INTERNATIONAL CIVIL AVIATION ORGANIZATION

SECOND MEETING OF WATER AERODROME SMALL WORKING GROUP (WASWG/2)

Colombo, Sri Lanka, 29 February to 2 March 2016

Agenda Item 4: Discuss draft water aerodrome standards

GUIDELINES FOR AEROPLANE LANDING AREAS

(Presented by Australia)

SUMMARY

This Information Paper presents the Guidelines for Aeroplane Landing Areas which includes the requirements for float plane operations.

CIVIL AVIATION AUTHORITY

CIVIL AVIATION ADVISORY PUBLICATION

Date: July 1992 No: 92-1(1)

SUBJECT: GUIDELINES FOR AEROPLANE LANDING AREAS

IMPORTANT

The information in this publication is advisory only. There is no legal requirement to observe the details set out in this publication. The Civil Aviation Regulations set out the legal requirements that must be complied with in relation to the subject matter of this publication. There may be a number of ways of ensuring that the requirements of the Civil Aviation Regulations are met. This publication sets out methods that may be used and which experience has shown should, in the majority of cases, ensure compliance with the Regulations. However, before using the information in this publication the user should always read the Civil Aviation Regulations listed in the reference section below to ensure that he or she complies with the legal obligations of the Regulations.

PURPOSE

Civil Aviation Regulation 92 (1) states that: “An aircraft shall not land at, or take-off from, any place unless: ...(d) the place....is suitable for use as an aerodrome for the purposes of the landing and taking-off of aircraft; and, having regard to all the circumstances of the proposed landing or take-off (including the prevailing weather conditions), the aircraft can land at, or take-off from, the place in safety.”

Regulation 92 (1) does not specify the method of determining which “circumstances”, other than the prevailing weather conditions, should be considered in any particular case. These matters are the responsibility of the pilot in command and, in some circumstances, are shared with the aircraft operator.

These guidelines set out factors that may be used to determine the suitability of a place for the landing and taking-off of aeroplanes. Experience has shown that, in most cases, application of these guidelines will enable a take-off or landing to be completed safely, provided that the pilot in command:

(a) has sound piloting skills; and

(b) displays sound airmanship.

CANCELLATION

This is the second issue of CAAP 92-1, and supersedes CAAP 92-1(0).

REFERENCES

This publication should be read in conjunction with: Civil Aviation Regulations 92 (1), 93, 233 and 235; Civil Aviation Orders; and the Aeronautical Information Publication.

HOW TO OBTAIN COPIES OF THIS PUBLICATION

Copies of this publication may be obtained from:

Civil Aviation Authority Publications Centre
607 Swanston Street
Carlton
Victoria 3053

Telephone (008) 331676
(008) 334191
(03) 342 2000

CONTENTS

1 Definitions p 2

2 Conversion table p 2
3 Which aircraft may use a landing area? p 2
4 Which types of operations may be conducted from a landing area? p 2
5 Recommended minimum physical characteristics of landing areas and water alighting areas p 3
6 Marking of landing areas p 4
7 Lighting for night operations p 4
8 Other factors that should be considered prior to using a landing area p 4
9 Surface testing of a landing area p 5

1 - DEFINITIONS

1. In these guidelines, unless the contrary is stated:

"clearway" means an area in which there are no obstacles penetrating a slope of 2.5% rising from the end of the runway over a width of 45m;

"float plane" means any aeroplane designed for landing or taking-off from water;

"fly-over area" means a portion of ground adjacent to the runway strip which is free of tree stumps, large rocks or stones, fencing, wire and any other obstacles above ground but may include ditches or drains below ground level;

"landing area" (LA) means an area of ground suitable for the conduct of take-off and landing and associated aeroplane operations under specific conditions;

"lateral transitional slope" means a desirable area around all LA's which provides greater lateral clearance in the take-off and landing area and may reduce wind-shear when the runway is situated near tall objects such as trees and buildings. The dimensions of a suitable lateral transitional slope are shown in the following diagram;

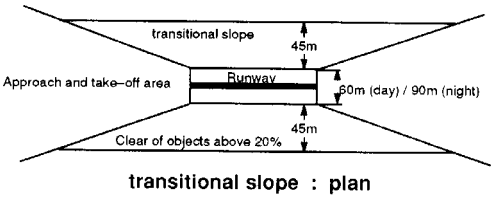

Figure 1 - Transitional Slope

"obstacle free area" means there should be no wires or any other form of obstacles above the approach and take-off areas, runways, runway strips, fly-over areas or water channels;

"runway" means that portion of the landing area which is intended to be used for the landing or take-off of aeroplanes;

"runway strip" means a portion of ground between the runway and fly-over area which is in a condition that ensures minimal damage to an aeroplane which may run off a runway during take-off or landing;

"water alighting area" means a suitable stretch of water for the landing or taking-off of a float plane under specific conditions.

2 - CONVERSION TABLE

2. Landing area gradients and splays expressed as a percentage, in accordance with ICAO practice, may be converted into ratios or angles using the following table:

Percentage	Ratios	Degrees & Minutes
1	1:100	0 34'
2	1:50	1 09'
2.5	1:40	1 26'
2.86	1:35	1 38'
3	1:33.3	1 43'
3.33	1:30	1 55'
5	1:20	2 52'
12.5	1:8	7 08'
20	1:5	11 18'

3 - WHICH AIRCRAFT MAY USE A LANDING AREA?

3. Use of landing areas other than aerodromes is not recommended for aircraft with a MTOW greater than 5700 kg.

4 - WHICH TYPES OF OPERATIONS MAY BE CONDUCTED FROM A LANDING AREA?

4. Aeroplanes engaged in the following operations may use a landing area:

(a) private;

(b) aerial work—excluding student solo flying and student dual flying prior to successful completion of the General Flying Progress Test; and

(c) charter.

5 - RECOMMENDED MINIMUM PHYSICAL CHARACTERISTICS OF LANDING AREAS AND WATER ALIGHTING AREAS

5.1 **Runway Width**. For other than agricultural operations, a minimum width of 15 metres is recommended although aeroplanes with a MTOW below 2000kg can be operated safely on runways as narrow as 10 metres provided there is no or only light cross-wind. For agricultural operations, a 10 metre wide runway is the recommended minimum.

5.2 **Runway Length**. For other than agricultural operations by day, a runway length equal to or greater than that specified in the aeroplane's flight manual or approved performance charts or certificate of airworthiness, for the prevailing conditions is required (increasing the length by an additional 15% is recommended when unfactored data is used). For agricultural day operations, the minimum runway length is the greater of 75% of the take-off distance specified in the aeroplane's flight manual or approved performance chart for the prevailing conditions with the balance as clearway or the landing distance so specified.

5.3 **Longitudinal Slope**. The longitudinal slope between the runway ends should not exceed 2%, except that 2.86% is acceptable on part of the runway so long as the change of slope is gradual. For agricultural operations, the slope should not exceed 12.5% for day and 2% for night operations: where the overall slope exceeds 2% the runway should only be used for one-way operations — downhill for take-off and uphill for landing.

5.4 **Transverse Slope**. The transverse slope between the extreme edges of the runway strip should not exceed 2.5% or 12.5% upward slope over the fly-over area. For agricultural day operations, the transverse slope should not be more than 3% over the runway and 5% over the runway strip.

5.5 **Other Physical Characteristics**. Both ends of a runway, not intended solely for agricultural operations, should have approach and take-off areas clear of objects above a 5% slope for day and a 3.3% slope for night operations. Other recommended landing area physical characteristics are shown on the following diagrams:

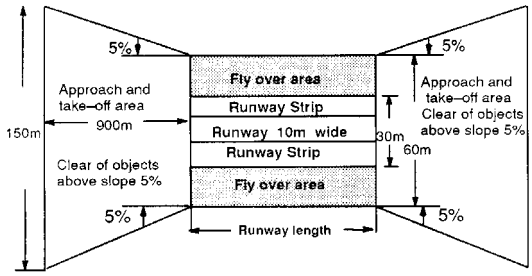

Figure 2A - Single engined and Centre-Line Thrust Aeroplanes not exceeding 2000 kg MTOW (day operations)

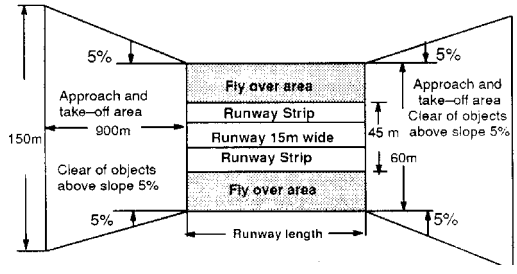

Figure 2B - Other Aeroplanes (day operations)

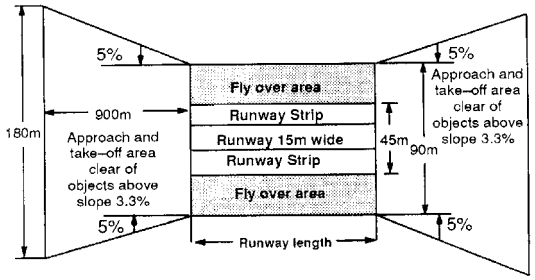

Figure 3 - Dimensions (night operations)

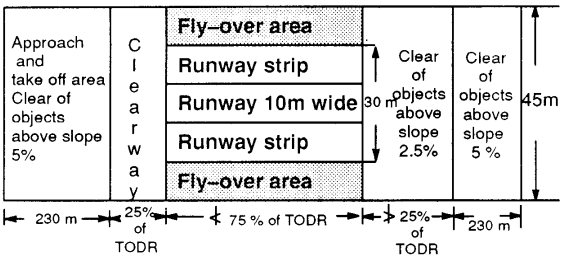

Figure 4 - Dimensions - agricultural day operations

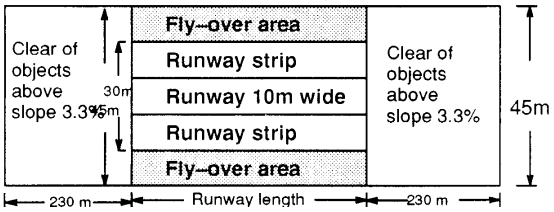

Figure 5 - Dimensions - agriculture night operations

5.6 **Float plane alighting areas**. For water operations, a minimum width water channel of 60 metres for day operations and 90 metres for night operations is recommended. The depth of water over the whole water channel should not be less than 0.3 metres below the hull or floats when the aeroplane is stationary and loaded to maximum take-off weight. An additional area, as shown in the following diagrams, provides a protective buffer for the water channel but need not consist of water. Where the additional area consists of water then it should be clear of moving objects or vessels under way. The centre line of a water channel may be curved, provided that the approach and take-off areas are calculated from the anticipated point of touchdown or lift-off.

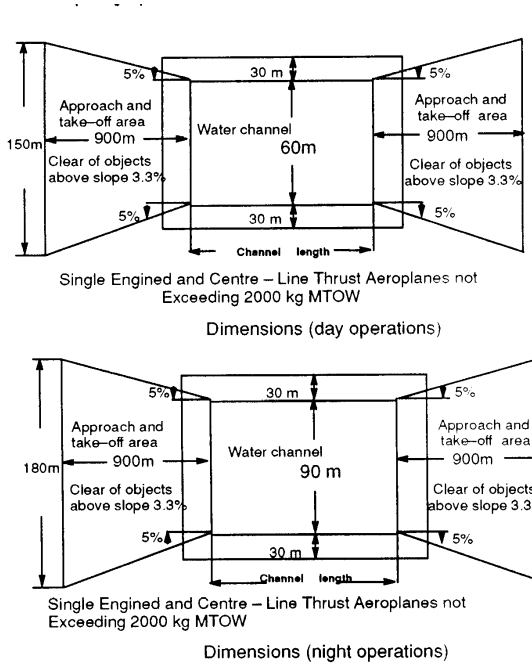

Figure 6 - Float planes

6 - MARKING OF LANDING AREAS

6.1 Where extended operations are expected to be conducted at a landing area, the owner/operator is encouraged to provide markings similar to those found at government and licensed aerodromes. If markings are provided, they should follow the colours and specifications set out in AIP AGA. A suitable layout is shown at Figure 7.

6.2 Where runway markers are provided which are not flush with the surface, they should be constructed of a material that is not likely to damage an aircraft.

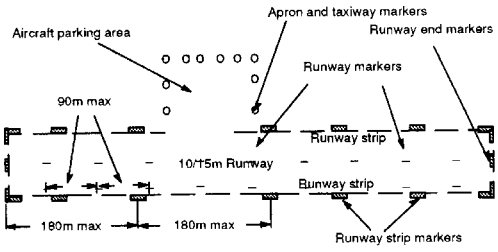

Figure 7 - Typical ALA layout and marking

7 - LIGHTING FOR NIGHT OPERATIONS

7.1 The recommended minimum lighting and layout is as follows:

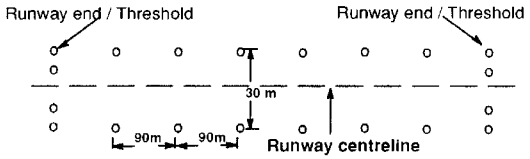

Figure 8 - Lighting for Night Operations

7.2 The lights should, under the weather conditions prevailing at the time of the flight, be visible from a distance of no less than 3000 metres.

7.3 Substitution of runway lights with reflectorised markers is permitted but not recommended by the Authority.

7.4 The different types of reflectorised markers vary in efficiency. Their luminosity can be affected by a number of factors, including equipment cleanliness/layout, the position/strength of the aircraft landing light(s) and meteorological conditions -— especially cross winds on final.

7.5 The following lights should not be substituted by reflectorised markers:

(a) runway end/threshold corner lights;

(b) lights 90m from each runway end/threshold; and

(c) lights nearest to the illuminated runway mid-length point.

8 - OTHER FACTORS THAT SHOULD BE CONSIDERED PRIOR TO USING A LANDING AREA

8.1 A pilot should not use a landing area or have an aeroplane engine running unless the aeroplane is clear of all persons, animals, vehicles or other obstructions.

8.2 A pilot should not use a landing area without taking all reasonable steps to ensure the physical characteristics and dimensions are satisfactory. For aerial work and charter operations the operator should provide evidence to the pilot on the suitability of a landing area prior to its use.

8.3 Runway lengths calculated for take-offs and landings should be increased by 50% for agricultural operations on one-way runways at night.

8.4 **Geographic Location**. A landing area should not be located:

(a) within the area or in such close proximity as to create a hazard to aircraft conducting a published instrument approach, excluding the holding pattern; or

(b) within any area where the density of aircraft movements makes it undesirable; or

(c) where take-off or landing involving flight over a populated area creates an unnecessary hazard.

8.5 Except in an emergency, the consent of the owner/occupier is required before a landing area may be used.

8.6 If the proposed landing area is located near a city, town or populous area or any other area where noise or other environmental considerations make aeroplane operations undesirable, the use of such a landing area may be affected by the provisions of the *Commonwealth Environment Protection (Impact of Proposals) Act 1974* and parallel State legislation as well as other legislation. It is the responsibility of the pilot and/or operator to conform with these requirements.

8.7 A method of determining the surface wind at a landing area is desirable. A wind sock is the preferred method.

8.8 The surface of a landing area should be assessed to determine its effect on aeroplane control and performance. For example, soft surfaces or the presence of long grass (over 150mm) will increase take-off distances while moisture, loose gravel or any material that reduces braking effectiveness will increase landing distance.

9 - SURFACE TESTING OF A LANDING AREA

9.1 **Rough Surfaces**. The presence of holes, cracks and ruts will degrade aeroplane performance and handling and increase the possibility of structural damage. The smoothness of a runway

can be tested by driving a stiffly sprung vehicle along the runway at a speed of at least 75 kph. If this is accomplished without discomfort to the occupants, the surface can be considered satisfactory.

9.2 **Soft, Wet Surfaces.** A test vehicle as indicated in the table below should be driven in a zig-zag pattern at a speed not exceeding 15 kph along the full length and width of the runway. Particular attention should be paid to suspect areas with possibly three passes over these areas. If tyre imprints exceed a depth of 25mm the surface is not suitable for aircraft operations represented by the test vehicle. Experience may prove that for a certain type of aircraft (eg, an aircraft with small wheels or high tyre pressure) operations are unsafe with a lesser imprint. Testing with a crowbar should also be done in several places along the runway to ensure that a dry surface crust does not conceal a wet base.

USER AIRCRAFT WEIGHT	SUGGESTED VEHICLE TO BE USED FOR TEST
1. MTOW not exceeding 2000kg	Fully laden utility, Landrover, station sedan.
2. MTOW 2001 kg to 3400kg	Fully laden 1.5 tonne truck or lightly laden 3 tonne truck.
3. MTOW 3401 kg to 5700kg	Fully laden 3 tonne truck
Attention should also be given to the remainder of the strip as this area is provided for run–off in the event of an abnormal take–off or landing.	