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Australian Government
Civil Aviation Safety Authority

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All-weather operations at aerodromes

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Audience

This advisory circular (AC) applies to all organisations who play an important role in achieving the safety, regularity and efficiency of all-weather operations (AWO), in particular:

- aerodrome operators
- aviation rescue and firefighting service providers
- air traffic service (ATS) providers
- aeronautical telecommunications service and radio-navigation service providers
- meteorological service providers.

Purpose

The purpose of this AC is to assist participants in AWO to:

- interpret and apply the regulatory requirements pertaining to AWO
- assess the suitability of an aerodrome for AWO
- determine the steps to be taken to prepare an aerodrome for AWO
- maintain these operations safely.

While primarily aimed at the supporting services for all-weather operations, this AC may also be of interest to pilots and aircraft operators. Specifically for increased understanding of the equipment, procedures and requirements that apply for an aerodrome when reduced or low visibility procedures (LVP) are implemented.

For further information

For further information, contact CASA's Personnel Licensing, Aerodromes and Air Navigation Standards (telephone 131 757).

Status

This version of the AC is approved by the Branch Manager, Flight Standards.

Version	Date	Details
v1.0		This AC updates and replaces AC 139-19 – All-weather operations at aerodromes.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

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Acknowledgement of country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to elders past, present and emerging.

Artwork: James Baban.

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	advisory circular
AD	aerodromes section of the aeronautical information publication
ADC	aerodrome controller (of the ATC unit)
AGSS	aerodrome ground surveillance system
AIP	aeronautical information publication
AIS	aeronautical information service
AMS	apron management service
A-SMGCS	advanced surface movement guidance and control system
ATC	air traffic control/controller
ATFM	air traffic flow management
ATIS	automatic terminal information service
ATS	air traffic service(s)
AWO	all-weather operations
BoM	bureau of meteorology
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
CAT	category
CNS/ATM	Communications, Navigation, Surveillance/Air Traffic Management
CSA	critical and sensitive areas
DA/H	decision altitude/height
D-ATIS	data link automatic terminal information service
DME	distance measuring equipment
EASA	European Aviation Safety Agency
END	stop-end zone (related to RVR)
ERSA	En Route Supplement Australia
FAA	Federal Aviation Administration (United States)
FMP	flow management position

Acronym	Description
GBAS	ground based augmentation system
GLS	GBAS landing system
GNSS	global navigation satellite system
ICAO	International Civil Aviation Organization
ILS	instrument landing system
LCL	landing clearance line
LOCA	local object consideration area
LVO	low visibility operation
LVP	low visibility procedures
LVTO	low visibility take-off
MAGS	movement area guidance signs
MDA/H	minimum descent altitude/height
MET	meteorological or meteorology
MID	mid-point zone (related to RVR)
NAA	national aviation authority
NPA	non-precision approach
OFZ	obstacle free zone
PA	precision approach
PANS	procedures for air navigation services
RAVC	reduced aerodrome visibility conditions
RAVP	reduced aerodrome visibility procedures
RETIL	rapid exit taxiway indicator lights
RTF	radiotelephonecat
RV	runway visibility
RVR	runway visual range
SA CAT	special authorisation category
SARPs	standards and recommended practices (of ICAO)
SMGCS	surface movement guidance and control systems
SMR	surface movement radar
SPECI	aerodrome special meteorological report
TDZ	touchdown zone

Acronym	Description
Voice-ATIS	voice-automatic terminal information service

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
aerodrome *(Civil Aviation Act 1988)*	an area of land or water (including any buildings, installations and equipment), the use of which as an aerodrome is authorised under the regulations, being such an area intended for use wholly or partly for the arrival, departure or movement of aircraft.
aerodrome operating minima (*Annex 6*)	the limits of usability of an aerodrome for: • take-off, expressed in terms of runway visual range (RVR) and/or visibility and, if necessary, cloud conditions • landing in 2D instrument approach operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions • landing in 3D instrument approach operations, expressed in terms of visibility and/or RVR and decision altitude/height (DA/H) as appropriate to the type and/or category of the operation.
Aeronautical information publication	a publication issued by or with the authority of a State that contains aeronautical information of a lasting character essential to air navigation.
Aircraft parking position (*Part 139 MOS*)	an open-air designated area on an apron for parking an aircraft. **Notes:** 1. An aircraft parking position is also known as an aircraft stand. 2: An aircraft parking position does not include any area that is within a fully or partially-enclosed aircraft hangar. 3. An area designated on an apron as being available for the parking of aircraft is considered to be an aircraft parking position.
air traffic service *(Annex 11)*	a generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control (ATC) services such as area control service, approach control service or aerodrome control service.
air traffic services unit (*Annex 11*)	a generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.
all-weather operations	any taxi, take-off or landing operations in conditions where visual reference is limited by weather conditions.
apron (*Part 139 MOS*)	a defined area on a land aerodrome to accommodate aircraft for the purposes of loading or unloading passengers, mail or cargo, fuelling, parking, or maintenance.
apron Management Service	a service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

Term	Definition
automatic terminal information service	the automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof:
ceiling *(Annex 2)*	the height above the ground or water of the base of the lowest layer of cloud below 20,000 ft covering more than one-half of the sky.
decision altitude/height (DA/H) or decision height (DH) *(Annex 6)*	a specified altitude or height in a 3D instrument approach operation at which a missed approach must be initiated if the required visual reference to continue the approach has not been established. **Notes:** 1. DA is referenced to mean sea level (MSL) and DH is referenced to the threshold elevation. 2. The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a DH, the required visual reference is that specified for the particular procedure and operation. 3. For convenience where both expressions are used they may be written in the form 'decision altitude/height' and abbreviated 'DA/H'.
ground-based augmentation system	means a ground-based augmentation system comprised of a VHF data broadcast (VDB) antenna and (typically) 4 remote satellite measurement unit (RSMU) antennas, with each of these components: a. separately located; and b. performing specific functions; and c. with different siting requirements and restrictions.
guided take-off (*)	a take-off in which the take-off run is not solely controlled with the aid of external visual references, but also with the aid of instrument references. For example, instrument landing system (ILS) localiser guidance).
height *(Annex 2)*	the vertical distance of a level, a point or an object considered as a point, measured from a specified datum.
ILS critical area *(Part 139 MOS)*	an area about the localizer and glide path antennas where vehicles and aircraft must be excluded during all ILS operations because the presence of vehicles or aircraft inside the area will cause unacceptable disturbance to the ILS signal-in-space.
ILS sensitive area *(Part 139 MOS)*	an area extending beyond the ILS critical area: a. where the parking and movement of vehicles and aircraft is controlled to prevent the possibility of unacceptable interference to the ILS signal during ILS operations; and b. which is protected against interference caused by large moving objects outside the ILS critical area but still normally within the airfield boundary.
instrument approach operation *(Annex 6)*	an approach and landing using instruments for navigation guidance based on an instrument approach procedure. There are two methods for executing instrument approach operations: • a two-dimensional (2D) instrument approach operation, using lateral navigation guidance only • a three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance.

Term	Definition
	Note: Lateral and vertical navigation guidance refers to the guidance provided either by ground-based radio navigation aids or computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

instrument approach classification	a system for classifying instrument approach procedures according to the designed lowest operating minima below which an approach operation can only be continued with the required visual reference. The classification system is as follows:
	• Type A: a minimum descent height or DH at or above 250 ft.
	• Type B: a minimum descent height or DH below 250 ft. Type B instrument approach operations are further categorised as follows:
	  ○ Category (CAT) I: a DH not lower than 200 ft and either a visibility not less than 800 m or an RVR not less than 550 m
	  ○ Special Authorisation Category I (SA CAT I): a DH lower than 200ft, but not lower than 150 ft and an RVR not less than 450 m
	  ○ SA CAT II: a DH lower than 200 ft, but not lower than 100 ft, and an RVR not less than 350 m
	  ○ CAT II: a DH lower than 200 ft, but not lower than 100 ft and an RVR not less than 300 m
	  ○ CAT III: a DH lower than 100 ft, or no DH, and an RVR less than 300 m
	
	Note: Some procedures, documentary references and guidance materials refer to CAT III subcategories (CAT IIIB, CAT IIIB and CAT IIIC). These subcategories are obsolescent and are progressively being omitted).

instrument approach procedure *(Annex 6)*	a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply. instrument approach procedures are classified as follows: • **Non-precision approach (NPA) procedure.** An instrument approach procedure designed for 2D instrument approach operations Type A. **Note:** NPA procedures may be flown using a continuous descent final approach technique (CDFA). CDFA with advisory vertical navigation (VNAV) guidance calculated by on-board equipment are considered 3D instrument approach operations. CDFA with manual calculation of the required rate of descent are considered 2D instrument approach operations. • **Approach procedure with vertical guidance (APV).** A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A. • **Precision approach (PA) procedure.** An instrument approach procedure based on navigation systems (ILS, GLS and SBAS Cat I) designed for 3D instrument approach operations Type A or B. **Note:** For a description of Type A and Type B, see the definition for 'instrument approach classification'.
intermediate holding position *(Part 139 MOS)*	a designated holding position for traffic control, at which taxiing aircraft and vehicles: a. must stop and hold only if so instructed by the aerodrome control tower;

Term	Definition
	and b. if so stopped, must not proceed until given clearance by the aerodrome control tower.
low-visibility approach *(CASR Dictionary)*	an approach using minima for a runway that are below the category I PA minima for the runway published in the AIP.
low visibility operation *(CASR Dictionary)*	an operation involving: • a low visibility take-off or low-visibility approach.
low visibility Procedure *(Part 139 MOS)*	a procedure applied at an aerodrome for protecting aircraft operations during conditions of reduced visibility or low cloud.
low visibility take-off (*CASR Dictionary*)	a take-off with an RVR of less than 550 m.
manoeuvring area (*Part 139 MOS*)	that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
minimum descent altitude/height (MDA/H) *(Annex 6)*	A specified altitude or height in a 2D instrument approach operation or circling approach operation below which descent must not be made without the required visual reference. **Notes:** 1. MDA is referenced to Mean Sea Level (MSL) and MDH is referenced to the aerodrome elevation or to the threshold elevation if that is more than 7FT below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation. 2. The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the runway environment.
movement area *(Part 139 MOS)*	that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the aprons.
NOTAM *(Annex 11)*	a notice issued by the NOTAM Office containing information or instructions concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.
obstacle free zone *(Part 139 MOS)*	the airspace above the inner approach surface, inner transitional surface, baulked landing surface, and that portion of the runway strip bounded by these surfaces, which is not infringed by any fixed obstacle other than a low mass and frangibly mounted one required for air navigation purposes.
obstacles *(Part 139 MOS)*	Fixed (whether temporarily or permanently) and mobile objects, structures, and parts of such objects and structures, that: a. are located on an area provided for the surface movement of aircraft; or b. extend above a defined surface designated to protect aircraft in flight; or c. stand outside the defined surfaces mentioned in paragraphs (a) and (b) and that have been assessed as being a hazard to air navigation..
operations phase	in relation to LVP, the phase must be in force prior to the commencement of any of the specific Low visibility operations (LVOs) for which LVP are required. It is brought into force only once all preparatory activities are complete.

Term	Definition
preparation phase	a description of the activities that take place to safeguard aircraft operations in deteriorating weather conditions and to ensure that, at the point when LVPs are declared to be in force, all actions to protect aircraft operations have been put in place.
reduced aerodrome visibility conditions	meteorological (MET) conditions such that all or part of the manoeuvring area cannot be visually monitored from the control tower.
reduced aerodrome visibility procedures	safeguarding procedures which are a subset of an aerodrome's low visibility procedures (LVP). They apply prior to the point at which air traffic control declares LVP in effect. RAVP are specific procedures applied at an aerodrome for the purpose of ensuring safe operations during RAVC.
runway *(Part 139 MOS)*	a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft
runway-holding position *(Part 139 MOS)*	a designated position at a controlled aerodrome that is provided to protect a runway, an obstacle limitation surface, or an ILS critical or sensitive area, at which taxiing aircraft and vehicles must stop and hold, unless otherwise authorised by the aerodrome control tower.
runway visibility *(Part 139 MOS)*	the distance along a runway over which a person can see and recognise a visibility marker or runway lights.
runway visual range *(CASR Dictionary)*	the range, measured using an electronic instrument, over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.
separation	within this document the term 'separation' is considered mandatory criteria applied for the purposes of directly preserving aircraft safety, including: • preventing collision, such as between aircraft, between aircraft on the manoeuvring area and obstructions on that area, or with respect to the obstacle free zone (OFZ) • minimising wake turbulence • protecting the integrity of radio navigation signals-in-space (such as ILS critical or sensitive areas) **Note:** An example of this would be a requirement to give landing clearance at 2 NM in respect of ILS sensitive area protection criteria. • applying defined separation minima, or other means, such as visual separation as determined by ATC or maintained by pilots.
spacing	within this document the term 'spacing' is considered to relate to a broader range of criteria, which are established to facilitate the orderly achievement of separation requirements or to assist the realisation of other provisions, such as aircraft acceptance/movement rates. **Note:** An example of this would be the application of 8 NM spacing required to achieve the ILS critical and sensitive areas (CSA) protection requirement between successive landing aircraft.
termination phase	a description of activities that take place in improving weather conditions to facilitate a smooth transition from LVP back to normal operations.
touchdown zone (TDZ) *(Part 139 MOS)*	the portion of a runway, beyond the threshold, where landing aeroplanes are to first contact the runway.

Term	Definition
visibility *(Annex 3)*	Visibility for aeronautical purposes and is the greater of the following: a. the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background b. the greatest distance at which lights in the vicinity of 1 000 candelas (cd) can be seen and identified against an unlit background. **Notes:** 1. The 2 distances have different values in air of a given extinction coefficient, and the distance mentioned in paragraph (b) varies with the background illumination. The distance mentioned in paragraph (a) is represented by the meteorological optical range (MOR). 2. For international recognition and consistency, the definition of visibility is taken from ICAO Annex 3, Meteorological Service for International Air Navigation, Chapter 1, Part 1. For ICAO documents, see section 1.06. **3**. The definition shown here is more complex than the simpler definition in the CASR Dictionary.
visibility condition 1	visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, and for 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 to avoid collision with other traffic on taxiways and at intersections by visual reference, but insufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance.
visibility condition 3	visibility sufficient for the pilot to taxi but insufficient for the pilot to avoid collision with other traffic on taxiways and at intersections by visual reference, and insufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance. For taxiing, this is normally taken as visibilities equivalent to an RVR of less than 400 m but more than 75 m.
visibility condition 4	visibility insufficient for the pilot to taxi by visual guidance only. This is normally taken as a RVR of 75 m or less. **Notes:** 1. The above visibility conditions apply for both day and night operations. 2. See Chapter 7 for more details of the transition between visibility conditions.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Part 139 of CASR	Aerodromes
Part 171 of CASR	Aeronautical telecommunications service and radio-navigation service providers
Part 172 of CASR	Air Traffic Service Providers
Part 139 MOS	Aerodromes
Part 171 MOS	Aeronautical telecommunications service and radio-navigation service providers
Part 172 MOS	Air Traffic Service (ATS) Providers

International documents

International Civil Aviation Organization (ICAO) documents are available for purchase from http://store1.icao.int/

Many ICAO documents are also available for reading, but not purchase or downloading, from the ICAO eLibrary (https://elibrary.icao.int/home).

Document	Title
EAPPRI	European Action Plan for the Prevention of Runway Incursions
EUR Doc 013	European guidance material on all-weather operations at aerodromes
ICAO Annex 2	Rules of the Air
ICAO Annex 3	Meteorological Service for International Air Navigation
ICAO Annex 6	Operation of Aircraft, Part I (International Commercial Air Transport — Aeroplanes)
ICAO Annex 10	Aeronautical Telecommunications, Volume (Vol) I (Radio Navigation Aids)
ICAO Annex 11	Air Traffic Services
ICAO Annex 14	Aerodromes, Vol I (Aerodrome Design and Operations)
ICAO Annex 15	Aeronautical Information Services
ICAO Annex 19	Safety Management
ICAO Doc 4444	Procedures for Air Navigation Services–Air Traffic Management (PANS-ATM)
ICAO Doc 8168	Procedures for Air Navigation Services–Aircraft Operations (PANS-OPS)
ICAO Doc 9157	Aerodrome Design Manual Part 2 — Taxiways, Aprons and Holding Bays Part 5 — Electrical systems
ICAO Doc 9328	Manual of Runway Visual Range Observing and Reporting Practices
ICAO Doc 9365	Manual of All-Weather Operations

Document	Title
ICAO Doc 9476	Manual of Surface Movement Guidance and Control Systems
ICAO Doc 9774	Manual on Certification of Aerodromes
ICAO Doc 9830	Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual
ICAO Doc 9859	Safety Management Manual (SMM)
ICAO Doc 9870	Manual for Preventing Runway Incursions
ICAO Doc 9981	Procedures for Air Navigation Services – Aerodromes (PANS-AD)
ICAO Doc 10066	Procedures for Air Navigation Services–Aeronautical Information Management (PANS-AIM)

Advisory material

CASA's advisory materials are available at https://www.casa.gov.au/publications-and-resources/guidance-materials

Document	Title
AC 91-11	Aeroplane low visibility operations - conduct and approvals

2 Introduction

2.1 Scope

2.1.1 This advisory circular (AC) provides guidance on all-weather operations (AWO) and LVPs. This includes the preparation and termination phases and provisions that support safe and efficient aerodrome ground operations when reduced aerodrome visibility conditions (RAVC) exist.

2.1.2 The AC describes:

- the framework supporting AWO (such as those relating to visual and non-visual aids) and highlights the most important elements, including a description of the requirements applicable to these elements
- any special provisions required to support the safe, orderly and efficient operation of the aerodrome whenever conditions are such that all or part of the manoeuvring area cannot be visually monitored from the control tower (when RAVC exist)
- LVP, including:
  - the initiation and conduct of preparatory activities to bring the LVP into force, and activities to facilitate the orderly termination of LVP
  - the LVP procedures that must be in force when certain defined flight operations are taking place.
- the safety management activities to be undertaken as a component of the initial establishment of LVP and reduced aerodrome visibility procedures (RAVP).

2.1.3 Due to the wide audience of this AC, the document takes a broad view and includes guidance and information relating to the operation of the aerodrome as a whole, with the focus on providing guidance to ensure the safety of air traffic while, at the same time, facilitating orderly and efficient operations under conditions of reduced visibility.

2.2 Supporting summary tables

2.2.1 Throughout this document, a number of tables have been used to provide a straightforward summary of the requirements and recommendations to be considered for AWO.

2.2.2 In the tables ‘shall’ or ‘must’ statements are drawn from the relevant CASR regulation, MOS standard, or where enabled as a standard by a CASR Part, such as a particular International Civil Aviation Organization (ICAO) standard or procedures for air navigation services (PANS) provision.

2.2.3 ‘Should’ statements from the ICAO Annexes, and ‘shall’ material drawn from the ICAO PANS that are not enabled as a standard by a CASR Part are shown as ‘recommended’, reflecting the status of ICAO recommended practice, or material which is approved and recommended for application.

2.2.4 Other material, such as ‘should’ material drawn from ICAO PANS, is identified as ‘good practice’, providing guidance as to practices that are referenced in ICAO material which can be useful to support the safety, regularity and efficiency of operations.

2.2.5 To aid with clarity in understanding compliance obligations, references back to the source material are provided wherever possible. These point to the ‘highest’ level of precedence.

2.3 Acknowledgement

2.3.1 This AC is based on EUR Doc 013 - *European guidance material on all weather operations*, produced by the European and North Atlantic Office of the International Civil Aviation Organization (ICAO), and approved by the European Aviation System Planning Group. CASA gratefully acknowledges the European region's experience in AWOs and the resulting comprehensive information and guidance derived from that document.

3 Regulatory framework – applicable regulations

3.1 Aerodromes

3.1.1 The regulatory requirements and standards applicable to AWO can be found in a variety of documents including the following regulations and the associated MOS:

- Part 139 of CASR
- Part 139.H of CASR (until replaced by Part 176 of CASR)
- Part 171 of CASR
- Part 172 of CASR.

3.1.2 While AWO requires coordination between multiple organisations, CASA recommends the aerodrome operator take the lead role and act as the single point of contact for all matters related to the implementation of low visibility LVPs at an aerodrome or to change the LVPs at an aerodrome.

3.1.3 At controlled aerodromes, the ATS provider is required to establish provisions at the aerodrome to support LVOs.[1] These provisions relate mainly to aerodrome traffic and include, for example, procedures for control of traffic on the manoeuvring area as well as applicable spacing between successive approaching aircraft. LVP are to be implemented where reported conditions are below CAT I minima (cloud height or visibility) for approaches and either RV below 800 m or RVR below 550 m for departure operations.

3.1.4 At non-controlled aerodromes, coordination with aircraft operators and pilots is required when departure operations in RV below 800 m are conducted.

3.1.5 At aerodromes that want to operate when RAVC exists, procedures need to be developed to ensure that operations during RAVC can be actioned safely. These procedures do not need to be complex or extensive. At an aerodrome with low traffic levels, this may be achieved by a simple set of control measures. For example, using position reports from pilots and vehicle drivers to confirm the position of traffic not visible from control units.

3.1.6 At large, high-density aerodromes, these procedures are likely to be more extensive to ensure that aircraft and vehicles are handled safely and that capacity is managed according to the conditions when visibility is restricted.

3.1.7 Consideration of all relevant requirements must be given when upgrading and maintaining the facilities used to support aerodrome surface movements or flight operations taking place when RAVC exist, or to support flight operations that require LVP to be in force.

3.1.8 Navigation facilities

3.1.8.1 Navigation facilities must be established in accordance with Part 171 (with reference to ICAO Annex 10), be appropriately designated and details published in the Aeronautical Information Publication (AIP).

[1] Required by Part 172 MOS and ICAO Doc 4444.

3.2 Aircraft

3.2.1 The authorisation of an aircraft operator to carry out specific LVOs in Australia is given by CASA or, for foreign operators, the relevant national aviation authority (NAA) approvals accepted by CASA.

3.2.2 Aircraft operators establish operating procedures and minima taking into account:

- aircraft equipment and performance (depending upon the aerodrome facilities)
- crew qualifications
- the applicable regulations.

4 Introduction to AWO

4.1 Considerations

4.1.1 Factors that should be considered in preparation for, and during the undertaking of AWO include:

- the prevailing or forecast meteorological (MET) conditions
- the ability of ATC to visually monitor the manoeuvring area
- the ability of the pilots to manoeuvre the aircraft on the ground by visual reference
- aerodrome equipage and the status of this equipment
- additional equipment and procedures necessary to support certain types of AWO
- the ability of the aircraft to perform approach, landing and departure operations in the prevailing conditions. This will, in turn, be dependent on the aircraft equipage, aircraft certification and crew qualifications and training.

4.2 Reduced aerodrome visibility conditions

4.2.1 For controlled aerodromes, RAVC exist when all or part of the manoeuvring area cannot be visually monitored from the control tower and consequently the personnel of the control units are unable to exercise visual control over the traffic in the area.

4.2.2 For non-controlled aerodromes, RAVC exist when the ability of pilots, vehicle drivers and other personnel to identify hazards and take appropriate actions becomes limited.

4.2.3 To describe the ability of the personnel of the control units to exercise visual control over all traffic and of the pilots and airside personnel to avoid other traffic, four different visibility conditions have been defined. These conditions range from Visibility Condition 1 through to Visibility Condition 4. Figure 1 shows the relationship between the various visibility conditions, the triggering weather phenomenon and the impact on Air Traffic Control (ATC) and pilot.

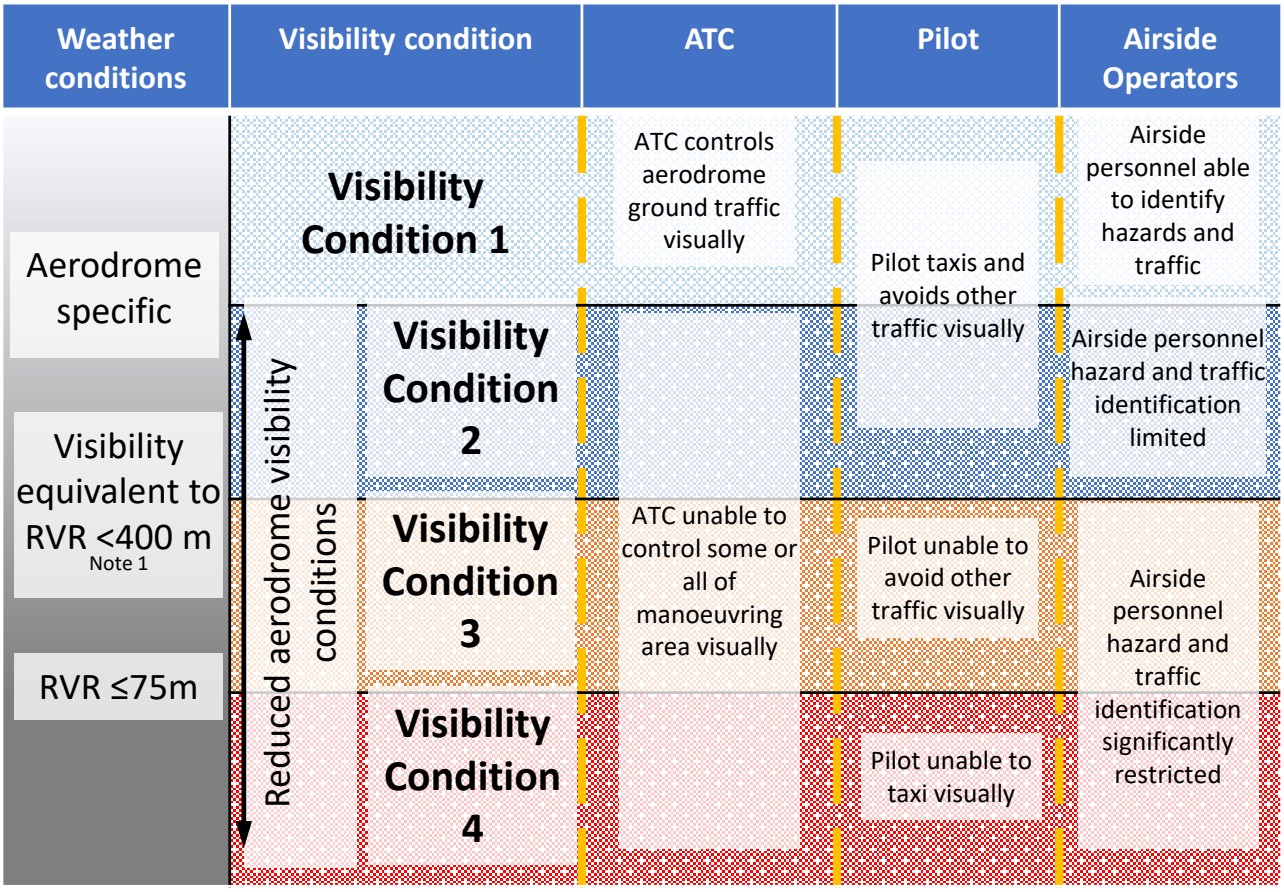


Figure 1: The relationship between ICAO visibility conditions

Note 1: *Visibility equivalent to RVR <400 m.* For taxiing, this value is normally taken as visibilities equivalent to an RVR of less than 400 m but more than 75 m. The value of 400 m is provided as an example in ICAO Doc 9830. Criteria for determining the transition between visibility conditions are a function of local aerodrome and traffic characteristics. See paragraphs 4.2.4 and 4.2.6 for more details of the transition between visibility conditions.

4.2.4 For controlled aerodromes, the transition from Visibility Condition 1 to Visibility Condition 2 occurs when MET conditions deteriorate to the point that ATC is unable to exercise control over traffic on the basis of visual surveillance. These circumstances, in practice, define the entry to RAVC. The process of determining this transition will be an aerodrome-specific exercise requiring consideration of the following:

- the location and height of the ATC tower
- the size and layout of the manoeuvring area
- reduced ground visibility – this will normally be the determining factor for this transition, however, at some locations (i.e. those with tall control towers) low cloud may be a consideration.

4.2.5 For non-controlled aerodromes, entering RAVC occurs when MET conditions begin to limit the aerodrome operator's ability to identify hazards. This includes hazards associated with airside

drivers, airside works and works relating to or near electrical power facilities, and airside access and inadvertent entry.

4.2.6 The transition from Visibility Condition 2 to Visibility Condition 3 will depend on factors such as the layout and complexity of the taxiway system and the types of operating aircraft. For taxiing, this is normally taken as visibilities equivalent to an RVR of less than 400 m.[2]

4.2.7 A study conducted by Eurocontrol to assess the transition from Visibility Condition 2 to Visibility Condition 3 concluded the visibility threshold below which pilots are unable to comply with ATC instructions (based on traffic information requiring the pilot to see and avoid traffic) is somewhere between 200 m and 300 m. Traffic information becomes less effective from visibility 300 m and below, reaching its efficiency limit at a visibility of 100 m.[3]

4.3 Aerodrome operations while RAVC exist

4.3.1 RAVP are established to cover cases where there is a requirement to safeguard aircraft or other aerodrome surface traffic when operating on the manoeuvring area while RAVC exist.

4.3.2 The purpose of RAVP is to support the safety, regularity and efficiency of aircraft operations on the manoeuvring area, including the protection of the runway(s) in use for take-off and landing.

4.3.3 RAVP are intended to support ground movements even though LVP are not in force. This is either because the aerodrome is not capable of operations that require LVP or where the conditions have not deteriorated to the point where ATC must declare LVP in force.

4.3.4 Several factors are considered when developing RAVP, including the:

- characteristics of the aids available for surveillance and control of ground traffic
- complexity of the aerodrome layout
- characteristics of the aircraft using the aerodrome.

4.3.5 When considering the provisions to be incorporated within the RAVP, the principal events to be considered relate to when all or part of the manoeuvring area is not visible to ATC.

4.3.6 At smaller aerodromes with light or medium traffic density, the RAVP may involve the increased use of position reports by pilots and vehicle drivers in order for ATC and/or apron management staff to maintain situational awareness of the position of traffic on the movement area. This may be accompanied by limitations on traffic movement rates to ensure that traffic can manoeuvre safely in areas not visible from the tower and/or apron management.

4.3.7 At busier aerodromes, there may be benefits in providing additional facilities such as intermediate holding positions on taxiways and installing a surveillance system, for example, surface movement radar (SMR) or Aerodrome Ground Surveillance System (AGSS)[4]. This would safely sustain higher movement rates. The decision to upgrade aerodrome infrastructure will need to be based on appropriate safety assessment.

4.3.8 Further details on the prerequisites to be considered when developing equipment and procedures to be utilised when RAVC exist, are located at Chapter 6. These include:

- aerodrome infrastructure and operating rules
- MET
- aeronautical information service (AIS) and communications

[2] Reference ICAO Doc 9476.

[3] Eurocontrol A-SMGCS VIS2 – VIS3 Transition Simulation Report.

[4] In this AC, AGSS is the term used for a system otherwise identified as an Advanced Surface Movement Guidance and Control System (A-SMGCS).

- navigation
- Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM).

4.3.9 Further detail on the conduct of aerodrome operations, while RAVC exist are located at Chapter 5.2 of this AC.

4.4 Low visibility procedures

4.4.1 In addition to the infrastructure, equipment, rules and procedures established to support aerodrome ground operations as detailed in Section 4.3, special provisions called LVP are established to support the following aircraft flight operations:

- Departure operations in RVR less than 550 m or runway visibility less than 800 m
- CAT II and III approach and landing operations
- SA CAT I and II approach and landing operations.

4.4.2 The objectives of LVP include:

- the protection of the runway(s) in use for take-off and landing against incursions
- maintaining the accuracy and integrity of ground-based navigation signals used during the specified departure and approach and landing operations.

4.4.3 Figure 2 shows the relationship between the specified aircraft flight operations and LVP.

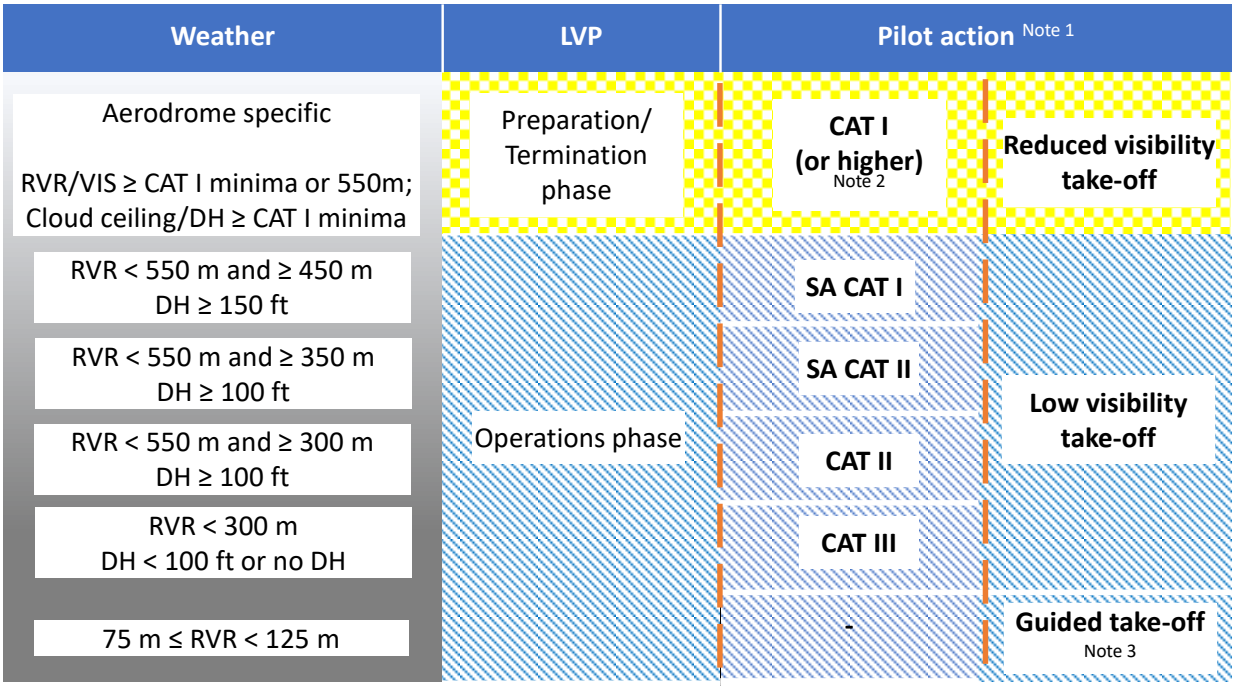


Figure 2: The relationship between the specified aircraft flight operations and LVP

Note 1: The approach category or departure operation is selected by the pilot according to the air operator's operations manual. This will depend on several factors outside the scope of this figure, such as the status of the ground and airborne equipment and pilot qualifications.

Note 2: Other types of approach (e.g. NPA, APV or visual approach) may be suitable, depending on the weather conditions and aerodrome equipment.

Note 3: In Australia it is mandatory for the pilot to conduct a guided take-off when the RVR is below 125 m.

Note 4: Some procedures, documentary references and guidance materials refer to CAT III subcategories (CAT IIIB, CAT IIIB and CAT IIIC). These subcategories are obsolescent and are progressively being omitted).

4.4.4 There are 3 phases of LVP:

- *Preparation phase* – this phase commences when deteriorating MET conditions reach, or are forecast to reach, specified height of cloud base or ceiling and/or visibility/RVR values.

Note: These triggering values are determined and specified for each aerodrome depending on the flight operations to be supported by LVP, local weather patterns, and considering local factors such as the lead times needed to prepare the aerodrome and to bring the operations phase of LVP into force.

- *Operations phase* – this phase must be in force prior to the commencement of any of the specific LVOs for which LVP are required. It is brought into force only once all preparatory activities are complete. Flight operations requiring LVP may only commence once the LVP are in force.

- *Termination phase* – this phase is established to facilitate a smooth transition back to normal operations.

4.4.5 Further details on the prerequisites to be considered when developing LVP are located in Chapter 6. Further detail on the application and conduct of LVP are located in Chapter 8.

4.4.6 Figure 3 is a graphical representation of the relationships between differing weather conditions, the related visibility 'categorisation', and resulting aerodrome operating procedures and instrument approach categories.

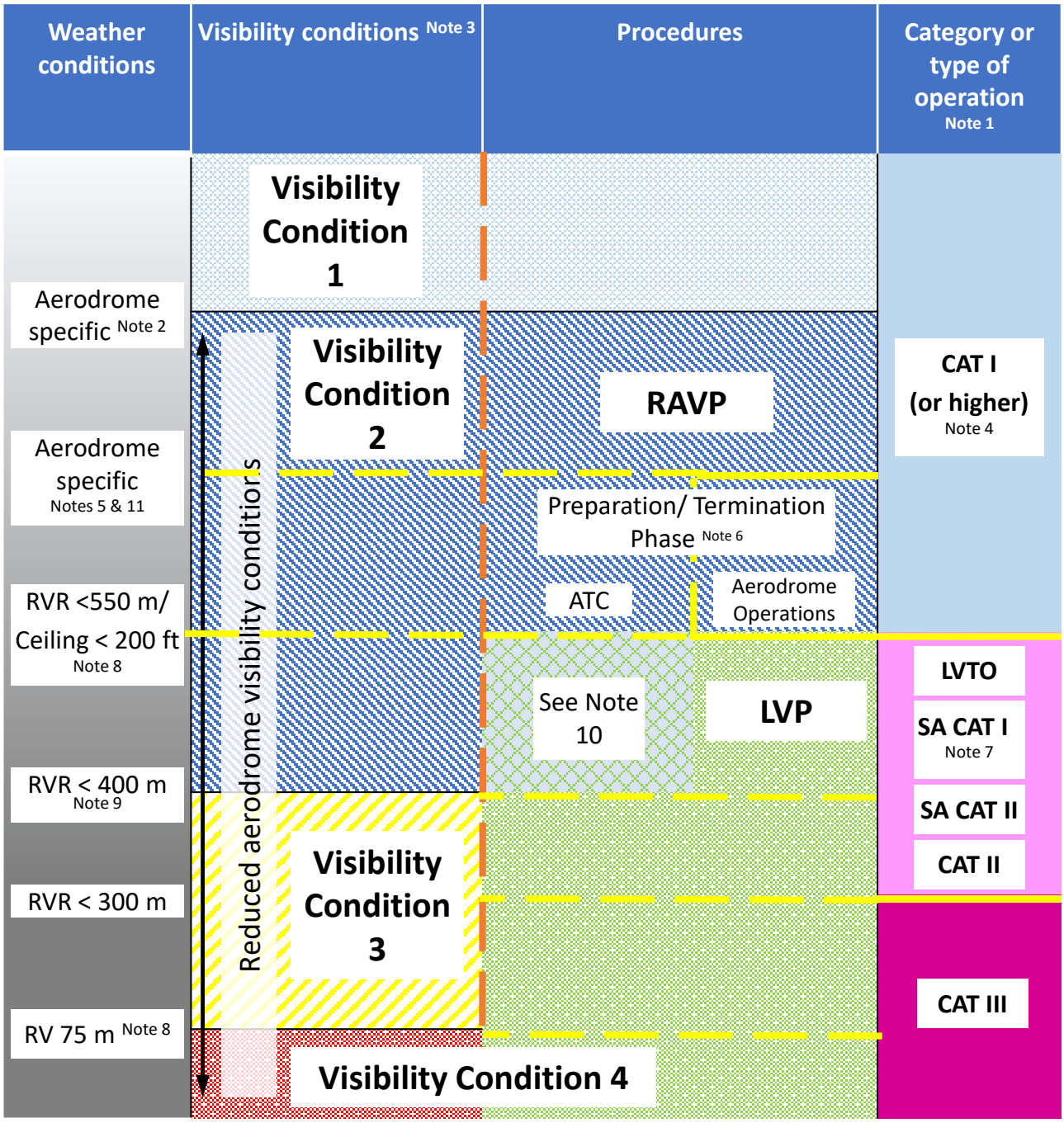


Figure 3: The relationship between visibility conditions, LVP and approach category or type of operation

Note 1: The approach category or LVTO is selected by the pilot according to the airline operations manual. This will depend on a number of factors outside the scope of this diagram, such as the status of the ground and airborne equipment and pilot qualifications.

Note 2: Entry into Visibility Condition 2 occurs when all or part of the manoeuvring area is not visible from the control tower. This value is locally determined depending on the size of the aerodrome. Entry into Visibility Condition 2 may also be due to low cloud, particularly for aerodromes with tall control towers.

Note 3: Further information on ICAO visibility conditions is provided in Chapters 7 and 8.

Note 4: Other types of approach (e.g. NPA, APV or even a visual approach) may be suitable, depending on the weather conditions and aerodrome equipment.

Note 5: The MET conditions for the commencement of the preparation phase are locally determined dependant on factors such as the size of the aerodrome and the extent of the preparations required. If the weather conditions are deteriorating rapidly, there may be a requirement to commence the preparation phase earlier. The intent is that LVP are in force at the latest when height of cloud base falls below 200 ft and/or RVR is below 550 m.

Note 6: There may be several parties undertaking specific aspects of the Preparation Phase such as ATC, apron management service (AMS), Aerodrome operations, and other agencies.

Note 7: At some locations, LVOs may commence above RVR 550 m, in which case LVP should be established accordingly. LVP should be in force at the latest when height of cloud base falls below 200 ft, RVR is below 550 m, or below CAT I minimums. If the preparation phase is not complete (for example, due to rapidly deteriorating weather conditions), then pilots are to be informed and operations that require LVP cannot be commenced.

Note 8: The commencement of Visibility Condition 3 will be determined locally depending on factors such as the size and complexity of the taxiway layout and the types of aircraft operating.

Note 9: RAVP may be in operation to support ground movements even though LVP is not in operation, either because the aerodrome is not capable of operations that require LVP, or these operations are not currently being undertaken.

Note 10: The Termination Phase will take place when the weather conditions improve to the point that LVP are no longer required. These weather criteria are likely to be different to the Preparation Phase, depending on the actual conditions at the time.

4.5 Roles and responsibilities

4.5.1 CASA

4.5.1.1 CASA is responsible for assessing the suitability of an aerodrome. The aerodrome must show evidence of:

- adequate runway protection measures
- surface movement guidance and control
- emergency procedures
- appropriate air traffic services
- aeronautical information service
- apron management
- MET services and equipment

necessary to support those flight operations which require LVP to be established and in force.

4.5.1.2 CASA authorises an aircraft operator to carry out specific operations in LVP such as SA CAT I, CAT II, SA CAT II or CAT III approach and landing operations, and take-off with a visibility less than 550 m.

4.5.1.3 CASA requires pilots to ensure that LVP have been established and are in force before undertaking certain approach and landing or departure operations.

4.5.1.4 States will normally establish specific operating procedures for aircraft operators, which may include low visibility take-off (LVTO) with RVR below 550 m.

4.5.2 Aerodrome operators

4.5.2.1 The aerodrome operator has a prime role in developing, establishing and maintaining LVP. Generally, the aerodrome operator will be primary point of contact for any system-wide program to change the all-weather capability of an aerodrome. It is important that RAVP, including LVP, are developed in close cooperation with ATC and any other relevant participant.

4.5.2.2 When upgrading and maintaining the facilities used to support aerodrome surface or flight operations taking place when RAVC exist, or to support flight operations which require LVP to be in force, the aerodrome operator must take into account the relevant standards detailed in the Part 139 MOS.

4.5.2.3 The aerodrome operator should establish operational procedures to support the LVP preparation phase. The activation of the LVP preparation phase is initiated by ATC when it is assessed that LVP are likely to be required. The aerodrome operator is responsible for coordinating the activities undertaken as part of safeguarding the movement area. The aerodrome operator is also responsible for ensuring all required operational measures are in place before advising ATC that LVP can be declared to be in force.

4.5.3 Aircraft operators

4.5.3.1 Aircraft operators conduct low visibility operations in accordance with the operating minima and the limits and conditions of the operator's authorisation to conduct low visibility operations.

4.5.3.2 It is not intended that the specifications in the Part 139 MOS or Annex 14 will limit or regulate the operation of an aircraft (Chapter 1 (Introductory Note) of Annex 14, Vol I).

4.5.3.3 Requirements to be considered by the aircraft operator in establishing the aerodrome operating minima are defined in AC 91-11 or the relevant State regulations. AC 91-11 also defines the permissible conduct of SA CAT I, CAT II, SA CAT II or CAT III operations.

4.5.3.4 AC 91-11 explains that LVOs are permitted at aerodromes where air traffic control (ATC) services are in operation and when ATC has declared that LVP are in effect. Additionally, the AC mentions that LVO are permitted to be conducted within:

- Australia: if the aerodrome and runway satisfy the regulatory standards for operations at the visibility minima specified for the particular LVO
- a foreign country: if the aerodrome and runway is authorised by the foreign regulatory authority for operations at the minima specified for the particular LVO.

4.5.4 Flight crew

4.5.4.1 The decision to undertake a specific type of operation, and the minima to be applied, is the responsibility of the pilot-in-command based on standard operating procedures, as published in the aircraft operations manual.

4.5.5 ATS provider

RAVP

4.5.5.1 Any special provisions that are to apply when all or part of the manoeuvring area cannot be visually monitored from the control tower are initiated by or through the aerodrome control tower in accordance with Part 172 MOS and ICAO Doc 4444.

LVP

4.5.5.2 The local ATC unit in coordination with the aerodrome operator establishes provisions applicable to the start and continuation of approach and landing, and take-off and departure procedures as specified in Part 172 MOS and ICAO Doc 4444.

4.5.5.3 ATC is responsible for advising the aerodrome operator that the activation of LVPs is likely to become necessary and for initiating the LVP preparation phase.

4.5.5.4 During the preparation phase a pre-defined set of activities are undertaken by nominated aerodrome agencies such as:

- ATC
- aerodrome operator
- those responsible for the visual and non-visual aids
- other agencies as directed by the appropriate authorities.

4.5.5.5 Once it has been confirmed that these activities are complete the LVP operations phase is declared to be in force by ATC. Therefore, ATC is responsible for advising pilots of the status of LVP.

4.5.5.6 While LVP are in force ATC is also responsible for monitoring the status of specified facilities and equipment (unless this is delegated to an appropriate responsible authority). Whenever any of the specified facilities or equipment do not meet a defined minimum performance level or becomes unserviceable, ATC must advise aircraft and maintenance units accordingly. This includes the provision of information to aircraft via the automatic terminal information service (ATIS) and/or Radiotelephone (RTF).

5 Provisions to support AWO

5.1 General

5.1.1 This chapter details the prerequisites to be considered in the development and implementation of infrastructure, facilities, equipment and procedures that will be used to support the ground operation of aircraft and vehicles on the aerodrome when RAVC exist.

5.1.2 The requirements to support specified take-off and departure and approach and landing operations that require LVP to be in force are also described in this chapter.

5.1.3 LVPs should be developed for controlled aerodromes to support operations when ATC/AMS as appropriate is unable to visually monitor all or part of the movement area.

5.1.4 CASA has established provisions applicable to the start and continuation of take-off operations in RVR conditions less than a value of 550 m, as well as approach operations with minima less than standard CAT I. These are set out in Part 172 MOS and ICAO Doc 4444.

5.1.5 When considering the equipment requirements and the operations that take place on the aerodrome, it is important the aerodrome operator appreciates the relationship between the existing LVP measures developed by the various agencies involved in the process.

5.1.6 The specific equipment and procedures that must be provided for the safe conduct of these ground operations depends on the aerodrome operating minima chosen and the extent to which aircraft and vehicles may come into conflict. Conflicting traffic may be reduced or eliminated by:

- restricting the number and type of movements
- utilising standard taxi routes during reduced aerodrome visibility conditions
- selecting facilities appropriate for the particular aerodrome lay-out and traffic density planned.

Note: The means adopted will vary with the size and complexity of the manoeuvring area and with the movement rate required.

5.1.7 Chapter 6 provides more detail on the matters to be considered in the development and establishment of local AWO plans.

5.1.8 ICAO Doc 9476 provides guidance for basic surface movement guidance and control systems. Whereas, ICAO Doc 9830 provides additional guidance intended to support the provision of adequate capacity and safety in relation to specific weather conditions, traffic density and aerodrome layout by making use of modern technologies and a high level of integration between the various functionalities.

5.2 Aerodromes

5.2.1 When aircraft or aerodrome ground operations are planned to take place while RAVC exist, all the facilities of the aerodrome must be considered and assessed for their suitability for such operations. Special procedures and, in some instances, additional equipment, may be required to ensure that these operations can be conducted safely.

5.2.2 In order to ensure that low visibility take-off and approach operations can be conducted safely, the aerodrome operator needs to consider the:

- physical characteristics of the runways and taxiways
- requirements for obstacle clearance

- protection of the defined areas surrounding a runway
- characteristics of pre-threshold terrain.

5.2.3 Construction and maintenance activities

5.2.3.1 Requirements and recommendations relating to construction or maintenance activities in preparation for and whenever LVP are in force are detailed in Chapters 8, 9, and 23 of Part 139 MOS and PANS ATM. Table 1 summarises these requirements and recommendations.

Table 1: Construction and maintenance activities

Provision	Degree of compliance	References
Maintain all visual aids to the standard that is required for the aid or indicator.	**Required**	Part 139 MOS, Chapter 8, Division 1
Monitor and maintain lights and lighting systems associated with the aerodrome day and night visual ground aids to ensure that they are correct and easily seen.	**Required**	Part 139 MOS, Chapter 9, Division 16
Rectify an aerodrome lighting system or facility experiencing a lighting outage as soon as possible after the outage is detected.	**Required**	Part 139 MOS, Chapter 9
Withdraw non-essential vehicles and personnel within the movement area during periods of low-visibility operations.	**Required**	Part 139 Chapter 23
Suspend routine maintenance on visual and non-visual aids during periods of low-visibility operations.	**Required**	Part 139 Chapter 23
In-field measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a PA runway category II or III should be undertaken by measuring all lights, as far as practicable, to ensure conformance with the applicable specification of Appendix 2 of Annex 14, Volume I.	**Recommended**	Annex 14, Volume I, 10.5.5
Measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a PA runway category II or III should be undertaken using a mobile measuring unit of sufficient accuracy to analyse the characteristics of the individual lights.	**Recommended**	Annex 14, Vol. I
The frequency of measurements of lights for a PA runway category II or III should be based on traffic density, the local pollution level, the reliability of the installed lighting equipment and the continuous assessment of the results of the in-field measurements but, in any event, should not be less than twice a year for in-pavement lights and not less than once a year for other lights.	**Recommended**	Annex 14, Vol. I

5.2.4 Secondary power supplies

5.2.4.1 Requirements and recommendations for the provision of power supplies for aerodrome lighting and other essential facilities and equipment (including changeover times for secondary supplies) are specified in Chapter 9 of the Part 139 MOS and are summarised in Table 2.

5.2.4.2 The MOS describes how to achieve the specified changeover times.

Table 2: Secondary power supply requirements

Provision	Circumstance	Degree of compliance	References
Provide secondary power supply for relevant aerodrome facilities.	General application	**Required**	Part 139 MOS, Chapter 9, Division 1
Meet maximum switch over times.	Departure operations - Runway used for take-off when RVR <800 m	**Required**	Part 139 MOS, Chapter 9, Division 1
Meet maximum switch over times.	Approach and landing operations - PA runways	**Required**	Part 139 MOS, Chapter 9, Division 1
Maximum switch over time for runway edge lights should be 1 second. The switch -over time for runway edge lights may be increased to 15 seconds when runway centre line lights are provided. In this case, the switchover time for runway centre line lights should be 1 second.	Approach and landing operations - PA runways supporting SA CAT I operations	**Recommended**	EASA AMC1 ADR.OPS.B.045(a)(2)

5.2.5 Visual aids

5.2.5.1 The need for visual aids will depend on the type of operations to be undertaken under various visibility conditions, the traffic density to be supported, and the complexity of the aerodrome layout and ground operations.

5.2.5.2 As visibility conditions deteriorate, appropriate visual aids may be required to enable pilots and vehicle drivers to identify their position and required routings on the movement area, and to help them to avoid other traffic.

5.2.5.3 Requirements and recommendations relating to visual aids at aerodromes are detailed in Chapters 8 and 9 of the Part 139 MOS and Chapter 5 of Annex 14 Vol I. Table 3 outlines some general visual aid considerations the operator should review.

Table 3: Visual aids considerations

Provision	Degree of compliance	References
Publish details of the taxiway guidance system in the appropriate sections of the AIP.	**Required**	Part 139 MOS, Chapter 5
For LVOs, provide aerodrome procedures and facilities for supporting the desired movement rate.	**Required**	Part 139 MOS, Chapter 23
A surface movement guidance and control system should be provided at an aerodrome.	**Recommended**	Annex 14, Vol I
The design of a surface movement guidance and control system (SMGCS) should take into account: • the density of air traffic • the visibility conditions under which operations are intended • the need for pilot orientation • the complexity of the aerodrome layout • movements of vehicles.	**Recommended**	Annex 14, Vol I
An SMGCS should be designed to assist in the prevention of inadvertent incursions of aircraft and vehicles onto an active runway	**Recommended**	Annex 14, Vol I
An SMGCS system should 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.		Annex 14, Vol I
Consider providing location and guidance signs, markings and traffic lights on service roads. **Note:** guidance on surface movement guidance and control systems is contained in the Manual of Surface Movement Guidance and Control Systems (SMGCS).	**Good practice**	ICAO Doc 9476

5.2.6 Aerodrome markings

5.2.6.1 Requirements and recommendations relating to aerodrome markings are specified in the Part 139 MOS and Annex 14, Vol I. Table 4 outlines some general marking considerations the operator should review.

Table 4: Aerodrome marking considerations – General application

Provision	Degree of compliance	References
Provide each runway-holding position with a runway-holding position marking.	**Required**	Part 139 MOS, Chapter 8, Division 4

Provision	Degree of compliance	References
Provide aircraft parking position markings for designated parking positions on a paved apron and on a de-icing/anti-icing facility.	**Required**	Part 139 MOS, Chapter 8 Division 5
Provide parking clearance lines on a paved apron as required by the parking configurations and ground facilities, to define the areas intended for use by ground vehicles and other aircraft servicing equipment, etc., to provide safe separation from aircraft.	**Required**	Part 139 MOS, Chapter 8 Division 5
Ensure runway holding positions installed for use while LVP are in force provide protection for the: • relevant localiser and glide path CSA • obstacle free zone (OFZ).	**Required**	Part 139 MOS, Chapter 6, Division 3
Provide continuous guidance (including aircraft parking position lead in lines and manoeuvring guidance lights) from the runway to the stand.	**Required**	Part 139 MOS, Chapters 8 and 9
Surface markings that are the sole runway or taxiway centre line reference to the users during LVP, or other essential markings used in connection with LVP, to be sufficiently conspicuous to the users throughout the taxi routes, and kept free of contamination.	**Good practice**	
Intermediate holding position markings at taxiway intersections and intermediate holding position markings of holding positions along a taxiway other than at taxiway intersections may assist in ensuring adequate spacing between taxiing aircraft while LVP are in force.	**Good practice**	Part 139 MOS, Chapters 6 and 8 Annex 14, Vol I
Service roads and emergency access roads should have adequate markings to enable drivers of emergency response vehicles to establish their position and route in the lowest visibility conditions in which the aerodrome maintains operations.	**Good practice**	

Table 5: Aerodrome marking considerations – All-weather operations

Provision	Circumstance	Degree of compliance	References
Provide appropriate runway markings.	Take-off and instrument approach and landing operations	**Required**	Part 139 MOS, Chapter 8, Division 3
Provide an aiming point marking at each approach end of each sealed, concrete or asphalt runway that is 30 m or more wide and 1500 m or more long.	Approach and landing operations	**Required**	Part 139 MOS, Chapter 8, Division 3
Provide a touchdown zone marking at each end of a sealed, concrete or asphalt runway that is 30 m or more wide and 1500 m or more long.	Approach and landing operations	**Required**	Part 139 MOS, Chapter 8, Division 3

Provision	Circumstance	Degree of compliance	References
Provide a touchdown zone (TDZ) markings with ICAO 'A' – basic pattern.	PA runway	**Required**	Part 139 MOS, Chapter 8, Division 3
Provide and site holding bay, runway-holding position and road-holding positions to protect the ILS critical or sensitive area(s) according with the type of PA operations conducted.	PA runway	**Required**	Part 139 MOS, Chapter 6; ICAO Annex 10, Vol I, Attachment C
Ensure the location of holding bays, runway-holding positions and road-holding positions protect the critical/sensitive area(s) for an instrument landing system (ILS) facility classified III/E/4.	Guided take-off operations	**Required**	Part 139 MOS, Chapter 6, Division 3; ICAO Annex 10, Vol I, Attachment C

5.2.7 Aeronautical ground lighting

5.2.7.1 Requirements and recommendations relating to lighting systems are specified in Chapter 9 of the Part 139 MOS. Table 6 outlines some general lighting considerations the operator should review in relation to AWO.

Table 6: Aerodrome ground lighting – monitoring and status

Provision	Degree of compliance	References
Provide automatic monitoring and relay to ATC control towers of lighting systems.	**Required**	Part 139 MOS, Chapter 9, Division 16
Provide an indication of the operational status of lights within defined response times.	**Required**	Part 139 MOS, Chapter 9, Division 16
ATC interface and visual aids monitoring.	**Good practice**	ICAO Doc 9157 Part 5

Runway lighting

5.2.7.2 Requirements and recommendations relating to runway lighting are detailed in Chapter 9 of Part 139 MOS and ICAO Annex 14. Table 7 summarises these requirements and recommendations and provides additional good practice guidance.

Table 7: Runway lighting

Component	Non-instrument runway	NPA runway	PA runway - CAT I	PA runway - CAT II	PA runway - CAT III
Approach lighting system (Part 139 MOS, Chapter 9, Division 7)	A simple approach lighting system can enhance visual guidance for a non-instrument runway	A simple approach lighting system can provide an operational benefit by reducing the minimum visibility or RVR requirements for an instrument approach conducted to the runway	A **PA CAT I** lighting system is **required** for a PA CAT I runway supporting instrument approach operations with a visibility less than 1 500 m	A **PA CAT II/III** lighting system is **required**	A **PA CAT II/III** lighting system is **required**
Runway edge lights (Part 139 MOS, Chapter 9, Division 10)	**Required** if the runway is intended to be used at night **Required** if a runway is available for take-off operations with an RVR less than 350 m	**Required** if the runway is intended to be used at night **Required** if a runway is available for take-off operations with an RVR less than 350 m	**Required**	**Required**	**Required**
Runway threshold lights (Part 139 MOS, Chapter 9, Division 10)	**Required** if the runway is equipped with runway edge lights	**Required** if the runway is equipped with runway edge lights	**Required**	Required	Required
Wing bar lights (Part 139 MOS, Chapter 9, Division 10)	N/A	N/A	Recommended when additional conspicuity is considered desirable	Recommended when additional conspicuity is considered desirable	Recommended when additional conspicuity is considered desirable
Runway end lights (Part 139 MOS, Chapter 9, Division 10)	**Required** if the runway is equipped with runway edge lights	**Required** if the runway is equipped with runway edge lights	**Required**	**Required**	**Required**

Component	Non-instrument runway	NPA runway	PA runway - CAT I	PA runway - CAT II	PA runway - CAT III
Runway centreline lights (Part 139 MOS, Chapter 9, Division 10)	**Required** if the runway is intended for take-offs with an operating minimum below an RVR of 350 m **Recommended** for the following runways if the width between the runway edge lights is greater than 50 and intended for take-offs with an operating minimum equal to or above an RVR of 350 m	**Required** if the runway is intended for take-offs with an operating minimum below an RVR of 350 m **Recommended** for the following runways if the width between the runway edge lights is greater than 50 m and intended for take-offs with an operating minimum equal to or above an RVR of 350 m	**Required** if the runway is intended for take-offs with an operating minimum below an RVR of 350 m **Recommended** for the following runways if the width between the runway edge lights is greater than 50 m: (a) precision approach CAT I runways; (b) runways intended for take-offs with an operating minimum equal to or above an RVR of 350 m	**Required**	**Required**
TDZ lights (Part 139 MOS, Chapter 9, Division 10)			**Recommended**	**Required**	**Required**
Simple TDZ lights (Part 139 MOS, Chapter 9, Division 10)	**Recommended** where the approach angle is greater than 3.5 degrees or where a limiting landing distance available combines with other risk factors increases the risk of an overrun. **Recommended** where TDZ lights are not otherwise	**Recommended** where the approach angle is greater than 3.5 degrees or where a limiting landing distance available combines with other risk factors increases the risk of an overrun. **Recommended** where TDZ lights are not otherwise available, in order to enhance situational awareness.	**Recommended** where the approach angle is greater than 3.5 degrees or where a limiting landing distance available combines with other risk factors increases the risk of an overrun. **Recommended** where TDZ lights are not otherwise available, in order to enhance situational awareness.	N/A	N/A

Component	Non-instrument runway	NPA runway	PA runway - CAT I	PA runway - CAT II	PA runway - CAT III
	available, in order to enhance situational awareness.				
Rapid exit taxiway indicator lights (Annex 14, 5.3.15)		Recommended when the traffic density is heavy	Recommended when the traffic density is heavy	Recommended when the traffic density is heavy	Recommended
Stopway lights (Part 139 MOS, Chapter 9, Division 10)	Required for a stopway that is: (a) longer than 180 m; and; (b) intended for night use.	Required for a stopway that is: (a) longer than 180 m; and; (b) intended for night use.	Required for a stopway that is: (a) longer than 180 m; and; (b) intended for night use.	Required for a stopway that is: (a) longer than 180 m; and; (b) intended for night use.	Required for a stopway that is: (a) longer than 180 m; and; (b) intended for night use.
Runway turn pad, runway bypass pad and runway starter extension edge lights (Part 139 MOS, Chapter 9, Division 10)	Required where an aircraft turn pad, runway bypass pad or runway starter extension is provided on a runway that has runway edge lights.	Required where an aircraft turn pad, runway bypass pad or runway starter extension is provided on a runway that has runway edge lights.	Required where an aircraft turn pad, runway bypass pad or runway starter extension is provided on a runway that has runway edge lights.	Required where an aircraft turn pad, runway bypass pad or runway starter extension is provided on a runway that has runway edge lights.	Required where an aircraft turn pad, runway bypass pad or runway starter extension is provided on a runway that has runway edge lights.

Taxiway lighting

5.2.7.3 Requirements and recommendations relating to taxiway lighting are detailed in Chapter 9 of Part 139 MOS and PANS ATM.

5.2.7.4 Table 8 summarises these requirements and recommendations and provides additional good practice guidance.

Table 8: Taxiway lighting

Component	Required	Recommended
Taxiway centre line lights	1. On an exit taxiway, taxiway, and apron intended for use in visibility conditions < 350m in such a manner as to provide continuous guidance between the runway centre line and aircraft stand.	On a taxiway intended for use at night in RVR conditions < 1200 m unless the aerodrome traffic density is light

Component	Required	Recommended
(Part 139 MOS, Chapter 9, Division 11)	Doesn't apply if: (a) taxiway edge lights and centreline markings provide adequate guidance; and (b) the aerodrome traffic density is light. 2. On a rapid exit taxiway 3. On a runway forming part of a standard taxi-route and intended for taxiing in RVR conditions < 350 m. Doesn't apply if: (a) taxiway edge lights and centreline markings provide adequate guidance; and (b) the aerodrome traffic density is light.	
Taxiway centre line lights **(Annex 14, 5.3.17)**	N/A	On an exit taxiway, taxiway, de-icing/anti-icing facility and apron in all visibility conditions where specified as part of an advanced surface movement guidance and control system in such a manner to provide continuous guidance between the runway centre line marking and aircraft stands.
Taxiway edge lights **(Part 139 MOS, Chapter 9, Division 11)**	1. At the edges of a taxiway or a holding bay if the taxiway or holding bay is: (a) intended for use at night; and (b) not provided with centreline lights. 2. On a runway that: (a) forms part of a standard taxi-route; and (b) is intended for taxiing at night; and (c) is not provided with taxiway centreline lights.	Where additional visual cues are required to delineate apron edges at night

Stop bars

5.2.7.5 The primary safety function of stop bars is to assist in the prevention of inadvertent penetrations of active runways and OFZ by aircraft and vehicles when visibility is reduced.

5.2.7.6 A stop bar is switched on to indicate that traffic stop, and switched off to indicate that traffic may proceed.

5.2.7.7 The key elements relating to the design and operation of stop bars that the operator should review are detailed in Chapter 9 of the Part 139 MOS and in Table 9:

Table 9: Stop bar lighting

Provision	Degree of compliance	References
Provide a stop bar at each runway-holding position when it is intended that the runway will be used when RVR < 550 m.	**Required**	Part 139 MOS, Chapter 9, Division 11)
Operational procedures ensure that in RVR conditions less than a value of 550 m: • aircraft on the manoeuvring area are limited to 1 at a time; and • vehicles on the manoeuvring area are limited to the minimum essential for safe aerodrome operations or • appropriate aids and procedures designed to prevent the inadvertent incursion of aircraft or vehicles on to the runway are in force for the runway.	Exceptions	Part 139 MOS, Chapter 9, Division 11
Refer within the relevant MOS for design requirements relating to stop bar lighting circuits. **Note:** Further guidance is available in ICAO Doc 9157, Part 5.		Part 139 MOS, Chapter 9, Division 11
Except where a stop bar has been installed, provide intermediate holding position lights on a taxiway intermediate holding position intended for use when RVR < 350 m.		Part 139 MOS, Chapter 9, Division 11
When it is desired to provide traffic control by visual means or to supplement markings, provide stop bars at intermediate holding positions.	**Recommended**	Part 139 MOS, Chapter 9, Division 11
Unless the aerodrome layout, traffic density and applied procedures enable protection by other means, provide stop bars at all taxiways giving access to runways that will be used by aircraft conducting take-off or landing operations which require LVP to be in force.	**Good practice**	ICAO Doc 9365
Where deemed necessary to assist in preventing inadvertent access of vehicles or aircraft to a taxiway, provide a stop bar as a no-entry bar across a taxiway which is intended to be used as an exit only taxiway.		ICAO Doc 9476
Consider the provision and use of stop bars at runway-holding positions for use at night and when RVR >550 m.		Annex 14, Vol I
Establish contingency measures to cover cases where the stop bars or controls are unserviceable. Publish such contingency measures in the AIP.		
Consider partial automating the operation of stop bars, reducing the need for operating personnel to manually intervene on each occasion; for example, a ‘limited visibility’ setting on the control panel might automatically illuminate stop bars closing access to taxiways which are not to be used when visibility is reduced or, following a manual switch-off of a stop bar, the stop bar would automatically switch back on triggered by the crossing aircraft.		ICAO Doc 9365

Runway guard lights

5.2.7.8 Runway-holding position markings, signs and stop bars may not by themselves be adequate during conditions of reduced visibility and runway guard lights are recommended as reinforcement.

5.2.7.9 Runway guard lights are provided to warn pilots, and drivers of vehicles, when they are operating on taxiways that they are about to enter an active runway.

5.2.7.10 Key factors relating to the provision and characteristics of runway guard lights are detailed in chapter 9 of the Part 139 MOS and Table 10.

Table 10: Runway guard lights

Provision	Degree of compliance	References
Provide runway guard lights – Configuration A or B, at the intersection of a taxiway with a runway intended for use in: • visibility conditions less than 550 m, if stop bars are not installed; • visibility conditions between 550 m and 1 200 m, when the aerodrome traffic density is heavy.	**Required**	Part 139 MOS, Chapter 9, Division 11
If runway guard lights are provided for a runway, they must be installed and used at all taxiways and road access points that allow access to the runway.	**Required**	Part 139 MOS, Chapter 9, Division 11
Runway guard lights are not required for a taxiway if: • the taxiway is used only for exiting from the runway; and • the taxiway cannot be used for entry to the runway by either aircraft or vehicles.	**Exception**	Part 139 MOS, Chapter 9, Division 11
Use both elevated and in-pavement runway guard lights together when increased conspicuity of the taxiway/runway intersection is required, for example: • if holding position markings do not extend straight across the taxiway or • on a wide taxiway, if elevated lights on both sides of the taxiway are not within the normal field of view of a pilot approaching the runway guard lights.	**Required**	Part 139 MOS, Chapter 9, Division 11
Provide runway guard lights in conjunction with a stop bar.	**Recommended**	Part 139 MOS, Chapter 9, Division 11
As part of runway incursion prevention measures, runway guard lights, Configuration A or B, should be provided at each taxiway/runway intersection where runway incursion hotspots have been identified, and used under all-weather conditions during day and night, except that Configuration B runway guard lights should not be collocated with a stop bar.	**Recommended**	Annex 14, Vol I

Provision	Degree of compliance	References
Supplement runway guard light Configuration A, with runway guard lights configuration B, when deemed necessary.	**Good practice**	Annex 14, Vol I

Road-holding position lights

5.2.7.11 The key factors relating to the provision and characteristics of road holding position lights are detailed in Table 11. The operator should review these provisions.

Table 11: Road holding position light considerations

Provision	Degree of compliance	References
Provide road-holding position lights at each road-holding position serving a runway when it is intended that the runway will be used when RVR < 350 m.	**Required**	Part 139 MOS, Chapter 9, Division 14
Provide road-holding position lights at each road-holding position serving a runway when it is intended that the runway will be used when RVR < 550 m.	**Recommended**	Annex 14, Vol I

Rapid exit taxiway indicator lights

5.2.7.12 Factors relating to the provision and characteristics of rapid exit taxiway indicator lights (RETIL) are detailed in Table 12. The operator should review these provisions.

Table 12: RETIL considerations

Provision	Degree of compliance	References
Provide RETIL on a runway intended for use in RVR conditions less than a value of 350 m or where traffic is heavy.	**Recommended**	Part 139 MOS, Chapter 9, Division 11
Provide RETILs in low visibility conditions to provide the pilot with useful situational awareness cues while allowing the pilot to concentrate on keeping the aircraft on the runway centre line regarding the runway centre line.	**Good practice**	Annex 14, Vol I

Intermediate holding position lights

5.2.7.13 Factors relating to the provision and characteristics of intermediate holding position lights are detailed in Table 13. The operator should review these provisions.

Table 13: Intermediate holding position lights

Provision	Degree of compliance	References

Provide intermediate holding position lights at the following locations:
• if runway guard lights or stop bars are not provided — the runway holding position on a taxiway serving a runway equipped for night use
• if the holding bay is intended to be used at night— the holding position of a holding bay
• taxiway/taxiway intersections if:
  ○ the intersection is intended for use in RVR conditions less than 350 m; and
  ○ it is necessary to identify the aircraft holding position
• a designated intermediate holding position on a taxiway intended for night use.
 	
Note: Provision of intermediate holding position lights should be based on local ATC procedures requirements.
	Required	Part 139 MOS, Chapter 9, Division 11

Provide intermediate holding position lights at an intermediate holding position, where there is no need for stop-and-go signals as provided by a stop bar.	**Recommended**	Annex 14, Vol I

Aircraft parking position manoeuvring guidance lights

5.2.7.14 Factors relating to the provision and characteristics of Aircraft parking position manoeuvring guidance lights are detailed in Table 14. The operator should review these provisions.

Table 14: Aircraft parking position manoeuvring guidance lights

Provision	Degree of compliance	References
Provide aircraft parking position manoeuvring guidance lights to facilitate the positioning of an aircraft on an aircraft parking position on a paved apron if the parking position is intended for use in RVR conditions less than 550 m.	**Recommended**	Part 139 MOS, Chapter 9, Division 13

Movement area guidance signs

5.2.7.15 Key elements relating to the location and characteristics of movement area guidance signs (MAGS) are specified in chapter 8 of the Part 139 MOS, and in Annex 14, Vol I.

5.2.7.16 Table 15 details MAGS in different circumstances. The operator should review the provisions.

Table 15: MAGS in different circumstances – general guidance

Provision	Degree of compliance	References
Provide MAGS with instructions: • at international aerodromes with scheduled air transport operations; and • at any aerodrome with ATC.	**Required**	Part 139 MOS, Chapter 8, Division 6
Provide MAGS with information only at aerodromes where taxiway intersection departures are promulgated in the AIP.	**Required**	Part 139 MOS, Chapter 8, Division 6
Provide runway exit signs for runways used for land and hold short operations (LAHSO) except when used for below 5 700 kg MTOW.	**Required**	Part 139 MOS, Chapter 8, Division 6
Provide mandatory instruction signs, information signs and location signs for the use of pilots and vehicle drivers to assist awareness of their position and of the direction to follow.	**Recommended**	Annex 14, Vol I
Provide runway vacated signs where: • the exit taxiway is not provided with taxiway centre line lights • there is a need to indicate to a pilot leaving a runway the perimeter of the ILS critical/sensitive area or the lower edge of the inner transitional surface (whichever is further from the runway centre line).	**Recommended**	Annex 14, Vol I
Consider the need to provide visual clues to pilots under very low visibilities. Designate taxiways, exits and entries in a manner which simplifies orientation on the aerodrome.	**Good practice**	Annex 14, Vol I
Provide service roads and emergency access roads with adequate signs to enable drivers of emergency response vehicles to establish their position and route in the lowest visibility conditions in which the aerodrome maintains operations.	**Good practice**	Annex 14, Vol I
Determine the location of signs laterally from the taxiway pavement edge, and the dimensions of the signs, considering the minimum visibility during which the aerodrome is used and the most restrictive aircraft type expected to operate at the aerodrome.	**Good practice**	Annex 14, Vol I

5.2.8 Aerodrome ground operations

Unserviceable areas

5.2.8.1 Provisions relating to management of unserviceable areas during AWO are detailed in Chapters 8 and 9 of the Part 139 MOS. The provisions apply regardless of the visibility conditions. Table 16 also provides requirements and guidance on securing unserviceable or non-operational areas. The operator should review the provisions.

Table 16: Securing unserviceable or non-operational areas

Provision	Degree of compliance	References
Deploy movement area unserviceability markings and lights on any unserviceable areas used by aircraft.	**Required**	Part 139 MOS, Chapters 8 & 9
Place unserviceability markers and lights at intervals sufficiently close so as to delineate the unserviceable area.	**Recommended**	Annex 14, Vol I
Do not operate lighting on a closed runway or a closed or unauthorised taxiway or portion thereof.	**Good practice**	ICAO Doc 9981
Existing aeronautical ground lighting and signs leading into a worksite should be extinguished or masked on a movement area used at night or during low visibility.	**Good practice**	ICAO Doc 9981

Movement area

5.2.8.2 Table 17 also provides guidance on protecting the movement area during, and in the lead up to declaring, LVP in force. The operator should review the provisions.

Table 17: Protecting the movement area

Provision	Degree of compliance	References
Establish arrangements to: • ensure that, in good time prior to the bringing LVP operations phase into force, all airlines and other organisations with access to movement areas are notified • prevent unauthorised vehicular traffic from entering the movement area when RAVC exist or while LVP are in force.	**Good practice**	

Aircraft ground operations

5.2.8.3 Table 18 also provides some considerations when planning restrictions that apply when RAVC exist. The operator should review the provisions.

Table 18: Aircraft ground operations when RAVC exist

Provision	Degree of compliance	References
In determining restrictions to apply when RAVC exist, consider the pilot's ability to taxi, taking into account: • taxiway lighting and markings • the availability, location and characteristics of position and information signs	**Good practice**	ICAO Doc 9476 and ICAO Doc 9830

Provision	Degree of compliance	References
Consider the potential need to limit aerodrome declared capacity and movement rates taking into account items such as the effects of reducing visibility, the physical layout of the aerodrome, supporting/enabling facilities (i.e. signs and lighting) and the availability of ground surveillance systems.	**Good practice**	
Establish defensive measures against runway incursions, such as limiting the choice of taxi-routing, additional procedures and/or radar monitoring, stop bars at runway access/holding points, or other technical means.	**Good practice**	
Establish defensive measures against runway incursions, such as limiting the choice of taxi-routing, additional procedures and/or radar monitoring, stopbars at runway access/holding points, or other technical means.	**Good practice**	

Vehicles and pedestrians

5.2.8.4 The general provisions relating to the on-aerodrome operation of vehicles are detailed in subsection 139.130 of CASR and Chapter 14 of the Part 139 MOS, with useful guidance in Annex 14, Vol I.

5.2.8.5 Further guidance on aerodrome vehicle operations is contained in the ICAO Doc 9476.

5.2.8.6 The general provisions relating to the knowledge and qualification requirements for operators of vehicles are detailed in Chapter 14 of the Part 139 MOS, with useful guidance in Annex 14, Vol I and ICAO Doc 9981.

5.2.8.7 General provisions relating to the control of vehicles and pedestrians on the manoeuvring area are detailed in ICAO Doc 4444.

5.2.8.8 Table 19 to Table 21 outline the general considerations for the entry, operation and control of vehicles and pedestrians.

Table 19: Vehicles and pedestrians on the aerodrome - General provisions

Provision	Degree of compliance	References
If an aerodrome's certificate requires an AGSS, vehicles operating in designated areas must have surveillance equipment meeting the standards specified in the MOS.	**Required**	Paragraph 139.130 (2) (a) of CASR and Part 139 MOS, Chapter 14
If an aerodrome's certificate requires an AGSS, vehicles operating in designated areas must have communications equipment meeting the standards specified in the MOS.	**Required**	Paragraph 139.130 (2) (a) of CASR and Part 139 MOS, Chapter 14
The driver of a vehicle must not operate on the manoeuvring area of a controlled aerodrome without authorisation from the ATC service.	**Required**	Part 139 MOS, Chapter 14

Provision	Degree of compliance	References
Note Authorisation may be in the form of an ATC clearance, or in accordance with an agreement in writing between the aerodrome operator and the ATS provider.		
The driver of a vehicle operating, or intending to operate, on the manoeuvring area of a controlled aerodrome must: • comply with any clearances and instructions issued by an air traffic controller; and • read back to the air traffic controller the safety-related parts of any clearance or instruction which the controller has transmitted by voice.	**Required**	Part 139 MOS, Chapter 14
An airside vehicle operating on a runway strip, a runway, a taxiway strip or a taxiway must be equipped for communications as follows: • for a non-controlled aerodrome or an aerodrome where ATC is not in operation — at least a VHF receiver capable of monitoring the CTAF or ATC frequencies, as applicable. • for a controlled aerodrome where ATC is in operation — a VHF radio capable of two-way communications with ATC. The requirement does not apply if the does not apply to an airside vehicle or equipment if the vehicle or equipment is under escort by another vehicle that is appropriately equipped.	**Required**	Part 139 MOS, Chapter 14
Refer to the European Action Plan for the Prevention of Runway Incursions (EAPPRI) for consideration of those provisions to apply during conditions of reduced aerodrome visibility.	**Good practice**	EAPPRI
If special procedures apply for vehicle operations in low visibility conditions, verify vehicle operator's knowledge of the procedures through periodic checks.	**Good practice**	Annex 14, Vol I
An airside vehicle must be lit if moving or operating: • on the movement area at night • during periods of low visibility.	**Required**	Part 139 MOS, Chapter 14
At an aerodrome that must have an AGSS, vehicles entering or operating on designated areas of the aerodrome must be fitted with a suitable surveillance equipment.	**Required**	Paragraph 139.130 (2) (a) of CASR and Part 139 MOS, Chapter 14
At locations where it is planned that taxi, take-off or landing operations will be permitted in conditions where visual reference is limited by weather conditions, establish and/or provide suitable guidance, equipment and/or procedures to enable and support the provision of rescue and fire fighting services in less than optimum conditions of visibility.	**Recommended**	Annex 14, Vol I
All vehicles allowed onto the manoeuvring areas while RAVC exist equipped with an aerodrome chart permanently displayed in the driver's cab clearly showing all taxiways, runways, holding points and vehicle routes marked with their appropriate designation.	**Good practice**	

Provision	Degree of compliance	References
Provide written instructions clearly detailing the actions to be taken in the event that the vehicle should break down or that the driver should become unsure of their position on the aerodrome.	**Good practice**	
For support of RAVP: Establish a driver education and training programme covering: • the aerodrome layout, the impacts of reduced visibility (orientation on the aerodrome) • special rules or procedures that will apply when reduced visibility occurs • the operation of LVP • the meaning of all markings, signs and aerodrome lighting • where appropriate, standard RTF phraseology.	**Recommended**	ICAO Doc 9981
Ensure drivers are aware of defined boundaries of their approved area(s) of operations under various conditions.	**Recommended**	ICAO Doc 9981
Provide practical training to facilitate visual familiarisation of airside service roads, taxiway crossings and any restrictions during low visibility.	**Good practice**	ICAO Doc 9870
Conduct training of those personnel who are intended to operate on the manoeuvring area during conditions of reduced visibility: • This training may include actual or simulated exercises • conduct this training in close co-ordination with ATC, in order that such personnel may become familiar with the level of assistance which can be provided by ATC.	**Good practice**	

Table 20: Vehicles and pedestrians on the aerodrome - Operations during RAVC

Provision	Degree of compliance	References
Restrict persons and vehicles to the essential minimum.	**Good practice**	Annex 14, Vol I
The aerodrome control tower maintains a record of vehicle and persons operating on the manoeuvring area.	**Good practice**	ICAO Doc 4444

Table 21: Vehicles and pedestrians on the aerodrome – Provisions for LVP

Provision	Degree of compliance	References
Withdraw non-essential vehicles and personnel.	**Required**	Part 139 MOS, Chapter 23
Prior to bringing the LVP Operations Phase into force, the aerodrome control tower establishes a record of vehicles and persons on the manoeuvring area and maintains this while LVP are in force.	**Required**	ICAO Doc 4444, Chapter 7

Provision	Degree of compliance	References
Conduct training of personnel operating on the manoeuvring area during conditions of reduced visibility in close co-ordination with ATC, so that such personnel may become familiar with the level of assistance which can be given by ATC, and other special characteristics of LVP.	**Good practice**	

Aerodrome emergency response

5.2.8.9 When RAVC exist, it is important that the operator establishes and reports the accurate location of aircraft for the benefit of emergency response agencies. Table 22 contains useful information in this regard.

Table 22: Aerodrome emergency response

Provision	Degree of compliance	References
Consider providing a grid map of the aerodrome and its vicinity for the use of the aerodrome services concerned. Information concerning topography, access roads and location of water supplies should be indicated. This map should be conspicuously posted in the control tower and fire station, and available on the rescue and fire fighting vehicles required to respond to an aircraft accident or incident. Copies should also be distributed to public protective agencies as desirable.	**Good practice**	Annex 14, Vol I
Establish strategically located fire stations and/or stand-by positions on the movement area, locations determined to assist preserving emergency response times under various visibility conditions.	**Good practice**	
Consider the desirability at very large or complicated aerodromes of temporarily relocating RFFS vehicles to strategic points while RAVC exist.	**Good practice**	
Provide service roads and emergency access roads with adequate signs and markings which enable drivers to establish their position and route in the lowest visibility conditions in which the aerodrome maintains operations.	**Good practice**	
Aerodrome control agencies use all available aids, including ground surveillance aids (such as surface movement radar where available), to assist emergency response agencies proceed quickly to an emergency site.	**Good practice**	

Apron management services

5.2.8.10 An AMS may be established at an aerodrome to regulate the activities and the movement of aircraft and vehicles on an apron. The safe and effective movement of aircraft and vehicles requires both management and traffic regulation.

5.2.8.11 The demand for traffic regulation will considerably increase in very low visibility where pilots and drivers of vehicles find it difficult to identify their position and routing, and in their ability to avoid

other traffic. Therefore, special procedures should be developed by the unit operating the AMS to manage the movement of aircraft and vehicles on the apron for the lowest visibility conditions under which the aerodrome will maintain operations.

5.2.8.12 The interface between the AMS and ATC is important during LVP. A formal agreement between ATC and the AMS should define the LVP to be used and clearly state the tasks and responsibilities of each party in LVP, in particular including provisions for the movement of vehicles on the apron.

5.2.8.13 Provisions relating to the establishment and provision of AMS are detailed in Annex 14, Vol I.

5.2.8.14 Further guidance on an AMS is available in ICAO Doc 9137 and ICAO Doc 9476.

5.2.8.15 Table 23 contains useful considerations the operator should review in relation to apron management during RAVC and LVP.

Table 23: Apron operations

Provision	Degree of compliance	References
Where low visibility procedures are in effect, restrict persons and vehicles operating on an apron to the essential minimum.	**Recommended**	Annex 14, Vol I
When warranted by the volume of traffic and operating conditions, provide an appropriate apron management service, in order to: • regulate movement with the objective of preventing collisions between aircraft, and between aircraft and objects • regulate entry of aircraft into, and coordinate exit of aircraft from, the apron with the aerodrome control tower; and • ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.	**Recommended**	Annex 14, Vol I
When MET conditions limit visual reference, restrict persons and vehicles operating on an apron to the essential minimum.	**Good practice**	
The unit operating the AMS should develop special procedures to manage the movement of aircraft and vehicles on the apron for the lowest visibility conditions under which the aerodrome will maintain operations.	**Good practice**	
Develop and establish formal arrangements between ATC and the AMS defining the procedures to be used, and clearly stating the tasks and responsibilities of each party when RAVC exist, and/or while LVP are in force (including provisions for the movement of vehicles on the apron).	**Good practice**	

5.3 MET services

5.3.1 The Bureau of Meteorology (BoM) is primarily responsible for both regulating and providing MET services within Australia. Generally, BoM standards comply with the relevant standards in ICAO Annex 3, however, current BoM policy and practices have priority over any conflicting guidance in this section.

5.3.2 The provision of MET observations and forecasts to ATC is fundamental to the successful initiation of the LVP preparation, operations and termination phases.

5.3.3 To recognise the required use of automated MET equipment in conjunction with runways intended for SA CAT II, CAT II and III instrument approach and landing operations the term 'height of cloud base' should be used instead of the generic term 'ceiling'.[5] Within this document, the term 'height of cloud base' is generally used, however there are still references to the term 'ceiling', reflecting the continued use of this term in other documents and contexts.

5.3.4 Table 24 contains general considerations in relation to the provision of meteorological information to support AWO.

Table 24: MET considerations

Provision	Degree of compliance	References
At aerodromes with runways intended for Category II and III instrument approach and landing operations, install automated equipment – as required to support approach and landing and take-off operations – for measuring or assessing, as appropriate, and for monitoring and remote indicating of: • surface wind • visibility • RVR • height of cloud base • air and dew-point temperatures; and • atmospheric pressure. **Note:** As SA CAT II operations require CAT II facilities (except for identified variations); any CAT II MET requirements also apply to SA CAT II.	**Required**	ICAO Annex 3
Where an integrated semi-automatic system is used for the dissemination/display of meteorological information, it should be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.	**Recommended**	ICAO Annex 3
Cloud observations for local routine and special reports representative of the approach area.	**Recommended**	ICAO Annex 3
Cloud observations for aerodrome routine meteorological report (METAR) and aerodrome special meteorological report (SPECI) representative of the aerodrome and its vicinity.	**Recommended**	ICAO Annex 3
For aerodromes with PA runways, sensors for cloud amount and height of cloud base should be sited to give the best practicable indications of the cloud amount and height of cloud base at the middle marker site or at a distance of 900-1200 m from the landing threshold at the approach end of the runway.		ICAO Annex 3
Establish a co-ordination process to: • familiarise MET with the requirements for LVP • provide ATC with forecasts that include the probability of visibility and/or ceiling conditions which may require LVP to	**Good practice**	

[5] Refer to paragraph 4.1.5 of ICAO Annex 3.

Provision	Degree of compliance	References
be undertaken.		

5.3.5 Secondary power supplies

5.3.5.1 A secondary power supply should be provided for all MET equipment. Refer to ICAO Annex 14, Vol I.

5.3.6 RVR

5.3.6.1 Arrangements for observation and reporting RVR are detailed at ICAO Annex 3 and ICAO Doc 9328.

5.3.6.2 The operator needs to review the general considerations for the provision and use of RVR shown in Table 25: RVR considerations.

Table 25: RVR considerations

Provision	Degree of compliance	References
Provide instrumented systems based on transmissometers or forward-scatter meters to assess RVR on runways intended for: • SA CAT I, SA CAT II, CAT II and CAT III instrument approach and landing operations • take-off operations with a visibility less than 350 m.	**Required**	Part 139 MOS, Chapter 23
The RVR system at an aerodrome is authorised for use by the BoM and must be maintained in accordance with the requirements of the equipment manufacturer and the BoM.		
Use the averaging periods defined in ICAO Annex 3.	**Recommended**	ICAO Annex 3
Inform units providing ATS and aeronautical information service for an aerodrome without delay of changes in the serviceability status of the automated equipment used for assessing RVR.		ICAO Annex 3,
Consider instrumented RVR systems based for runways intended for CAT I instrument approach and landing operations.		ICAO Annex 3,
Assess and report RVR/RV for all runways intended for use during periods of reduced visibility. **Note:** This includes PA runways intended for CAT I instrument approach and landing operations and runways used for take-off and having runway edge lights and/or centre line lights.	**Recommended**	ICAO Annex 3

Provision	Degree of compliance	References
Use standard reporting intervals for transmitting RVR on the ATIS: • at locations where the ATIS is recorded manually, update RVR values every 30 minutes, unless the standards in Chapter 4 of Annex 11 require immediate updates • in the case of a deterioration, update RVR/RV values immediately • In the case of an improvement, update RVR/RV values only if the improvement lasts for 10 minutes.	**Good practice**	
For SA CAT I, provide RVR representative of the TDZ.	**Required**	Part 139 MOS, Chapter 23
For SA CAT I, provide RVR representative of the TDZ and MID[6] and END[7] zones.	**Recommended**	
For SA CAT II and CAT II, provide RVR representative of the TDZ and one other zone.	**Required**	Part 139 MOS, Chapter 23
For SA CAT II and CAT II, provide the RVR representative of the TDZ, and MID and END zones.	**Recommended**	
For CAT III Provide the RVR representative of the TDZ, MID and END zones.	**Required**	Part 139 MOS, Chapter 23

5.3.7 RV assessments

5.3.7.1 An aerodrome operator may facilitate RV assessments in lieu of electronic RVR for:

- approach operations with an RV of not less than 800 m
- take-off operations with an RV of not less than 350 m.

Note: Flight operations requirements mandate electronic RVR for CAT I operations with a visibility less than 800 m, approach operations with lower visibility than CAT I and take-off operations with a visibility less than 350 m.

5.3.7.2 Table 20 provides considerations the operator should review in relation to RV assessments.

Table 26: RV assessments

Provision	Degree of compliance	References
If RV is provided, establish a system, including RV assessors, procedures and equipment for using visibility markers or counting runway lights (or both) for assessing runway visibility	**Required**	Part 139 MOS, Chapter 23

[6] Mid-point zone.

[7] Stop-end zone.

Provision	Degree of compliance	References
Provide RV assessments in accordance with the Part 139 MOS.	**Required**	Part 139 MOS, Chapter 23
For landing operations, provide RV assessments for at least the TDZ.	**Recommended**	Part 139 MOS, Chapter 23
For landing operations, provide RV assessments for the MID zone.	**Good practice**	
For take-off operations, provide RV assessments for at least the TDZ and MID zone.	**Recommended**	Part 139 MOS, Chapter 23

5.4 Aeronautical information

5.4.1 Samples of 'AIP entries on LVP' are presented in Appendix A. The general provisions for providing information about AWO are summarised in Table 27. The operator should review these provisions.

Table 27: Aeronautical information provisions

Provision	Degree of compliance	References
Publish the general conditions under which the Low Visibility Procedures applicable to SA CAT I, SA CAT II, CAT II/III operations, if any, are applied.	**Required**	ICAO Doc 10066
When LVP are established at an aerodrome, publish in the AIP a detailed description of the LVP, including: • runways and equipment used under LVP • the defined MET conditions under which initiation, used and termination of LVP would be made • the ground markings and lighting used under LVP.	**Required**	Part 139 MOS, Chapter 5, Division 1
When LVP are established at a heliport, publish in the AIP detailed description of the LVP, including: • touchdown and lift-off (TLOF) area(s) and associated equipment authorised for use under LVP • defined MET conditions under which initiation, use and termination of LVP would be made • description of ground marking/lighting for use under LVP.	**Recommended**	ICAO Doc 10066
Provide detailed information relating to specific aerodromes.	**Recommended**	
Publish standard taxi routes in the AIP/En Route Supplement Australia (ERSA) at AD 2.20 (local traffic regulations).	**Recommended**	ICAO Doc 4444 ICAO Doc 10066
Provide information that is comprehensive enough to avoid the need for additional enquiries from individual operators.	**Recommended**	

Provision	Degree of compliance	References
Where there are a number of aerodromes in a State at which LVP may be carried out, provide a general entry in the AD section.	**Recommended**	
Detail the conditions under which guided take-offs are available.	**Recommended**	
Publish the normal interval of updating the ATIS.	**Recommended**	
The wording of Notice to Airmen (NOTAMs) should provide a full description of each part of the system that is available. This should include a description of any special procedures that will be applied as part of the LVP, together with the trigger point at which they will be implemented by the ATS.	**Recommended**	
In NOTAMs, avoid giving the impression that operations are dependent on the availability of any particular part of the ground system.	**Recommended**	
Aerodrome charts to provide sufficient detail and clarity to enable pilots to navigate around the aerodrome in reduced visibility conditions.	**Good practice**	
Refer to ICAO Doc 4444 for details of the provisions to be specified in relation to operations undertaken while RAVC exist, or when LVP are in force.	**Good practice**	ICAO Doc 4444

5.5 Communications systems - secondary power supply

5.5.1 The specifications for secondary power supply for the ground elements of communications systems are given in ICAO Annex 10, Vol I.

5.6 Non-visual aids

5.6.1 The full text of standards and recommended practices (SARPS) related to non-visual aids at aerodromes appears in ICAO Annex 10, Vol I.

5.6.2 Secondary power supplies

5.6.2.1 The specifications for secondary power supply for radio navigation aids are given in ICAO Annex 10, Vol I.

5.6.3 Operating requirements

5.6.3.1 Guidance material for the protection of the ILS CSA is provided in ICAO Annex 10 Vol I, Attachment C.

5.6.3.2 General matters pertaining to PA aids are summarised in Table 28.

Table 28: Precision approach aids

Provision	Degree of compliance	References
Suppress the identification signal of the localiser whenever the transmissions are not available for operational use (e.g. after removal of navigation components or during maintenance or test transmissions).	**Required**	ICAO Annex 10, Vol I
ILS installations intended to support SA CAT I operations must be a dual-channel facility classified at least I/T/1[8] Otherwise, provided the ILS is certified for CAT I operations to Point C, SA CAT I operations must be limited to HUD-only operations. **Note:** Ground based augmentation system (GBAS) Landing System (GLS) may be substituted for ILS if the accuracy and performance of the GLS is at least the equivalent of a complying ILS installation.	**Required**	Part 171 MOS, Chapter 10
ILS installations intended to support SA CAT II operations must be classified at least II/D/2.	**Required**	Part 171 MOS, Chapter 10
Whenever an ILS is unavailable for use the identification signal should be suppressed.	**Recommended**	ICAO Annex 10, Vol I
When a glide-path signal is transmitted for test or tuning purposes, switch off the associated localiser system.	**Recommended**	
When localiser signal is radiated for test or tuning purposes, switch off the associated glide-path system.	**Recommended**	
When an ILS localiser or glide path signal is being radiated for test or tuning purposes, ATC advises pilots before an approach is commenced.	**Good practice**	
Conduct periodic monitoring of the signal-in-space in order to detect interference.	**Good practice**	
Investigate pilot reports of signal disturbances.	**Good practice**	
Conduct special flight checks when there is reason to believe that serious interference is occurring.	**Good practice**	
Joint ILS/GLS installations: Refer to Chapter 9 – Optimised operations, to assist the development of ATC procedures to support the efficiency of flight and aerodrome operations where mixed ILS and GLS environments exist.	**Good practice**	
For guided take-off operations: protect the ILS localiser CSA for classification III/E/4. Refer to ICAO Annex 10 Vol I for guidance relating to the protection of ILS CSA.	**Required**	ICAO Annex 10, Vol I,
For all PA and landing operations: vehicle or personnel must not be permitted within the relevant ILS critical areas during ILS operations.	**Required**	Part 172 MOS, Chapter 10

[8] For details of the ILS classification system, see ICAO Annex 10 Vol I.

Provision	Degree of compliance	References
Refer to ICAO Annex 10 Vol I for guidance relating to the protection of ILS CSA.		ICAO Annex 10 Vol I
For all PA and landing operations: protect the relevant ILS critical area in relation to aircraft movements if: • the cloud ceiling is at, or below, 600 ft; • or • the visibility is 2000 m or less.	**Required**	Part 172 MOS, Chapter 10
For SA CAT I approach and landing operations: ATC must protect the ILS critical area when the arriving aircraft has passed the outer marker, or if no outer marker is within 4 NM of touchdown.	**Required**	Part 172 MOS, Chapter 10
For SA CAT I approach and landing operations: If required by the ILS classification, ATC must protect the ILS sensitive area when the arriving aircraft is within 2 NM of touchdown.	**Required**	Part 172 MOS, Chapter 10
For SA CAT II, CAT II and CAT III approach and landing operations: ATC must protect the ILS critical area when the arriving aircraft has passed the outer marker, or if no outer marker is within 4 NM of touchdown.	**Required**	Part 172 MOS, Chapter 10
For SA CAT II, CAT II and CAT III approach and landing operations: ATC must protect the ILS sensitive area when the arriving aircraft is within 2 NM of touchdown.	**Required**	Part 172 MOS, Chapter 10
LVP to specify the minimum ILS equipment requirements.	**Recommended**	ICAO Doc 4444
Refer ICAO Doc 4444 for details of the provisions to be specified in relation to operations undertaken while RAVC exist, or when LVP are in force.	**Good practice**	ICAO Doc 4444

5.7 Surveillance systems

5.7.1 The general provisions relating to the provision of SMR are contained in Annex 14, Vol I.

5.7.2 In the absence of visual observation of all or part of the manoeuvring area or to supplement visual observation, SMR, as provided in accordance with the provisions of ICAO Annex 14, Vol I, or other suitable surveillance equipment, may be used to:

- monitor the movement of aircraft and vehicles on the manoeuvring area
- provide directional information to pilots and vehicle drivers as necessary
- provide advice and assistance for the safe and efficient movement of aircraft and vehicles on the manoeuvring area (refer to section 3.10 of ICAO Annex 11).

5.7.3 Information displayed on an SMR display may be used to assist in:

- monitoring of aircraft and vehicles on the manoeuvring area for compliance with clearances and instructions
- determining that a runway is clear of traffic prior to a landing or take-off
- providing information on essential local traffic on or near the manoeuvring area

- determining the location of aircraft and vehicles on the manoeuvring area
- providing directional taxi information to aircraft when requested by the pilot or deemed necessary by the ATC. Except under special circumstances (e.g. emergencies) such information should not be issued in the form of specific heading instructions
- providing assistance and advice to emergency vehicles (refer to ICAO Doc 4444).

5.7.4 At locations where low visibility operations are conducted or ground operations are conducted while RAVC exist, additional surveillance equipment may be established to support these operations.

5.7.5 Ground surveillance systems are not a requirement to support LVP, or to undertake aerodrome ground operations while RAVC exist, but may be provided to maintain the safety of surface movement and flight operations while minimising the reduction of aerodrome capacity that would otherwise be required to preserve safety. The capabilities of any ground surveillance system under consideration will depend on a number of factors, such as:

- MET conditions (including the frequency and duration of prevailing RAVC)
- the volume and characteristics of aircraft expected to use the aerodrome while RAVC exist and/or while LVP are in force
- the complexity of the aerodrome layout.

5.7.6 For aerodromes having a medium or light traffic density and/or a system of well segregated ground movement routes, surface movements may be handled without ground surveillance monitoring.

5.7.7 At aerodromes with heavy traffic density, surveillance of the manoeuvring area may be required.

5.7.8 Table 29 contains general guidance on aerodrome surveillance systems.

Table 29: Aerodrome surveillance systems

Provision	Degree of compliance	References
Provide SMR for the manoeuvring area of aerodromes intended for use when RVR conditions < 350 m.	**Recommended**	Annex 14, Vol I
At aerodromes other than above, provide SMR when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.	**Recommended**	Annex 14, Vol I
At aerodromes where surveillance display systems (SMR or AGSS) are provided, use such systems whenever LVP are in force.	**Good practice**	

5.8 Air traffic services

5.8.1 The Part 172 MOS details the standards for implementing and declaring in force LVP.

5.8.2 Table 30 summarises some general considerations of the role of ATS in supporting AWO.

Table 30: ATS support of AWO

Provision	Degree of compliance	References
Initiate LVP measures whenever conditions are such that all or part of the manoeuvring area cannot be visually monitored from the control tower.	**Required**	Part 172 MOS, Chapter 10

Ensure LVP are fully implemented if the following takes place:
• an instrument approach operation when either:
  ○ the reported cloud ceiling is less than the PA CAT I DH published in the AIP for the runway to be used; or
  ○ the visibility is less than the PA CAT I RVR minimum published in the AIP for the runway to be used
• a take-off operation when the reported visibility or RVR on the runway to be used is less than 550 m.
	Required	Part 172 MOS, Chapter 10

Prior to a LVP coming into force, establish a record of vehicles and persons currently on the manoeuvring area, and maintains this record while the LVP are in force.	**Required**	ICAO Doc 4444
When there is a requirement for traffic to operate on the manoeuvring area in conditions of visibility which prevent the aerodrome control tower from applying visual separation between aircraft, and between aircraft and vehicles, ATC: • applies the longitudinal separation[9] on taxiways as specified for that particular aerodrome • holds aircraft or vehicles operating on taxiways no closer to an intersecting taxiway than the holding position limit defined by a clearance bar, stop bar or taxiway intersection marking.	**Required**	ICAO Doc 4444
Operations taking place when RAVC exist, or which require LVP to be in force, are initiated by or through the aerodrome control tower.	**Required**	ICAO Doc 4444
Tower informs TMA/Approach when LVP will be applied.	**Required**	ICAO Doc 4444
Provisions applicable to operations taking place when RAVC exist, or which require LVP to be in force should specify: • the visibility or RVR value(s) at which the LVOs shall be implemented • the minimum ILS equipment requirements for PA operations • other facilities and aids required for SA CAT I, SA CAT II, CAT II and CAT III operations, including aeronautical ground lights,	**Recommended**	ICAO Doc 4444

[9] After consideration of the circumstances, the ATS provider may establish longitudinal separation on taxiways applicable for each particular aerodrome under these circumstances. This would occur with consideration of the characteristics of the aids available for surveillance and control of ground traffic, the complexity of the aerodrome layout and the characteristics of the aircraft using the aerodrome.

Provision	Degree of compliance	References
which shall be monitored for normal operation • the criteria for and the circumstances under which downgrading of the ILS equipment from SA CAT I, SA CAT II, CAT II and CAT III operations capability shall be made. • the requirement to report any relevant equipment failure and degradation, without delay, to the flight crews concerned, the approach control unit, and any other appropriate organisation • special procedures for the control of traffic on the manoeuvring area, including: ○ the runway-holding positions to be used ○ the minimum distance between an arriving and a departing aircraft to ensure protection of the sensitive and critical areas ○ procedures to verify that aircraft and vehicles have vacated the runway ○ procedures applicable to the separation of aircraft and vehicles ○ applicable spacing between successive approaching aircraft ○ action(s) to be taken in the event LVOs need to be discontinued (e.g. due to equipment failures).		

5.9 Information to pilots

5.9.1 Special attention shall be given to the rapid dissemination of information to pilots through ATIS or RTF (as appropriate) whenever the operating performance of any part of the ground facilities falls below the level at which it has been promulgated (refer to ICAO Annex 11). Further details of the information to be passed can be found in Appendix B. This is particularly important if the MET conditions are such that low visibility landing operations are likely.

5.9.2 The wording of NOTAM or AIP entries should not give the impression that such operations are dependent on the availability of any particular part of the ground system, but should give a full description of each part of the system that is available. This should include a description of any special procedures which will be applied as part of the LVP, together with the trigger point at which they will be implemented by the ATS.

Note: Details of the procedures for LVP are listed in the Part 172 MOS and ICAO Doc 4444.

5.9.3 Where there are a number of aerodromes at which LVP may be carried out, a general entry will be included in the AD section of the AIP in addition to the detailed information relating to specific aerodromes. The description of the LVP should be comprehensive enough to avoid the need for additional enquiries from individual operators. Two samples of ‘AIP entries on LVP’ are shown in Appendix A.

5.9.4 When any part of the system supporting LVP is unserviceable or downgraded, a NOTAM must be issued by the aerodrome operator (provided the failure time complies with the NOTAM issuance requirements). The NOTAM should give a full description of what is unserviceable or downgraded.

5.9.5 The NOTAM must also include any additional measures or restrictions that have been taken in the LVP as a result of the downgrade.

5.9.6 ATIS broadcasts are provided at aerodromes where there is a requirement to reduce the load on RTF communication channels and therefore reduce the workload on both ATCs and pilots. This is particularly beneficial in LVP where additional information about the status of LVP and the aerodrome facilities should be provided. Pilots can receive the information required before they are in RTF contact with approach control units or before start-up. The information provided by ATIS broadcasts in LVP can assist pilots in planning for the approach and, should the need arise, any diversions in a timely manner.

5.9.7 The ATIS should be used as the primary means to report the status of. The exception is for short notice changes which may be passed by RTF.

5.9.8 Information may be passed automatically to ATIS and ATC display systems from other independent systems (e.g. RVR). It is essential that the correct information arrives in a timely manner. Automated systems (e.g. ATIS) should include error checking to ensure that the information provided is accurate and reliable, and that erroneous information is not transmitted to users (pilots and ATC).

5.9.9 In case of failure, a warning should be displayed to ATC who should inform pilots by RTF. The failure of an ATIS system may place considerable burdens on the ATC's requirement to transmit this information to each aircraft and consequently reduce airport traffic capacity. The operator should consider providing backup or duplicate systems to ensure that a failure will not result in a loss of the ATIS broadcast.

5.9.10 Table 31 provides general guidance for the provision of RVR.

Table 31: Provision of RVR information

Provision	Degree of compliance	References
Use standard intervals for reporting the RVR.	**Recommended**	ICAO Annex 3
The RVR should be averaged over a 1 minute interval according to the criteria for the local routine and special reports.	**Recommended**	
The average RVR figure should be broadcast on the ATIS.	**Recommended**	ICAO Annex 11
Unless Annex 11 standards require an immediate update, renew the reported RVR every 30 minutes where the ATIS is recorded manually.	**Recommended**	ICAO Annex 11
Local special reports should be transmitted as soon as specified conditions occur. However, by local agreement, they do not need to be issued in respect of: • any element for which there is in the local ATS unit a display corresponding to the one in the MET station • where arrangements are in force for the use of this display to update information included in local routine and special reports • RVR, when all changes of one or more steps on the reporting scale in use are being reported to the local ATS unit by an observer on the aerodrome	**Recommended**	ICAO Annex 3
When automatic ATIS systems are in use, in order to avoid frequent updates, the ATIS should only be updated when the 1 minute average values reach or pass through the criteria for the issuance of special reports in the aerodrome special meteorological (SPECI) code form. In the case of a deterioration, the RVR values should be updated	**Recommended**	

Provision	Degree of compliance	References
immediately and in the case of an improvement, the RVR values should only be updated if this improvement lasts for 10 minutes.		
The normal interval of updating should be published in the AIP.	**Recommended**	

5.10 Air traffic flow management

5.10.1 Operations, particularly at aerodromes where traffic density is high, may be seriously affected by MET related phenomena resulting in RAVC. In such circumstances, appropriate forecasting and close co-ordination by ATC with MET offices and air traffic flow management (ATFM) is essential to enable any capacity reductions to be implemented in time to be effective. Equally, significant changes and/or termination of these reductions to ensure that the actual ATC traffic load is at the optimum level require similar close co-ordination not only to maintain safety but also to minimise any impact on the aircraft operators in terms of delay.

5.10.2 The provision of MET observations and forecasts to ATC is fundamental to the successful planning of LVP. A co-ordination process should be established to familiarise the relevant MET office with the requirements for LVP and to provide ATC with forecasts that include the probability of visibility and/or height of cloud base conditions, which may require LVP to be undertaken. These forecasts should be regularly reviewed in order to provide updates of the relevant conditions and advance warning of the expected termination of LVP.

5.10.3 Taking into account observations and forecasts from the relevant MET office, ATC must co-ordinate with ATFM to manage the traffic in order to achieve optimum capacity for the aerodrome in the prevailing and expected conditions. The responsible ATS unit, in co-operation with the flow management position (FMP) and the unit providing ATFM services, should determine if ATFM measures are required.

5.10.4 The timing of the implementation of any ATFM measures is also considered critical to ensure a smooth transition from full capacity to the reduced capacity due to LVP, as well as the return to normal operations/capacity.

5.10.5 Given the variable nature of factors that affect visibility, experience has shown that it is often necessary to apply ATFM measures early and with a capacity which should be quite restrictive, but can be increased as conditions stabilise/improve. However, capacity/acceptance rate should be increased only when there is a reasonable assurance that the MET condition will improve. Such decisions should be made in close co-ordination with the relevant MET, ATS and FMP units.

5.10.6 The aircraft operators must strictly comply with any ATFM measures in force, including the provision of accurate aerodrome operating minima for individual flights, when requested. It should not be forgotten that in RAVC, the need to ensure safety is paramount.

5.10.7 Aircraft operators may be subject to an approach ban - that is, an aircraft may not descend below 1 000 ft above aerodrome elevation unless the reported RVR is equal to or better than the approach procedure's controlling RVR minimum. This may have implications for ATFM in that there may be a need to cater for frequent go-arounds and/or extending holding while LVPs are in force.

5.10.8 Where ILS or GLS approach operations are taking place at an aerodrome, the units providing ATFM services may apply enhanced ATFM measures. Details of the aircraft ILS or GLS equipage can be obtained from item 10 of the ICAO Flight Plan Form.

5.10.9 In the event of low visibility at the destination aerodrome, the FMP should consider regulating the traffic within their area of responsibility based upon the reduced capacity of the destination aerodrome and following the principles listed below:

- suspend flights with unknown RVR capability
- delay flights with insufficient RVR capability until the end of the low visibility period
- slot flights with sufficient RVR capability within the low visibility period.

5.10.10 Table 32 provides information about good practice in ATFM during weather conditions that necessitate LVOs.

Table 32: Air traffic flow management during low visibility operations

Provision	Degree of compliance	References
Aerodrome operators, in consultation with local ATS, aircraft operators and other parties, determine the movement rate that they wish to sustain, and develop LVP that will support the desired movement rate. During the process of planning local procedures to be implemented whenever LVP are initiated/terminated ATC, together with their FMP and other concerned aerodrome operational agencies, taking into account the impact LVP have on the capacity of the aerodrome and should determine these capacities for each type of category which may be declared. Consider determining figures for the total capacity, together with the arrival/departure capacities within the total figure.	**Good practice**	

6 Preparing a local AWO plan

6.1 Introduction

6.1.1 Due to the more demanding nature of aerodrome and flight operations during conditions of reduced visibility, restrictions limiting aerodrome operations will normally be required. While this may be acceptable at airports with low traffic density, aerodromes with higher numbers of traffic may need additional means, for example, improved lighting systems or ground surveillance (i.e. SMR or AGSS[10]), to maintain optimal capacity. The development of the AWO plan should consider the operational requirements of the aerodrome, and assess the need for additional measures to achieve the desired capacity while preserving the required level of safety.

6.2 Organisation

6.2.1 To ensure that all ground elements are properly integrated into the total system, the aerodrome operator should convene a working group comprising of representatives from all sections concerned with equipment or services associated with AWO.

6.2.2 The working group engagement should involve, but not be limited to:

- the aerodrome operator
- ATS
- apron management services
- MET services
- the engineering section(s) responsible for establishment and/or maintenance of visual and non-visual aids and power supplies
- rescue and fire fighting services
- airport security
- ground support providers
- major aircraft operators.

6.2.3 The size and organisation of the working group should be adjusted to accommodate changing circumstances. However, adequate involvement of key stakeholders, as determined by the scope of airport operations, should be ensured at all times.

6.2.4 Benefits may be also gained by adopting a ‘total system approach’ to the safety management of AWO. This approach is based on the understanding that individual components of the air navigation system are all part of a single network:

- aircraft operators
- flight crews
- aerodromes
- ATS
- AIS
- MET

[10] Aerodrome Ground Surveillance System.

- CNS providers
- apron management
- ground handlers and vehicle operators
- network management functions, such as ATFM, whether on the ground or in the air.

6.2.5 See Chapter 11 for specific information about safety management during AWO.

6.2.6 The working group should be tasked with ensuring that infrastructure, facilities and equipment, local instructions and inter-agency agreements fulfil legislative and regulatory requirements, as well as any operational or safety requirements that may also be identified. The terms of reference should include, as a minimum:

- the initial establishment of the AWO plan
- the review of any incidents and safety related reports to ensure that the safety and operational objectives of the plan are maintained
- initiating corrective actions when deviations from described standards are detected
- the regular review of the AWO plan and associated provisions contained in the local instructions of various agencies, and maintenance in light of changes to the aerodrome's operating environment.

6.2.7 The group should appoint a coordinator to be responsible for coordinating the whole task. The first priority of the coordinator should be to scope and document the activities needed to establish a program encompassing all issues related to the successful development and establishment of a local AWO plan. The scope should include:

- a timetable for completion of preliminary studies
- the installation and verification of visual and non-visual aids
- other necessary facilities or infrastructure for the development and delivery of procedures and training necessary to ensure safe AWO.

6.2.8 Items for consideration during the initial study of the aerodrome operating environment should include:

- examination of movement statistics for aircraft and vehicles, including:
  - examination of documentation, investigation, and reporting procedures covering movement data, serviceability of equipment and systems (including incidents)
  - evaluation of impact on aerodrome capacity during conditions of reduced visibility on the aerodrome
  - determination of desired movement rates
- evaluation of airport lay-out – paying particular attention to taxi routes between aprons and runways, ground traffic routes, service roads, ground traffic control points, movement area entrances and existing aids
- evaluation of records of runway incursions and taxiway junction incidents
- evaluation of existing airport security measures
- evaluation of marking and equipment of vehicles to be permitted on the movement area during conditions of reduced visibility
- evaluation of the requirements for aeronautical information services, including the need for AIP entries and aeronautical charts necessary to support AWO and communication facilities such as ATIS
- MET elements, such as:

  - examination of documentation, investigation, and reporting procedures covering MET data, serviceability of equipment and systems as well as incidents
  - examination of aeronautical MET records to establish the requirements for additional facilities and services for AWO
  - examination of instrument, measuring and recording equipment and procedures used by MET services
  - establishment of MET limits for variations or discontinuation of aerodrome operations when RAVC exist, or while flight operations that require LVP to be in force are in progress.
- evaluation of the obstacle environment against limitations surfaces determined in accordance with PANS-OPS, and examination of terrain conditions in the final approach areas for impact on radio altimeter indications
- evaluation of requirements for communications between ATC and aircraft, vehicles, rescue and fire fighting services, MET services, engineering support, security, apron control, other ATC units, air traffic flow management and other units/authorities/services affected by AWO
- evaluation of approach, runway and taxiway lighting, runway taxiway and apron markings as well as access control and signage for suitability to support aerodrome operations during periods of RAVC and LVP
- examination of non-visual guidance systems, including:
  - all components of ILS and associated monitoring systems, including calibration records, for the intended type(s) of operation
  - determination of CSA for ILS components.
- examination of surveillance systems for ground movements
- evaluation of instructions to, and recording systems employed by, engineering support services responsible for visual and non-visual aids, MET instrumentation and power supply
- evaluation of existing ATC local instructions and operational Letters of Agreement for suitability for AWO
- evaluation of impact on rescue and fire fighting services' ability to respond in a timely and efficient manner
- evaluation of the effects of de-icing/anti-icing activities, including the use of remote bays, on AWO
- identification of operational requirements for the safe provision of ground support services, such as refuelling, cleaning, maintenance, cargo and baggage handling and catering services
- evaluation of experience and training requirements for operational staff.

6.2.9 This study should be completed as the first stage of the development process. The general picture derived from the study should identify mitigation measures to be established as an integral part of the AWO plan, along with the range of supporting operational policy and procedures for the aerodrome and other agencies. The working group should then start work on developing and establishing the provisions needed to support the safe conduct of AWO.

6.2.10 In determining the aerodrome equipment and facilities established to support pilot situational awareness in conditions of reduced visibility, the working group should emphasise the means (and specifications) necessary to enable the pilot to locate their position (location signs, stopbars) and to follow a defined taxi-route (e.g. selective taxiing centre line lights, guidance signs).

6.2.11 Aerodrome charts should be of sufficient detail and clarity with all relevant items identified for navigational purposes (for example, permanently disused or closed taxiways and roadways, if still in place) to enable pilots to navigate in these conditions. Special attention should also be given to specifying an unacceptable level of deficiencies of the required visual aids, the monitoring criteria including the presentation to the ATC unit, and the action to be taken when the movement rate is being affected.

7 Reduced aerodrome visibility procedures

7.1 Introduction

7.1.1 This chapter provides consolidated guidance specifically related to the development, establishment, and use of RAVP.

7.1.2 Specific RAVP will relate to the relevant visibility condition existing (e.g. Visibility Condition 2 or Visibility Condition 3). Further information regarding the requirements for LVOs can be found in the ICAO Doc 9426, ICAO Doc 9365 and ICAO Doc 9476.

7.1.3 When developing procedures to accommodate ground operations while RAVP exist, consideration should be given to the visibility over the aprons and taxiways. The use of certain procedures (e.g. the use of certain elements of an AGSS or additional visual aids) or the use of other elements of the ground procedures (e.g. the application of low visibility taxi-routes) will be dependent on the visibility conditions.

7.1.4 Additionally, RAVP may be applied to support ground movements even though LVP are not in force, either because the aerodrome does not support operations that require LVP, or these operations are not currently being undertaken.

7.2 Objectives of RAVP

7.2.1 The objectives of RAVP are to:

- protect active runways against incursions by aircraft, vehicular and pedestrian traffic
- support the efficient flow of aircraft, mainly between aircraft stand parking positions and runways, but also between other areas, such as maintenance facilities and de/anti-icing facilities
- reduce the possibility of conflicts between the aircraft, vehicular and pedestrian traffic
- assist ATC and/or apron management staff to maintain situational awareness of the positions of traffic on the manoeuvring area and aprons
- facilitate coordinated action by various agencies, including the aerodrome and aircraft operators, rescue and fire fighting services, vehicle operators and drivers, MET and AIS providers, and ATS.

7.3 RAVP considerations

7.3.1 The general provisions relating to provision, design and characteristics of aerodrome surface movement guidance and control systems are detailed in section 9.8 of ICAO Annex 14, Vol I.

7.3.2 The general provisions relating to operation of vehicles on the aerodrome are detailed in Chapter 14 of the Part 139 MOS and ICAO Annex 14, Vol I.

7.3.3 The general provisions relating to the control of vehicles and pedestrians on the manoeuvring area are detailed in ICAO Doc 4444.

7.3.4 General

7.3.4.1 Before starting to develop the facilities, equipment and procedures necessary to support aerodrome operations in conditions of reduced visibility, the aerodrome operator will need to coordinate with aerodrome stakeholders as described in Chapter 6.

7.3.4.2 If the decision is made to proceed, the stakeholders will need to:

- establish the lowest visibility conditions under which the aerodrome intends to operate
- complete a comprehensive safety and security assessment of the total aerodrome movement area and its operations
- provide any additional and/or more reliable ground aids and equipment
- provide for more comprehensive control of ground traffic
- assess the RFF deployment and response time
- provide appropriate training and qualification of relevant personnel.

7.3.5 Use of facilities and equipment to support ground operations while RAVC exist

7.3.5.1 In RAVC, the ability to visually monitor the manoeuvring area is limited. Without any ground surveillance capability, it is likely that more stringent control techniques and practices will be needed (for example, increased position reporting by pilots). Such changes, combined with decreased situational awareness and unplanned deviations by pilots and vehicles, will result in restrictions to aerodrome capacity.

7.3.5.2 In order to maintain capacity while ensuring safety, it may be appropriate to install a surveillance system. There are significant differences between SMR and AGSS.

7.3.5.3 SMR provides surveillance of the aerodrome with a number of defined limitations.[11] SMR is used to augment visual surveillance, but not to replace it. As a result, it can provide ATCs with improved situational awareness of the traffic situation and potentially contribute to the safety of the operation (for example, by monitoring traffic crossing or vacating the runway prior to issuing a take-off clearance, or landing clearance to a following aircraft).

7.3.5.4 An AGSS is an advanced surface surveillance system which, as part of an aerodrome's Advanced surface movement guidance and control system (A-SMGCS), provides 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. CASA may designate aerodromes or parts of aerodromes at which certain vehicle electronic surveillance equipment and 2-way communication equipment requirements apply. [12]

Note: As described in ICAO Doc 9830, an A-SMGCS is not simply a ground surveillance system, but the sum of a number of different modules (ATC surveillance systems, cockpit avionics, lighting, marking and procedures) that may be applied as appropriate to maximise aerodrome capacity in all weather conditions.

7.3.5.5 Guidance on the use of SMR and AGSS is contained in ICAO Doc 4444, ICAO Doc 9476, ICAO Doc 9830, and Part II of ICAO Doc 9426. Further guidance on the use of SMR and AGSS is provided in Table 33.

7.3.5.6 When an essential component of the surface surveillance equipment is temporarily unserviceable or does not meet the minimum performance or technical requirements, the operational use of the aerodrome should be restricted and, as a consequence, the traffic movement rate may be limited (contingency measures in force). The ATFM unit should be

[11] Refer to ICAO Doc 9476 and ICAO Doc 4444.

[12] See Division 139.B.4 of CASR

advised of any restriction to traffic flow and a new flow rate declared together with the anticipated period of time that the restriction will be in force (where possible).

Table 33: Use of SMR/AGSS

Provision	Degree of compliance	References
In low visibility conditions augment visual observation with an ATS surveillance system (when available).	**Recommended**	ICAO Doc 4444
Use SMR/AGSS to provide surveillance of traffic on those parts of the manoeuvring area which cannot be observed visually.	**Good practice**	ICAO Doc 4444
Use remote cameras to monitor sections of taxiways shadowed by terminal buildings or other aerodrome structures if such obstructions cannot be practically avoided	**Good practice**	ICAO Doc 9157, Part 2
Use the information displayed on an SMR/AGSS display to assist in: • determining the location of aircraft and vehicles on the manoeuvring area • monitoring of aircraft and vehicles on the manoeuvring area for compliance with clearances and instructions • determining that a runway is clear of traffic (aircraft, vehicles or obstructions) prior to a landing or take-off • providing information on essential local traffic on or near the manoeuvring area • providing directional taxi information to pilots or vehicle operators when requested or deemed necessary by the ATC • providing assistance and advice to emergency vehicles.	**Good practice**	ICAO Doc 4444
Aerodrome controllers usually determine the position of aircraft and vehicles on the manoeuvring area by visual observation and/or radio position reports. Within the limitation of the ATS surveillance coverage, the information displayed on an SMR/AGSS display may be used to supplement these existing methods to: • ensure that the departing aircraft is lined up on the correct runway • ensure that the arriving aircraft has vacated the runway • ascertain that the departing aircraft has commenced take-off run • monitor the manoeuvring area and identify optimum taxiing routes that reduce congestion and assist in expediting the flow of traffic during periods of low visibility • confirm a pilot or vehicle operator position report • assist in the timing of landing and take-off clearances in low visibility conditions to maximise runway utilisation • provide detection and guidance information to an aircraft uncertain of its position • assist in detecting runway intrusions • ensure that approving of requested push-back will not conflict with traffic on the manoeuvring area.	**Good practice**	ICAO Doc 9426, Part 2
For the purpose of analysis and to improve overall safety levels, the ATS provider must retain electronic records of all alerts triggered.	**Required**	Part 172 MOS

Provision	Degree of compliance	References
Where an AGSS is used, aircraft and vehicles may be identified by the procedures specified or referred in Part 172 MOS	**Required**	Part 172 MOS

7.3.6 The use of RVR for ground operations

7.3.6.1 The provision of RVR information is intended to support aircraft landing and take-off operations and not aerodrome ground operations when RAVC exist. The term RVR cannot strictly be applied to ground operations, but the basis for these procedures can be described in terms of visibility conditions that correspond to certain RVR values.

7.3.6.2 Since it may not be practical or cost effective to measure the visibility on taxiways, the RVR information from one or more observation positions may be considered to be representative for nearby taxiways. The suitability of RVR sources will depend on local circumstances.

7.3.6.3 At aerodromes where taxi-routes are extensive, the RVR observation positions may not represent the visual reference requirements for particular aircraft ground operations due to large distances and local MET factors. Such factors should be considered when determining the provisions governing ground operations.

Note: In such cases, aerodrome authorities may consider installing additional means of determining ground visibility (for example, forward-scatter meters) at critical areas to support decision making related to the ground operations.

7.3.6.4 The determination of the applicable visibility conditions on an aerodrome will depend on a number of local factors such as the:

- size of the aerodrome
- configuration and layout of the movement area
- siting of the ATC tower in relation to the manoeuvring area and/or the AMS in relation to the aprons
- height of control positions above the aerodrome surface.

7.3.6.5 In some cases, Visibility Condition 2 may be triggered by low cloud when the control tower is in cloud, but visibility on the surface is sufficient for pilots and vehicle drivers to manoeuvre and avoid other traffic. During these circumstances, it is likely that the whole movement area will be in Visibility Condition 2. However, the visibility may gradually decrease and the furthest points of the aerodrome may cease to be visible from the control tower. Therefore only those parts of the movement area not visible from the control tower will be in Visibility Condition 2. Whatever the cause of Visibility Condition 2 or Visibility Condition 3, special procedures that are applied in RAVC may be applied only to those portions of the aerodrome subject to that visibility condition rather than the whole aerodrome.

7.3.7 Determination of the visibility conditions

7.3.7.1 The criteria for determining the transition between visibility conditions at a particular aerodrome should be established by the aerodrome operator in consultation with the ATS provider.

7.3.8 Operations in Visibility Condition 2

7.3.8.1 The measures needed to support operations in Visibility Condition 2 will depend mainly on the:

- dimensions of the aerodrome and the position of the control tower in relationship to the manoeuvring area
- visual aids available to the pilot to determine position and follow the correct route
- equipment available to ATC to:
  - determine and issue correct control instructions and information to the pilot
  - monitor and support correct pilot navigation around the aerodrome and in relationship with other traffic.

7.3.8.2 Pilots can be expected to see and avoid other ground traffic in Visibility Condition 2. ATC should provide pilots and vehicle drivers with instructions and information to enable them to navigate and to avoid other traffic by visual reference. Control instructions and information may be derived from an AGSS, where available (see Table 33). Table 34 provides general advice for operations in Visibility Condition 2.

Table 34: Operations when Visibility Condition 2 exists

Provision	Degree of compliance	References
The ATS provider for each particular aerodrome shall specify the longitudinal separation on taxiways taking into account the characteristics of the aids available for surveillance and control of ground traffic, the complexity of the aerodrome layout and the characteristics of the aircraft using the aerodrome.	**Required**	ICAO Doc 4444

Provision	Degree of compliance	References
Establish procedures specifying: • the ground visibility value(s), or other circumstances, under which these special procedures shall apply • operations when RAVC exist that shall be initiated by or through the aerodrome control tower • that the aerodrome control tower shall, prior to a period of application of RAVP, establish a record of vehicles and persons currently on the manoeuvring area and maintain this record during the period of application of these procedures • that an aircraft or vehicle on a taxiway holds no closer to another taxiway than the holding position limit defined by a clearance bar, stop bar or taxiway intersection marking • the longitudinal separation on taxiways, taking into account the characteristics of the aids available for surveillance and control of ground traffic, the complexity of the aerodrome layout and the characteristics of the aircraft using the aerodrome. • special procedures for the control of traffic on the manoeuvring area, including: ○ the runway-holding positions to be used. ○ procedures to verify that aircraft and vehicles have vacated the runway ○ procedures applicable to the separation of aircraft and vehicles • a requirement to report any relevant equipment failure and degradation, without delay, to the flight crews concerned, the approach control unit, and any other appropriate organisation • action(s) to be taken in the event that equipment failures or other contingencies occur requiring restriction of aircraft movements or aerodrome traffic.	**Recommended**	ICAO Doc 4444
Establish documented procedures for operations in RAVC to: • be clearly defined and published in the instructions for ATC, Apron Control Aerodrome operations departments • ensure coordination with all the parties involved as the visibility deteriorates.	**Good practice**	
Consider establishing restrictions to ground movements, to apply where and when RAVC exists, unless some additional aids (i.e. Ground Surveillance Systems) are available to sustain the desired movement rates while preserving the required safety levels.	**Good practice**	
Establish provisions to: • specify the equipment or other means to be used to monitor aircraft progress and other traffic operating on the manoeuvring area • specify monitoring criteria and deficiencies in visual aids that can be accepted without further affecting the movement rate • specify the reduction in movement rates when unacceptable deficiencies in visual aids and surveillance equipment occurs • restrict access to the manoeuvring area to those vehicles and personnel essential to aerodrome operations • ensure that all movements on the manoeuvring area are subject	**Good practice**	

Provision	Degree of compliance	References
to specific individual clearance (for example, no blanket or 'at own discretion' clearances) • activate defensive measures to protect against runway incursions, for example, reduced visibility taxi routes, reduce the number of runway access or crossing points to be used, and/or the mandatory use of stop-bars (where provided) • ensure that instructions and information provided to pilots and vehicle drivers are sufficient to enable them to navigate and to avoid other relevant traffic by visual reference • stop any temporary works-in- progress on the manoeuvring area • require that work areas be vacated and either be returned to operational condition or clearly marked/lit and notified as unavailable for use.		

7.3.9 Operations in Visibility Condition 3

7.3.9.1 During ground operations in Visibility Condition 3, the visibility is considered insufficient to enable pilots to rely on visual reference to avoid vehicles or other aircraft.

7.3.9.2 To enable the desired movement rates to be sustained, while preserving the required safety levels, additional equipment and procedures may be required.

7.3.9.3 In the event that the same level of equipment and procedures are in place as for Visibility Condition 2, a reduction in the aerodrome capacity should be anticipated and ATFM arrangements are established accordingly.

7.3.9.4 Reports of visibility, such as visual observations by MET observers, or pilot reports from taxiing aircraft (if available) should be considered when deciding to declare Visibility Condition 3 and activate the appropriate procedures.

7.3.9.5 When Visibility Condition 3 exists, ATC clearances and instructions should be formulated and procedural control techniques employed to positively control and resolve conflict for all traffic. This may require the use of techniques such as clearing aircraft to intermediate holding positions until confirmation is received that all other traffic is clear of the intended route. In some cases this may result in traffic restrictions enabling only one aircraft movement at a time. Control instructions and information may be derived from A-SMGCS, where available. Table 35 provides general advice for operations in Visibility Condition 3.

Table 35: Operations when Visibility Condition 3 exists

Provision	Degree of compliance	References
As for Visibility Condition 2, **plus**: • Determine the need for additional provisions to take into account the inability of pilots to avoid other traffic visually • Consider the ability and need for ATC to accept increased responsibility for ground movements, for example to assist in guiding rescue and fire fighting services to the scene of an accident or incident • In the absence of ground surveillance capability suitable for the control of all aircraft and vehicular traffic, consider establishing a single or conflict-free route(s) from apron to	**Good practice**	

Provision	Degree of compliance	References
runway, and runway to apron • Consider closing intermediate taxiway intersections, and using only specific runway holding and entry points, and establishing separate exit taxiway and return route for landings or rejected take-offs • Establish provisions to: ○ where ground surveillance capability permits, increase the provision of traffic information to assist pilot situational awareness ○ implement simplified taxi routes for use in Visibility Condition 3 ○ ensure that conflict free taxi routes, clearances and instructions are used and issued whenever possible ○ exclude the use of 'Conditional Clearances' ○ specify the minimum distance to be maintained between taxiing aircraft ○ clearly identify any additional restrictions to aerodrome capacity and aircraft movement rates, considering both normal surveillance capability and contingency/degraded surveillance modes.		

7.3.10 Operations in Visibility Condition 4

7.3.10.1 Reports of visibility, such as visual observations by MET observers, or pilot reports from taxiing aircraft (if available) should be considered when deciding to declare Visibility Condition 4 and activate the appropriate procedures. Table 36 provides general advice for operations in Visibility Condition 4.

Table 36: Operations when Visibility Condition 4 exists

Provision	Degree of compliance	References
As for Visibility Condition 3, **plus**: • Determine the need additional provisions to take into account the inability of pilots to taxi visually. • Consider using stop-bars, physical barriers or unserviceability markers to close all runway access or crossing points not used during Visibility Condition 4. • Establish provisions to: ○ provide for the use of 'Follow Me' vehicles ○ clearly identify any additional restrictions to aerodrome capacity and aircraft movement rates.	**Good practice**	

8 Low visibility procedures

8.1 Objectives

8.1.1 The objectives of LVP are to:

- protect active runways against incursions by aircraft, vehicular and pedestrian traffic
- facilitate the availability of various support equipment and facilities (for example, RVR equipment and aerodrome lighting) to prescribed levels of availability and redundancy, to support low visibility operations
- preserve the accuracy of radio navigation aids (for example, via protection of ILS CSA)
- support the efficient flow of aircraft, mainly between aprons and runways, but also between other areas, such as maintenance facilities and de/anti-icing facilities.
- reduce the possibility of conflicts between the aircraft, vehicular and pedestrian traffic
- assist ATC and/or apron management staff to maintain situational awareness of the positions of traffic on the manoeuvring area and aprons
- facilitate coordinated action by various agencies, including the aerodrome and aircraft operators, rescue and fire fighting services, vehicle operators and drivers, MET and AIS providers, and ATS
- ensure that accurate and timely information is available to pilots regarding the status of relevant supporting systems, including equipment, facilities, MET conditions and the LVP themselves.

8.2 Initial establishment

8.2.1 Development and establishment of the provisions necessary to achieve these objectives will require the cooperative efforts of many aerodrome stakeholders, including, but not be limited to:

- the ATS provider
- the aerodrome operator
- airport security agencies
- ground support providers and major operators
- technical and engineering section(s) responsible for establishment and/or maintenance of visual and non-visual aids and power supplies
- MET services
- rescue and fire fighting services.

8.2.2 Before starting to develop the facilities, equipment and procedures necessary to support low visibility operations, the aerodrome operator will need to coordinate with aerodrome stakeholders to ascertain the:

- incidence of low visibility conditions
- volume of traffic expected to operate in such conditions
- assessment of current needs and equipment
- justification for such operations
- if the decision is made to proceed, the appropriate authorities will need to:

- establish the worst conditions (lowest visibility/RVR or height of cloud base at which the aerodrome intends to operate)
- complete a comprehensive safety and security assessment of the total aerodrome movement area and its operations
- provide any additional and/or more reliable ground aids and equipment
- provide for more comprehensive control of ground traffic
- provide specific LVP and regulations for implementation by the relevant affected agencies
- assess the RFF deployment and response time
- provide appropriate training and qualification of relevant personnel.

8.2.3 In developing LVP, various factors need to be considered by the operator, including:

- determination of the aircraft flight operations to be supported by LVP
- determination of desired movement rates, and evaluation of impacts on airport capacity while LVP are in force
- evaluation of aerodrome visual aids, existing and potentially required to support low visibility operations (including assessment of aerodrome markings, lighting systems and signs for suitability)
- evaluation and establishment of MET elements existing and potentially required to support low visibility operations:
  - determination of the limits for initiating and terminating LVPs
  - examination of available MET equipment used by MET services
  - evaluate the need to establish the additional meteorological facilities and services for the desired flight operations.
- evaluation of aeronautical information requirements, such as requirements for changes to the AIP, aeronautical charts and AIP entries required to support LVP, and the need for ATIS facilities
- evaluation of requirements for communications between ATC and aircraft, vehicles, rescue and fire fighting services, MET services, engineering support, security, apron control, other ATC units, ATFM and other units/authorities/services affected by LVP
- determination of the non-visual aids to navigation needed to support low visibility operations, particularly all components of ILS and associated monitoring systems
- determination of CSA for ILS glide path and localisers
- evaluation of the support arrangements and requirements for visual and non-visual aids, meteorological instrumentation and power supplies
- evaluation of the suitability of existing, or need for new surveillance systems for ground movements
- evaluation of existing aerodrome access control measures
- evaluation of ground and access restrictions that would be necessary to preserve the safety of aircraft operations while LVP are in force, considering ground support services, such as re-fuelling, cleaning, maintenance, cargo and baggage handling and catering services
- evaluation of the risk of runway incursions, including a review of the history of runway incursions and taxiway conflict incidents (runway hotspots, runway safety team)
- evaluation of aerodrome layout with particular attention to taxi routes between aprons and runways, service roads, access control points, access point to the movement area, and existing control mechanisms

- evaluation of existing ATC and AMS procedures for compatibility with LVP
- evaluation of the suitability of inter-unit Letters of Agreement for supporting LVP
- evaluation of training and competence requirements for operational staff (for example, safety officers, airside drivers, RFFS, maintenance crews, technicians, AMS and ATC)
- evaluation of impact of LVP on rescue and fire fighting services on emergency response times.

8.3 Deployment

8.3.1 Once LVP have been developed and agreed upon by the relevant parties, they must be published in the appropriate local instructions and also in the AIP/ERSA in the AD section. The LVP must then be fully implemented for the affected runway or runways whenever the following types of operations are in progress:

- take-off operations in RVR conditions less than a value of 550 m
- approach and landing operations with minima less than standard CAT I (in other words, SA CAT I, SA CAT II, CAT II and III approach and landing operations).

8.4 Phases

8.4.1 Initiation of the LVP preparation phase is determined by reference to height of cloud base and visibility. Visibility criteria may be based on RVR or MET reported visibility, depending on the equipment available at the aerodrome and the type of operations being conducted. The aerodrome LVP should include the specific MET criteria for the implementation of LVP, and these must be published in the relevant AIP entry.

8.4.2 The transition phases for both the initiation and termination of LVP are, in many ways, the most important from an operational point of view and it is during these phases that some States have found that the most problems may occur. Any confusion or misunderstanding as to the status of LVP may have safety implications and the change in the status of the operations creates additional demands on pilots and ATCs. Careful planning and clear procedures during these phases will reduce the risk of an incident occurring.

8.4.3 Prediction of conditions for initiation and termination of LVP is dependent on specific coordination with MET. The timescale for this coordination will vary according to the type of traffic expected, but for aerodromes handling significant amounts of long-haul traffic this process may have to commence much more than 12 hours in advance. MET forecasts and any subsequent updates are needed in order to plan the introduction of LVP and to determine the optimum traffic capacity for the aerodrome in the expected conditions.

8.4.4 The aerodrome control tower must coordinate with FMP and other ATC units (i.e. Approach Control and Area Control) as required, to determine the maximum traffic acceptance rate. This allows the unit providing ATFM services ample time to allow for the regulation of traffic rates and the efficient introduction of LVP.

8.4.5 LVP preparation phase

8.4.5.1 The LVP preparation phase is initiated by the ATC control tower. This is triggered when the height of the cloud base or ceiling or visibility is below or is forecast to reduce below predetermined values. Because aircraft operators have specific minima, by preference generic values are determined at each aerodrome for triggering LVP preparations and safeguarding activities. The timing of initiating the LVP preparation phase will vary from one aerodrome to another due to various tactical factors such as:

- the amount of lead time needed to prepare the aerodrome and implement safeguarding measures

- the expected rate of weather deterioration
- planned aircraft movements.

8.4.5.2 The intent is that safe-guarding measures will be initiated in time to meet the objective that the procedures and associated safeguarding measures are in force at the latest before the MET conditions fall below CAT I limits or the limits for take-off operations in RVR conditions less than a value of 550 m. The trigger points for initiating the preparation phase must be clearly defined and included in the LVP. It is normally related to specific MET criteria reached in a worsening MET situation. If the weather is deteriorating rapidly, the procedures may be initiated at a higher value of RVR. The precise value will be a matter of judgement based on the previous experience at the aerodrome and the extent of the preparations required. All persons involved with LVP must be informed when this phase is initiated.

8.4.6 LVP operations phase

8.4.6.1 The point at which LVPs are in force must be clearly defined in terms of a specific RVR or height of cloud base and must be promulgated in the LVP. LVP should be in force at the latest when the MET conditions deteriorate below the lower limit of CAT I operations for the particular runway. In the case where only take-off operations are taking place, LVP should be in force at the latest possible time, when the RVR deteriorates below 550 m.

Aircraft spacing requirements

8.4.6.2 A landing aircraft should not stop taxiing until well past the end of the coded taxiway centre line lights. Runway exit points should be kept clear of any aircraft or vehicles to allow landed aircraft to move out of the ILS sensitive area without delay.

8.4.6.3 Instructions to ATCs should state that if a landed aircraft is not entirely clear of the ILS sensitive area then the runway is not usable for SA CAT II, CAT II or CAT III operations (and SA CAT I operations if a critical or sensitive area is provided) even though the obstructing aircraft may well be clear of the runway itself.

8.4.6.4 If an aerodrome surveillance display system (for example, SMR or AGSS) is available, the procedures should require that it should be used to monitor the clearance of the ILS sensitive area. If it is not available, traffic should be directed to leave the runway where there is a positive indication to the pilot that the aircraft is clear of the ILS sensitive area and pilots should be required to report when the entire aircraft is clear of this area.

Note: Wake turbulence separation must always be taken into account.

8.4.6.5 Spacing between aircraft should be varied according to the actual MET and runway conditions at the time. As these conditions deteriorate, pilots will need to taxi more slowly when exiting or crossing the runway and when lining up for take-off. The spacing on final approach should be increased as the MET conditions deteriorate in order to achieve the required objectives.

8.4.6.6 The availability of an adequate surveillance display system (for example, SMR or AGSS) and appropriate procedures will also be a factor in the choice of final approach spacing. This will enable the position of aircraft entering and leaving the runway to be monitored and an adequate level of situational awareness to be maintained. The actual spacing depends upon the configuration and conditions on the runway and the available exit points.

8.4.6.7 The procedures should accommodate the requirement for aircraft to be able to carry out a stabilised approach. Accordingly, they should allow the approaching aircraft to intercept the ILS localiser or GLS approach course at a range of typically 10 NM from touchdown.

Low visibility take-off operations

8.4.6.8 LVP should ensure that the runway is protected against incursions while an aircraft is conducting a take-off operation in RVR conditions less than a value of 550 m. This may be achieved through the use of suitable holding positions (for example, where stopbars are installed). At aerodromes with light traffic this may, in the most restrictive case, be achieved by only allowing one aircraft movement at a time and no vehicle movements.

8.4.6.9 Where the ILS localiser guidance is used for guided take-offs, the ILS localiser CSA should be kept clear while an aircraft is conducting a guided take-off until it has overflown the ILS localiser antenna. A subsequent departing aircraft should not be cleared for take-off until the preceding departure has overflown the ILS localiser antenna. The ILS sensitive area behind the departing aircraft may be infringed (for example, to line up or cross the runway).

ILS operations

8.4.6.10 To ensure that the integrity of the guidance signal radiated by the ILS is maintained during aircraft approaches, the ILS CSA must be protected in accordance with the Part 172 MOS requirements. The following protection measures are required:

- vehicles and personnel must be kept clear of the relevant ILS critical areas during ILS operations
- if the cloud ceiling is at, or below, 600 ft or the visibility is 2 000 m or less, aircraft must be kept clear of the relevant ILS critical area except:
  - if the aircraft enters the critical area in the process of landing or vacating a runway after landing
  - under ATC clearance, provided an approaching aircraft has not passed the ILS outer marker or, if an outer marker is not available, an approaching aircraft is not within 4 NM of the landing runway threshold.

Note: If an aircraft penetrates the critical area, ATC will broadcast an appropriate warning to approaching aircraft in accordance with the Part 172 MOS requirements.

- if the aerodrome supports SA CAT II, CAT II or CAT III operations (and SA CAT I operations if a critical or sensitive area is provided) and weather conditions require such operations, aircraft or vehicles will be kept clear of:
  - the ILS critical area—once an arriving aircraft has passed the ILS outer marker or, if an outer marker is not available, is within 4 NM of the landing runway threshold
  - the ILS sensitive areas—once an arriving aircraft is within 2 NM of the landing runway threshold.

8.4.6.11 These objectives are normally achieved by providing appropriate spacing between successive landing and/or departing aircraft. This may frequently be in excess of the spacing normally used and this may affect the capacity of the aerodrome. To accord with the basic requirements, the spacing specified must provide sufficient separation between successive approaching aircraft, to allow the leading aircraft to land, to vacate the runway, and to clear the ILS sensitive area before the following aircraft reaches a point 2 NM from touchdown. Some States have found that spacing of the order of 10 NM between successive aircraft may be necessary.

8.4.6.12 When departing aircraft are using the same runway as arriving aircraft, it is essential that the aircraft taking off has passed over the ILS localiser antenna before the arriving aircraft reaches a point on the approach where the interference caused by the overflight will have a critical effect. The aim should be for the departing aircraft to pass over the ILS localiser antenna before the arriving aircraft reaches a point 2 NM from touchdown. To achieve this, some States have

implemented procedures to ensure that the departing aircraft must commence its take-off run before the arriving aircraft reaches a point 6 NM from touchdown.

8.4.6.13 Landing clearance should normally be given to an approaching aircraft when the runway and the ILS sensitive area are clear, normally before the time it reaches a point 2 NM from touchdown.

RVR/RV reports

8.4.6.14 ATC must ensure that the current RVR/RV values for the runway in use are passed to pilots of arriving and departing aircraft (refer to ICAO Doc 4444). When multiple values are available, these must always be given in the order of the landing or take-off direction (i.e. TDZ, mid-point and stop-end) (refer to ICAO Doc 4444).

8.4.6.15 When values for three positions are passed, the positions do not need to be identified provided that the values are given in the correct order. However, when only two reports are given, the positions should be identified. If it is not possible for the operator to report the RVR/RV for any reason, the MET visibility should be identified and given instead.

8.4.6.16 If an RV report is given because installed RVR equipment is unserviceable, reports should clearly identify the source of the visibility information.

8.4.6.17 LVP should include the requirements for setting the correct runway light intensity during RVR conditions to ensure that correct RVR values are obtained (refer to ICAO Annex 3).

8.4.6.18 The operator should review the considerations listed in Table 37.

Table 37: Considerations when developing an LVP

Provision	Degree of compliance	References
In conditions where LVP are in force: • restrict persons and vehicles operating on the manoeuvring area of an aerodrome to the essential minimum • protect the ILS sensitive area(s) when SA CAT I (where established), SA CAT II, CAT II or CAT III precision instrument operations are in progress • protect the ILS localiser sensitive areas when guided take-offs are in progress • determine the minimum separation between vehicles and taxiing aircraft taking into account the aids available.	**Required**	Part 172 MOS, and ICAO Annex 11
Establish provisions applicable to the start and continuation of SA CAT I, SA CAT II, CAT II or CAT III operations as well as departure operations in RVR conditions less than a value of 550 m.	**Required**	Part 172 MOS, and ICAO Annex 11
Establish procedures specifying: • LVP initiated by or through the aerodrome control tower • that the aerodrome control tower must inform the approach control unit concerned when procedures for SA CAT I, SA CAT II, CAT II or CAT III operations and low visibility take-off operations are in force or no longer in force • that the aerodrome control tower shall, prior to a period of application of LVP, establish a record of vehicles and persons currently on the manoeuvring area and maintain this record during the period of application of these procedures • the RVR value(s) and height of cloud base values at which LVP	**Required**	ICAO Doc 4444

Provision	Degree of compliance	References
shall be initiated and brought into force • the minimum ILS equipment requirements for SA CAT I, SA CAT II, CAT II or CAT III operations • other facilities and aids required for category II/III operations, including aeronautical ground lights, which shall be monitored for normal operation • the criteria for and the circumstances under which downgrading of the ILS equipment from category II/III operations capability shall be made • the requirement to report any relevant equipment failure and degradation, without delay, to the flight crews concerned, the approach control unit, and any other appropriate organization • special procedures for the control of traffic on the manoeuvring area, including: ○ the runway-holding positions to be used ○ the minimum distance between an arriving and a departing aircraft to ensure protection of the sensitive and critical areas. • procedures to verify that aircraft and vehicles have vacated the runway • procedures applicable to the separation of aircraft and vehicles • applicable spacing between successive approaching aircraft • action(s) to be taken in the event LVOs need to be discontinued, for example, due to equipment failures • any other relevant procedures or requirements.		
Establish provisions specifying: • that the ATIS is updated by adding the 'LVP in force [Runway XX]' message • the requirement to inform the flight crews: • that LVPs are in operation • when LVPs are cancelled.	**Required**	Part 172 MOS
Prior to bringing the LVP operations phase into force, the aerodrome control tower must establish a record of vehicles and persons on the manoeuvring area	**Required**	ICAO Doc 4444
While LVP are in force, the aerodrome control tower maintains a record of vehicles and persons on the manoeuvring area.	**Required**	ICAO Doc 4444
Establish provisions specifying: • the applicable spacing between successive arriving and/or departing aircraft to ensure protection of the sensitive and critical areas • any ATFM measures to be implemented.	**Required**	ICAO Doc 4444
The ATS provider for each particular aerodrome should specify the longitudinal separation on taxiways taking into account the characteristics of the aids available for surveillance and control of ground traffic, the complexity of the aerodrome layout and the characteristics of the aircraft using the aerodrome.	**Required**	ICAO Doc 4444

Provision	Degree of compliance	References
The provision of the equipment on the ground to be supported by detailed procedures covering the use of the equipment and clearly defined responsibilities for those involved in the procedures such as pilots, ATCs, vehicle drivers, apron management personnel and other departments on the aerodrome.	**Good practice**	
In visibility conditions corresponding to RVRs of less than 550 m, use stop bars (where provided).	**Good practice**	ICAO Doc 9365
ATC units should establish fall back procedures covering the failure of essential components of the SMGCS or AGSS.	**Good practice**	
Establish a co-ordination process to familiarise the BoM with the requirements for LVP and to provide ATC with forecasts which include the probability of visibility and/or ceiling conditions which may require LVP to be initiated.	**Good practice**	
Include a description of the responsibilities of the various sections, for example: • the sections responsible for the functioning of the visual and non-visual aids should be informed by ATC when LVP are in force • they immediately advise ATC if the performance of those aids deteriorates below the level promulgated • ATC advises all sections responsible for the implementation of any safeguarding requirements that the LVP prescribe • These sections should then advise ATC when such safeguarding actions are complete • ATC informs all relevant agencies (e.g. rescue and fire fighting, police, apron management) when LVP is brought into force and when they are no longer in force.	**Good practice**	
Include procedures for the termination of LVP to ensure an efficient return to normal operations.	**Good practice**	

8.4.7 LVP termination phase

8.4.7.1 The termination phase will be initiated when the weather conditions improve to the point that LVP are no longer required. Depending on the actual conditions, criteria applied may be different to those that triggered the preparation phase.

8.4.7.2 The termination phase of LVP should be carefully managed in order to ensure a smooth transition back to normal operations. Specific co-ordination with the BoM should include MET forecasts and any subsequent updates with the objective of predicting the conditions for the termination of LVP.

8.4.7.3 Commercial interests of operators mean that they consider it desirable for LVP to be removed as soon as conditions allow, thereby increasing airport capacity and reducing delays. The LVP should include procedures developed for the termination of LVP to ensure an efficient return to normal operations. A common phenomenon of poor visibility is a temporary improvement in visibility, followed by a subsequent reduction in visibility. The removal of LVP before a sustained improvement is evident can result in the need to re- instate the LVP again when the MET conditions deteriorate.

8.4.7.4 When the relevant MET conditions improve and it is expected that LVP are to be withdrawn then co-ordination with the unit providing ATFM services is essential. They should be provided with the expected improvement in flow rates and the time from which this improvement will be achieved.

8.4.7.5 Pilots must be advised of the cancellation of LVP. Where possible, it is of assistance to inform approaching aircraft in advance that LVP will be cancelled at a certain time. This will assist pilots to plan their approaches accordingly, in particular where autoland is involved. For an aircraft that has passed the outer marker, (or equivalent DME[13] position), no changes to the status of LVP should be made. Table 38 provides general advice for terminating LVP that the operator should follow.

Table 38: LVP termination phase

Provision	Degree of compliance	References
Manage the LVP termination phase to ensure a smooth transition back to normal operations.	**Good practice**	
Coordinate with the MET office to obtain and maintain up-to-date forecasts enabling early preparation in anticipation of conditions enabling the termination of LVP.	**Good practice**	
When MET conditions are expected to improve such that LVP will no longer be necessary, coordinate with the unit providing ATFM services; advise the expected improvement in flow rates and the time from which this improvement can be expected.	**Good practice**	
If possible, advise pilots in advance that LVP will be terminated.	**Good practice**	
Once LVP are terminated: • advise pilots immediately (individually if necessary) • update the ATIS by removing the 'LVP in force' message; and • consider that, depending on the conditions at the time, some or all of the manoeuvring area may not be visible to control units, in which case procedures applicable to Visibility Condition 2 may still be applicable.	**Good practice**	

8.5 Application of LVP over large operational areas

8.5.1 LVP generally apply to all the operational areas of an aerodrome, including all runways. However, at certain aerodromes with large geographic areas, MET conditions may vary considerably between different parts of the manoeuvring area. At these aerodromes, there may be a need to consider the possibility that different types of operation could take place on each runway (e.g. CAT I on one runway and CAT III on another runway). This would normally be driven by the need to avoid unnecessary capacity restrictions on a runway where the MET conditions were better than the CAT I minima.

8.5.2 Where requirements exist for different categories of operation on various parts of the aerodrome, considerable care must be taken when establishing the LVP. The safety assessment (see Chapter 11) must consider the whole aerodrome and will depend on local factors such as the physical layout of the aerodrome, the facilities available and environmental

[13] Distance measuring equipment.

issues. The ground movement capacity and the associated SMGCS and AGSS facilities must also be considered to permit any increased movement rate to be handled safely.

8.5.3 The specific requirements for each runway must include the runway protection measures and the protection of the guidance signals of the non-visual aids. Pilots must be aware if LVP are in operation for that runway. The prime objective is to ensure that there is no confusion between the pilot and ATC regarding the category of operation being undertaken and the level of protection in place.

8.6 Autoland operations when LVP are not in force

8.6.1 ILS installations may be subject to signal interference by aircraft and other objects. In order to protect the ILS signal during operations in LVP, the sensitive area is protected to ensure that the accuracy of the ILS signal is maintained.

8.6.2 There are a number of occasions where pilots wish to perform autoland operations when LVP are not in force. These may be for:

- pilot qualification and recency
- operational demonstration
- in-service proving flights
- system verification following maintenance.

8.6.3 Some aircraft operators recommend that their pilots perform autoland operations routinely in order to reduce pilot work load during marginal MET conditions and after long haul flights.

8.6.4 When LVP are not in force, it is possible that aircraft and vehicles may cause disturbance to the ILS signal. This may result in sudden and unexpected flight control movements at a very low altitude or during the landing and rollout when the autopilot attempts to follow the beam bends. As a result pilots are advised to exercise caution during these operations according to the instructions provided in their Operations Manual.

8.6.5 Pilots should inform ATC if they wish to conduct an autoland with protection of the CSA. In this case, ATC must inform the pilot if protection of the ILS sensitive area will or will not be provided. In some States, the hours where practice autolands are permitted are published in the AIP.

8.7 Guided take-off

8.7.1 Some aircraft are equipped with a take-off guidance system that provides directional guidance information to the pilot during the take-off. This operation is referred to as a guided take-off. Whenever an aircraft is conducting a guided take-off, the guidance signal (normally the ILS localiser) must be protected. It is mandatory for the pilot to conduct a guided take-off below 125 m RVR, but a pilot may request to conduct a guided take-off at any time. ATC must then inform the pilot if the guidance signal is or is not protected. The conditions under which guided take-offs are available should be published in the AIP.

9 Optimised operations

9.1 Introduction

9.1.1 The optimised operations concept has been developed to reduce the impact of LVP on runway capacity. It specifically addresses the case of a landing aircraft following a landing aircraft on a runway equipped with a PA landing aid that has a very small sensitive area, or no sensitive area in the vicinity of the runway, and is particularly applicable to GLS.

9.1.2 The capacity of a runway in LVP is limited by a number of factors. Optimised operations addresses two of these factors:

- the location of the CAT II/III holding positions
- the position at which ATC give landing clearance to arriving aircraft.

9.1.3 There are other restrictions on aircraft operations in LVP such as the requirement for departing aircraft to overfly the ILS localiser and slower taxiing speeds, which leads to an increase in runway occupancy time. However, these are outside the scope of the concept and are not discussed in this AC.

9.1.4 The purpose of this chapter is to:

- describe the concept of operation based on the use of a landing clearance line (LCL)
- describe the landing clearance delivery position
- explain the safety arguments to justify the revised concept of operation
- identify the changes to LVP.

9.2 Traditional operating concepts

9.2.1 Traditionally, the utilisation of a runway during low visibility landing operations has been dictated by the location of the runway holding positions and the profile of the OFZ.

9.2.2 Figure 4 and Figure 5 illustrate the potential issues for protecting the OFZ when aircraft of different sizes are taxiing to and from runways. The relevant distances are defined in the Part 139 MOS.

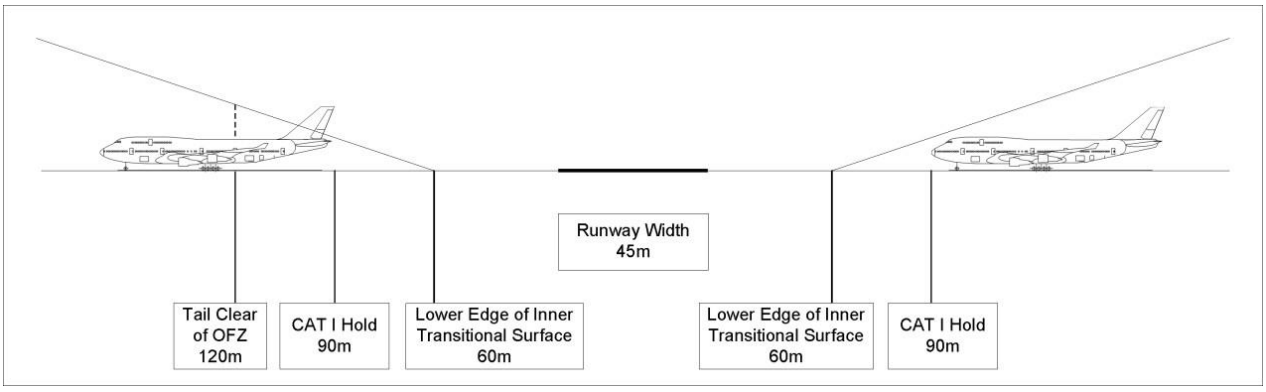


Figure 4: Code E runway (Boeing 747-400)

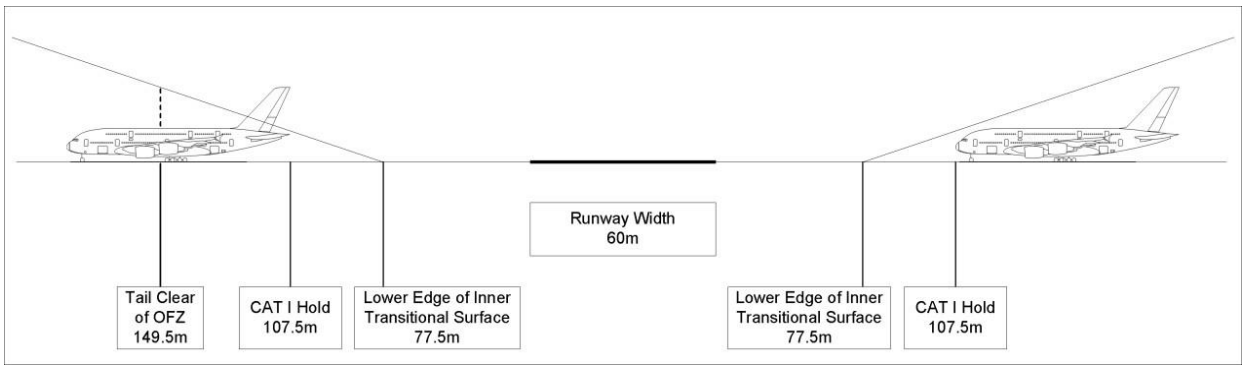


Figure 5: Code F runway (Airbus A380-800)

9.2.3 The rationale for the location of these items can be summarised as follows:

- **Lower edge of the inner transitional surface**—the location at which the OFZ intersects the runway strip.
- **CAT I holding position**—designed to protect the runway and OFZ. It is based on the aircraft holding at an angle of 45° or more in respect of the runway centreline and facing towards the runway. The location is based on a defined nose height and tail height of the largest aircraft using the holding position.
- **the tail of a landing aircraft vacating the runway** can still infringe the OFZ when the entire aircraft is clear of the CAT I holding position. For example, as shown in figures shown above, in order for the tail of the aircraft to fully vacate the OFZ, the tail must be 120 m from the centreline for a B747-400 or 149.5 m from the centreline for an A380.
- **CAT II/III holding position**—the location of the holding position ensures that the holding aircraft does not infringe the CSA of the approach and landing aids (e.g. ILS).

9.2.4 Holding positions are located to protect the CSA of the supporting navigation aids (currently ILS) and the OFZ. To date, for ILS operations, the sensitive areas have generally been larger than the OFZ and by default the OFZ has been protected by the larger ILS sensitive areas.

Note: The CSA is calculated specifically for each runway depending on local factors such as the type of ILS antenna, but is typically in the order of 150 m each side of the runway centreline.

9.2.5 The other factor that limits capacity in LVP is the position at which ATC issue a landing clearance to arriving aircraft. This is normally at 2 NM from touchdown.

9.2.6 Compared to ILS, landing aids such as GLS require smaller or no sensitive areas around the runways. Where the sensitive area is smaller than the OFZ, any potential capacity benefit is limited by the OFZ dimensions. In this case, the potential benefits of new landing aids with a smaller sensitive area may be limited by the need to protect the OFZ.

9.2.7 In traditional CAT II/III operations, issuing landing clearance is based on the preceding landing aircraft being clear of the CSA, at which point ATC issue landing clearance to the following landing aircraft. This is subject to the following aircraft being no closer than 2 NM from the threshold. This in turn defines the final approach spacing between these aircraft, which must be sufficient to allow time for the preceding aircraft to vacate the CSA before the following aircraft reaches 2 NM from touchdown (see Figure 6.).

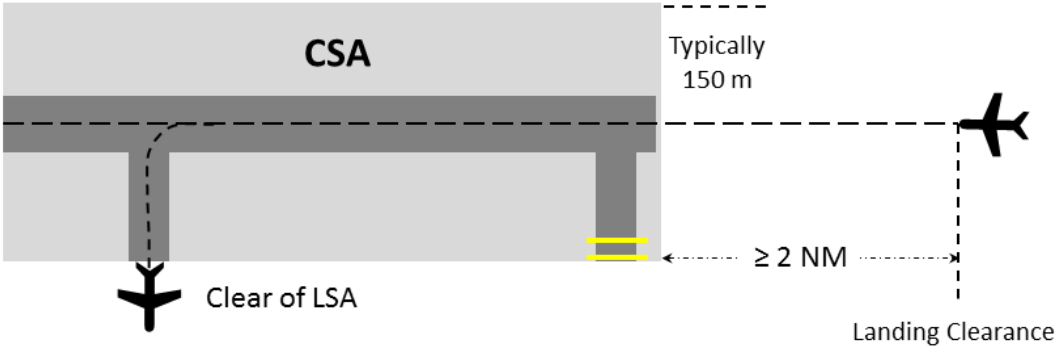


Figure 6: Requirements to give landing clearance in current operations

9.3 Application of optimised operations

9.3.1 The objective of optimised operations is to improve the landing rate during LVP by reducing spacing between aircraft on final approach. The concept is based on use of suitable approach and landing aids. These are generically any landing aid where the sensitive area is significantly smaller than the OFZ (or has no sensitive area around the runway). In theory, this could apply to an ILS system with a very small sensitive area, but in practice applies to GLS.

9.3.2 A key consideration for implementing optimised operations is that there is sufficient demand for aircraft movements, such that the runway capacity in LVP is a limiting factor. Optimised operations could be introduced at any aerodrome equipped with suitable landing aids, but in practice the additional requirements for optimised operations in terms of equipment and ATC training means that the concept is only likely to be adopted by high capacity aerodromes where additional runway capacity is required in LVP.

9.3.3 Optimised operations require the use of an AGSS to determine when the aircraft vacating the runway has passed a defined point on the taxiway, at which point it is safe to give landing clearance to a following aircraft. Optimised operations therefore can only be applied to aerodromes equipped with a minimum of Level 1 A-SMGCS and requires a surveillance system capable of monitoring the position of aircraft on final approach.

9.3.4 Optimised operations define how landing clearance is given to an arriving aircraft following a preceding landing aircraft and so only applies to the arrival/arrival case. It is not applicable to the situation where an arriving aircraft is approaching the runway after a previous departing aircraft.

9.3.5 Optimised operations must be underpinned by a safety assessment that demonstrates the operations can be safely implemented at the particular aerodrome, and that the selected minimum landing clearance point is acceptable to aircraft operators.

9.4 Optimised operations concept

9.4.1 The optimised landing operations involve defining:

- LCLs for the runway
- the latest point at which it is safe to issue a landing clearance to a following aircraft.

9.4.2 LCLs are not marked on the airfield by any signs or markings. They are only displayed on the AGSS to identify to the ATC the point the aircraft vacating the runway must have reached in order to issue landing clearance to a subsequent landing aircraft.

9.4.3 ATC is required to monitor the progress of the landing aircraft on AGSS. Once the landing aircraft is observed to be fully clear of the LCL, the controller issues landing clearance to the following aircraft.

9.4.4 Because the LCL is closer to the runway than current CAT II/III holding points, and the minimum distance for the issuance of landing clearance is closer to the threshold, the final approach spacing between aircraft may be reduced accordingly resulting in an increase in runway capacity.

Note: This minimum spacing must never be less than radar separation minima or wake turbulence separation requirements.

9.4.5 The position of the LCL has been defined based on the following elements:

- If a preceding aircraft is still within the OFZ at the time that a landing clearance is issued to the following aircraft, there may be a potential risk of collision in the case of a missed approach or baulked landing by the following aircraft.
- Once the following aircraft has landed, it may, in some cases, travel behind another aircraft on the taxiway and the LCL must ensure adequate wingtip clearance between the aircraft on the runway and the aircraft on the taxiway.
- If the landing system has a sensitive area on the runway, then the LCL must also protect the sensitive area.

9.4.6 Typically, the LCL will be located at the lower edge of the inner transitional surface (60 m for a Code E runway or 77.5 m for a Code F runway), unless the sensitive area of the landing system is larger.

9.4.7 Due to the higher collision risk within the OFZ close to the runway threshold, the trigger line will normally be ‘tailored’ to ensure that an acceptable collision risk is maintained throughout the length of the runway. This will result in the LCL being further away from the runway for the first 900 m from the threshold. This protects aircraft and vehicles that cross the runway close to the threshold.

9.4.8 In accordance with ICAO Doc 9365, an aircraft manoeuvring on the ground (e.g. when clearing the runway after landing) should be clear of the CSA before an aircraft approaching to land has descended to a height of 60 m (200 ft) above the runway. While a height of 200 ft above the threshold equates to approximately 0.6 NM from touchdown, States using optimised operations apply a value of not less than 1 NM from touchdown. This is the latest point at which the preceding aircraft must have crossed the LCL in the case of any landing system that has an ILS CSA around the runway. Even if the landing system has no CSA around the runway, the preceding aircraft must have cleared the LCL before the following aircraft descends to the height of the OFZ to meet the collision risk requirements. However, in establishing a minimum distance for issue of a landing clearance, it is important that aircraft operators are consulted to ensure the proposed distance is operationally acceptable.

9.4.9 Figure 7 and Figure 8 illustrate typical LCL and landing clearance distance values for Codes F and E runways, respectively.

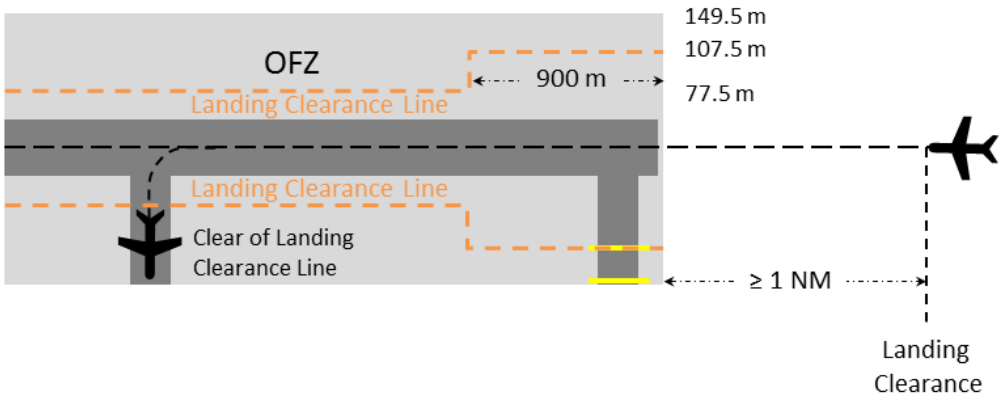


Figure 7: Distances defined for a Code F runway

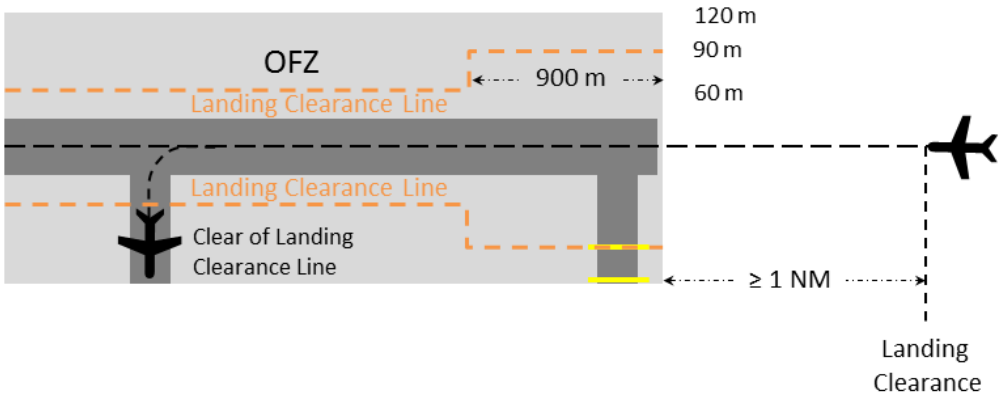


Figure 8: Distances defined for a Code E runway where no new large aircraft (NLA) operate

9.5 Changes to procedures to facilitate optimised operations

9.5.1 In order to implement the optimised operations concept, the following operational changes may be necessary:

- landing clearances will be based on the assessment of the preceding aircraft position in relation to the LCL instead of holding points for landing aircraft vacating the runway and for aircraft/vehicles crossing the runway.
- the location of the LCL will need to be determined on the basis of a number of safety requirements such as:
  - the LCL should be established no closer than 77.5 m from runway centreline on runways where Code F aircraft operate
  - the LCL should be established no closer than 60 m from runway centreline on runways where only Code E and smaller aircraft operate
  - current holding positions as specified in the Part 139 MOS should be used to define the location of the LCL up to a distance of 900 m after the threshold

  - the location of the LCL should lie outside any landing system protection area on the runway (for example, ILS, CSA)
  - the LCL should be displayed on the ATC's Human Machine Interface (HMI) for the AGSS.
- landing clearances to the following aircraft would be based on ensuring that both the following conditions are met:
  - all aircraft/vehicles crossing or vacating the runway are completely clear of the LCL assessed by observation on the AGSS
  - the landing clearance is given to the approaching aircraft before reaching the defined latest landing clearance distance based on observation of a suitable surveillance means.

9.5.2 These are the procedural elements that are necessary in order to deliver the expected capacity benefit. In addition, ATC training and/or familiarisation program may be required.

Note: These changes (the LCL and revised position for the delivery of landing clearance) can be implemented independently and would still deliver some benefit.

10 GBAS landing system

10.1 Introduction

10.1.1 GLS is an augmentation system to a satellite navigation system. GLS provides an enhanced level of service supporting all phases of approach and landing within the systems area of coverage. In particular, the main driver for the installation of GLS will normally be to provide a PA service (CAT I, II, or III). GLS CAT I facilities have been commissioned and development of GLS CAT II/III capability is underway.

10.1.2 GLS is divided into three distinct sub-systems:

- **The satellite constellation**—this provides both the aircraft Global Navigation Satellite System (GNSS) receiver and the GBAS ground station with ranging information. Current developments of GLS use Global Positioning System[14] (GPS) and/or GLONASS[15], and will potentially use other constellations (such as Galileo) in the future.
- **The GBAS ground station**—this monitors the satellite signals, calculates and broadcasts a number of parameters and corrections to improve the accuracy and integrity of the signals. The GBAS ground station also broadcasts the final approach segments (FAS) data that defines the final approach path in space (both laterally and vertically) to enable PA operations.
- **The aircraft receiver**—this receives both the satellite signals and the GBAS datalink signals, supplying navigation output/guidance to both the pilots' displays and to the autopilot.

10.1.3 In the medium term, GLS operations need to be envisaged in a 'mixed equipage' operational scenario (i.e. some aircraft using ILS, some aircraft using GLS). In the long term, GLS may potentially replace ILS.

10.1.4 The benefits of GLS operations compared to ILS operations are listed below:

- **Siting criteria**—contrary to ILS, which may only be installed adjacent to the runway, GLS offers more flexibility in the vicinity of the aerodrome. However, certain siting and signal protection criteria must still be met. The GLS protection area is named Local Object Consideration Area (LOCA). This may still present a challenge at highly congested aerodromes.
- **Multipath**—the need to protect the ILS signal from multi-path effects places restrictions on building developments and aircraft movements. A large localiser sensitive area is required to protect ILS CAT II/III operations. The GBAS ground station must be sited to avoid multipath effects, but this is likely to be less difficult than the requirements for ILS and the GBAS ground station is likely to be situated away from the runway.
- **CSA**—the biggest restriction on runway capacity during ILS CAT II/III operations is normally the CSA. This restriction does not apply to GLS (as the GBAS Ground Station can be located further away from the runway). This setup potentially allows higher movement rates than ILS during LVP. Although it is considered unlikely that rates equivalent to the full CAT I movement rate will be possible in CAT II/III operations due to other considerations such as the need to protect the OFZ and the position at which landing clearance is given. The concept of optimised operations uses this benefit to maximise capacity in LVP at high density aerodromes.

[14] United States.

[15] Global Navigation Satellite System (Russian Federation).

- **False capture or pitch up**—ILS equipment can sometimes generate misleading lateral and vertical guidance, leading to premature turns onto the localiser centreline or sudden pitch up. These phenomena cannot happen with GLS.
- **Single GBAS ground station**—single GBAS ground station can serve multiple runways, potentially reducing the installation and maintenance costs compared to ILS.
- **Flight inspection**—GLS should need significantly less periodic flight inspections than ILS as most of the checks can be realised on the ground. Fewer checks are also required.
- **Enabling all runway ends**—with GLS all runway ends can be enabled simultaneously, allowing a higher flexibility in runway operation at a given aerodrome with single or multiple runways. It is also possible to select and de-select specific approaches according to operational needs. At some airports it has proven beneficial to have multiple glide path angles (such as 3° and 3,2°) active at the same time, to minimize noise for those aircraft able to fly the steeper slope.

10.1.5 GLS is implemented as an 'ILS look-alike' straight in approach. This greatly simplifies the transition phase from other approach aids due to:

- standardisation of PA procedures
- limited requirements for pilot training
- lower cost aircraft architecture implementation
- the certification process is reduced
- changes to ATC procedures and training requirements are minimised.

10.1.6 The differences between ILS and GLS operations are minimised by the use of 'ILS look-alike' approaches, but there are still some significant operational differences:

- the system is dependent on the satellite constellation and GBAS ground station rather than the ground based navaid (ILS)
- one GBAS ground station can serve multiple runways. This has the benefit of providing maximum operational flexibility, however the failure of the GBAS ground station could affect multiple approaches
- for the foreseeable future multiple systems (ILS and GLS) may be providing PA and landing operations for one runway, requiring procedures to support mixed equipage operations
- positioning of the GBAS ground station should ensure that GLS is not sensitive to multipath around the runways, but suitable protection will be required around the GBAS antennae
- different chart terminology and phraseology. A GLS is sometimes called a GBAS approach.

10.1.7 From the ATC point of view, a GLS is considered to be operationally identical to an ILS approach to the same runway. ATC operational procedures are the same, for example, with ATC vectoring the aircraft to intercept the final approach track in the same manner as for ILS. The only differences are that the aircraft is 'cleared GLS approach' and the term 'localiser' is replaced with the term 'final approach course'.

10.1.8 Runway changes may be easier and more efficient due to the ability to broadcast the approaches to all runways. The facility to disable certain selected approaches will be provided where required (e.g. to disable the approach to a closed runway).

10.1.9 There are likely to be changes to LVP to accommodate the mixed equipage operations (ILS and GLS). Particularly if special procedures such as optimised operations are used to maximise capacity.

10.1.10 The position of CAT II/III runway-holding positions may be reviewed. As GLS does not have a critical or sensitive area around the runway, on a GLS only runway, the CAT II/III holding

position may be located closer to the runway (e.g. at the same position as the CAT I holding position).

10.1.11 The size of the OFZ must also be taken into consideration. This is only likely once the ILS has been removed. In the interim period, the ILS CSA is likely to be the factor controlling the location of the CAT II/III holding position.

10.1.12 From the pilot's perspective, the ILS look-alike concept uses similar operational procedures for all landing functions so as to minimise the impact on the crew. The cockpit interface is the same, except that the pilot selects pilot selects a GLS channel number rather than the ILS frequency.

10.2 Mixed equipage operations with more than one approach aid

10.2.1 The introduction of new technology approach and landing aids (including GLS) will, in many cases, be on runways that are already equipped with ILS. Due to the length of time required for fleet equipage or renewal, operations with mixed equipage are likely to be required for a considerable period of time.

10.2.2 Other cases where new technology can provide benefits are at runways where no PA currently exists. GLS can reduce the risk of controlled flight into terrain (CFIT) and may improve the regularity of service with reduced aerodrome operating minima.

10.2.3 Where GLS is introduced, one GBAS ground station may enable new or improved approach and landing operations on more than one runway. For example, with mixed equipage GLS and ILS operations on the primary runway, but with a new GLS approach on a subsidiary runway where previously no approach aid was available, or a lower category of approach was available (for example, NPA on the subsidiary runway upgraded to GLS CAT I).

10.2.4 The upgrading of any runways to a higher approach category will require the full range of facilities (for example,. aerodrome ground lighting) and runway holding positions to be re-assessed based on the new category of operations.

10.2.5 On runways with mixed equipage ILS/GLS operations, the requirements for all the approach aids will need to be considered carefully, in particular the protection requirements for the landing aids, as ILS and GLS may all have different sized CSA (GLS may have none in the vicinity of the runway). In most cases, the most practical solution will be for the runway holding positions to be established to protect the largest areas as these are the most demanding protection requirements. Separate CAT I and CAT II/III holding positions may be required.

10.2.6 When conducting mixed equipage operations the pilot needs to be informed of the status of the approach aids. This information may be provided individually to each aircraft or via ATIS. The pilot should then request the preferred approach aid and the ATC clears the aircraft for this type of approach.

10.2.7 Controllers should be provided with information on the aircraft equipage either automatically (for example, flight plan information displayed on the flight strip or radar data block) or manually via RTF. In cases where an automated system is provided, the actual type of approach being flown should be confirmed by the pilot. The ATC then clears the aircraft for the appropriate type of approach.

10.2.8 At aerodromes that are not capacity limited, the most straightforward mode of operations would be to protect the most restrictive areas regardless of the type of approach being conducted (e.g. to protect the ILS CSA even when aircraft are using GLS). This has the advantage that a single and simplified set of procedures can be applied to all aircraft. The disadvantage is that this may be unnecessarily restrictive and have an impact on runway capacity.

10.2.9 For aerodromes where there is a need to maximise runway capacity in LVP, consideration should be given to the concept of optimised operations (see Chapter 9).

11 Safety management for AWO

11.1 Introduction

11.1.1 Due to the more demanding nature of aerodrome operations conducted in conditions of reduced visibility the safety management of AWO requires special consideration. The complexity of managing these risks to an acceptable level is multiplied because of the interactions associated with the number and diverse range of specialist organisations actively involved in AWO.

11.1.2 This chapter provides guidance on the key elements to be considered in managing the safety risks associated with the conduct of AWO at aerodromes.

11.2 Safety management activities

11.2.1 Risk management activities contributing to the safe conduct of AWO relate primarily, but not exclusively, to:

- aircraft and aerodrome operations
- air traffic management
- the management of vehicle movements on the manoeuvring area and apron.

11.2.2 The successful conduct of AWO relies on close cooperation not only between pilots, ATCs, aerodrome management and vehicle drivers, but with and between many additional supporting or enabling stakeholders, such as:

- the navigation and surveillance domains
- MET service providers
- AIS
- ATFM functions.

11.2.3 The safety management of AWO will involve many stakeholders in addition to air navigation service providers, including:

- CASA
- aerodrome designers and planners
- aerodrome operators
- instrument flight procedures designers
- aircraft operators and pilots
- ground vehicle handling/operating agencies.

11.2.4 Although runway incursions and the associated potential for collisions are considered to be the most significant risks in aerodrome operations, the safety-related objectives of AWO more broadly include, in addition to the protection of the runway(s) in use for take-off and landing against incursions by aircraft, vehicular and pedestrian traffic:

- maintaining the accuracy and integrity of ground-based navigation signals used during specified departure and approach and landing operations
- reducing the possibility of conflicts between the aircraft, vehicular and pedestrian traffic
- assisting ATC and/or apron management staff to maintain situational awareness of the positions of traffic on the manoeuvring area and aprons

- facilitating coordinated action by various agencies, including:
  - aerodrome and aircraft operators
  - rescue and fire fighting services
  - vehicle operators and drivers
  - MET and AIS providers
  - ATS.

11.2.5 Safety management activities supporting AWO must assess and treat hazards that may result in unacceptable certainty that these safety-related objectives can and will be achieved.

11.3 Scope

11.3.1 The effective and efficient safety management of AWO, and specifically of those operations that take place in accordance with published RAVP and LVP, will require the inputs from a diverse range of specialty areas, domains, and stakeholders. To ensure that these inputs are efficiently obtained and managed in order to facilitate balanced and effective outcomes, a coordinated and interdisciplinary approach is necessary.

11.3.2 As a minimum, the key areas represented in the safety management of AWO will be:

- management
- aircraft operators and pilots
- ATC and apron management
- operators and drivers of vehicles operating on the manoeuvring area
- other personnel who operate on or near the runway.

11.3.3 Other stakeholders may also need to be involved from time to time, including:

- AIS/AIM
- MET
- those agencies responsible for aerodrome perimeter security
- agencies responsible for communications, navigation and surveillance facilities and services associated with the operations on the aerodrome movement area, or with take-off and departure and approach and landing operations.

11.3.4 The scope of safety management activities is not constrained to an assessment of the conduct of AWO for compliance with legislative/regulatory requirements or the relevant ICAO SARPs, but includes continuous monitoring and regular assessment of actual ‘in use’ safety performance. Specifically reviewing the effectiveness of those operational rules and procedures that result from the implementation of remedial actions that are determined to be necessary to maintain the agreed safety performance.

11.3.5 The ‘effectiveness’ of the operating rule set is determined by defined objectives of the RAVP and LVP. The fundamental questions are:

- Are these objectives achieved to a level that is acceptably safe?
- If not, then why not?
- What needs to be done to rectify the situation?

11.3.6 This activity takes place not only in a retrospective context reviewing past performance and ‘what went wrong’ but, of critical importance, with a forward looking stance, proactively assessing ‘what can go wrong’.

11.3.7 It is intended that in addition to lessons arising from investigations into air safety occurrences, proactive safety management of AWO will result in:

- improved awareness of potential safety hazards connected with various roles, functions and activities
- proposed solutions to eliminate or mitigate identified potential hazards, before they can adversely affect operational outcomes and objectives
- identification of changes that can be made to reduce the likelihood of an air traffic incident resulting in injury to persons or property damage.

11.4 Frameworks for safety management in AWO

11.4.1 It is important for all the ground components of the system that supports and conducts AWO (for example, aerodromes, procedure design, navigation aids, ATC, rescue and fire fighting) operate under a safety management system. The same applies to commercial aircraft operators as they are the main flying participants in AWO.

11.4.2 The CASR Parts relevant to LVP and LVO have clear obligations in relation to managing operations under a safety management system (SMS). From an international perspective, ICAO Annex 19 provides a SMS framework for international aviation.

11.4.3 To support Annex 19 and other SARPs, ICAO has published ICAO Document 9859 with the aim to harmonise SMS implemented in the aviation sector.

11.4.4 In addition to these generic frameworks, it has been recognised that a key defence in preventing collisions between aircraft during take-off and landing, is minimising the likelihood of runway incursions. The following publications are also relevant in fulfilling the safety-related objectives associated with AWO:

- ICAO Doc 9870
- EAPPRI.

11.5 Approach to managing the safety risks of AWO

11.5.1 It is important that effective interface arrangements are established between all parties involved in AWO. It is also essential that roles and responsibilities for the various elements within the AWO plan and framework, and for the associated safety management activities, are clearly defined and allocated (despite any organisational differences).

11.5.2 In addition to the institutional and inter-organisational arrangements identified above, all organisations or agencies involved in AWO should ensure that:

- all personnel are aware of the potential safety risks connected with their duties (safety awareness)
- the lessons arising from safety occurrence investigations and other safety activities are disseminated within the organisation at management and operational levels (lesson dissemination)
- all personnel are actively encouraged to identify any safety issues in their operational area, and to propose solutions to identified hazards
- changes are made to improve safety where they appear needed (safety improvement).

11.5.3 There may be direct benefits in utilising existing inter-organisational groups that are already working towards the safety of aerodrome operations (i.e. local runway safety teams) when establishing and conducting activities supporting the safety management of AWO.

11.5.4 Benefits may be also gained by adopting a 'total system approach' to the safety management of AWO.

11.5.5 The total system approach seeks to eliminate risks arising from safety gaps or overlaps, and to avoid conflicting requirements and confused responsibilities. By adopting a total system approach, benefits may also be achieved through a common shared understanding that the objective is to reduce the overall systemic risk, in preference to simply reducing the risk for, to, or of an individual sub-element of the air traffic management functional system (such as ATC) via the transfer of that risk to another sub-element (such as to the air crew).

11.6 Key activities

11.6.1 There are a number of fundamental activities that reflect good practice to be considered as the basis for any framework established for managing the safety risks associated with AWO.

11.6.2 An aerodrome planning to conduct or undertaking AWO should undertake the following risk management activities:

- **Establish** a common AWO safety risk management *policy* (including the mandate and commitment of the various parties), agreed by those parties involved in the safety management of AWO at that location, addressing:
  - commonly shared or visible terminology for the management of the safety risks of AWO
  - roles and responsibilities
  - risk criteria
  - an AWO safety risk management plan, addressing such things as:
    - » frequency of meetings and reviews, or other activities
    - » identification of events that would trigger special activities, for example, extra-ordinary meetings or reviews due to incidents/accidents, or due to the change of the AWO risk profile beyond acceptable limits.
- **Establish** a safety risk management *process*, including:
  - establishing the operational context by baselining the existing or proposed AWO operational environment
  - risk assessment by identification, analysis, and evaluation
  - risk mitigation
  - communication and consultation
  - monitoring and review.
- **Maintain** the local AWO *risk profile* (Risk Register)
- **Undertake** the development and *continuous improvement* of the safety risk management policy, process and profile:
  - designing and implementing a safety risk management framework
  - monitoring and reviewing the safety risk management framework
  - continual improvement, including, for example, maintaining the operational *context* and *risk profile* in light of changing circumstances, and incremental refinement of the management plan, vocabulary, roles and responsibilities, risk criteria, monitoring and review activities, communication and consultation activities in accordance with evolving understanding and needs.

11.7 Sources of hazards to be considered

11.7.1 The following factors listed in the ICAO Doc 9859 are examples of common hazard sources in aviation, and may usefully be considered in assessing the hazards and risks associated with AWO:

- design factors, including equipment and task design
- procedures and operating practices, including their documentation and checklists, and their validation under actual operating conditions
- communications, including the medium, terminology and language
- personnel factors, such as company policies for recruitment, training, remuneration and allocation of resources
- organisational factors, such as the compatibility of production and safety goals, the allocation of resources, operating pressures and the corporate safety culture
- work environment factors, such as ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing
- regulatory oversight factors, including the applicability and enforceability of regulations, the certification of equipment, personnel and procedures, and the adequacy of oversight
- defences, including such factors as the provision of adequate detection and warning systems, the error tolerance of equipment and the resilience of equipment to errors and failures
- human performance, restricted to medical conditions and physical limitations.

11.7.2 In addition, a number of factors specific to AWO will need to be considered. These include:

- probability of runway incursions, taking into account the ability of vehicles and aircraft to navigate in reduced visibility, including the records of previous runway incursions
- suitability of existing and/or planned future RAVP and LVP
- consideration of the aerodrome layout, taxiway and apron routings and runway entrances and exits
- consideration of MET records and aerodrome movement statistics
- suitability of airport security measures
- size and protection requirements for the CSA of the approach and landing aids
- protection of the OFZ
- suitability of the SMGCS and AGSS.

Appendix A
AIP examples - Samples of AIP entries on LVP

SAMPLE 1 and SAMPLE 2 are sample generic AIP entries for large and small aerodromes respectively to assist in the preparation of local AIP entries.

A.1 Sample 1

EZZZ AD 2.20 Local Traffic Regulations

Low Visibility Procedures

1. **Runways and associated equipment**

1.1 Runways 08 and 26 are equipped with ILS and support CAT III operations, including guided take-off. Runway 21 is equipped with ILS and supports CAT II operations. Runway 03 is equipped with ILS and supports CAT I operations.

2. **Criteria for the initiation and termination of LVP**

2.1 The preparation phase will be implemented when visibility falls below 1 200 m and/or height of cloud base is at or below 300 ft and CAT II/III operations are expected.

2.2 The operations phase will be commenced when the RVR falls to 550 m or the height of cloud base is below 200 ft.

2.3 LVP will be terminated when RVR is greater than 550 m and height of cloud base is greater than 200 ft and a continuing improvement in these conditions is anticipated.

3. **Description of ground marking and lighting**

3.1 Runway exits for Runways 08 and 26 are equipped with green/yellow coded taxiway centre line lights.

3.2 Aircraft landing on Runway 21 must only exit via the SOUTH taxiway where white flashing lights indicate the boundary of the ILS localiser sensitive area.

4. **Description of LVP**

4.1 Pilots will be informed by ATIS or RTF when LVP are in operation.

4.2 Pilots must request an ILS on first contact with EZZZ Approach.

4.3 Aircraft will be vectored to intercept the ILS at least 10 NM from touchdown.

4.4 The ILS localiser sensitive area will be protected when an ILS landing aircraft is within 2 NM from touchdown. ATC will provide suitable spacing between aircraft on final approach to achieve this objective. It is anticipated that for CAT II operations this spacing will be in the order of 6 NM and for CAT III operations this spacing will be in the order of 8 NM. Spacing in front of an aircraft conducting a GLS approach will be in the order of 5 NM.

4.5 Guided take-off may be conducted on Runways 08 and 26. Whenever LVP are in operation the ILS CSA will be protected for all departing aircraft.

4.6 Departing aircraft are required to use the following CAT II and CAT III holding positions:

- Runway 08 – D2 (CAT III)

- Runway 26 – A3 or B3 (CAT III)
- Runway 21 – E2 (CAT II)

4.7 Intersection take-offs are not permitted.

4.8 Taxiing is restricted to taxiways equipped with centre line lights as indicated on the aerodrome chart. On receiving taxi clearance aircraft must only proceed when a green centre line path is illuminated. In the event of failure of the taxiway lights or stopbars, aircraft are only to taxi on the direction of a 'follow me' vehicle.

4.9 Aircraft taxiing for departure on Runway 26 must use Taxiway Bravo to avoid infringing the ILS sensitive area.

4.10 Restrictions on traffic flow

The following hourly traffic rates are anticipated in LVP:

- RVR 550 m to 350 m = 15 arrivals/12 departures.
- RVR less than 350 m = 12 or less arrivals/10 or less departures.

It is expected that these figures will increase according to the proportion of GLS equipped aircraft.

4.11 Multiple use of both Runway 21 and Runway 26 is not permitted in LVP. ATC will designate the runway in use according to the prevailing wind and RVR conditions.

A.2 Sample 2

EXXX AD 2.20 Local Traffic Regulations

Low Visibility Procedures

1. **Runways and associated equipment**

1.1 Runway 24 supports departure operations in RVR conditions less than a value of 550 m.

2. **Criteria for the initiation and termination of LVP**

2.1 LVP operations will be provided when requested by an aircraft operator to conduct departure operations in RVR conditions less than a value of 550 m. This request should be made a minimum of

30 minutes in advance to permit the appropriate preparations by the aerodrome authority.

3. **Description of ground marking and lighting**

3.1 Entry and exit to Runway 24 is only permitted via Taxiway Alpha.

4. **Description of LVP**

Aircraft and vehicle movements will be restricted to one aircraft movement at a time while departure operations in RVR conditions less than a value of 550 m are conducted in order to ensure protection of the runway.

Aircraft movements on the apron must only be carried out with the direction of a marshaller.

4.1 Use the holding position for Runway 24 on Taxiway Alpha.

4.2 Taxiing is normally restricted to one aircraft movement at a time. Operation of vehicles on the manoeuvring area is not permitted when departure operations in RVR conditions less than a value of 550 m are in progress. The only taxiway available is Taxiway Alpha to the threshold of Runway 24. This taxiway is equipped with green taxiway centre line lights.

Appendix B
Equipment failure tables - Equipment failures to be reported, low visibility take-off operations and ILS approach and landing operations

B.1 Introduction

B.1.1 Under normal circumstances, the appropriate facilities should be provided according to the operations being carried out at the aerodrome. The following paragraphs describe the effect on these operations of failures of the ground equipment. It should not be interpreted as meaning that multiple failures are acceptable or that any part of the ground equipment need not be provided. As a general rule, it is expected that every effort should be made to keep the period of non-availability of the failed equipment to an absolute minimum. CASA may define the maximum acceptable length of time any failure may be permitted, taking into account the effect on safety and any mitigation means available.

B.1.2 Should the performance of any visual or non-visual aid deteriorate below the level promulgated, ATC must inform pilots immediately. This information must also be passed to the approach control unit. Additionally, it should be reported to any other appropriate organisation and these deficiencies should be published by NOTAM.

B.1.3 It is important that the information passed by ATC to pilots is clear and unambiguous. In order to meet the needs of the pilots in determining the effect of the failure on the operation, ATC should report the failure in terms of the category of operations which the ILS/GLS can support (CAT I, II or III). As a general rule, a change in the category of operations which the ILS/GLS can support (CAT I, II or III), and changes in the status of the aerodrome lighting, ancillary equipment and the RVR assessment equipment, shall be reported to the pilot.

B.2 Effects of approach and landing aid deficiencies

B.2.1 It is recognised that the ILS/GLS classification published in the AIP is of a long-term nature; nevertheless, on a day to day basis due to different causes (e.g. equipment defects, environmental effects), the ILS/GLS status may be impaired. With regard to equipment failure, two situations can exist: long-term or short-term deficiencies.

B.3 Long-term deficiencies

B.3.1 In the case of long-term ILS/GLS deficiencies, as for example environmental effects causing deterioration of the localiser or glide path course structure, the ILS classification can change and the reduced category of operations which the ILS can support shall be published, e.g. by NOTAM.

B.4 Short-term deficiencies

B.4.1 It is an absolute necessity to avoid any misunderstanding by the pilot in the case of a reduced category of operations which the ILS/GLS can support. Aerodrome control towers and units providing approach control service shall be provided without delay with information on the operational status of radio navigation aids essential for approach, landing and take-off at the aerodrome(s) with which they are concerned. For that reason, it is necessary to present clear information to the ATC on the maximum category of operation which the ILS/GLS can support. In order to provide this information to the ATC, it is recommended that an automatic system is used in order to avoid ATC overload and to facilitate a clear and unambiguous report to the pilot. Therefore, this system should provide an alert to the ATC for any downgrading of the category of operations which the ILS/GLS can support. It is also essential to report failure of the lighting systems.

B.4.2 In order to assist in determining the category of operations that can be supported in the case of the failure of a component of the ILS/GLS system, or a failure of the visual aids, MET equipment and ancillary systems, two tables have been developed to indicate the effect of any failure on the category of operation, as presented in the tables in this Appendix.

B.4.3 The purpose of these tables is to provide ATC and aerodrome operators with information on the items which need to be reported to pilots in case of a failure or downgrading in accordance with paragraphs B.1.2 and B.1.3.

B.4.4 The consequences of equipment failures for flight operations are dependent upon the operational regulations for the individual operator. This is presented in the right hand column of the tables. It should be noted that combinations of failures are only acceptable where specifically authorised in flight operations rules.

Table 1: Equipment failure to be reported – low visibility take-off operations

System considered	Failure to be reported on RTF by ATC[16]	Expected effect on flight operations
ILS (Where used for guided take-off)	ILS localiser downgraded to CAT II, CAT I ILS out of service[17]	No take-off guidance. Guided Take-Off not permitted
RVR	Touchdown RVR system unserviceable	Restriction depending on the aircraft operator's approval. The touchdown RVR may be replaced by pilot assessment or, for take-offs with visibility/RVR ≥ 350 m, by Runway Visibility (RV) assessments
RVR	(Other) RVR systems unserviceable	Restriction depending on the aircraft operator's approval. For take-offs with visibility/RVR ≥ 350 m, RVR can be replaced by RV assessment
Lighting systems	Runway lighting unserviceable	Restriction depending on the aircraft operator's approval.

[16] Also to be reported on ATIS as appropriate (see section 5.9).

[17] This may be caused by the failure of a component of the complete ILS (e.g. failure of the localizer/Azimuth or failure of the status monitoring equipment)

System considered	Failure to be reported on RTF by ATC[16]	Expected effect on flight operations
	Standby power supply unserviceable[18]	No effect
	Runway centre line lighting unserviceable[19]	Restriction depending on the aircraft operator's approval.
	Runway edge lighting unserviceable[19]	Restriction depending on the aircraft operator's approval.
	Taxiway lighting system unserviceable[19]	No effect except delays due to reduced movement rate
Ancillary	Stop bars unserviceable	No effect if runway protection is ensured by other means
	Ceilometer unserviceable	No effect
	Anemometer unserviceable	No effect if other sources available otherwise restriction depending on flight operation rules

Table 2: Equipment failure to be reported - approach and landing operations

System considered	Failure to be reported on RTF by ATC[20]	Expected effect on flight operations
ILS/GLS	ILS/GLS downgraded	Flight operations limited to type of approach supported by the resulting facility classification
	ILS/GLS out of service[21]	Restricted to NPA (or other PA aid if available)
	Outer Marker unserviceable	No limitation if replaced by published equivalent position, otherwise restricted to NPA
	Glide path out of service	Restricted to NPA (e.g. localiser only)
DME	DME (as alternative to marker beacons) unserviceable	No limitation if replaced by published equivalent position, otherwise restricted to NPA

[18] Generally, a single standby power supply is provided for all lighting systems.

[19] When a portion of the lighting system is unserviceable, then this should be reported as a percentage when evenly distributed and the lighting pattern is not distorted (e.g. if 1 in 4 lights is unserviceable the '25% of runway centreline unserviceable') or otherwise the failure should be described in full.

[20] Also to be reported on ATIS as appropriate (see section 5.9).

[21] This may be caused by the failure of a component of the complete ILS system (e.g. failure of the localiser/Azimuth or failure of the status monitoring equipment).

System considered	Failure to be reported on RTF by ATC[20]	Expected effect on flight operations
RVR	Touchdown RVR system unserviceable	Restriction depending on the aircraft operator's approval.
	(Other) RVR systems unserviceable	Restriction depending on the aircraft operator's approval.
Lighting systems	Approach lighting unserviceable[22]	Restriction depending on the aircraft operator's approval.
	Runway lighting unserviceable	
	Runway centre line lighting unserviceable[22]	Restriction depending on the aircraft operator's approval.
	Runway edge lighting unserviceable[22]	
	Touch Down Zone lighting unserviceable[22]	
	Taxiway lighting system unserviceable	No effect except delays due to reduced movement rate
	Standby power supply unserviceable[23]	No effect
Ancillary	Stop bars unserviceable	No effect if runway protection is ensured by other means
	Ceilometer unserviceable	No effect
	Anemometer unserviceable	No effect if other sources available otherwise restriction depending on flight operation rules

[22] When a portion of the lighting system is unserviceable, then this should be reported as a percentage when evenly distributed and pattern is not distorted (e.g. if 1 in 4 lights is unserviceable the *'25% of runway centreline unserviceable'*) or otherwise the failure should be described in full.

[23] Generally, a single standby power supply is provided for all lighting systems.

Appendix C
Examples of AWO checklists

C.1 Introduction

C.1.1 This Appendix contains example checklists used by some European States to assist ATCs with the efficient and harmonised implementation of Visibility Condition 2 and LVP. These checklists should not be considered as definitive. The specific operational requirements of each aerodrome will be different. As part of the process for the establishment and safety assessment of the procedures, each item in the checklist should be considered for applicability and implementation at the particular aerodrome.

C.2 Example ATC checklist

C.2.1 The following checklists are used by ENAV – the Italian air navigation service provider. They provide a general framework for checklists intended to support Tower personnel while applying AWO. The templates are not exhaustive on the subject, and are intended to be adapted in local circumstances. All actions must be clearly defined and assigned so as to avoid any doubt as to responsibility, and to avoid task overlapping.

C.2.2 They will be laminated and available in each TWR position (i.e. Supervisor, ADC, Ground Control, and Clearance Delivery).

C.2.3 General requirements for a checklist:

- not a summary of published AWO
- concise and easily readable
- contains appropriate actions for both LVP phases and Visibility Condition 2.

Table 1: Checklist for supervisors

Action stage	Supervisor
Preparation	In accordance with MET actual conditions and forecasts
	Inform Airport Operator
	Inform technical maintenance to check required systems
	Inform Supervisor Approach. Request FMP to issue appropriate restrictions
	Inform MET personnel
	Check serviceability of airport equipment (e.g. though status monitors)
	Await for acknowledgement by all stakeholders
Activation	In accordance with MET actual conditions and forecasts
	Inform Airport Operator, MET personnel, technical maintenance Inform Supervisor Approach , require appropriate separations Request FMP to issue appropriate restrictions

Action stage	Supervisor
	Check Airport Ground Lighting (stopbars on)
	Notify TWR ATCs of the current ILS operations category
	Insert appropriate messages in ATIS; advise aircraft by RTF
	Monitor MET forecasts and reports for possible alternate aerodromes
	Note in supervisor logbook: time of activation
CAT III	Initiate any special local requirements (e.g. relocation of Aerodrome Rescue and Fire Fighting Services)
Deactivation	In accordance with MET actual conditions and forecasts
	Inform Supervisor Approach, Airport Operator, MET personnel, technical maintenance
	Cancel messages in ATIS; advise aircraft by RTF as required
	Note in supervisor logbook time of deactivation
Cancellation	In accordance with MET actual conditions and forecasts
	Inform supervisor Approach , Airport Operator, MET personnel, technical maintenance
	Cancel ATIS message
	Ask FMP to revise/cancel traffic restrictions
	Note in supervisor logbook time of cancellation
Visibility condition 2	Inform Airport Operator and pilots
	Stop-bars on
	Note in supervisor logbook

Table 2: Checklist for controllers

Action stage	ATCs (may be divided according to available positions)
Preparation	Advise supervisor of actual MET conditions
	Remove unnecessary personnel and vehicles from the manoeuvring area
	Keep record of personnel/vehicles inside manoeuvring area
	Check serviceability of airport equipment (e.g. though status monitors)
Activation CAT II - III	Inform supervisor of actual MET conditions

Action stage	ATCs (may be divided according to available positions)
	Wait for supervisor approval for ILS CAT II/III operations
	Check AGL (Airport/Aerodrome Ground Lighting): Runway Stopbars are on
	Protect ILS sensitive areas
	Inform pilots and vehicle drivers of LVP activation (if no ATIS available)
	Clear departing traffic to CAT II/III holding position
	Check ‘sensitive area vacated’ report by arriving traffic
	Apply appropriate ground movement routings
	Apply appropriate separation between departing/arriving traffic
	Suspend conditional clearances
	Report devices failure and/or degradation to pilots and supervisor
CAT III	Initiate any special local requirements (e.g. relocation of Aerodrome Rescue and Fire Fighting Services)
Deactivation	Inform supervisor of actual MET conditions
	Report deactivation to aircraft and vehicles
Visibility condition 2	Inform supervisor
	Clear manoeuvring area of unnecessary personnel and vehicles
	Keep record of personnel/vehicles operating on the manoeuvring area
	Suspend conditional clearances
	Inform pilots and vehicle drivers about TWR visibility limitations on manoeuvring area
	Ensure stopbars are ON
	Apply appropriate ground movement routings
	Maintain situational awareness

C.3 Checklist used as Milan Linate airport

C.3.1 Figure 10b shows example checklists from Milan Linate Airport.

AWO short checklist — **TWR Supervisor** — SMR 1 and/or SMR 2 ON

AIP AIRAC 9/11 dated 20 Oct 2011 - Attachment P1 -A3

VIS 2 CONDITIONS

Capacity: 16 ARR / hr - Spacing on FNL: 8nm

Apron Management	**Inform Duty Manager**
ACC	**Inform / Request appropriate spacing**
FMP	**Advise anticipated traffic restrictions**
SPVR logbook	**Note timing**
RWY Stopbars TWYs T & G (to prevent RWY incursion)	Check: ON
Conditional Clearances	Suspended
Vehicles on manoeuvring area	Only as necessary / Strip

TWR SPVR checklist ***VIS 2 conditions*** COMPLETED

LVP PREPARATION

RVR TDZ <800m or height of cloud base =200ft

TAM TAM. (Alerting system)	**Set**
ACC	**Request appropriate spacing**
FMP	**Request implement required traffic restrictions**
Technical Department	**Inform**
Aerodrome Equipment	**Check & monitor serviceability status**
Vehicles on manoeuvring area	Only as necessary / Strip
Traffic situation	Inform pilots & drivers
Visibility Conditions	Evaluate/Activate → checklists

TWR SPVR checklist ***LVP Preparation*** COMPLETED

LVP ACTIVATION

RVR TDZ ≤550m or height of cloud base <200ft

CAT II: RVR TDZ <550m CAT III: RVR TDZ <300m

TAM TAM. (Alerting system)	**Set**
TWR GND COO	**Report activation**
APP / ACC	**Request appropriate spacing**
Technical Maintenance	**Inform**
Airport Reporting Officer	**Inform**
FMP	**Request implement traffic flow restrictions**
ATIS	**Insert message**
AGL	Set to MAX intensity
RWY Stopbars: TWYs T & G (to protect sensitive areas)	Check: ON
SPVR logbook	Note timing
Equipment status monitors	Monitor continuously
RVR TDZ <550m	ATIS 'CAT II IN PROGRESS'
RVR TDZ or MID or END <400m	VIS 3 CONDITIONS checklist
RVR TDZ <300m	ATIS "CAT III IN PROGRESS"

TWR SPVR checklist ***LVP ACTIVATION*** COMPLETED

VIS 3 CONDITIONS

RVR (TDZ or MID or END) <400m

Capacity: 10 ARR / hr - Spacing on FNL: 16nm

Apron Management	**Inform Duty Manager**
APP / ACC	**Request appropriate spacing**
FMP	**Request traffic restrictions**
Manoeuvring area movement	1 a/c per IHP
Apron North movement	"FOLLOW ME" vehicle AVBL

TWR SPVR checklist ***VIS 3 conditions*** COMPLETED

LVP DEACTIVATION/CANCELLATION

Deactivation: RVR TDZ >550m and height of cloud base =200ft

Cancellation: RVR TDZ >800m and height of cloud base >200ft

TAM TAM. (Alerting system)	**'LVP DELETED'**
Preparation LVP	**Evaluate → Checklist**
VIS conditions	**Evaluate → Checklist**
APP / ACC	**Appropriate spacing**
FMP	**Appropriate flow restrictions**
TWR GND COO	Report Deactivation/Cancellation
ATIS	Cancel message
SPVR logbook	Note timing

TWR SPVR checklist ***LVP Deactivation/Cancellation*** COMPLETED

AWO short checklist — **TWR ATCO** — SMR 1 and/or SMR 2 ON

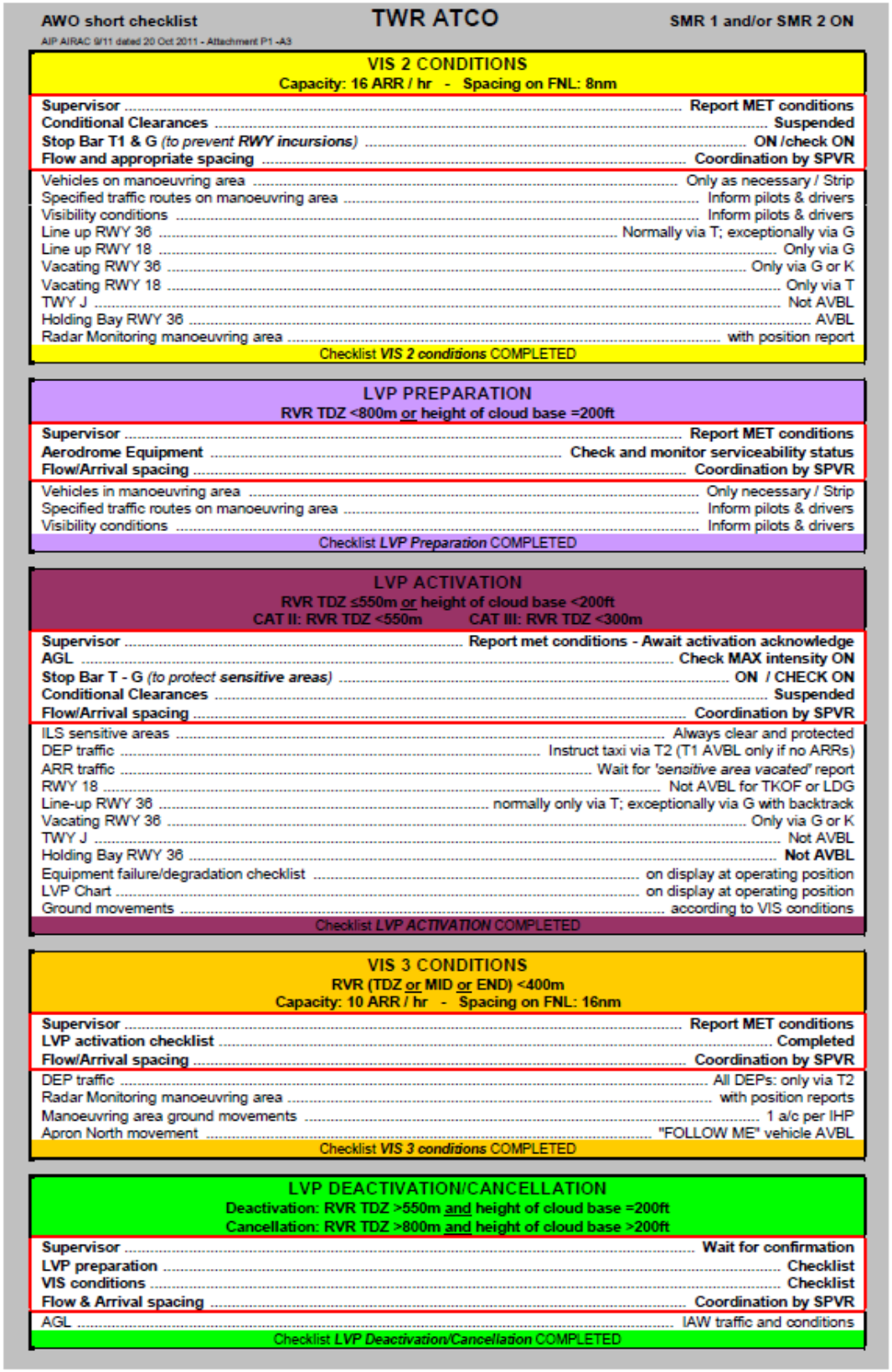
AIP AIRAC 9/11 dated 20 Oct 2011 - Attachment P1 -A3

VIS 2 CONDITIONS

Capacity: 16 ARR / hr - Spacing on FNL: 8nm

Supervisor	**Report MET conditions**
Conditional Clearances	**Suspended**
Stop Bar T1 & G *(to prevent RWY incursions)*	**ON/check ON**

Figure 9a: Example checklists from Milan Linate Airport



AWO short checklist — **TWR ATCO** — **SMR 1 and/or SMR 2 ON**

AIP AIRAC 9/11 dated 20 Oct 2011 - Attachment P1 -A3

VIS 2 CONDITIONS
Capacity: 16 ARR / hr - Spacing on FNL: 8nm

Supervisor	**Report MET conditions**
Conditional Clearances	**Suspended**
Stop Bar T1 & G *(to prevent **RWY incursions**)*	**ON /check ON**
Flow and appropriate spacing	**Coordination by SPVR**
Vehicles on manoeuvring area	Only as necessary / Strip
Specified traffic routes on manoeuvring area	Inform pilots & drivers
Visibility conditions	Inform pilots & drivers
Line up RWY 36	Normally via T; exceptionally via G
Line up RWY 18	Only via G
Vacating RWY 36	Only via G or K
Vacating RWY 18	Only via T
TWY J	Not AVBL
Holding Bay RWY 36	AVBL
Radar Monitoring manoeuvring area	with position report

Checklist ***VIS 2 conditions*** COMPLETED

LVP PREPARATION
RVR TDZ <800m or height of cloud base =200ft

Supervisor	**Report MET conditions**
Aerodrome Equipment	**Check and monitor serviceability status**
Flow/Arrival spacing	**Coordination by SPVR**
Vehicles in manoeuvring area	Only necessary / Strip
Specified traffic routes on manoeuvring area	Inform pilots & drivers
Visibility conditions	Inform pilots & drivers

Checklist ***LVP Preparation*** COMPLETED

LVP ACTIVATION
RVR TDZ ≤550m or height of cloud base <200ft
CAT II: RVR TDZ <550m CAT III: RVR TDZ <300m

Supervisor	**Report met conditions - Await activation acknowledge**
AGL	**Check MAX intensity ON**
Stop Bar T - G *(to protect **sensitive areas**)*	**ON / CHECK ON**
Conditional Clearances	**Suspended**
Flow/Arrival spacing	**Coordination by SPVR**
ILS sensitive areas	Always clear and protected
DEP traffic	Instruct taxi via T2 (T1 AVBL only if no ARRs)
ARR traffic	Wait for *'sensitive area vacated'* report
RWY 18	Not AVBL for TKOF or LDG
Line-up RWY 36	normally only via T; exceptionally via G with backtrack
Vacating RWY 36	Only via G or K
TWY J	Not AVBL
Holding Bay RWY 36	**Not AVBL**
Equipment failure/degradation checklist	on display at operating position
LVP Chart	on display at operating position
Ground movements	according to VIS conditions

Checklist ***LVP ACTIVATION*** COMPLETED

VIS 3 CONDITIONS
RVR (TDZ or MID or END) <400m
Capacity: 10 ARR / hr - Spacing on FNL: 16nm

Supervisor	**Report MET conditions**
LVP activation checklist	**Completed**
Flow/Arrival spacing	**Coordination by SPVR**
DEP traffic	All DEPs: only via T2
Radar Monitoring manoeuvring area	with position reports
Manoeuvring area ground movements	1 a/c per IHP
Apron North movement	"FOLLOW ME" vehicle AVBL

Checklist ***VIS 3 conditions*** COMPLETED

LVP DEACTIVATION/CANCELLATION
Deactivation: RVR TDZ >550m and height of cloud base =200ft
Cancellation: RVR TDZ >800m and height of cloud base >200ft

Supervisor	**Wait for confirmation**
LVP preparation	**Checklist**
VIS conditions	**Checklist**
Flow & Arrival spacing	**Coordination by SPVR**
AGL	IAW traffic and conditions

Checklist ***LVP Deactivation/Cancellation*** COMPLETED

Figure 10b: Example checklists from Milan Linate Airport