highlighted for the accountable manager's attention where appropriate?	3.10.5.4(f)	☐ Yes ☐ No ☐ Partial	
SAFETY PROMOTION				
Training and education				
4.1-1	Is there a programme to provide SMS training/familiarization to personnel involved in the implementation or operation of the SMS?	3.10.6.2(c)	☐ Yes ☐ No ☐ Partial	
4.1-2	Has the accountable executive undergone appropriate SMS familiarization, briefing or training?	3.10.6.2(r)	☐ Yes ☐ No ☐ Partial	
4.1-3	Are personnel involved in conducting risk mitigation provided with appropriate risk management training or familiarization?	3.10.6.2(j)	☐ Yes ☐ No ☐ Partial	
4.1-4	Is there evidence of organization-wide SMS education or awareness efforts?	3.10.6.2(e)	☐ Yes ☐ No ☐ Partial	
Safety communication				
4.2-1	Does the aerodrome operator participate in sharing safety information with relevant external industry product and aerodrome operators or organizations, including the relevant aviation regulatory organizations?	3.10.6.3(a)	☐ Yes ☐ No ☐ Partial	
4.2-2	Is there evidence of a safety (SMS) publication, circular or channel for communicating safety (SMS) matters to employees?	3.10.6.3(g)	☐ Yes ☐ No ☐ Partial	
4.2-3	Is the aerodrome operator SMS manual and related guidance material accessible or disseminated to all relevant personnel?	3.10.6.3(g)	☐ Yes ☐ No ☐ Partial	

APPENDIX 13

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION **DCA FORM 612**		
APPLICATION FOR HELIPORT LICENCE		
(PUBLIC USE)		
1. PARTICULARS OF THE APPLICANT (a) Full Name (b) Address (c) Phone/Facsimile (d) Email (e) Position	(Give details as required to be shown in the licence) ……………………………….…………. ……………………...………………… ……………………...………………… ………………………………………… …………………………………………	
2. PARTICULARS OF HELIPORT (a) Name (b) Location (c) Bearing and Distance from the Nearest Town (d) Geographical coordinates of the heliport	………………………………………… …………………………………….……... ...……………………………………… ………………………………………… ………………………………………… …………………………………………	
3. PARTICULARS OF LICENCE (a) Period for which licence is required (b) Classification/largest type of helicopter to be operated at aerodrome (c) Rotor Diameter (d) D value of the helicopter (e) Any limitations or exemptions	 …………………………………….……... ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… ………………………………………… …………………………………………	
4. PARTICULARS OF TRANSPORT (a) Type and max. total weight authorized of the heaviest helicopter engaged on for the public transport.	Public transport of passengers ……………………….. ……………………….. ………………………..	Instruction in flying ……………… ……………… ………………

(b) Expected average number of movements during the three busiest calendar months of the year (one movement = one take-off or one landing).	……………………….. ……………………….. ………………………...	……………… ……………… ………………
5. IS HELIPORT TO BE USED FOR NIGHT FLYING?	……………………………………… ………………………………………	
6. ARE YOU THE OWNER OF AERODROME? **IF NOT PLEASE STATE:** (a) Details of rights you hold (b) Name and address of the owner or Tenant.	……………………………………… ……………………………………… ……………………………………… ………………………………………	
7. Is the safe guarding measures are taken with local planning ministry to control new construction in vicinity of aerodrome which may cause obstacle.	……………………………………… ……………………………………… ………………………………………	

8. Give details of the approvals obtained from ministries as indicated below as applicable. Mention details of objection raised, if any:

	Name of the Ministry	**Reference of approval**
(a)	……………………………………………..	……………….………………………….
(b)	……………………………………………..	..………………………………………….
(c)	…………………………………………...	..………………………………………….
(d)	……………………………………………..	…………………………………………....

9. Any other information	……………………………………… ………………………………………

10. LICENCE

I hereby certify that the foregoing information is correct in every respect and no relevant information has been withheld.

Date: ………………………………… Signature : ………………………….
Seal: ………………………………... Name : …………………………..

11. LIST OF ENCLOSURES

…………………………………
…………………………………

APPENDIX 14

REPUBLIC OF MAURITIUS

DEPARTMENT OF CIVIL AVIATION DCA FORM 613

HELIPORT LICENCE FOR PUBLIC AND DOMESTIC USE

1. **PARTICULARS OF LICENCE**

   LICENCE NO. :

2. **PARTICULARS OF HELIPORT**

   (a) NAME OF HELIPORT :
   (b) LOCATION OF HELIPORT :
   (c) LATITUDE/LONGITUDE :

3. **PARTICULARS OF HELIPORT OPERATOR**

   (a) NAME OF HELIPORT OPERATOR :
   (b) ADDRESS OF HELIPORT OPERATOR :

4. **TYPE OF HELICOPTER ALLLOWED** :

5. **NIGHT OPERATION** :

6. **ANY EXEMPTION OR OPERATIONAL RESTRICTION** :

7. This Heliport Licence is issued pursuant to the grant of the Minister under the provisions of the Civil Aviation Act 1974, the Civil Aviation Regulations, as subsequently amended, and Aerodrome Licensing Manual in respect of the above named heliport as a heliport to be used for the take-off and landing of helicopters engaged on flights for the purpose of public and domestic transport of passengers.

8. This Licence is granted subject to the conditions specified in Schedule A, see overleaf, and may be suspended or cancelled at any time where the said heliport operator fails to comply with the conditions specified in Schedule A.

9. This Licence shall remain in force from …. to …. both dates inclusive unless surrendered, varied, suspended or revoked. This licence is not transferable.

DATE: SIGNATURE

I POKHUN

SEAL **DIRECTOR OF CIVIL AVIATION**

(Please see overleaf for Schedule A)

SCHEDULE A

CONDITIONS OF HELIPORT LICENCE

1. This heliport is licensed for public and domestic use and shall at all times, when it is available for take-off or landing of helicopter, be so available to all persons on equal terms and conditions.

2. The holder of this licence shall -

   (a) give to the Authority not less than 10 days' notice in writing of any intended change in the appointment or duties of the Chief Operating Officer and the nominated persons;

   (b) notify the Authority of the times during which the heliport shall be available for take-off and landing of helicopter engaged on flights for the purpose of public and domestic transport of passengers;

   (c) make no change in physical characteristics of the heliport, including the erection of new installations or alterations to the existing installations, without the prior approval of the Authority;

   (d) inform the Authority, by the quickest available means, of any degradation in the facilities specified in the Heliport Manual or any material change in the surface of the landing area, manoeuvering area, the apron or in the obstructions characteristics of the approach areas;

   (e) ensure that no helicopter shall take off or land at the heliport unless the medical, rescue and fire fighting facilities specified in the Heliport Manual are provided, maintained and ready for immediate turn-out whenever the heliport is available for operations; and

   (f) ensure that in the event there are future development in the vicinity of the heliport that would adversely affect safety, operations would have to be ceased pending implementation of any mitigating measures for safe operations.

3. The holder of this licence shall operate and maintain the heliport as per the approved Heliport Manual.

4. Subject to Condition 1 above, nothing in this licence shall be taken to confer on any person the right to use the heliport without the consent of the Heliport Operator and the Authority.

5. The holder of this licence shall comply with the requirements of the Civil Aviation Act 1974, Civil Aviation Regulations, Aerodrome Licensing Manual and Mauritius Civil Aviation Requirements MCAR (Heliports) and any other instructions issued by the Authority from time to time.

The expressions used in this licence shall have the same respective meanings as in the Civil Aviation Regulations, as amended, Aerodrome Licensing Manual and MCAR (Heliports).

APPENDIX 15

Runway Condition Assessment Worksheet DCA FORM 614

Aerodrome

Date/Time (UTC) of assessment (MMDDhhmm)

Lower Runway Designator

Initials

Is **more than 25%** of any runway third surface wet or contaminated?

☐ Yes – assign Runway Condition Codes for each third and complete RWY Condition Report (Blue Box)

☐ No - No report created

Note: RWYCC 6/6/6 for all runway thirds may be used to indicate that the runway is no longer wet

1st RWY Third	2nd RWY Third	3rd RWY Third
For coverage 25% or less enter Code 6 - Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right RWYCC	For coverage 25% or less enter Code 6 - Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right RWYCC	For coverage 25% or less enter Code 6 - Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right RWYCC
Dry 6	Dry 6	Dry 6
Wet (Damp) 5 % Coverage...................... Slippery Wet (Below Min Friction Level Classification) 3 % Coverage..........................	Wet (Damp) 5 % Coverage...................... Slippery Wet (Below Min Friction Level Classification) 3 % Coverage......................	Wet (Damp) 5 % Coverage............... Slippery Wet (Below Min Friction Level Classification) 3 % Coverage......................
Standing water >3mm 2 % Coverage......................... Depth: 4mm Assessed depth (mm): For Standing water 4mm depth have to be reported as Minimum	Standing water >3mm 2 % Coverage....................... Depth: 4mm Assessed depth (mm): For Standing water 4mm depth have to be reported as Minimum	Standing water >3mm 2 % Coverage....................... Depth: 4mm Assessed depth (mm): For Standing water 4mm depth have to be reported as Minimum

Situational Awareness Section/Notes

State approved CFME Braking coefficient

Mμ not to be transmitted in RWY Condition Report

Adjusted RWYCC

ONLY if Downgraded/Upgrade Assessments used

Downgrade/Upgrade Criteria

☐ AIREP ☐ CFME ☐ Other

☐ TWY .... Poor

☐ Apron .... Poor

☐ Other

RCR

Aerodrome	Date & Time	RWY	RWYCC	% Coverage	Depth in mm
			/ /	/ /	/ /

Contaminant Type 1st third | Contaminant Type 2nd third | Contaminant Type 3rd third

Plain language remarks ....

Reduced RWY width in m (if applicable) ....