Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 139.F-01 v1.0

Design and operation of Australian water aerodromes for air transport operations

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Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory Circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- persons involved in the design, construction and operation of water aerodromes
- proponents of water aerodromes
- seaplane operators
- planning authorities
- aerodrome and aircraft landing area operators
- the Civil Aviation Safety Authority (CASA).

Purpose

The purpose of this AC is to provide guidance and advice about CASA's recommendations for the design and operation of water aerodromes that facilitate air transport operations.

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	November 2020	Initial AC.

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

Contents

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
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
ICAO	International Civil Aviation Organization
MOS	Manual of Standards

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below.

Term	Definition
aerodrome	A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and movement of aircraft.
aeroplane	A power-driven heavier than air aircraft deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.
air transport operation	Operation of an aircraft for hire or reward, that is a passenger transport operation, a cargo transport operation, or a medical transport operation.
fixed platform	A platform extending from the shore, on water and supported by pillars to hold it in position, intended to align alongside seaplanes for the purposes of embarkation and disembarkation of passengers, loading and unloading of cargo, or refuelling or parking of seaplanes.
floating platform	A platform placed on open water intended for the purpose of embarkation and disembarkation of passengers, loading and unloading of cargo by seaplane.
gangway	A movable walkway where people board and disembark such as platforms, and piers.
low water level	The average low level during that month of the year when levels are lowest or, in the case of tidal waters, the average level of low water springs or lower low waters, depending on the type of tide.
mooring	A fixed permanent installation on the water surface used to secure seaplanes. The seaplane may be moored to a floating buoy, a pier, platforms, etc.
mooring buoy	A buoy connected by chain or cable to a permanent unmovable anchor sunk deeply into the bottom of a body of water.

Term	Definition
movement area	The part of an aerodrome to be used for take-off, landing and taxiing of seaplanes, consisting of the manoeuvring area and platforms.
protected area	An area which is protected from large waves. The structure providing protection can be natural or constructed.
seaplane	An aeroplane on floats (amphibious or non-amphibious) or a flying boat (water-only or amphibious).
taxi channel	A defined path on a water aerodrome, intended for the use of taxiing seaplanes.
turning basin	A water area used for the water taxi manoeuvring of seaplanes along shoreline facilities and at the ends of a narrow water runway.
waterways	A river, canal or other waterbody serving as a route or way of travel or transport.
water aerodrome	A defined area, primarily on water, intended to be used either wholly or in part for the arrival, departure and movement of seaplanes, and any building and equipment on ground or water.
water aerodrome operator	Any organization/ or person in charge of a water aerodrome including employee, agent or other authorized representative.
water current	The rate of flow of the water.
water runway (channel)	A defined rectangular area on a water aerodrome, intended for the landing and take-off of seaplanes along its length.

1.3 References

Regulations

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

Document	Title
Part 139 of CASR	Aerodromes
Part 139 Manual of Standards	Part 139 (Aerodromes) Manual of Standards
ICAO Annex 14 Aerodromes Vol 1	Aerodrome Design and Operations
CAAP 92-1	Guidelines for Aeroplane Landing Areas

Advisory material

CASA's advisory circulars are available at http://www.casa.gov.au/AC

CASA's Civil Aviation Advisory Publications are available at http://www.casa.gov.au/CAAP

Document	Title
	ICAO Asia Pacific Guidance on Requirements for the Design and Operations of Water Aerodromes for Seaplane Operations

2 Background

2.1.1 This AC outlines the recommended specifications for the physical characteristics, visual aids, services and operating procedures that should be considered at a water aerodrome that is used for air transport operations.

2.1.2 Annex 14 to the Convention on International Civil Aviation (the Chicago Convention), Aerodromes does not differentiate between land and water as a surface from which aircraft can operate and states that an aerodrome can be an area of land or water. However, operations by aeroplanes on water differ significantly from those conducted on land. The specifications outlined in this AC focus on those facilities, services and equipment where water aerodromes differ from land aerodromes in terms of their design and operations.

2.1.3 CASA does not require certification of water aerodromes open to public use. The International Civil Aviation Organization (ICAO) recommends that States certify water aerodromes open to public use through an appropriate regulatory framework; therefore, CASA has notified a difference with ICAO.

2.1.4 When on the water, seaplanes will be subject to maritime regulations or statutes. It is recommended that water aerodrome operators and developers consult with maritime authorities to ensure compliance with the identified and applicable requirements.

2.1.5 Caution is required within proximity of a seaplane landing and take-off area. Appropriate warning signage indicating the presence of seaplane activity should be considered both locally and in maritime charts.

3 Physical characteristics

3.1.1 The physical characteristics described in this section are to guide water aerodrome operators in providing a safe facility for seaplane operators. They are not intended to restrict or limit a pilot from determining the most suitable landing area for the aircraft operation.

3.2 Water runway

3.2.1 The landing or take off direction of a water runway will vary, depending on the prevailing conditions and the physical environment. The pilot determines the correct direction at the time of take-off or landing.

3.2.2 Length of water runways

3.2.2.1 In terms of required operating parameters, the length of a water runway should be adequate to meet the operational requirements of the critical seaplane for which the runway is intended. The runway should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aircraft.

3.2.3 Dimensions and limits of a water runway

3.2.3.1 In conjunction with any relevant authorities (water authority, local council etc), the aircraft operator should determine the dimensions of the water runway that will be available for use by pilots.

3.2.3.2 The agreed location and dimensions of the waterway that will be available for aircraft use should be provided in a suitably recorded format to all pilots operating to and from that water runway.

3.2.3.3 The agreed dimensions should be sufficient for the safe operation to and from that water runway for the aircraft type intended.

3.2.3.4 Any limits or restrictions placed on operations to or from a water runway should be made available to pilots in a suitably recorded format prior to any operation taking place.

3.2.3.5 If hazards such as shoals, rocks and shallow points could endanger a seaplane, their identification should be provided to pilots in a suitably recorded format if marker buoys or another form of marking have not been installed to clearly indicate the hazardous area.

3.2.4 Annual water runway site survey (regular use)

3.2.4.1 The aircraft operator should survey the proposed landing site prior to conducting regular operations and annually thereafter to ensure the local conditions are suitable for a particular aircraft type and operation. For the purposes of this section of the AC, CASA considers regular use to be four or more movements a week consisting of two arrivals and two departures.

3.2.4.2 The survey should consider:

a. Direction of current (river).
b. Direction of prevailing winds and known weather impacts.
c. Depth of waterway at low tide.
d. Surrounding terrain (hills, trees, beaches, houses etc).
e. Any evidence of regular use by other water users.
f. Location of any buoys or markers.
g. Review waterway maps which might indicate position and extent of any hazards such as rocks, waterweeds which might fowl water rudders.
h. Location of any towers, cranes, powerlines and ship or boat mooring locations.
i. Intensity of use by other water users and potential for clash in use.
j. Local waterway regulations.
k. Location of a potential docking / mooring site.
l. Potential regulations or restrictions which may have been imposed by local authorities.
m. Sufficient width for aircraft to manoeuvre prior to and after landing.

3.2.5 Should there be a known significant change to any relevant conditions or a change to the aircraft type or operation, an additional review should be conducted to confirm continuing suitability of the site for operations.

3.2.6 Where considered necessary, turning basins should be provided at the end of the water runway.

3.2.7 When turning basins are provided, they should have a diameter measured at low water level of at least twice the minimum width of the designated water runway.

3.2.8 Where turning basins are not provided, the aircraft operator should ensure that there is sufficient space for the aircraft to be manoeuvred without creating an unnecessary risk to the aircraft or to other water users.

3.3 Mooring areas

3.3.1 Wherever necessary, mooring areas should be provided for the mooring of seaplanes and to permit the embarkation and disembarkation of passengers, loading and unloading of cargo without interfering with other aircraft or water traffic.

3.3.2 The size of the mooring areas should be adequate to permit expeditious handling of the peak hour traffic and the depth of water at the mooring area measured at low water level should be at least that of the corresponding taxi channel. Depending on the water level the mooring area should be designed in such a manner as to provide a minimum clearance of 15 m between any part of the aircraft and any object which it could come into contact.

3.4 Shore facilities

3.4.1 The size of the aircraft operation will determine the level of shore facilities provided for a water aerodrome. The aircraft operator may choose to use either a platform (fixed or floating), boat ramp or beach to permit the embarking and disembarking of passengers and crew, loading and unloading of cargo and refuelling.

3.4.2 Where platforms are used, they should:

- be in a condition that permits constant use without causing injury to persons or damage to aircraft
- be attached or anchored in a manner that prevents it from shifting position or becoming detached
- have access from the shore that provides for the safe movement of crew and passengers
- have at least two bull rails or provision for appropriate number of tie-down cleats at each seaplane parking position to secure the seaplane.

3.4.3 When an aircraft is normally secured in a position where any aircraft component overhangs the platform and may constitute a hazard to the movement of crew and passengers, the hazard should be clearly indicated by cones and/or hashed red and white markings, and in a manner easily identifiable to crew and passengers.

3.4.4 Where a boat ramp or beach is intended for aircraft operations it should preferably:

- be one and a half times the width of floats or landing gear of the largest seaplane intended to use the facility
- located in such a manner as to provide a minimum clearance of 1.8 m between a seaplane wing and any object which it could come into contact
- have a slope ratio not steeper than 1:8.

4 Visual aids

4.1 Wind direction indicator

4.1.1 Unless the direction of the wind can be obtained by the pilot from an alternative means, at least one wind direction indicator should be installed.

4.1.2 Where a wind direction indicator is installed it should be:

- of an international orange

  or
- orange and white or red and white colour
- in the form of a truncated cone.

4.1.3 The wind direction indicator(s) should be visible at a height of 300 m above the water runway and visible from any portion of the manoeuvring area.

4.2 Visual aids for denoting obstacles

4.2.1 The *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* identifies how obstacles to commercial vessel safety should be marked.

4.2.2 For waterways not subject to commercial waterway activity, all fixed objects should be marked by a conspicuous colour.

4.2.3 Where it is not possible to colour the fixed objects, markers or flags should be displayed on or above the objects or the aircraft operator may choose to identify the hazard in a suitably recorded format which can be made available to pilots using the aerodrome.

4.2.4 Any objects that are conspicuous by their shape, size or colour need not be marked.

4.3 Markings

4.3.1 Dock identification marking

4.3.1.1 Where it is preferable for the dock to be clearly visible to pilots in the circuit area of the aerodrome, a suitable method of dock identification should be used. This could consist of the dock being painted in a conspicuous colour, a conspicuous marking being used on the deck of the dock (e.g. painted triangle), or some other form of suitable marking.

4.3.2 Bull rails

4.3.2.1 Where bull rails are installed on platforms, they should be painted in a conspicuous colour to increase their visibility to the pilot when docking the aircraft.

4.3.3 Gangways

4.3.3.1 Gangways should have signage provided indicating 'seaplane access only' to deter other water users from accessing the mooring point and restricting aircraft operations.

4.3.4 Marker buoys

4.3.4.1 Any marker buoys that may be in use in the waterway should be visible to aircraft manoeuvring on the surface of water and by aircraft 300 m above the water runway.

4.4 Signs

4.4.1 Prohibition signs

4.4.1.1 A sign should be provided and displayed on any dock dedicated to seaplane operations only.

4.4.1.2 A sign should be displayed on the dock restricting passengers from the docking area until all seaplanes and propellers have come to a complete stop.

4.5 Lighting of movement area for reduced visibility conditions

4.5.1 Where operations in reduced visibility conditions are considered necessary, water aerodrome identification and manoeuvring area lighting should be provided.

4.5.2 A water aerodrome can be identified by a beacon alternating white and yellow flashes at the rate of 12 to 30 flashes per minute.

4.5.3 In water traffic congested areas, a radio activated strobe beacon may be used to alert mariners and other airman that a seaplane will be arriving or departing within a short time.

4.5.4 Wherever necessary, floodlights or spotlights should be installed on the shore to illuminate aprons, floats, ramps, and piers. Care must be taken in locating and aiming floodlights to preclude affecting the vision of pilots landing or taking off or creating distracting reflections.

5 Obstacle restriction and removal

5.1.1 Fixed objects on a water aerodrome should be identified and assessed by the aircraft operator prior to the aerodrome being used for operations.

5.1.2 Where it is considered that a permanent object may be hazardous to seaplane operations on the movement area or in the air in the immediate vicinity of the water aerodrome, it should where possible be removed or marked and/or lighted in accordance with the Part 139 Manual of Standards (MOS), Chapter 8, Division 10.

5.1.3 Where it is not possible to remove or mark an obstacle, the aircraft operator may choose to identify the hazard in a suitably recorded format which can be made available to pilots using the aerodrome.

5.1.4 On waterways with significant water activity, the aircraft operator should consider basing a staff member at the water aerodrome to monitor shipping movements, and other water borne activities prior to the expected arrival of an aircraft. The employee should be equipped with a suitable method of relaying the information to the pilot to assist in the determination of the most appropriate landing area and landing direction.

5.1.5 Pilots are expected as part of their prelanding and pre take off checks for every flight to review the wind direction, the landing or take off direction and the potential for any objects to be a hazard to the landing or take off. If there is any doubt the pilot should conduct a precautionary pass to confirm suitability.

6 Operational considerations

6.1.1 Wildlife strike hazard

6.1.2 The presence of wildlife (birds) on and in the water aerodrome vicinity may pose a serious threat to seaplane operational safety. Where possible, action should be taken by the aircraft operator to decrease the risk to seaplane operations by adopting measures to minimize the likelihood of collisions between wildlife and seaplane.

6.1.3 The objectives of wildlife hazard management outlined in Part 139 MOS, Chapter 17 can be applied to water aerodromes.

6.1.4 Safety management system

6.1.5 A safety management system or a risk management plan should be considered for a water aerodrome, taking into consideration the complexity of the operating environment and the size of the operation.

6.1.6 Operational procedures

6.1.7 A maintenance program is recommended as a means to ensure that all markers, signs, lighting and other infrastructure that supports the operation of seaplanes remain fit for purpose and suitably visible.

6.1.8 Environment

6.1.9 If approval for establishment of a water aerodrome is required, the relevant land use and/or maritime authority should be able to provide advice on what information will be required. The relevant authority should determine the scope and extent of the evaluation required for that authority to adequately assess any proposal.

6.1.10 Where aviation fuel is provided at a water aerodrome, care should be taken to ensure that the storage and delivery systems are safe and that precautions are taken to minimize the possibility of spills and the resulting adverse environmental effects of a fuel spillage.

6.1.11 The design of fuelling facilities and storage areas should comply with national, state and local regulations.

7 Water aerodrome emergency planning

7.1.1 The objectives of emergency planning outlined in Part 139 MOS, Chapter 24 can be equally applied to water aerodromes.

7.1.2 Minimum expectations when planning and preparing an emergency response should necessitate engagement with local agencies that are likely to assist. Established procedures should be developed and incorporated into any existing local emergency response plan.

7.1.3 When establishing emergency response arrangements, the aircraft operator should consider hazards associated with seaplane operations, including passenger evacuation. For example:

- deep water
- the onset of hypothermia and its associated effects, during and following prolonged immersion in cold water
- the immediate toxicity and respiratory effects on survivors in the water following the ingestion of floating fuel and oils and their associated vapours
- fire suppressant foams, powders and gases.

7.1.4 The emergency response arrangements should contain provisions for water rescue, fire response and recovery of disabled aircraft from the waterway.

7.1.5 Consideration should be given to:

- number of persons that the largest aircraft can carry
- local hazards (water temperatures)
- availability of rescue boats (shallow water/surface considerations)
- flotation equipment, rafts
- thermal blankets
- adequate two-way radio equipment should be provided in all rescue boats in order to maintain communication
- flood lighting should be available for night operations
- a command post and casualty areas should be established at a safe location on adjacent land.

7.1.6 The emergency response arrangements should contain procedures for periodic testing to ensure their adequacy and to improve its effectiveness.

7.1.7 Local responders should be familiar with the operating environment and the established emergency response arrangements.