



Australian Government  
Civil Aviation Safety Authority

OFFICIAL

**MULTI-PART  
ADVISORY CIRCULAR**

**AC 91-32 and AC 139-22 v1.0  
Global reporting format –  
Runway surface condition**

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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:

- aerodrome operators
- airlines
- air transport operators
- pilots
- air traffic service providers
- aeronautical information service providers.

## Purpose

This AC provides guidance on implementation of the Global Reporting Format (GRF). The GRF provides an internationally harmonised and standardised method of assessing and reporting runway surface conditions which impact on flight operations. The GRF was developed by the International Civil Aviation Organization (ICAO) to enable an improved flight crew assessment of take-off and landing performance and help mitigate the risk of runway excursions.

## 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	February 2024	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)*.

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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
AFM	aircraft flight manual
AIREP SPECIAL	special air-report
AIS	Aeronautical Information Service
ATC	air traffic control
ATIS	automatic terminal information service
ATS	air traffic services
CA/GRS	certified air/ground radio service
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
FIS	flight information service
FMS	Flight Management System
GRF	Global Reporting Format
ICAO	International Civil Aviation Organization
MCDU	Multi-Function Control and Display Unit
NOTAM	Notice to Airmen
NTSB	National Transport Safety Board
RCAM	runway condition assessment matrix
RCR	runway condition report
RWYCC	runway condition code
SIGMET	Information concerning en route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations
SPECI	Aviation Special Weather (in aeronautical meteorological code)
TAF	aerodrome forecast
UNICOM	universal communications

Acronym	Description
WHS	Work, health and safety

## 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
Aeronautical information service (AIS)	A service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.
air traffic control (ATC)	Air Traffic Services in its capacity as a provider of air traffic control services.
air traffic service (ATS)	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.
automatic terminal information service (ATIS)	The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts during the hours when the unit responsible for the [air traffic] service is in operation.
CA/GRS	An aerodrome radio information service that provides aircraft operating in the vicinity of an aerodrome with the services and information specified in Chapter 22 of the Part 139 Manual of Standards (MOS).
contaminant	Matter present on the surface of a runway including, compacted snow, dry snow, frost, ice, slush, standing water, wet ice or wet snow.
Contaminated runway	A runway is contaminated if more than 25% of the surface area required for a take-off or landing is covered by any of the following: (a) water or slush more than 3 mm deep; (b) loose snow more than 20 mm deep; (c) compacted snow or ice.
Dry runway	A runway is dry if the surface area required for a take-off or landing: (a) has no visible moisture; and (b) is not contaminated.
FIS	A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights
NOTAM	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
reduced braking action	Based on pilot observations that braking deceleration and directional control is worse than expected.

Term	Definition
runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
Runway condition assessment matrix (RCAM)	A matrix for assessing the runway condition code from a set of observed runway surface conditions and the pilot in command's report on braking action.
Runway condition code (RWYCC)	The number used in a runway condition report to describe the runway surface condition.
Runway condition report (RCR)	A comprehensive standardised report relating to runway surface conditions, and their effect on aeroplane landing and take-off performance.
Runway surface condition descriptors	See definition of 'contaminant' above.
SIGMET	A concise description of the occurrence or expected occurrence, in an area over which area meteorological watch is maintained, of specified phenomena which may affect the safety of aircraft operations
Slippery wet runway	A wet runway where the surface friction characteristics of a significant portion of the runway show that the runway is degraded.
SNOWTAM	A special series NOTAM given in a standard format providing a surface condition report notifying the presence or cessation of hazardous conditions due to snow, ice, slush, frost, standing water or water associated with snow, slush, ice or frost on the movement area.
SPECI	SPECI are non-routine aerodrome reports issued whenever one or more observed meteorological elements meet specified criteria significant to aviation
Special Air-Report (AIREP Special)	An AIREP containing the report of special meteorological conditions, i.e. SIGMET phenomenon, or any other MET phenomenon which is likely to affect the safety or efficiency of other aircraft.
Wet runway	A runway is wet if the surface area required for a take-off or landing: (a) is not dry; and (b) is not contaminated.
UNICOM	A non-air traffic control communication facility operated to provide an advisory service to enhance the value of information normally available at a non-controlled aerodrome.

## 1.3 References

### Legislation

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

Document	Title
Volume 5 of CASR	Dictionary
Part 121 of CASR	Australian air transport operations—larger aeroplanes
Part 135 of CASR	Australian air transport operations—smaller aeroplanes
Part 172 of CASR	Air Traffic Service Providers
Part 175 of CASR	Aeronautical information management
Part 91 Manual of Standards	Part 91 (General Operating and Flight Rules) Manual of Standards 2020
Part 139 Manual of Standards	Part 139 (Aerodromes) Manual of Standards Amendment Instrument 2020 (No. 1)

### International Civil Aviation Organization 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
Annex 3	Meteorological Service for International Air Navigation
Annex 6 Part I	International Commercial Air Transport — Aeroplanes
Annex 8	Airworthiness of Aircraft
Annex 11	Air Traffic Services
Annex 14 Volume I	Aerodrome Design and Operations
Annex 15	Aeronautical Information Services
Doc 9981	PANS-Aerodromes
Doc 10066	PANS-Aeronautical Information Management
Doc 4444	PANS-Air Traffic Management
Doc 10064	Aeroplane Performance Manual
Doc 9137	Airport Services Manual Part 2 — Pavement Surface Conditions Part 8 — Airport Operational Services Part 9 — Airport Maintenance Practices

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Document	Title
Circular 355	Assessment, Measurement and Reporting of Runway Surface Conditions

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## Advisory material

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

Document	Title
AC 91-02	Guidelines for aeroplanes with MTOW not exceeding 5 700 kg - suitable places to take off and land
AC 139.C-03	Serviceability Inspections
AC 139.C-06	Skid resistance of aerodrome pavements

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## 2 Introduction

Runway safety, particularly runway excursions, remains one of the top aviation safety priorities of the International Civil Aviation Organization (ICAO). The Flight Safety Foundation shared these concerns and indicated that the third most common landing excursion risk factor is ineffective braking action, due to contamination on the runway such as snow, ice, slush or water. This trend was also confirmed by the main aircraft manufacturers.

Figure 1 is from a USA National Transport Safety Board (NTSB) investigation into a runway excursion in Jacksonville, Florida USA in 2019. The investigation determined that the probable cause was 'an extreme loss of braking friction due to heavy rain and the water depth on the ungrooved runway, which resulted in viscous hydroplaning'.



**Figure 1. Runway Excursion (source: US NTSB report - DCA19MA143)**

To address the issue, the ICAO Friction Task Force developed a new global reporting system for assessing and reporting runway surface conditions, known as the Global Reporting Format (GRF).

The GRF provides uniformity and consistency in the assessment and reporting of runway surface conditions when contamination, mainly due to adverse weather conditions, is present. It is also used to correlate the reported runway surface condition and aircraft performance data. Assessing and reporting the condition of the movement area and, in particular, the runway surface is necessary to provide the flight crew with the information needed for safe operation of the aeroplane. The runway condition report (RCR) is used for reporting assessed information.

According to ICAO Annex 14 Volume I:

'movement areas are exposed to a multitude of climatic conditions and consequently a significant difference in the condition to be reported. The runway condition report (RCR) describes a basic methodology applicable for all these climatic variations and is structured in such a way that States can adjust them to the climatic conditions applicable for that State or region'.

These harmonised procedures are reflected in a runway condition assessment matrix (RCAM) (see Appendix A) which correlates the runway condition code (RWYCC) and runway surface description with downgrade assessment criteria related to aeroplane deceleration or directional control observation and pilot reporting of aircraft braking action which the flight crew should expect for each value of the RWYCC. The introduction of the RCR based on the runway surface description and RWYCC, in conjunction with new or existing aeroplane performance data, establishes a clear link between the observation, reporting and accounting of runway surface conditions in aeroplane performance.

The intent of the RCR is to put into place a common language between all runway safety participants and is based on the impact of runway surface conditions on aeroplane performance. Therefore, it is necessary that all participants, from aerodrome operators to pilots and aeroplane operators, have been given appropriate training.

Training content for both aerodrome personnel and pilots may be based on information in this AC, among other sources. An outline of the suggested training for aerodrome personnel and pilots can be found in Appendix D and E of this document.

## 2.1 GRF implementation in Australia

### 2.1.1 Weather conditions in Australia

2.1.1.1 Australia has relatively benign weather conditions but does experience wet seasons, tropical storms, thunderstorms and extensive periods of rain. However, there are a relatively small number of certified aerodromes which may experience frost or snow conditions. Therefore, the majority of runway, or contaminated runway reporting, will be in relation to 'wet' or 'standing water'. There is also another category of runway surface friction reporting which is 'slippery wet' runways; however, this runway description is not defined as contaminated but has runway surface friction impacted through one or more of factors (e.g. rubber deposits, surface polishing) and water, usually rain. We have implemented the ICAO runway surface conditions associated with the GRF but have separated them into: 'dry' and 'wet' surface conditions; 'slippery wet' surface conditions; and 'snow' and 'ice' surface conditions. This allows an aerodrome operator, or pilots and aircraft operators, to quickly be able to locate the regulatory requirements for reporting the relevant runway surface conditions applicable.

### 2.1.2 Mandatory RCR elements

2.1.2.1 The RCR has an aeroplane performance calculation section and a situational awareness section. Australia has determined the core runway surface condition reporting elements from the aeroplane performance section of the RCR. Situational awareness is more beneficial in colder climates where there can be significant levels and different types of contaminants on the movement area than to Australia. Figure 2 shows the effect and impact of water on the runway during aeroplane operations.

**Note:** If, due to runway surface conditions, the width of runway available is less than the published width, or the runway length available is reduced, CASA expects a separate runway NOTAM to be issued.



**Figure 2. Aircraft operations on a wet runway**

- 2.1.2.2 According to ICAO, in the data-gathering process, almost all runway information can typically be gathered from visual observations, with the exception of 'slippery wet' runways. If information is gathered from measuring devices or instruments, ICAO states they must be calibrated and operated within their limitations and in compliance with standards set or agreed by the State. Automated systems are becoming available to provide a remote indication of runway surface conditions, while others are still under development. At present, these systems are not in widespread use, and systems that provide an accurate indication of braking action seem a long way off. This unavailability strongly affects the related implementation and communication process.
- 2.1.2.3 Australia does not require aerodrome operators to install sophisticated measuring or modelling equipment; however, aerodrome operators may wish to employ this technology to offset the number of aerodrome personnel required to conduct inspections, assessment and reporting during and after weather events. The most labour-intensive aspect of runway surface assessment and reporting is as a wet runway becomes completely dry.
- 2.1.2.4 Aerodrome operators need to gather relevant data, process the related information using manual systems and make information available to users using conventional methods. This requires a considerable amount of time in addition to the need to obtain access to runways, which is often difficult, particularly at busy aerodromes. It is not necessarily safe to require aerodrome personnel to access an active or operational runway and take numerous measurements. It is for this reason, and to keep the assessment and reporting system simple, that Australia has decided to implement the RWYCC, surface description elements of the RCR and some percentage and depth reporting.
- 2.1.2.5 Additionally, at controlled aerodromes air traffic controllers (ATCs) are trained under the Part 172 MOS to determine if the runway is completely dry or wet in selection of the runway to be used. Therefore, if there is an agreement in place between the aerodrome operator and ATC

(under the auspices of Airservices Australia), then ATC can conduct the assessment and reporting for wet and dry runways but only during the control tower hours of operation. In any case, ATC generally provide automated broadcasts via the Automatic Terminal Information Service (ATIS) and not directly to each pilot.

2.1.2.6 The elements of the RCR adopted by Australia are:

- runway designator number
- RWYCC for each runway third
- runway surface condition description for each runway third
- percentages of runway thirds are to be reported for 'slippery wet' runways
- if 25% or less of a runway third has 'standing water' or is 'otherwise contaminated', it is to be assigned a RWYCC of 5 and surface description of WET (noting that ICAO treats these surface conditions the same as a DRY runway)
- if the depth of standing water or other contaminants are available, they are to be reported.

2.1.2.7 The ICAO RCR format does not require 'RWY' to be inserted in front of the runway number, however a string of numbers separated by obliques may be confusing to pilots from a human factor's perspective. Additionally, automated NOTAM processing systems may benefit from being able to search on the keyword 'RWY' to filter the most safety critical NOTAMs. Therefore, the RCR in Australia includes 'RWY' preceding the runway number.

2.1.2.8 Under the ICAO GRF, the RWYCC for 'slippery wet' runways is '3' however the surface condition is described as 'WET', the same as for a normal rain affected runway with a braking condition of 'GOOD'. From a human factor's perspective, a pilot with an aeroplane Flight Management System (FMS) not capable of direct inputting of the RWYCC number, may not be able to discern the difference between a 'WET' and 'slippery wet' runway simply based on the surface description, if unfamiliar with the meaning of the RWYCCs. Additionally, a pilot may be unaware that the braking action had deteriorated from 'GOOD' to 'MEDIUM'. Therefore, in Australia, we require the RCR to include the full runway surface description of 'SLIPPERY WET' for these conditions along with the relevant RWYCC of 3.

2.1.2.9 Introduction of the GRF by ICAO also included amendments to the definitions of contaminated, dry and wet runways. These changes will require amendments to the relevant definitions in the CASR Dictionary. Until the CASR Dictionary can be amended the current definitions are still consistent with Australia's implementation. The CASR definition of contaminated runway is:

**contaminated:** a runway is **contaminated** if more than 25% of the surface area required for a take-off or landing is covered by any of the following:

- (a) water or slush more than 3 mm deep;
- (b) loose snow more than 20 mm deep;
- (c) compacted snow or ice.

Australia requires reporting of thirds of runways (33.33%) when they are contaminated which meets the trigger of 25% under the current definition. Water and slush depth is consistent with the RCR values and aerodrome operators will report depth of snow if it is available, noting this will be a rare circumstance for aerodromes in Australia. Loose snow is not referred to in the RCR but rather dry or wet snow. Pilots need to take into account the reported runway surface conditions, including contaminants, and associated impact on landing and take-off performance.

## 2.1.3 Applicability of GRF to all certified aerodromes

- 2.1.3.1 Prior to the introduction of the GRF, MOS Parts 121 and 135 for air transport operations, required pilots to take into account the Aircraft Flight Manual (AFM) or aircraft manufacturers' data in relation to **runway surface condition** for take-off and landing performance. Part 121 MOS has specific requirements for landing on dry, wet, or contaminated runways. Part 91 MOS for general operations also requires pilots to take into account the AFM or the manufacturer's data in relation to take-off and landing performance and now also requires **runway surface conditions**, if known, to be taken into account.
- 2.1.3.2 Due to the need for all pilots to be informed of runway surface conditions, the applicability of the GRF is to all certified aerodromes. It should be noted that Part 91 operations also occur at aerodromes that are not certified, where RCRs are unavailable, therefore, under Part 91 MOS, runway surface conditions only need to be taken into consideration if they are available.

## 2.1.4 Runway serviceability inspections

- 2.1.4.1 Under Part 139 MOS the aerodrome operator is required to carry out a serviceability inspection 'after a severe wind event, a severe storm or a period of heavy or prolonged rainfall'. These are the most likely weather conditions to cause runways to become contaminated with standing water or snow. It is important to note that aerodrome personnel are not required to carry out serviceability inspections if the weather conditions cause a work, health and safety (WHS) hazard, for example, lightning in the area and WHS procedures require all aerodrome and aircraft personnel to vacate the movement area.
- 2.1.4.2 Aerodrome serviceability inspections are also required to be carried out due to meteorological conditions that may cause the RWYCC to change e.g., from '5' to '2' or if the runway surface contaminant changes, for example, from 'wet' to 'standing water'. This situation is representative of runway surface conditions deteriorating. These inspections are only required when aeroplane operations are scheduled, advised in advance by the aeroplane operator, or known to be in progress at the aerodrome.
- 2.1.4.3 For any nonweather-related aerodrome serviceability inspections a check must also be carried out for visible dampness (to indicate a 'wet' runway), standing water, snow, slush, ice, or frost on an operational runway. However, it is unlikely that these runway surface conditions or contaminants will be present on a runway without a preceding weather event.

## 2.1.5 Ponding and poor drainage of water on runways

- 2.1.5.1 It is important to note, in accordance with the Part 139 MOS, that the design of runway and taxiway transverse slopes are such that water is not permitted to pond or pool, thus reducing the likelihood of standing water. Additionally, as part of the GRF standards introduced by ICAO, aerodrome operators should visually assess a runway under natural or simulated rain conditions for ponding or poor drainage and take corrective maintenance action. The requirement under the Part 139 MOS is for the aerodrome operator to carry out a serviceability inspection 'after a severe wind event, a severe storm or a period of heavy or prolonged rainfall'. This then provides an appropriate opportunity for an aerodrome operator to later undertake corrective maintenance action if pooling, ponding or poor drainage of water is observed following such a weather event. However, it is not expected that the aerodrome operator will be required to undertake a runway surface overlay, resurfacing or replacement, but rather maintenance action should be taken to address the formation of depressions or surface irregularities that allow water to pond.

## 2.2 Aircraft operator and pilot

- 2.2.1 The RWYCC reflects the runway braking capability as a function of the surface conditions. With this information, the flight crew can derive, from the performance data provided by the aeroplane manufacturer, normally through the AFM, the necessary stopping distance of an aircraft on the approach under the prevailing conditions, or the required take-off distance.
- 2.2.2 Aeroplane performance can be impacted whenever the coverage of any water-based contaminant on any runway third exceeds 25%. The intent of the assessment and reporting procedures is to communicate the runway surface conditions impacted by any contamination to the aeroplane operators in a way consistent with the effect on aeroplane performance.
- 2.2.3 The flight crew needs information relevant for the safe operation of the aircraft, as far as it is relevant to the conditions of the runway surface, obtained using the RCR.
- 2.2.4 The RCR contains all the necessary information for the determination of the relevant runway condition for the performance assessment by the flight crew. This information is required at several stages of the flight, in particular during dynamic weather event conditions. The flight crew may need updates throughout the flight.

**Note:** The flight crew's ability to receive the RCR in the various phases of flight is dependent upon the technology made available to them and, as a consequence, such ability will vary between aeroplane operators.

- 2.2.5 Pilots can use the RWYCC to determine their aircraft's performance by correlating the code with performance data provided by their aircraft's manufacturer. This can be performed, using an On-board Performance Tool, or equivalent, for example, Multi-Function Control and Display Unit (MCDU) as shown in Figure 3; or using performance manuals. This will help pilots to correctly carry out their landing and take-off performance calculations for wet or contaminated runways. For aeroplanes, where Flight Management Systems (FMS) are not GRF-capable, landing and take-off distance safety factors for wet and contaminated runways can be used. These are included in the AFM specific to the aeroplane or generic performance tables. For further information regarding factored landing distances, refer to [AC 91-02 - Guidelines for aeroplanes with MTOW not exceeding 5 700 kg - suitable places to take off and land](#).



Figure 3. Honeywell MCDU with braking action, associated RWYCC and landing distance factor

## 2.3 Aerodrome operator

- 2.3.1 It is recognised that information provided by the aerodrome’s personnel assessing and reporting runway surface condition is crucial to the accuracy and effectiveness of the RCR. A misreported runway condition alone should not lead to an accident or incident. Operational margins should cover for a reasonable error in the assessment, including unreported changes in the runway condition. A misreported runway condition can mean that the margins are no longer available to cover for other operational variance, such as unexpected tailwind, high and fast approach above threshold or long flare.
- 2.3.2 It is important to follow standard procedures when providing assessed information on the runway surface conditions to ensure that safety is not compromised when aeroplanes use wet or contaminated runways. Personnel should be trained in the relevant fields of competence. A sample training syllabus is provided at Appendix D for 'Runway Surface Condition Assessment and Reporting'.
- 2.3.3 The methodology of the RCR is that the aerodrome operator assesses the runway surface conditions whenever water, snow, slush, ice or frost are present on an operational runway. From this assessment, a RWYCC is assigned and reported which can be used by the flight crew for aeroplane performance calculations. This format, based on the type, depth and coverage of contaminants, is the best assessment of the runway surface condition by the aerodrome operator.
- 2.3.4 Visually inspecting the runway to assess the surface condition is the core method for determining an RWYCC. However, an overall assessment does imply more than just this activity is required. Continuously monitoring the development of the situation and prevailing weather condition is essential to ensuring safe flight operations. Other information that might influence the assessment result includes the control and deceleration of the inspection vehicle, pilot reports of runway braking action, friction readings (continuous friction measuring device or decelerometer), weather forecast, etc. Due to the interaction between all these factors, it is not possible to define a precise method for determining how they affect the RWYCC to be reported.
- 2.3.5 Aerodrome personnel should use their best judgement and experience to determine an RWYCC that best reflects the prevailing situation. Reporting, in compliance with the RCR, commences

when a significant change in runway surface condition occurs due to water, snow, slush, ice or frost.

2.3.6 Reporting of the runway surface condition should continue to reflect significant changes until the runway is no longer contaminated. A change in the runway surface condition used in the runway condition report is considered significant whenever there is:

- any change in the RWYCC
- any change in contaminant type
- any other relevant information, for example pilot reports of reduced runway braking action is known to be significant.

**Note:** If an aerodrome operator is unable to issue a RCR for a runway affected by 'standing water', is otherwise contaminated, or parts of the runway are 'slippery wet', then the aerodrome operator always has the safe option available to close the entire runway or parts of it, which then doesn't require a RCR to be issued.

## 2.4 Air traffic services

2.4.1 For controlled aerodromes when the runway is wet (RWYCC 5), the assessed information shall be reported by RCR and disseminated via ATC only. Assessment and reporting for WET and DRY conditions will be provided by the aerodrome operator to ATC at controlled aerodromes unless there is an agreement in place between the aerodrome operator and ATC for ATC to provide the assessment and report. There is significant workload for aerodrome personnel to assess and report a wet runway as it is drying, therefore it is preferable that there is an agreement with ATC to report these conditions. Additionally, ATCs have the best vantage point from the control tower to assess when a runway is completely dry as shown in Figure 4.



**Figure 4.** View from control tower during wet runway operations

2.4.2 The purpose of reporting to ATC is so that this information can be passed on to pilots using standard phraseology or communicating the RCR via automated means such as on the ATIS.

2.4.3 Pilots must inform ATC, via AIREP, whenever runway conditions are not as good as currently reported. If ATCs receive an AIREP SPECIAL concerning braking action that is found not to be

as good as that reported for a runway. For example, a 'WET' runway normally has a braking action of 'GOOD' but if two or more consecutive pilots report it as 'MEDIUM'; this indicates a 'SLIPPERY WET' runway, they will forward the AIREP without delay to other pilots and the aerodrome operator. This is a prerequisite for using the AIREP for downgrading purposes when assessing the RWYCC.

- 2.4.4 When ATC report a runway as being wet or thirds being wet, the RCR is made using the active runway number which may be the higher rather than the lower runway number i.e. if runway 30 is in use, ATC will report runway 30 instead of runway 12 which is used in the NOTAM.

## 2.4.5 Flight information service

- 2.4.5.1 Under ICAO's PANS-Aerodromes, the aerodrome operator is required to disseminate 'contaminated' runway surface reports to AIS and ATS. This can be accommodated for aerodromes with air traffic control services; however some aerodromes do not have ATC present 24/7 and some have no ATC service at all. The intention of providing 'contaminated' runway reports to AIS and ATS is to ensure pilots receive these reports as part of their pre-flight planning or via the control tower. At aerodromes that are non-controlled, pilots can receive 'contaminated' runway reports through provision of a flight information service (FIS) by ATS.
- 2.4.5.2 ICAO's Annex 11 describes the scope of FIS which includes 'information on changes in condition of aerodromes and associated facilities, including information on the state of the aerodrome movement areas when they are affected by snow, ice or significant depth of water'. Additionally, FIS broadcasts can include 'significant runway surface conditions and, if appropriate, braking action'. Therefore, affected pilots will receive a RCR for 'contaminated' or 'slippery wet' runways through provision of FIS if they are airborne, similarly to provision of SIGMETs, SPECIs and Amended TAFs.

## 2.5 Aeronautical information management

- 2.5.1 Any 'SLIPPERY WET' or contaminated runway is to be reported by the aerodrome operator to the AIS (NOTAM Office) using the RCR. The required reporting format is in Section 3.2 of this AC. The RCR should continue to be reported until the complete runway surface condition is 'DRY', including changes to the RWYCC or runway surface description. While PANS-Aerodromes expects a RCR to be issued when the runway is dry, Australia only requires the RCR NOTAM to be cancelled which indicated to pilots that the complete runway has returned to normal dry conditions.
- 2.5.2 Due to technical limitations with Australia's NOTAM system (National Aeronautical Information Processing System (NAIPS)), SNOWTAM cannot currently be issued within Australia. A RCR NOTAM will be issued with the relevant and necessary runway surface condition elements in Field E). For further information refer to paragraph 3.2.2.

# 3 Runway surface condition assessment and reporting

## 3.1 Assessment

### 3.1.1 Assigning a RWYCC

- 3.1.1.1 The RCAM supports the classification of runway surface conditions according to their effect on aeroplane braking performance using a set of criteria identified and quantified based on the best industry knowledge, built on dedicated flight testing and in-service experience. The agreed thresholds at which a criterion changes the classification of a surface condition are intended to be reasonably conservative, without being excessively pessimistic.
- 3.1.1.2 In ICAO Doc 9981 PANS-Aerodromes, the RCAM in Table II-2-5 is a combination of Table II-2-3 (Assigning a runway condition code (RWYCC)) and Table II-2-4 (Correlation of runway condition code and pilot reports of runway braking action).
- 3.1.1.3 Therefore, Tables II-2-3 and II-2-4 provide the means for aerodrome operators to initially assign a RWYCC and to downgrade it if the runway surface condition deteriorates and/or subsequent pilot reports are received that indicate the braking action is less than that normally associated with the RWYCC. We have split Table II-2-3 into WET and DRY conditions, which are the predominant weather-related impacts on runway surface condition and winter conditions of, for example frost and snow, which impact very few aerodromes in Australia.
- 3.1.1.4 A RWYCC is initially assigned based on the runway surface condition and its description (refer Part 139 MOS Section 12.04A). Figures 5 to 8 below outline the process to be followed to assess a runway third, assign a RWYCC and report runway surface conditions.

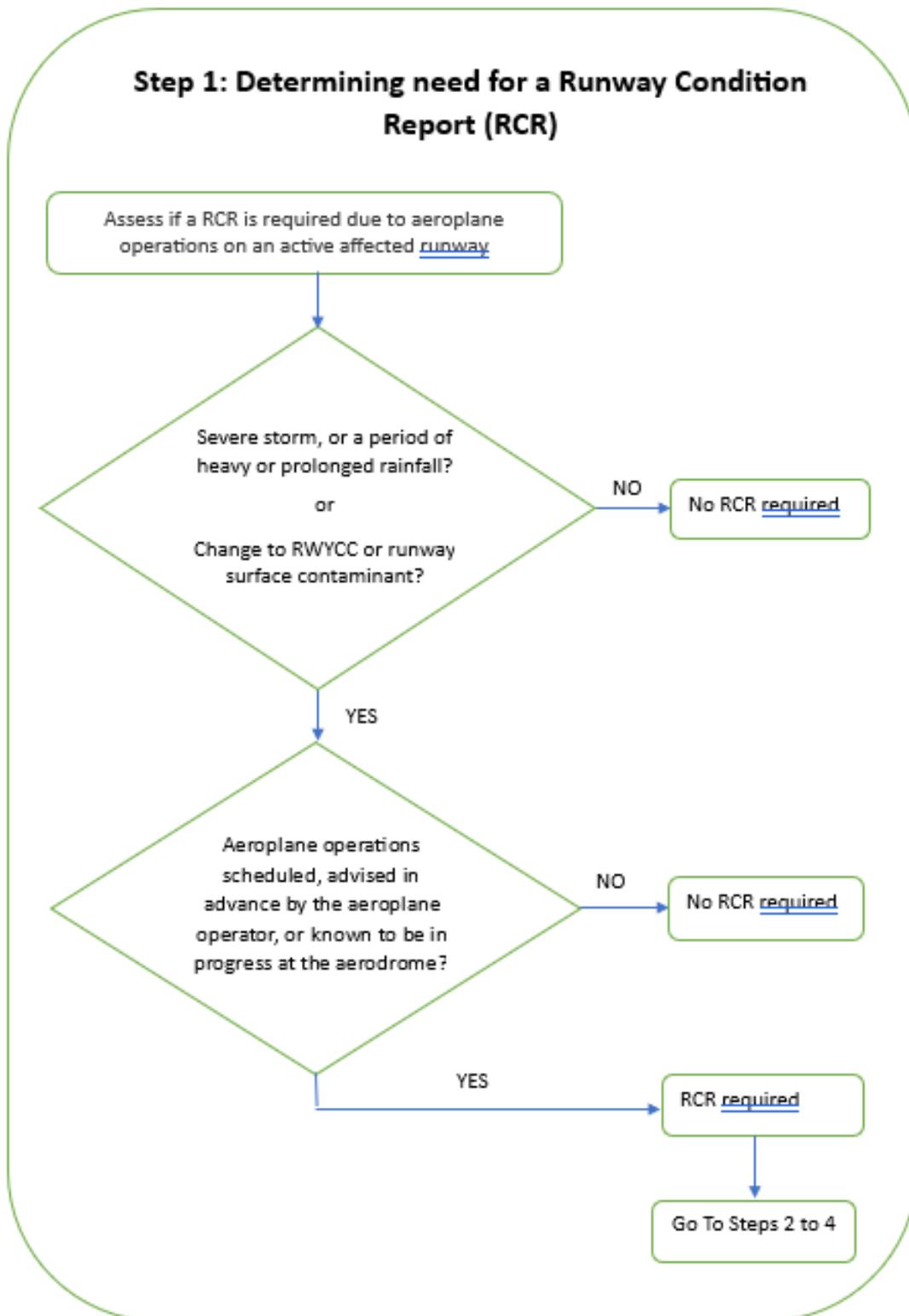


Figure 5. Process for determining if RCR is required

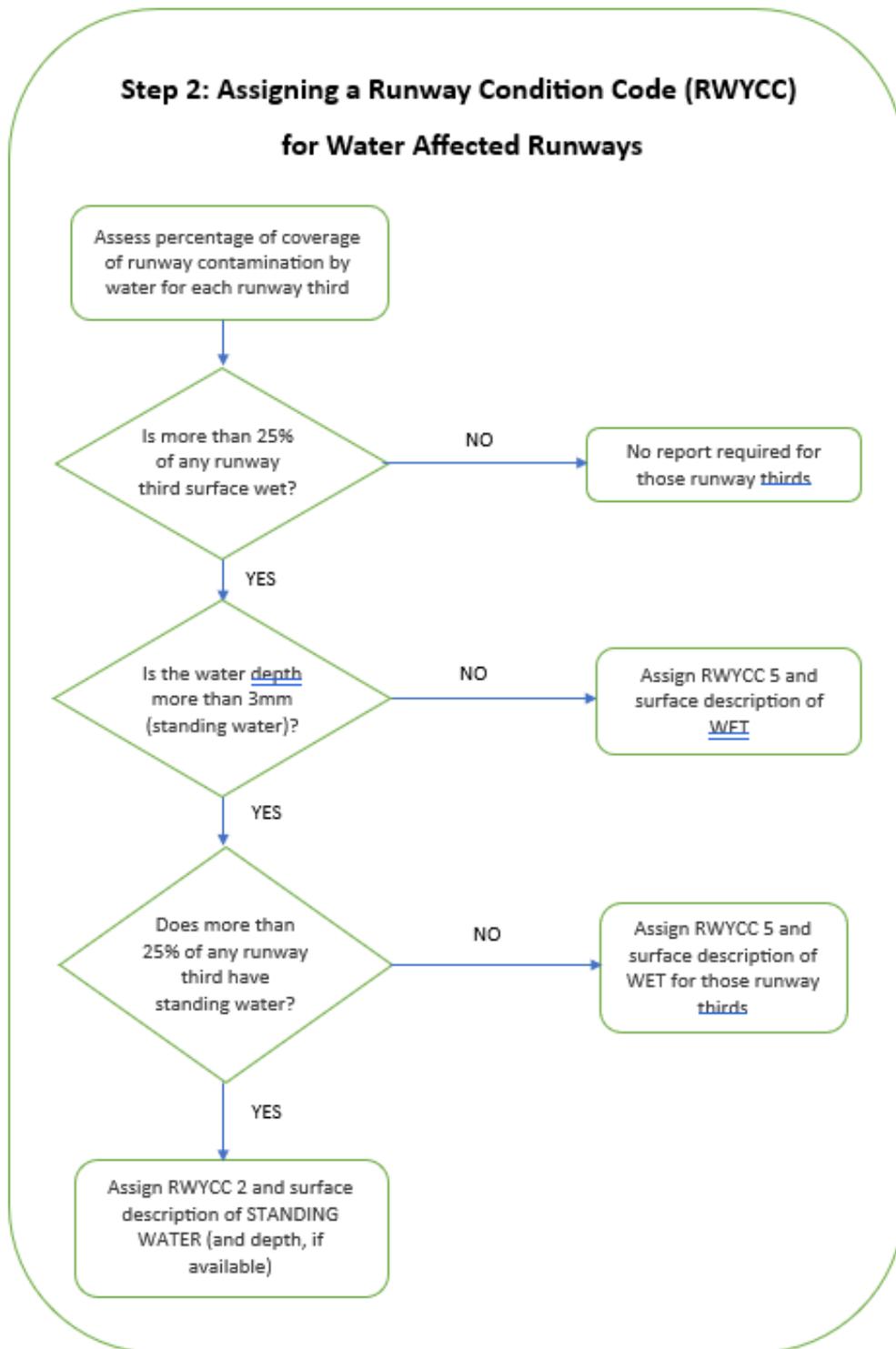


Figure 6. Process for assigning a RWYCC for water affected runways

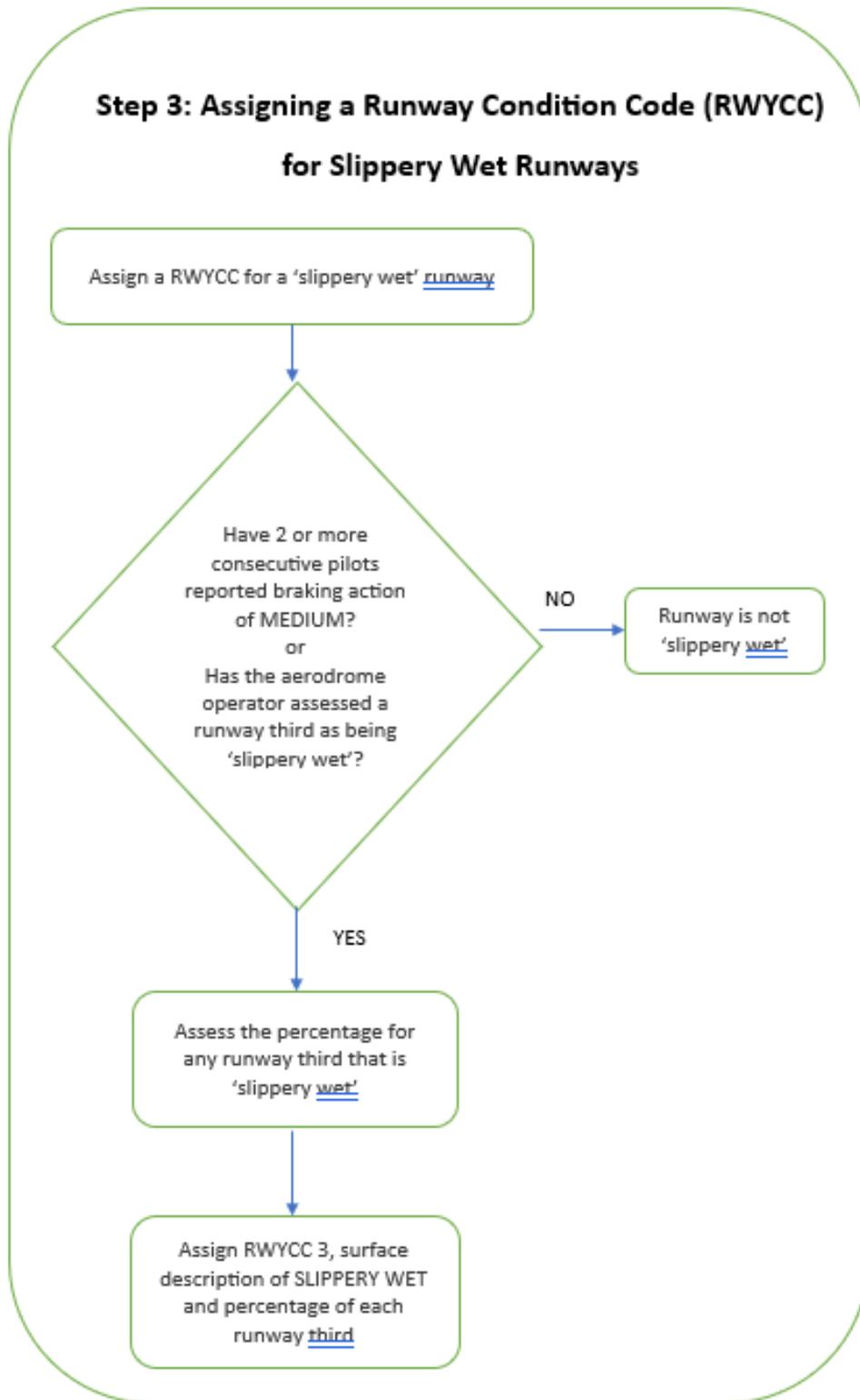
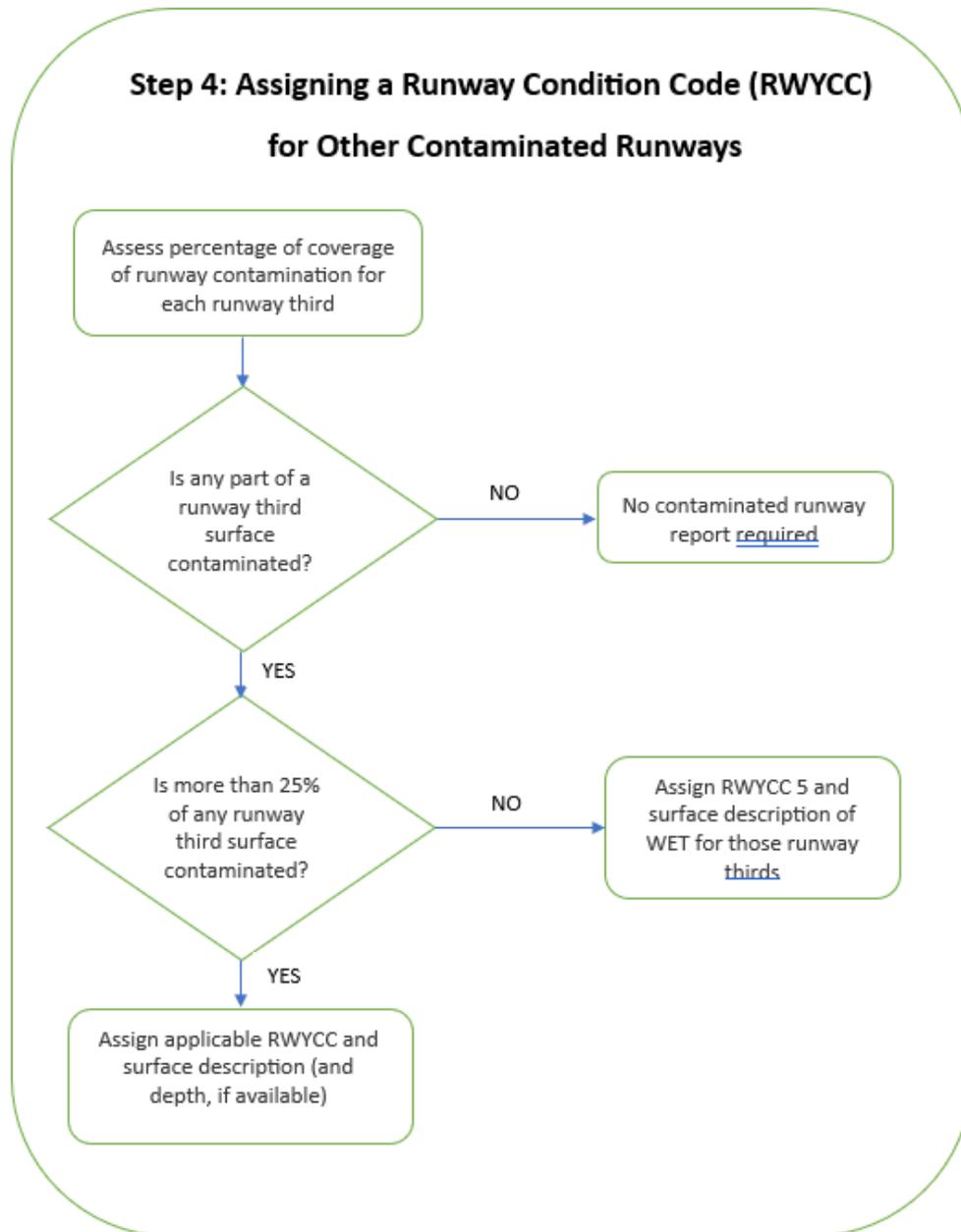


Figure 7. Process for assigning a RWYCC for a 'Slippery Wet' runway



**Figure 8. Process for assigning a RWYCC for other 'Contaminated' runways**

### 3.1.2 Wet and dry runways

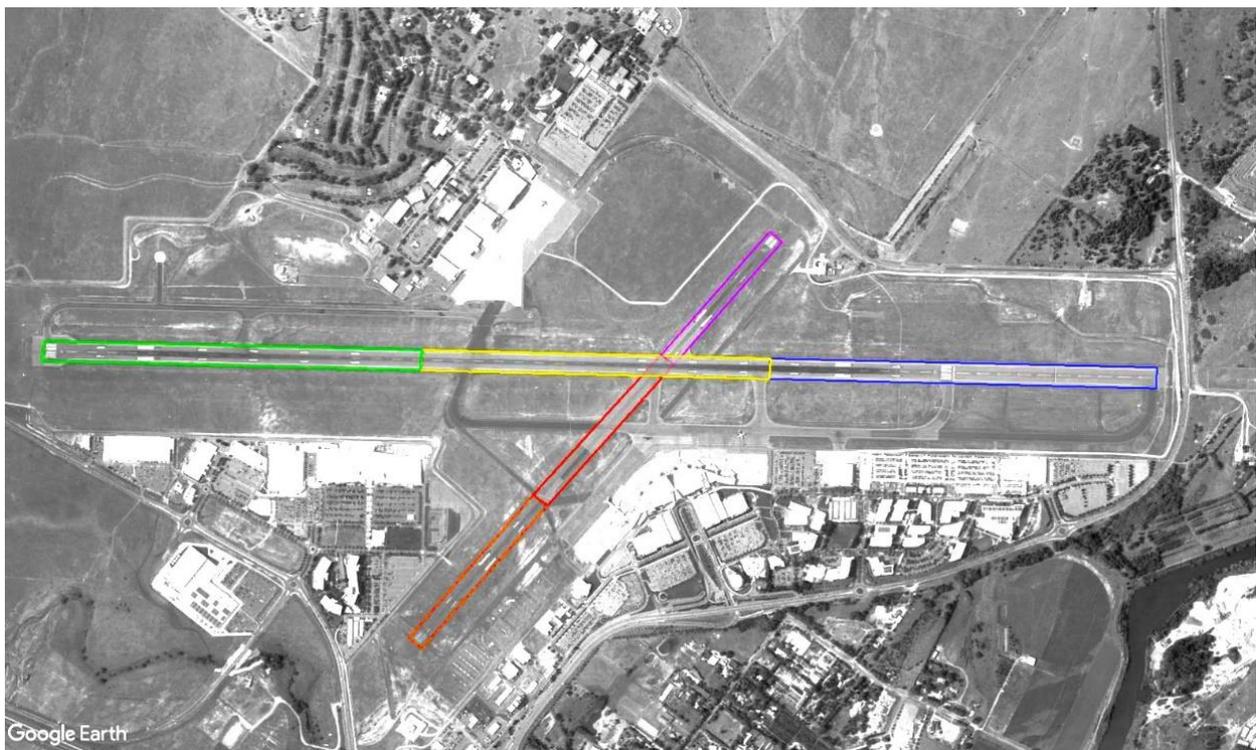
- 3.1.2.1 Due to the prevalence of 'wet only' conditions in Australia, the RWYCC assignment tables in Part 139 MOS Section 12.04A have been spilt into two sections for the convenience of aerodrome operators i.e. 'dry, wet, slippery wet and standing water' and 'other contaminants'.
- 3.1.2.2 In order to create an RCR, aerodrome operators must first assign a RWYCC. This is done by assessing the surface condition description of the runway and allocating the corresponding

code number in accordance with Table 1 below. For example, a runway with 'standing water' on it would be allocated an RWYCC of '2'.

**Table 1. Using a runway surface description to assign a RWYCC (WET and DRY only)**

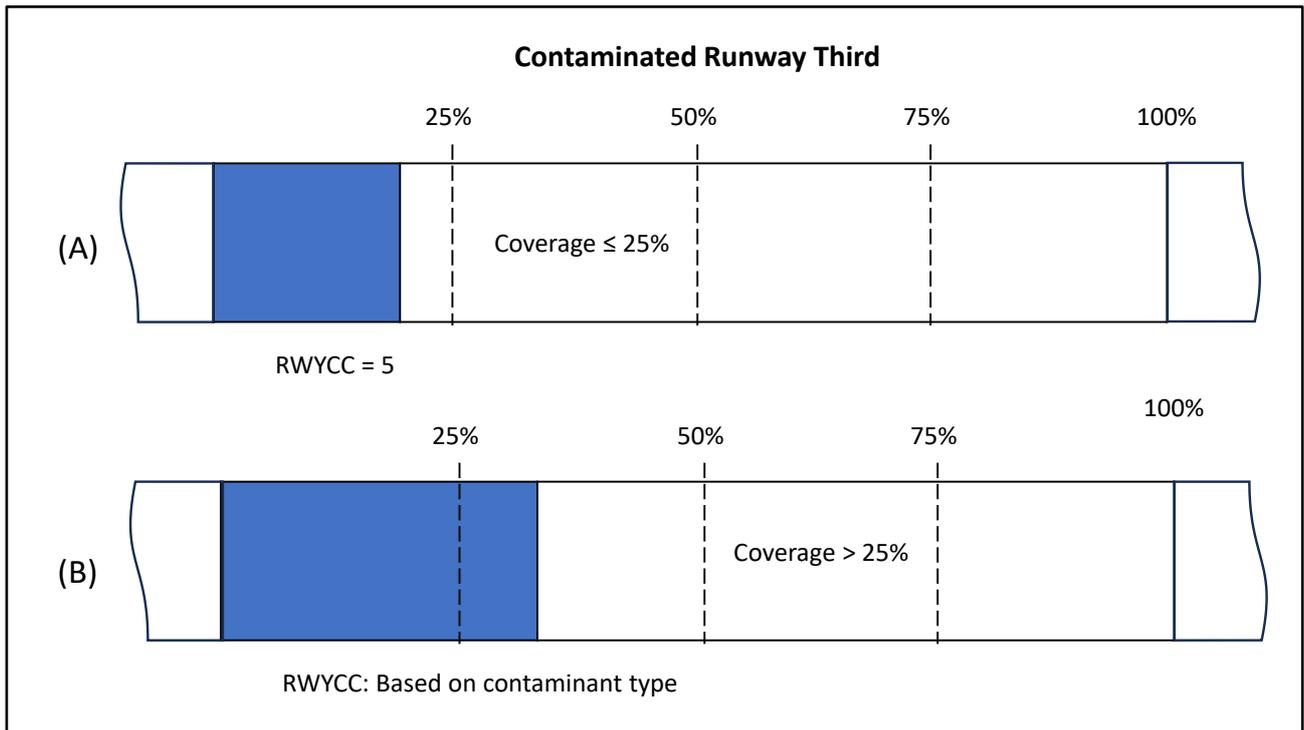
For a runway surface description	Applicable RWYCC
DRY	6
WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth)	5
WET ("slippery wet" runway)	3
STANDING WATER (depth of more than 3 mm)	2

3.1.2.3 Once the RWYCC has been determined, the aerodrome operator needs to make an assessment of which thirds of the runway have been affected. Australia does not require an aerodrome operator to purchase sophisticated and expensive equipment to determine runway thirds. There may be natural infrastructure markers associated with a runway such as taxiway or runway intersections with the affected runway and, in any case, certified aerodrome operators are required to establish obstacle limitation surfaces (OLS) for their runways so should be able to **approximate** the thirds of a runway length. Figure 9 provides an example.



**Figure 9. Depiction of Runway Thirds**

3.1.2.4 If a runway third has 25% or less standing water on its surface it is to be reported as RWYCC 5 and runway surface of description of 'WET'. This indicates to pilots that the surface is not contaminated but that it isn't completely dry either (refer Figure 10 below).



**Figure 10. Depiction of 25% of a Contaminated Runway Third**

3.1.2.5 Report the depth of the standing water if this data is available. When a runway is not in use and there is previous instances of water pooling or ponding following periods of rain, the aerodrome operator could measure the depth of water and record it in their aerodrome manual. This would facilitate easier reporting of it during the next occasion when water is pooling and an RCR is required to be provided.

### 3.1.3 'Slippery wet' runways

3.1.3.1 The surface friction characteristics of a runway, or a portion of it, can become degraded due to rubber deposits (e.g. in the touchdown zone), surface polishing, poor drainage or other factors. The determination that a runway is 'slippery wet' stems from various methods. These methods may be used in isolation or in combination. They may include periodic friction assessment and surface texture evaluation or using a continuous friction measuring device which are available to the aerodrome operator. Other ways for the aerodrome operator to become aware that a runway is 'slippery wet' is by receiving 2 or more consecutive pilot reports or relayed reports from ATC of a reduced braking action for a 'wet' runway that is 'MEDIUM' instead of 'GOOD'.

3.1.3.2 If ATC receive an AIREP by voice communications concerning braking action that is found not to be as good as that reported, they will forward the AIREP to the aerodrome operator, as well as other pilots. This is a prerequisite for using the AIREP for downgrading purposes when assessing the RWYCC. The distribution of AIREPs to aerodrome operators should be subject to an agreement between ATC and the aerodrome operator or between the aircraft operator and the aerodrome operator.

3.1.3.3 AIREPs may be generated by automated systems processing aeroplane data recorded during the deceleration phase. Such reports are less subjective than those generated based on the flight crew's perception alone and may provide additional information. It is therefore encouraged to discriminate between the two types of report origins.

- 3.1.3.4 Various methods are available to aerodrome operators to assess runway surface friction. Appendix C provides guidance to aerodrome operators on various methods to assess changes to the surface friction characteristics of runways.
- 3.1.3.5 As with wet and contaminated runways, a 'slippery wet' runway is required to be assessed in thirds. Due to the particular hazards associated with the reduced surface friction the percentage of each runway third is to be reported in increments of 25% (i.e. 25%, 50%, 75% or 100%).

**Note:** Reporting runway condition as 'slippery wet' does not remove the aerodrome operator's Part 139 MOS responsibility to maintain runways with sealed, concrete or asphalt surfaces in accordance with the surface texture or friction standards and to take corrective action.

### 3.1.4 Other contaminated runways

- 3.1.4.1 There are a limited number of certified aerodromes in Australia that may experience conditions in winter leading to 'frost' or 'snow' on a runway. These will be rare events and there will be a likelihood that these contaminants will not be present on a runway for long periods of time. Even so, an RCR must be issued if there are aeroplanes scheduled to operate, or known to the aerodrome operator to be operating, during these conditions. Due to the limited use of the RCR in these circumstances the Part 139 MOS Section 12.04A table for assigning the RWYCC has been separated for ease of use by affected aerodromes. Refer to Table 2 below to assign a RWYCC for other contaminated runways.
- 3.1.4.2 Other contaminated runways are also required to be reported in thirds of a runway, along with the depth of the contaminant if available.
- 3.1.4.3 If a runway third has 25% or less contaminants on its surface it is to be reported as RWYCC 5 and runway surface of description of 'WET'. This indicates to pilots that the surface is not contaminated but that it isn't completely dry either.

**Table 2. Using a runway surface description to assign a RWYCC for other contaminants**

For a runway surface description	Applicable RWYCC
<ul style="list-style-type: none"> <li>• FROST</li> <li>• SLUSH (up to and including 3 mm depth)</li> <li>• DRY SNOW (up to and including 3 mm depth)</li> <li>• WET SNOW (up to and including 3 mm depth)</li> </ul>	5
<ul style="list-style-type: none"> <li>• COMPACTED SNOW (Outside air temperature minus 15 degrees Celsius and below)</li> </ul>	4
<ul style="list-style-type: none"> <li>• DRY SNOW (more than 3 mm depth)</li> <li>• WET SNOW (more than 3 mm depth)</li> <li>• DRY SNOW ON TOP OF COMPACTED SNOW (any depth)</li> <li>• WET SNOW ON TOP OF COMPACTED SNOW (any depth)</li> <li>• COMPACTED SNOW (outside air temperature above minus 15 degrees Celsius)</li> </ul>	3
<ul style="list-style-type: none"> <li>• SLUSH (more than 3 mm depth)</li> </ul>	2

For a runway surface description	Applicable RWYCC
<ul style="list-style-type: none"> <li>ICE</li> </ul>	1
<ul style="list-style-type: none"> <li>WET ICE</li> <li>WATER ON TOP OF COMPACTED SNOW</li> <li>DRY SNOW OR WET SNOW ON TOP OF ICE</li> </ul>	0

### 3.1.5 Downgrading a RWYCC

3.1.5.1 Initial assignment of a RWYCC is based on the runway surface description. Table 3 below allows an aerodrome operator to downgrade a RWYCC based on 2 or more consecutive pilot reports of a braking action less than that allocated for the RWYCC. The pilot reports can be provided by ATC to the aerodrome operator or directly from the pilot.

**Table 3. Correlation of runway condition code and pilot reports of runway braking action**

Pilot report of runway braking action	Description	RWYCC
N/A		6
GOOD	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	5
GOOD TO MEDIUM	Braking deceleration OR directional control is between good and medium.	4
MEDIUM	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	3
MEDIUM TO POOR	Braking deceleration OR directional control is between medium and poor.	2
POOR	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	1
LESS THAN POOR	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	0

3.1.5.2 Downgrading the RWYCC is an integral part of the assessment process and is essential to making relevant reports of the prevailing runway surface conditions. When all other

observations, experience and local knowledge indicate to trained aerodrome personnel that the primary assignment of the RWYCC does not accurately reflect the prevailing conditions, a downgrade or upgrade can be made. The only RWYCCs which can be upgraded are '1' (ICE) and '0' (WET ICE, WATER ON TOP OF COMPACTED SNOW or DRY SNOW OR WET SNOW ON TOP OF ICE) which are runway surface conditions unlikely to occur in Australia.

### 3.1.5.3 Wet runways

3.1.5.4 RWYCCs are initially assigned based on the runway surface description. Therefore, a 'wet' runway would be assigned a RWYCC of 5 which indicates a braking action of 'GOOD', however, if an aerodrome operator becomes aware (through ATC or pilot reports of braking action) that the braking action is not what is expected of a 'wet' runway e.g. during an ongoing heavy storm then the initial RWYCC can be downgraded using Table 3 - Correlation of runway condition code and pilot reports of runway braking action.

3.1.5.5 Additionally, there may be circumstances (e.g. during extremely heavy rainfall periods) when a 'slippery wet' runway may have even worse braking action than 'MEDIUM'. Table 3 allows for downgrading of the RWYCC, for example, from '3' to '2', based on braking actions reported by the pilot or relayed by ATC.

#### Example:

A RWYCC of 5 is assigned for a 'wet' runway. The aerodrome operator receives multiple reports from ATC that pilots are reporting a braking action of 'GOOD to MEDIUM'. The aerodrome operator can then downgrade the RWYCC to 4 and provide a new RCR to ATC. Note that, if there is an agreement in place between the aerodrome operator and ATC, ATC can report the reduced RWYCC on the ATIS, or to pilots.

### 3.1.5.6 Contaminated runways

3.1.5.7 For runways with 'Standing Water' or 'otherwise contaminated' the same methodology can be used to downgrade a RWYCC. If the reported braking action is not what is expected after the initial assessment, then the RWYCC can be downgraded using Table 3.

#### Example:

A RWYCC of 2 is assigned for a runway with 'Standing Water'. The aerodrome operator receives multiple reports from ATC or from pilots reporting a braking action of 'POOR'. The aerodrome operator must then downgrade the RWYCC to 1 and issue a new RCR.

## 3.2 Reporting

### 3.2.1 RCR — elements

3.2.1.1 The RCR includes:

- aerodrome location indicator
- date and time of assessment
- lower runway designation number (at controlled aerodromes this will be the runway designator for the runway number broadcast on the ATIS)

- RWYCC for each runway third
- If 25% or less of a runway third has standing water or is otherwise contaminated it is to be assigned a RWYCC of 5 and surface description of WET
- percentage coverage of each runway third for slippery wet runways
- contaminant depth, if available
- surface description for each runway third.

3.2.1.2 The sources of information for each element of the RCR are in Table 4 below:

**Table 4. Runway condition report (RCR) - Aeroplane performance calculation section**

Information	Source
Aerodrome location indicator.	AIP-ERSA.
Date and time of assessment.	UTC/Local time.
Lower runway designation number.	Actual runway.
RWYCC for each runway third.	Assignment based on runway surface description.
Percentage coverage of runway third.	Visual observation for each runway third.
Depth of contaminant for each runway third.	Visual observation for each runway third, confirmed by measurements when appropriate.
Runway surface description for each runway third.	Visual observation for each runway third.

### 3.2.2 RCR — format

3.2.2.1 The format of the information to be included in RCR is as follows:

- a. Aerodrome Y-code location indicator

Format: nnnn

Example: YXXX

- b. Date and time of assessment: date and time (UTC or local time)

Format: MMDDhhmm

Example: 07152357

- c. Lower runway designation number: a two- or three-character number identifying the runway for which the assessment is carried out and reported

Format: RWY nn[L] or nn[C] or nn[R] or nn

Example: RWY 09L

**Note:** At controlled aerodromes the runway designation number will be the runway designator for the runway number broadcast on the ATIS.  
The ICAO RCR format does not require 'RWY' to be inserted in front of the runway number, however due to the infrequent usage expected in Australia, a string of

numbers separated by obliques may be confusing to pilots from a human factor's perspective. Additionally, automated NOTAM processing systems may benefit from being able to search on the key word 'RWY'.

- d. RWYCC for each runway third: a one-digit number identifying the RWYCC assessed for each runway third. The codes are reported in a three-character group separated by a “/” for each third. The direction for listing the runway thirds shall be in the direction as seen from the lower designation number.
- Format: n/n/n
- Example: 5/5/2
- e. Percentage coverage of a SLIPPERY WET runway separated by an oblique stroke “/” For runway thirds that are not affected they are reported as 'NR' for 'not reported'.
- Format: nn/nn/nn
- Example: 25/NR/NR
- f. Depth of STANDING WATER or contaminant (if available) separated by an oblique stroke “/” For runway thirds that are not affected they are reported as 'NR' for 'not reported'.
- Format: nn/nn/nn
- Example: 05/07/NR
- g. Surface description for each runway third: to be reported in capital letters. The condition type is reported by any of the following condition type descriptions for each runway third and separated by an oblique stroke “/”.
- Format: aaa/aaa/aaa
- Example: WET/WET/STANDING WATER

### 3.2.3 RCR reporting

- 3.2.3.1 ICAO has produced a Runway Condition Assessment Worksheet to assist aerodrome operators to assess and record runway surface conditions. The Runway Condition Assessment Worksheet for wet runways is reproduced at Appendix B and the editable or printable version is available on ICAO's website:

[RCA Worksheet wet condition\\_041218.cdr \(icao.int\)](#)

An additional 'winter' worksheet is also available:

[RCA Worksheet\\_041218.cdr \(icao.int\)](#)

- 3.2.3.2 Figure 11 below summarises the reporting of RCRs to ATC, AIS or to pilots.

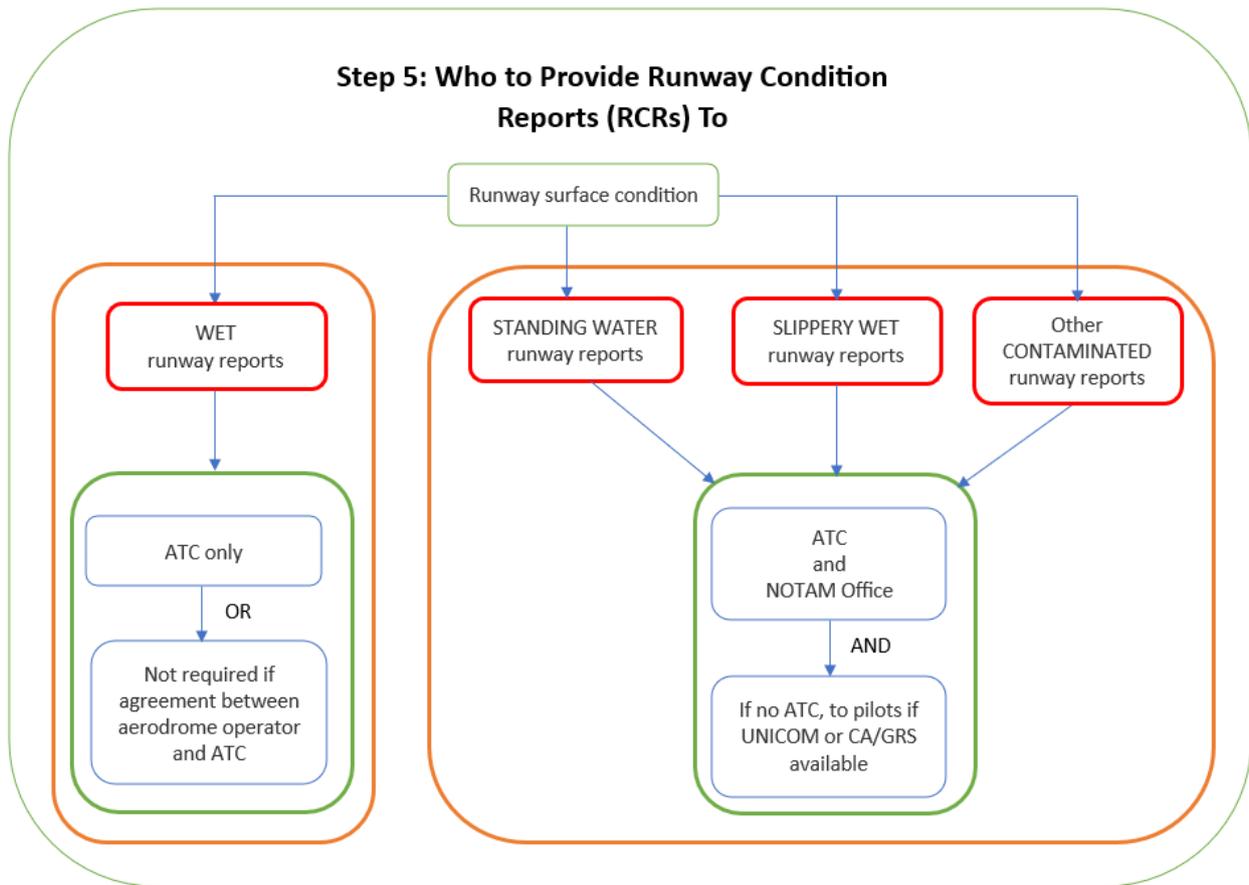


Figure 11. Summary of provision of RCRs

### 3.2.4 Wet or standing water reports

- 3.2.4.1 Runways that are 'wet' only need to be reported to ATC, and not to AIS (refer Table 5). This is only the case when ATC are present in the control tower as some towers do not operate 24 hr/7 days a week. If there is an agreement in place between the aerodrome operator and ATC (Airservices Australia), then ATC can conduct the assessment and reporting for wet runways only, during the control tower hours of operation.
- 3.2.4.2 ATC can provide the RCR via the ATIS or through voice communications to pilots using standard phraseologies.
- 3.2.4.3 An ATIS presents a very important means of transmitting information, relieving operational personnel from the routine duty of transmitting runway conditions and other relevant information to the flight crew. In addition to normal operational and weather information, the following information about the runway surface condition should be mentioned whenever the runway is not dry (RWYCC 6):
  - a. operational runway in use at time of issuance
  - b. RWYCC for the operational runway, for each runway third in the operational direction; and
  - c. Surface condition description, for each third
- 3.2.4.4 When transmitting information on runway surface conditions by ATIS to flight crews, the sections are referred to as the first, second or third part of the runway. The first part always means the

first third of the runway as seen in the direction of landing or take-off. This is different to reporting to AIS which is the lower runway number being reported first, as operational direction will not necessarily be known by the aerodrome operator.

- 3.2.4.5 'Standing water' RCRs are to be provided to both ATC and AIS in the format prescribed in paragraph 3.2.2.
- 3.2.4.6 Some aerodromes have UNICOM services or CA/GRS and in these cases, if possible, the aerodrome operator should provide the 'Standing Water' RCR directly to the pilot, as well as AIS.
- 3.2.4.7 Figures 12 and 13 demonstrate a complete information string prepared for 'wet' or 'standing water' runway condition reports:

**WET ONLY RUNWAY:**



The diagram shows a runway divided into three equal sections by vertical yellow lines. Each section is labeled 'WET' and 'RWYCC = 5'. The runway number '16' is on the left end and '34' is on the right end. The runway is represented by a dark blue bar with white dashed lines and white vertical bars at the ends.

**ATIS:**

**MELBOURNE TERMINAL INFORMATION CHARLIE, EXPECT INSTRUMENT APPROACH, RUNWAY 34, SURFACE CONDITION CODE 5, 5, 5, WET, WET, WET, WIND 325 DEGREES/15 KNOTS etc**

**ATC:**

**RUNWAY 34 SURFACE CONDITION CODE 5, 5, 5, WET, WET, WET**

**Note:** NOTAMs are not issued for WET runways. RCRs are provided via the ATIS or ATC. Additionally, at controlled aerodromes the RCR will not necessarily be the lower runway number designator, but the direction of the runway in use.

Figure 12. WET runway reporting format

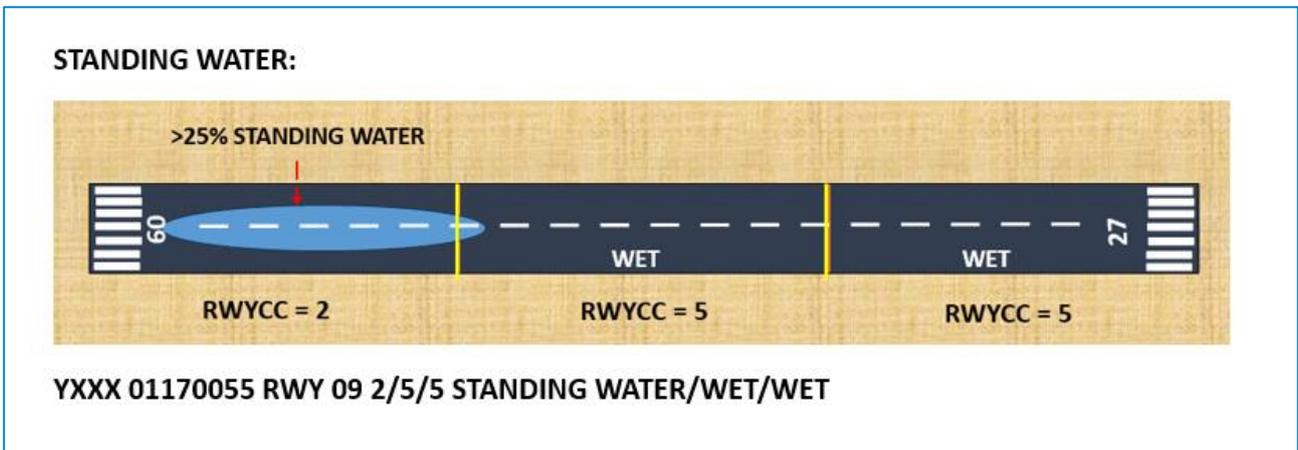


Figure 13. STANDING WATER runway reporting format

3.2.4.8 Figure 14 demonstrates a complete information string prepared for 'standing water' runway condition reports, when depth of 'standing water' is available:

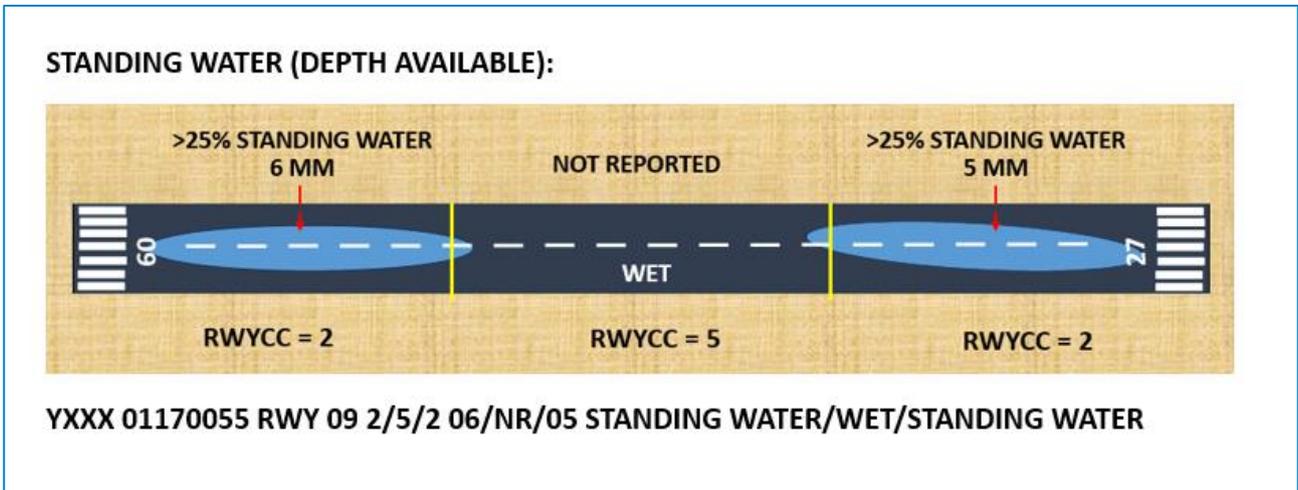


Figure 14. STANDING WATER runway (depth available) reporting format

Figure 15 demonstrates a complete information string prepared for 'standing water' runway condition reports, when 25% or less of any runway third has 'standing water':

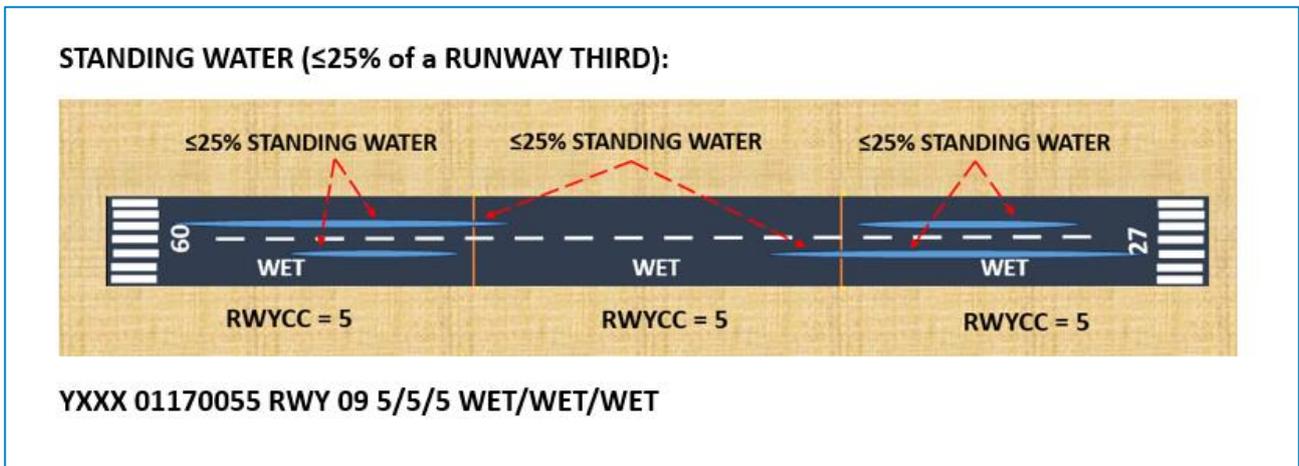


Figure 15. STANDING WATER runway (with 25% or less of a runway third) reporting format

Table 5. Reporting Runway Surface Conditions (Wet only)

RWYCC	Runway surface description	Report made available to
5	WET	(a) ATC (if available); or (b) not required if agreement between aerodrome operator and ATC.
2	STANDING WATER	(a) the NOTAM Office, and ATC (if available); and (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.

### 3.2.5 'Slippery wet' runway reports

3.2.5.1 As discussed in paragraph 3.1.2.5, 'slippery wet' runways are particularly hazardous to aircraft operations due to the nature of the runway surface providing less than the required or expected surface friction.

**Note:** In Australia, runway surface description 'SLIPPERY WET' will be included in the RCR to provide additional safety awareness of the risk to operations on a wet runway with a braking action of 'MEDIUM'.

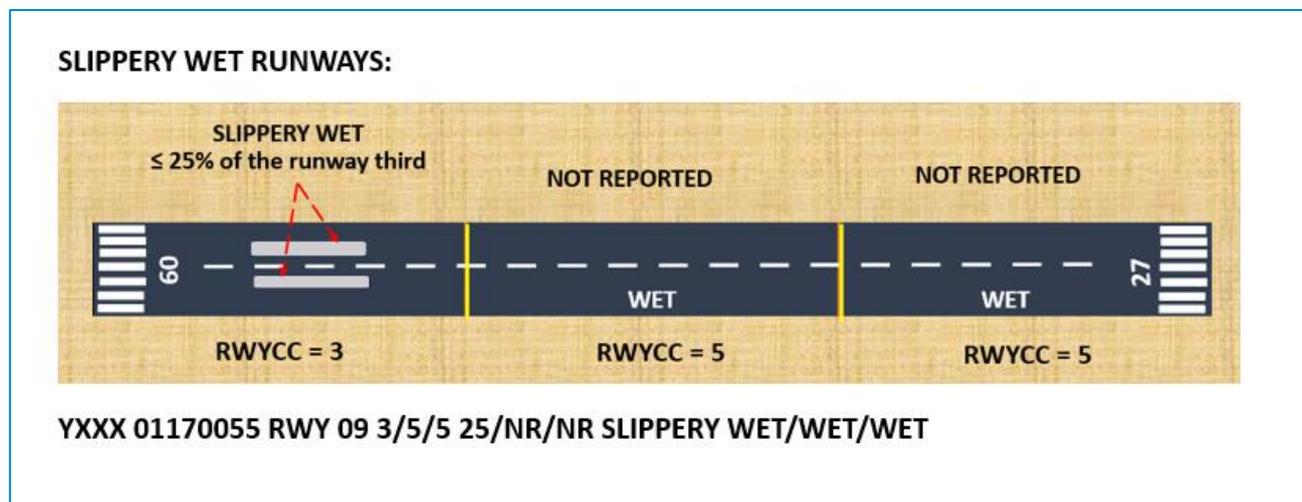
3.2.5.2 'Slippery wet' RCRs are to be provided to both ATC and AIS in the format prescribed in paragraph 3.2.2. Some aerodromes have UNICOM services or CA/GRS and in these cases, if possible, the aerodrome operator should provide the RCR directly to the pilot, as well as AIS. Refer to Table 7 for reporting requirements of 'slippery wet' runways.

3.2.5.3 The percentage of a runway third is to be assessed and reported as shown in Table 6:

Table 6. Assessing and reporting percentages of a runway third (Slippery wet only)

Assessed per cent	Reported per cent
10 - 25	25
26 - 50	50
51 - 75	75
76 - 100	100

3.2.5.4 Figure 16 demonstrates a complete information string prepared for 'slippery wet' runway condition reports, along with percentage coverage:



**Note:** The percentage reported of a runway third for SLIPPERY WET runways is the total percentage for the runway third i.e. 25%, 50%, 75% or 100%.

Figure 16. SLIPPERY WET runway (with percentages of runway thirds) reporting format

Table 7. Reporting Runway Surface Conditions (Slippery wet only)

RWYCC	Runway surface description	Report made available to
3	SLIPPERY WET	(a) the NOTAM Office, and ATC (if available); and  (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.

### 3.2.6 Other contaminated runway reports

3.2.6.1 The remaining contaminated runway RCRs are to be provided to both ATC and AIS in the format prescribed in paragraph 3.2.2. Some aerodromes have UNICOM services or CA/GRS

and in these cases, if possible, the aerodrome operator should provide the RCR directly to the pilot, as well as AIS. Refer to Table 8 for reporting requirements of 'other contaminated' runways.

3.2.6.2 Figure 17 demonstrates a complete information string prepared for 'frost' runway condition reports:

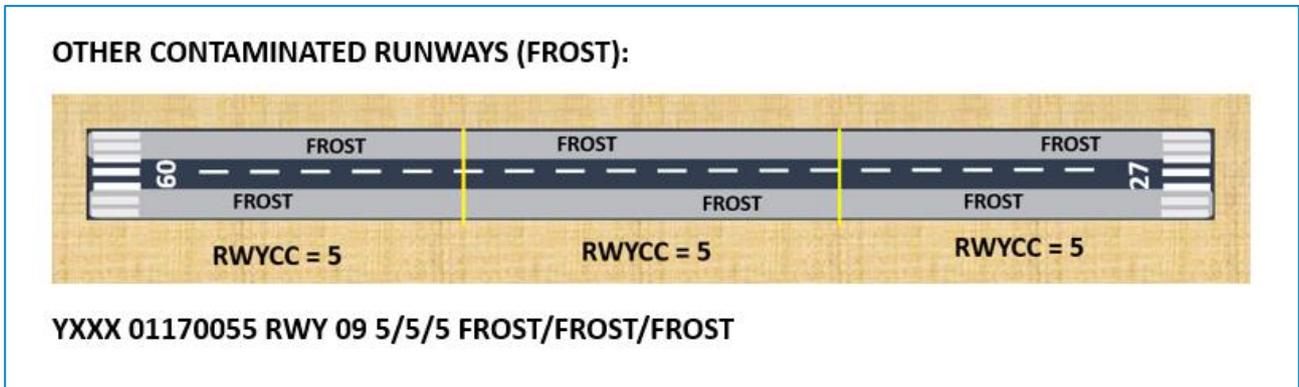


Figure 17. Contaminated runway (FROST) reporting format

3.2.6.3 Figure 18 demonstrates a complete information string prepared for 'snow' runway condition reports:

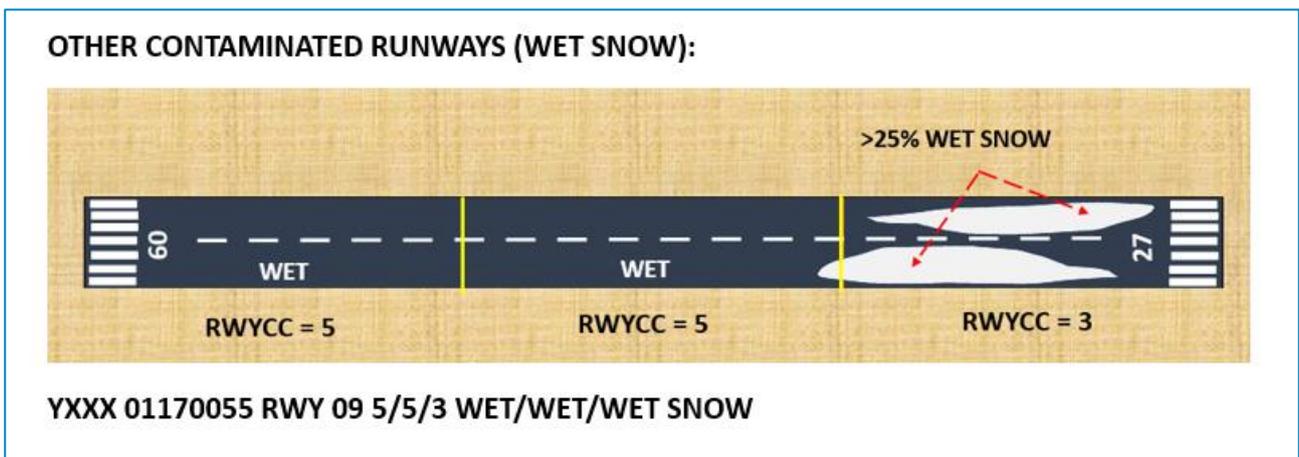


Figure 18. Contaminated runway (WET SNOW) reporting format

3.2.6.4 Figure 19 demonstrates a complete information string prepared for 'snow' runway condition reports, when depth of snow' is available:

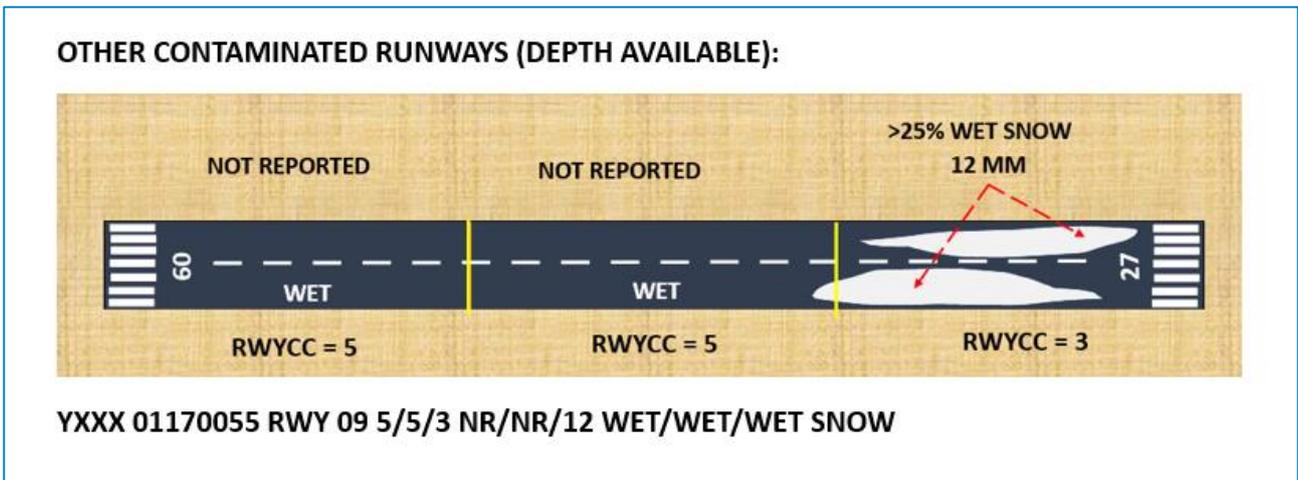


Figure 19. Contaminated runway (with depth of contaminant available) reporting format

3.2.6.5 Figure 20 demonstrates a complete information string prepared for 'snow' runway condition reports, when 25% or less of any runway third has 'snow':

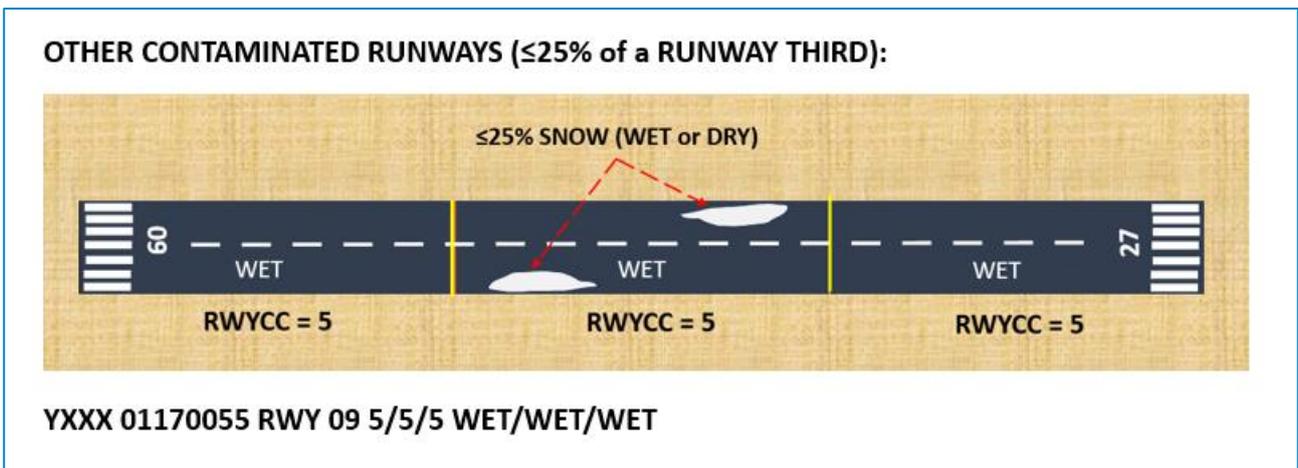


Figure 20. Contaminated runway (with 25% or less of a runway third) reporting format

Table 8. Reporting Runway Surface Conditions (Other contaminants)

RWYCC	Runway surface description of:	Report made available to
5	<p>FROST</p> <p><b>Up to and including 3 mm depth:</b>                      SLUSH                      DRY SNOW                      WET SNOW</p>	<p>(a) the NOTAM Office, and ATC (if available); and</p> <p>(b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.</p>

RWYCC	Runway surface description of:	Report made available to
4	<b>-15°C and Lower outside air temperature:</b> COMPACTED SNOW	(a) the NOTAM Office, and ATC (if available); and  (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.
3	DRY SNOW or WET SNOW (any depth) ON TOP OF COMPACTED SNOW  <b>More than 3 mm depth:</b> DRY SNOW WET SNOW  <b>Higher than -15°C outside air temperature:</b> COMPACTED SNOW	(a) the NOTAM Office, and ATC (if available); and  (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.
2	<b>More than 3 mm depth:</b> SLUSH	(a) the NOTAM Office, and ATC (if available); and  (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.
1	ICE	(a) the NOTAM Office, and ATC (if available); and  (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.
0	WET ICE WATER ON TOP OF COMPACTED SNOW DRY SNOW or WET SNOW ON TOP OF ICE	(a) the NOTAM Office, and ATC (if available); and  (b) if ATC is not available — pilots, but only where the aerodrome operator has available UNICOM, or CA/GRS.

### 3.2.7 Displaced thresholds

3.2.7.1 For runways with displaced thresholds, the thirds of the runway to be reported are thirds of the take-off run available (TORA). Also as stated in paragraph 2.4.4, when ATC provide the RCR they report the runway direction in use as indicated on the ATIS. Figure 21 depicts reporting of runways with displaced thresholds:

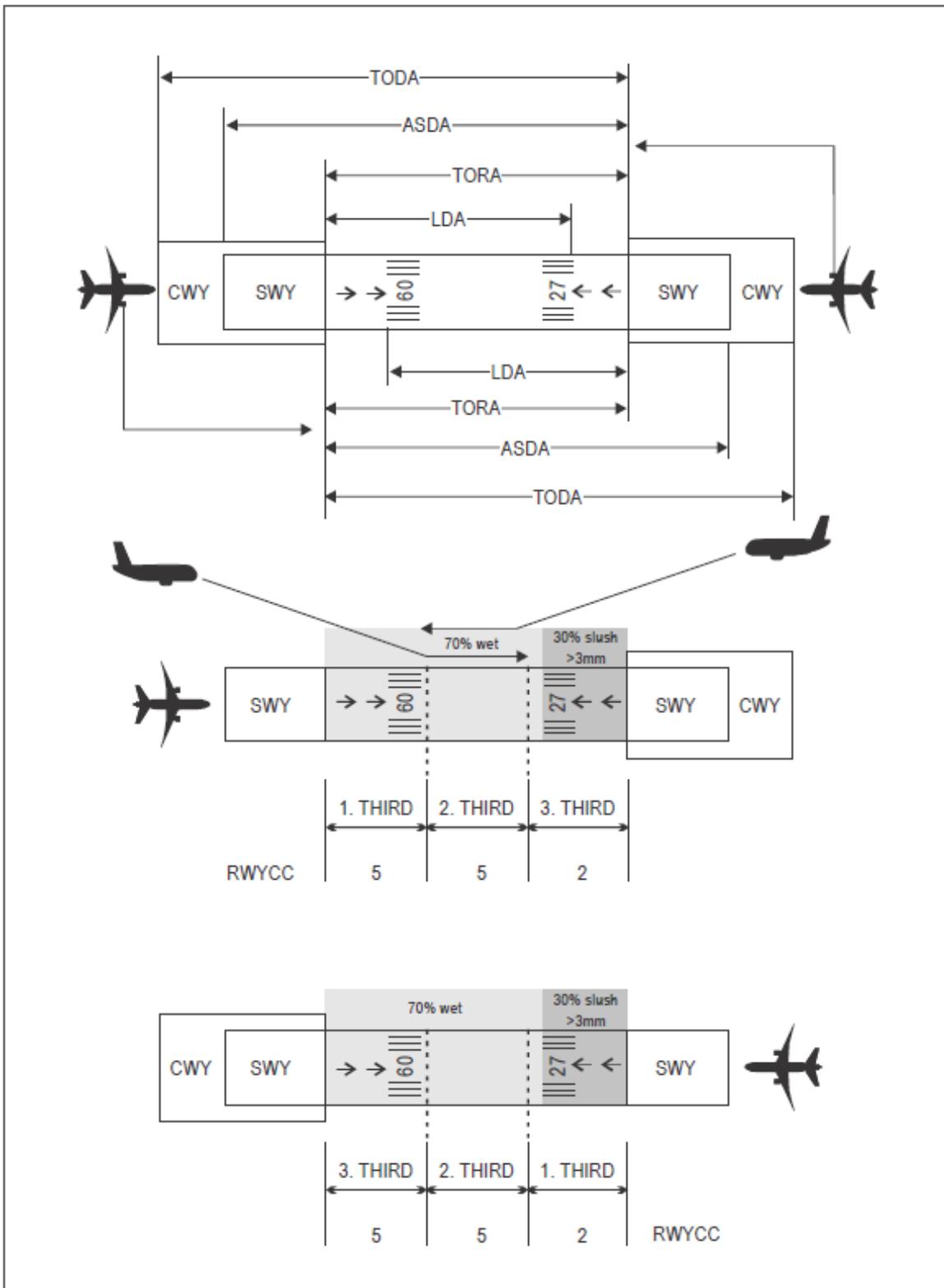


Figure 21. Reporting of RWYCC for runway thirds from ATS to flight crew on a runway with displaced threshold (ICAO Cir 355)

# Appendix A

## Runway Condition Assessment Matrix (RCAM)

Assessment criteria		Downgrade assessment criteria	
Runway Condition Code (RWYCC)	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action
6	<ul style="list-style-type: none"> <li>DRY</li> </ul>	-	-
5	<ul style="list-style-type: none"> <li>FROST</li> <li>WET (runway surface is covered by any visible dampness or water up to and including 3 mm depth)</li> </ul> <p><b>Up to and including 3 mm depth:</b></p> <ul style="list-style-type: none"> <li>SLUSH</li> <li>DRY SNOW</li> <li>WET SNOW</li> </ul>	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
4	<p><b>-15°C and Lower outside air temperature:</b></p> <ul style="list-style-type: none"> <li>COMPACTED SNOW</li> </ul>	Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM
3	<ul style="list-style-type: none"> <li>WET (“slippery wet” runway)</li> <li>DRY SNOW or WET SNOW (any depth) ON TOP OF COMPACTED SNOW</li> </ul> <p><b>More than 3 mm depth:</b></p> <ul style="list-style-type: none"> <li>DRY SNOW</li> <li>WET SNOW</li> </ul> <p><b>Higher than -15°C outside air temperature<sup>1</sup>:</b></p> <ul style="list-style-type: none"> <li>COMPACTED SNOW</li> </ul>	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	<p><b>More than 3 mm depth of water or slush:</b></p> <ul style="list-style-type: none"> <li>STANDING WATER</li> <li>SLUSH</li> </ul>	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR

Assessment criteria		Downgrade assessment criteria	
1	<ul style="list-style-type: none"> <li>ICE</li> </ul>	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR
0	<ul style="list-style-type: none"> <li>WET ICE</li> <li>WATER ON TOP OF COMPACTED SNOW</li> <li>DRY SNOW or WET SNOW ON TOP OF ICE</li> </ul>	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

# Appendix B Runway Condition Assessment Worksheet - Wet runway surface conditions

### Runway Condition Assessment Worksheet

Aerodrome

Date/Time (UTC) of assessment (MMDDhhmm)

Lower Runway Designator

Initials

Is more than 25% of any runway third surface wet or contaminated?

**Yes - assign Runway Condition Codes for each third and complete RWY Condition Report (Blue Box)**

**No - No report created**

Note: RWYCC 6/6/6 for all runway thirds may be used to indicate that the runway is no longer wet

1st RWY Third	2nd RWY Third	3rd RWY Third
For coverage 25% or less enter Code 6 - Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right	For coverage 25% or less enter Code 6 - Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right	For coverage 25% or less enter Code 6 - Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right
Dry 6	Dry 6	Dry 6
Wet (Damp) 5 Wet 3 (Slippery wet runway) (Below Min Friction Level Classification) % Cov. 25/50/75/100	Wet (Damp) 5 Wet 3 (Slippery wet runway) (Below Min Friction Level Classification) % Cov. 25/50/75/100	Wet (Damp) 5 Wet 3 (Slippery wet runway) (Below Min Friction Level Classification) % Cov. 25/50/75/100
Standing water >3mm 2 % Cov. 25/50/75/100 Depth: 4mm Assessed depth (mm):	Standing water >3mm 2 % Cov. 25/50/75/100 Depth: 4mm Assessed depth (mm):	Standing water >3mm 2 % Cov. 25/50/75/100 Depth: 4mm Assessed depth (mm):

Situational Awareness Section / Notes

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TWY \_\_\_\_\_ Poor

Apron \_\_\_\_\_ Poor

Other \_\_\_\_\_

State approved CFME Braking coefficient

MJI not to be transmitted in RWY Condition Report

RCR

Aerodrome    Date & Time    RWY    RWYCC    % Coverage    Depth in mm

Contaminant Type 1st third    Contaminant Type 2nd third    Contaminant Type 3rd third

Plain language remarks

Adjusted RWYCC

ONLY if Downgrade/ Upgrade Assessments used

Downgrade/ Upgrade Criteria

AIREP     CFME     Other

Figure 22. Runway Condition Assessment Worksheet - Wet runway surface conditions

# Appendix C Assessment methods for monitoring runway surface friction characteristics

**Table A1: Assessment methods for monitoring trend of change to surface friction characteristics**

Inspection method	Assessment results	Rubber build-up	Geometry change	Polishing
Visual – macrotexture	Visual assessment will only give a very crude assessment of the macrotexture. Extensive rubber build-up can be identified.	X		
Visual – microtexture	Visual assessment will give a very crude assessment of the microtexture and to what degree the microtexture has been filled and covered by rubber.	X		
Visual – runway geometry (ponding)	Visual assessment during a rain storm and subsequent drying process of the runway will reveal how the runway drains and if there have been any changes to runway geometry causing ponding. Depth of any pond can be measured by a ruler or any other appropriate depth measurement method/tool.		X	
By touch – macrotexture	Assessment by touch can differentiate between degree of loss of texture but not quantifying it.	X		
By touch – microtexture	Assessment by touch can identify if microtexture has been filled in/covered by rubber build-up.	X		
Sand (glass) patch method (MTD)	Measure a volume – Mean Texture Depth (MTD). The sand (glass) patch method is not identical to the grease smear method. There is at present no internationally accepted relationship between the two methods.	X		
Laser – stationary (MPD)	Measure a profile – Mean Profile Depth (MPD). There is no established relationship between MTD and MPD. The relationship must be established for the laser devices used and the preferred volumetric measurement method used.	X		
Laser – moving (MPD)				

Inspection method	Assessment results	Rubber build-up	Geometry change	Polishing
Friction measurement – controlled applied water depth	<p>A friction measurement is a system output which includes all the surface friction characteristics and characteristics of the measuring device itself. All other variables than those related to the surface friction characteristics must be controlled in order to relate the measured values to the surface friction characteristics.</p> <p>The system output is a dimensionless number which is related to the surface friction characteristics and as such is also a measure of macrotexture. (The system generated number needs to be paired with other information (assessment methods) to identify which surface friction characteristics significantly influence the system output.)</p> <p>It is recognized that there is currently no consensus within the aviation industry on how to control the uncertainty related to repeatability, reproducibility and time stability. It is paramount to keep this uncertainty as low as possible, consequently ICAO has tightened the Standards associated with use of friction measurement devices, including training of personnel who operate the friction measuring devices.</p>	X		X
Friction measurement – natural wet conditions	Friction measurements performed under natural wet conditions during a rain storm might reveal if portions of a runway are susceptible to ponding and/or to fall below State set criteria.	X	X	X
Modelling of water flow and prediction of water depth	Emerging technologies based on the use of a model of the runway surface describing its geometrical surface (mapped) and paired with sensor information of water depth allow real-time information and thus a complete runway surface monitoring, and anticipation of water depths.		X	



## D.2.3 RCR

D.2.3.1 Format and updating:

- Downgrade and upgrade criteria
- Aeroplane performance section
- Timeliness - significant changes
- Pilot report - AIREP Special
- "DRY and WET" or "SNOW and ICE" runway surface conditions

## D.2.4 Reporting to

D.2.4.1 ATC:

- ATIS

D.2.4.2 AIM:

- NOTAM format (Field E)

D.2.4.3 Pilots:

- UNICOM
- CA/GRS

D.2.4.4 Coordination with ATC for:

- runway entry
- timing of inspections
- dissemination of results

## D.2.5 “Slippery wet” runway

D.2.5.1 Assessment:

- Friction measuring devices
- Friction testing

D.2.5.2 Pilot report:

- Braking action
- Assigning RWYCC

D.2.5.3 AIM:

- "Slippery Wet" NOTAM

## D.2.6 Documents and records

D.2.6.1 Recommended documentation:

- Aerodrome manual
- ICAO Circular 355 etc

# Appendix E

## Training Syllabus - Contaminated runway operations

### E.1 Aircraft operators and pilots

- E.1.1 This appendix provides an example of a syllabus for training flight crew using theGRF. The examples are provided to support Part 139 MOS requirements for runway surface condition inspection, assessment and reporting.
- A.1.1 Online courses are also available for aircraft operators and flight crew through ICAO, in association with the International Air Transport Association (IATA):  
[The New Global Reporting Format for Runway Surface Conditions \(icao.int\)](https://www.icao.int/publications/Pages/default.aspx?lang=en&id=12345)
- E.1.2 Training and actual operations should be based on the fact that the assessment of the runway condition, friction measurement and estimation of braking action are not an exact science. Pilots should understand that the actual safety margins get smaller when conditions get worse and, at the same time, the assessment of the runway condition becomes more difficult in deteriorating weather. Therefore, the RCAM, RWYCCs and braking action are adaptive tools in decision-making rather than operating norms or rules. For example, a calculated 1 m margin in landing distance does not necessarily mean that the landing will be safe; the pilot must use their best judgement, taking different variables into account and cross-checking between sources when making decisions.
- E.1.3 It is also good airmanship to determine how small changes in runway and/or weather conditions affect operations, for instance, how the downgrading of the RWYCC by one level or a predetermined wind change affect operations. It is good crew resource management (CRM) to make some predetermined decisions regarding deteriorating conditions. These “canned decisions” improve situational awareness, help in late-stage decision-making and improve workload management.

**Note:** Items marked with an asterisk (\*) are directly linked to runway surface condition reporting.

### E.2 Example list of subjects for training pilots on contaminated runway operations

#### E.2.1 General

- E.2.1.1 Contamination:
- Definition\*
  - Contaminants that cause increased drag and therefore affect acceleration, and contaminants that cause reduced braking action and affect deceleration
  - Slippery when wet: status\*

- 
- E.2.1.2 Contaminated runway
- Runway surface condition descriptors\*
  - Operational observations with friction devices\*
  - Operator's policy on the use of:
    - reduced take-off thrust
    - runway thirds in take-off and landing performance calculations; and
    - low visibility operations and autoland.
  - Stopway
  - Grooved runway
- E.2.1.3 RWYCCs\*:
- RCAM\*
    - Differences between those published for aerodromes and flight crew\*
    - Format in use\*
    - The use of runway friction measurements\*
    - The use of temperature\*
    - The concept of performance categories and ICAO runway surface condition codes\*
    - Interpretation of "slippery wet"
    - Downgrade/upgrade criteria\*
    - Difference between a calculation and an assessment\*
  - Braking action\*
    - Reporting of LESS THAN POOR → no operations
  - Use of aircraft wind limit diagram with contamination
- E.2.1.4 RCR:
- Refer to Doc 10064
- E.2.1.5 Aeroplane performance Manual):
- Availability\*
  - Validity\*
  - Performance and situational awareness\*
  - Decoding\*
  - Situational awareness (reference: Doc 10064)\*
- E.2.1.6 Aeroplane control in take-off and landing (refer Doc 10064 Aeroplane performance Manual):
- Lateral control:
    - Windcock effect
    - Effect of reversers
    - Cornering forces

- Crosswind limitations:
  - » Operations if cleared runway width is less than published width
- Longitudinal control:
  - V1 correction in correlation with minimum control speed on ground
  - Aquaplaning
  - Anti-skid
  - Autobrake
- E.2.1.7 Take-off distance:
  - Acceleration and deceleration
  - Take-off performance limitations
  - Take-off distance models
  - Factors involved
  - Reason for using the type and depth of contaminant instead of RWYCC\*
  - Safety margins
- E.2.1.8 Landing distance:
  - Model for distance at time of landing
  - Factors involved
  - Safety margins:
    - Minimum equipment list (MEL) does not include any additional margins (e.g. 15%)
- E.2.1.9 ICAO differences in runway reporting:
  - States that do not comply with ICAO\*

## E.2.2 Flight planning

- E.2.2.1 Flight planning requirements:
  - Dispatch/in-flight conditions
  - MEL/configuration deviation list (CDL) items affecting take-off and landing performance
  - Operator's policy on variable wind and gusts
- E.2.2.2 Landing performance at destination and alternates:
  - Selection of alternates if airport is not available due to runway conditions
    - En-route
    - Destination alternates
  - Number
  - Runway condition

## E.2.3 Take-off

- E.2.3.1 Take-off operations:
- Runway selection
  - Take-off from a wet or contaminated runway

## E.2.4 In-flight operations

- E.2.4.1 Landing distance:
- Distance at time of landing calculations
    - Considerations for flight crew (reference: Doc 10064)\*
    - Operator's policy
  - Factors involved
  - Runway selection for landing
  - Safety margins
- E.2.4.2 Use of aircraft systems:
- Brakes/autobrakes
  - Difference between friction-limited braking and different modes of autobrakes
  - Reversers
  - Aeroplane as a friction-measuring and/or reporting system

## E.2.5 Landing techniques

- E.2.5.1 Procedures for conducting landings:
- Pilot procedures and flying techniques when landing on length-limited runway (reference: Doc 10064)
  - Use of the Engineered Materials Arresting System (EMAS) in case of overrun

## E.2.6 Safety considerations

- E.2.6.1 Impacts on safety:
- Possible types of errors\*
  - Mindfulness principles necessary for high reliability\*

## E.2.7 Documents and records\*

- E.2.7.1 Recommended documentation:
- Aircraft Flight Manual
  - ICAO Circular 355 etc

## E.2.8 AIREP Specials

**Reference:** AIP ENR 1.1 Appendix 1

E.2.8.1 Requirements for reporting braking action:

- Assessment of braking action\*
- Terminology\*
- Possible automated AIREPs\* (aeroplane as a friction-measuring and reporting system)
- Air safety reports if flight safety has been compromised.