Australian Government
Bureau of Meteorology

YBBN Air Traffic Operations

Brisbane is the third busiest international airport in Australia consisting of two parallel runways in the direction 01R/19L magnetic and 01L/19R magnetic

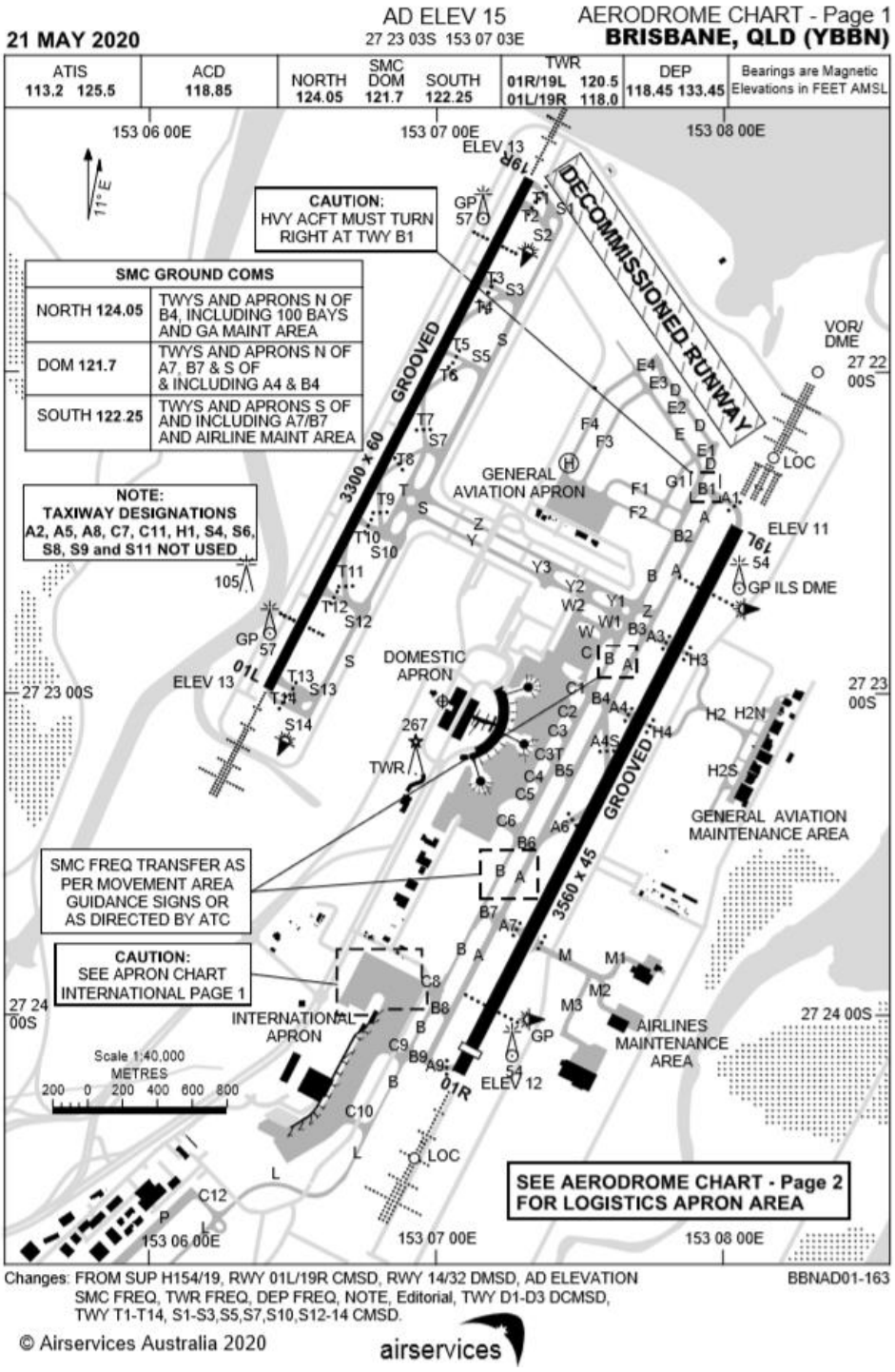

Figure 1. Brisbane Airport Aerodrome Chart. Source: Departure and Approach Procedures (DAP) 163, Airservices Australia. Effective 21 May 2020.

Noise Abatement

There is no curfew at Brisbane airport. However, noise abatement procedures apply, and there are preferred runway operations during both day (0600 to 2200 hours local) and night (2200 to 0600 hours local) during normal operations. These are subject to wind, cloud ceiling, visibility and critical operational requirements.

Refer to the current AIP Departure and Approach Procedures (DAP), Aerodrome and Procedure Charts, for this aerodrome – available from Airservices Australia.

Terminal Area (TMA)

This term is used to describe the designated area of controlled airspace surrounding a major airport where there is a high volume of traffic. The Terminal Area (TMA) is a 30NM radial area surrounding Brisbane Airport.

The TMA is divided into segments called corridors for arriving and departing aircraft. For Brisbane Airport the main airport arrival corridors are to the north and south.

Airport Acceptance Rates (AAR)

A maximum planned airport acceptance rate (AAR) of 48 is ultimately expected to occur during the use of both parallel runways for arrivals in independent (IND) runway operations. The AAR is related to the spacing between arriving aircraft and may be adjusted due to a number of factors, including meteorological factors such as cloud ceiling and visibility (see Tables 4a and 4b).

Ground Delay Program

Airservices Australia run a Ground Delay Program (GDP) for Brisbane Airport. A special software application called Harmony (produced by Metron Aviation) is an advanced Air Traffic Flow Management (ATFM) application capable of simultaneously managing traffic flows at multiple airports.

Essentially, when delays are foreseen to occur because of demand exceeding the expected capacity, these delays are assigned to the aircraft at their location of departure, rather than in the air in the vicinity of their destination (i.e. Brisbane).

An aircraft that departs significantly before their assigned Calculated Off-Blocks Time (COBT) will be given enroute delays to meet their programmed time of landing. Aircraft that complied with their assigned COBT will be given priority. The maximum benefit of the system will only occur if all users comply.

The Harmony application is run at the Airservices Network Coordination Centre (NCC).

The Bureau's NCCMET staff are co-located at the NCC and supply additional information critical to decisions surrounding the running of the Ground Delay Programs.

The ground delay program can be revised at any time yet will only impact flights that have not departed yet.

MET CDM

NCCMET advises a tailored runway configuration and AAR forecast (MET CDM rate) for Air Traffic Control (ATC), based on a forecast of various meteorological parameters for the airport during the period of the GDP. This forecast is discussed with the airline meteorologists and presented to ATC for modification and sign-off, a process which is known as 'Meteorological Collaborative Decision Making' (MET CDM).

The MET CDM forecast is a monitored forecast and currently forms the main input for the Brisbane GDP.

Runway Direction

It is important to remember that although runway direction is annotated in magnetic bearings, wind direction is reported in degrees true. The conversion for Brisbane Airport is as follows:

Table 1: Brisbane Runway Direction Conversion Table.

Runways	Magnetic	True
01R / 01L	016 / 016	027 / 027
19L / 19R	196 / 196	207 / 207

* Please note that you refer to a runway direction as it is being travelled on. For example, using RWY19L or RWY19R means landing and departing towards the SSW. This as opposed to how meteorologists report wind direction.

Nomination of Runways

The nomination of runway is determined by Air Traffic Control (ATC) using a preferred landing or take-off direction. ATC shall not nominate a particular runway for use if an alternative runway is available, when:

Table 2: Runway Wind Thresholds

	Dry	Wet
Crosswind	>20 knots	>20 knots
Tailwind	>5 knots	>0 knots

*Please note that thresholds relate to sustained wind gusts as well as mean wind speeds.

It is expected that there will be several runway modes utilised that incorporate either a parallel runway mode or a single runway, dependent on factors that include wind, cloud ceiling and visibility in addition to other operational considerations. In normal modes of operation, aircraft departing/arriving north and west will operate on RWY 01L/19R and those departing/arriving south and east on RWY01R/19L.

Initial selection of either RWY01 or 19 is based on a forecast of zero tailwind (i.e. RWY01 for wind within the arc 297-117º resulting in zero tailwind). As a result, wind directions near 110-120º or 290-300º are particularly important for tactical and pre-tactical decision making with respect to runway nomination.

If possible, aircraft will take off and land with a head wind. A tail wind on landing is acceptable up to 5 knots, or not at all when the runway is wet. When departing with a tail wind, the Take-off Distance increases so the runway length is important. With a cross wind component exceeding 20 knots, an alternative landing runway could be planned but an alternative runway to 01R/19L and 01L/19R is no longer available at Brisbane Airport. With an excessive crosswind, a reduced arrival rate will apply (refer ATFM Business Rules table). It is important to note that departures and arrivals do not have to occur on the same runway.

Forecasting for Brisbane Airport

Forecasters for Brisbane Airport should contact NCCMET for information on the operational effect caused by a TAF amendment. Forecasters may contact Brisbane Centre directly if the need arises.

It is expected that forecasters can provide meaningful information to Air Traffic Controllers regarding Brisbane Airport when requested.

Peak Times

Generally peak demand for traffic movements at Brisbane airport occur between Sunday to Friday 1700 to 2200 local time, and Monday to Saturday 0700 to 1100 local time. Additional loading occurs on both a Monday morning and a Friday afternoon.

The forecasting of holding near or during these hours must be considered carefully. The removal or movement of holding that affects these periods should prompt a call to NCCMET prior to the TAF amendment.

Wind Forecasts

The TAF can be used by forecasters to routinely provide information about wind speed and directional changes that affect ATC decisions about runway changes. Accurately forecasting a change in wind direction is important in planning and daily operations.

Instances can also occur where a strong cross wind component is forecast on both runway directions. Air Traffic Control has a process for dealing with this issue.

Dependent Modes

The nominal MET CDM process will plan for Independent (IND) rates unless specifically instructed by Brisbane Traffic Manager or Operations Manager to plan Dependent (DEP) rates. DEP rates may be used tactically by ATC during periods of low traffic or when inclement weather prevents IND operations (e.g. heavy showers or thunderstorms within the circuit).

Shower activity heavy enough to result in aircraft deviations in the 30NM range typically requires a DEP AAR. This may be considered only when forecast confidence is very high.

Thunderstorms at YBBN

Thunderstorm cells within 5-10NM of Brisbane Airport affect the ability of aircraft to land and the provision of services to aircraft once on the ground. The movements of aircraft into and out of bays are affected due to ramp closures and the removal of ground staff from the tarmac.

Airline WHS regulations require the removal of ground staff from the tarmac when a thunderstorm is within 5NM, with an 'on-alert' status for a thunderstorm within 10NM. This decision is an important part of the duties of the Virgin and Qantas meteorologists.

In prolonged thunderstorm events this can lead to a backlog of aircraft waiting on the ground to be handled. By accurately forecasting thunderstorms on a TAF the planned acceptance rate at Brisbane may be reduced, thereby mitigating airport congestion.

Additionally, the ability of forecasters to predict or recognise wind outflow from nearby thunderstorms is important in the management of tactical runway changes.

Thunderstorms in the TMA (30NM)

Thunderstorms within the Terminal Area (TMA - 30NM) also affect operations. Specifically thunderstorms in the entry corridors to the northwest

and southeast of Brisbane airport have major impacts on traffic flow.

Thunderstorms to the south and southeast have a particular effect on Brisbane airport. The main departure corridor for Brisbane lies to the south and the main arrival corridor lies to the southeast. Organised thunderstorms that occur to the south and southeast and stalls near the ocean represent a major complication for air traffic both arriving and departing Brisbane.

When the weather results in conditions below the landing minima at the Gold Coast (YBCG), aircraft will often divert to Brisbane. This potential for conditions to be observed below the minima at Gold Coast is important to capacity planning at Brisbane and needs to be highlighted in the METCDM process.

The ability to forecast organised thunderstorms in these areas can provide Airservices with the capability to open additional corridors and re-route aircraft to minimise delays.

Within the TMA, any thunderstorms within 10NM present a specific problem for aircraft trying to join the initial approach for an ILS runway.

Note that actual thunderstorms within the 30NM range constituting weather diversions will likely require Dependent runway operations, and a reduced AAR.

Thunderstorms outside the TMA (30-100NM)

Thunderstorms outside the Terminal Area (30-100NM) can also affect operations. If significant weather such as thunderstorms are located in the band 30-100NM from YBBN, then additional spacing (a longer arrival sequence) may be required to allow for random deviations. This may also result in extra spacing between departing aircraft southbound from YBBN and YBCG.

Fog

Fog can occur at Brisbane Airport at any time of the year but is more typical between April and October and often advected to the airport from the southwest. There are around 8 to 9 events on average annually, lasting 2 to 4hrs.

The inclusion of a PROB30 or PROB40 for fog on the YBBN TAF does not affect the AAR into Brisbane Airport, although the MET CDM process is very likely to suggest a reduced pre-tactical AAR for ATFM planning. However, a 50% or greater probability of fog on the TAF is treated as if the fog will occur and the tactical AAR may be reduced to 12 (or as negotiated).

The planning of arrival rates surrounding the cessation of fog at the airport is informed by the TAF and TTF. It is important that forecasters communicate any potential forecast changes and amendments to NCCMET as soon as possible, so that this information can be incorporated into the MET CDM rate assessment and inform ATFM decision-making.

Cloud/Visibility

Low cloud and/or reduced visibility on approach will necessitate the use of an instrument approach when a visual reference with the runway is not available. Any instrument approach has a specified decision height (landing minima) at which a 'missed approach' must be initiated if the required visual reference to continue the approach still has not been established.

This decision height (DH) will depend on the available equipment that is available for the runway and can vary widely, but is of the order of 250ft AGL for an Instrument Landing System (ILS) Category 1, the most common instrument approach on runways at Australian major airports. Brisbane Airport currently has ILS Category 1 approaches available for both runways 01R/19L and 01L/19R.

Visibility and cloud are less critical during take-off, with most commercial jet aircraft allowed to depart with visibility over 550m.

Cloud and visibility have a large effect on airport acceptance rates at Brisbane Airport. Scattered or more cloud below 2500ft and visibility less than 5000m will affect arrival spacing, with the potential effect and resulting arrival rates indicated in Tables 3 and 4 below.

CROPS

Converging Runway Operations (CROPS) procedures at Brisbane Airport were developed by Airservices Australia to enhance the capacity of the airport. This mode is no longer available as RWY14/32 has been decommissioned with a new parallel runway 01L/19R having opened in July 2020.

Archerfield

Archerfield aerodrome (YBAF) is located approximately 13NM to the SSW of Brisbane Aerodrome. Archerfield runway configuration consists of two sets of parallel runways in the magnetic directions of 04/22 and 10/28. Archerfield is located within the TMA of Brisbane Airport and is within Brisbane controlled airspace. Arrivals into Archerfield will be considered in the Brisbane sequence, and tactically managed by ATC.

The effect of Archerfield on air traffic flow can be alluded to in the following situations:

- Poor weather conditions at Archerfield may increase the complexity and workload within the TCU handling sequences into YBAF and processing IMC departures out of YBAF.
- Aircraft unable to land as scheduled at YBAF may divert to either YBBN or YBCG.

Gold Coast

Gold Coast aerodrome is located approximately 50NM to the SSE of Brisbane Aerodrome. Gold Coast Airport consists of two intersecting runways in the magnetic direction of 14/32 and 17/35. The responsibility for arrivals and departures is held by a dedicated controller in Brisbane Terminal Control Unit (TCU). Please refer to the reference card for Gold Coast for further information.

Monitoring of Alternate Aerodromes

The presence of very poor conditions at Brisbane that prohibit scheduled landings may result in the use of alternate aerodromes. Brisbane Centre may request for additional information regarding expected conditions at surrounding aerodromes such as YBSU (Sunshine Coast) and YBCG.

Table 3: Summary of Decision Point Triggers

Phenomena	Criteria	Potential Effect
Cloud (SCT or more)	<2500ft	Reduced rate, Instrument approach
Visibility	<5000m	Reduced rate, Instrument approach
	<1500m	Reduced rate, Low Visibility Operations (previously Fog rate)
Crosswind	>20kts	Gradually decreasing rate as negotiated
Tailwind	>5/0kts (dry/wet)	Change of runway

Summary - Weather Effects on Runway Modes and Arrival Rates

The effect of weather on the availability of runway modes and arrival rates (for ATFM planning) at Brisbane Airport is summarised in Tables 4a and 4b.

Table 4a: Brisbane Acceptance Rates

ATFM Business Rules Brisbane			
RWY	**Configuration**	**Cloud (ft) and Visibility (m)**	**AAR**
01// OR 19// IND	VMC	CLD≥2500 & VIS≥5000	48
01// OR 19// IND	ILS	CLD<2500 OR VIS<5000	42
01// OR 19// DEP*	VMC	CLD≥2500 & VIS≥5000	34
01// OR 19// DEP*	ILS	CLD<2500 OR VIS<5000	30
01// OR 19//	TSRA<20NM	Thunderstorms within the circuit. Exact number to be specified through METCDM process.	19-30
01// OR 19//	TSRA>20NM	Thunderstorms within TMA on specified feeder fixes which will have impacts on flow.	34
Low Visibility Operations	-	VIS<1500	15
Single RWY#	VMC	CLD≥2500 & VIS≥5000	24
Single RWY#	ILS	CLD<2500 OR VIS<5000	21

* For MET CDM purposes, plan for IND rates unless high confidence in heavy showers (see MET CDM considerations)

Single RWY operations would not normally be planned by the MET CDM process, but may occur for operational reasons or tactically during severe weather events such as thunderstorms

Table 4b: Brisbane Airport weather considerations

METCDM Considerations Brisbane		
Phenomenon	**AAR**	**Rationale**
Thunderstorms	19-30	MET CDM process to estimate anticipated event severity, position, duration and set rates accordingly within a range of 19-30. - The MET CDM calculator will apply an initial selection of AAR 30 when TSRA are forecast on the TAF. Note that the TAF only covers the area within 5NM of the aerodrome, while the MET CDM considers the TMA. - The default AAR for TSRA >20NM is 34, and 30 for TSRA <20NM. Note these are starting points only to convey the greater potential impact of TSRA on rates when within 20NM. - Thunderstorm rates can be applied if the METCDM process estimates a significant risk and there are no thunderstorms on the TAF. The assessment of rates between 19-30 is based on likelihood, timing and impact on ATFM within a forecast event and the initial starting AAR of 30 or 34 may be used at any distance from the aerodrome and changed with a combination of x-factors and text explanations. A negative x-factor exceeding 10 may be used to indicate an AAR of 19 for thunderstorms. Note that actual thunderstorms within the 30NM range constituting weather diversions will likely require dependent runway operations.
Heavy showers	30	Shower activity heavy enough to result in aircraft deviations in the 30NM range typically requires a tactical dependent AAR. This may be considered only when forecast confidence is very high.
Headwind	-2	If the headwind component on final exceeds 30 knots at 3000ft AGL, an x-factor of -2 will be applied to account for reduced speed over ground.
Crosswind	-4	If sustained crosswind on the ground exceeds 30 knots, an x-factor of -4 will be applied to account for go-arounds.

MET CDM x-factor	+2 to -10 Positive numbers cannot be applied to exceed the maximum rate	1. There may be phenomena that affect traffic flow that are not conveyed in the TAF or are not part of the business rules, e.g. TMA TS, TS with PROB below 30%, low-level wind shear, gusts 20-24 knots and other meteorological phenomena. 2. Certainty in a severe event (e.g. +TSRA could reduce by 2). 3. Transition creating closer acceptance rates, e.g. 21, 20, 19 instead of 21, 19, 19 over a 3 hour period. 4. Overcomes hourly granularity and other TAF limitations. 5. MET CDM x-factors can be applied to end up between two configurations when forecasting confidence is limited. 6. When cloud ceiling is forecast to near 2500ft consider use of x-factor to convey risk of periods falling below 2500ft and moving to an ILS configuration. 7. A negative x-factor exceeding 10 should only be used to reduce the AAR to 19 for thunderstorms (see above).

This is a reference card intended to educate users on the phenomena that affect Air Traffic Flow Management (ATFM) and is based on information obtained from Airservices Australia. The card was accurate on 22 July 2020 and will be updated by July 2021. The information contained within may be subject to short term changes that are not reflected in this document. There may also be other factors beyond the meteorological conditions affecting ATFM on any particular day. Airservices Australia, NCC should be contacted for all day of operations information related to arrival/departure rates and runway configurations. Please email any feedback, corrections or comments to NCCMET_TL@bom.gov.au

Note: Changes to the previous version have been highlighted in yellow.