ATM Network Performance Report

March 2019

Table of contents

Summary

This report focusses on the performance of the Air Traffic Network in March 2019, as measured by Airborne Delay. The combined 75th percentile performance during March for Airborne Delay across the four major airports (Sydney, Melbourne, Brisbane and Perth) was **4.4** minutes. The median airborne delay across these airports was **1.1** minutes. These results did not meet the Airservices 2018/19 Corporate Plan KPI targets and represent an increase compared to the same period last year.

Whilst there are many factors that affect Airborne Delay, a known limitation of the Air Traffic Flow Management (ATFM) measures deployed in Australia, and consequentially a driver of Airborne Delay, is the exemption provided to International flights from participating in ATFM measures. The upward trend in Airborne Delay since 2017 has coincided with a year-on-year increase in international traffic at the three largest airports (up 4% in Sydney, 10% in Melbourne and 8% in Brisbane).

The impact of international flights is particularly prominent in Melbourne which experienced 50% more hours with excess demand than any other airport (for March, 56 excess hours in Melbourne compared to 38 excess hours in Sydney).

The airborne delay outcomes (75th percentile and median) for March were the highest observed in FY 2019. This was a result of the high number of notable events during March (36 – highest for FY 2019). Seventeen of these events took place in Sydney, 10 in Melbourne, six in Brisbane and three in Perth.

The year-to-date performance for FY 2019 is above the targets for the median (0.7 minutes against the 0.5 target) and 75th percentile (3.8 minutes against the 3.4 target). Compared to the same period in FY 2018 there has been an increase in the median (from 0.6 minutes) and the 75th percentile (from 3.5 minutes).

There were 36 notable events in March, which are summarised under each of the airport sections below**.** Sixteen of these notable events resulted in a prolonged and moderately elevated airborne delay for the entire day (i.e. 75th percentile greater than seven minutes across the entire day). These events are labelled in **Figure 1**. Twenty events resulted in a shorter and more intense period of elevated airborne delay (i.e. two or more consecutive hours where the 75th percentile was over 10 minutes).

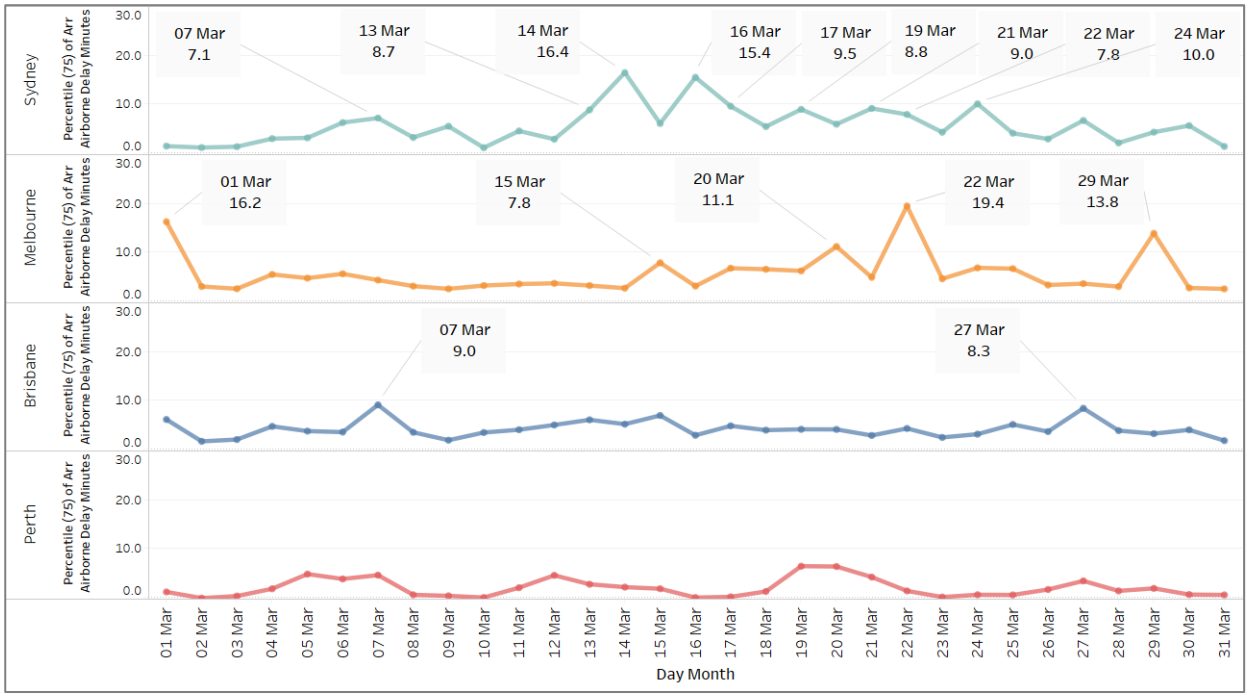

Figure 1: Notable prolonged delay impact events during March 2019

Numbers underneath the dates indicate the extent of the 75th percentile of airborne delay in minutes across the day.

Network Wide Performance

Airborne delay

The combined median and 75th percentile airborne delay at the four major airports is indicated in **Figure 2**. The 24-month trend shows a statistically significant increase in both measures.

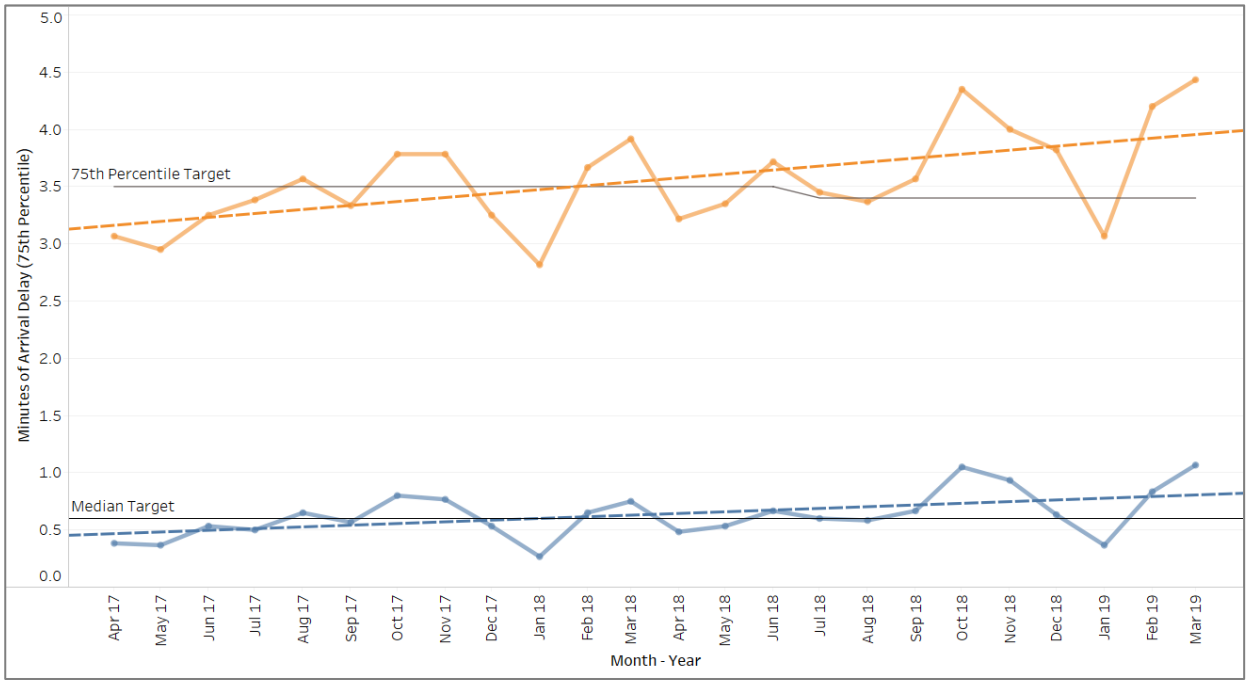

Figure 2: 24-month trend for airborne delay

The long term (48-month) trends of the 75th percentile airborne delay for each of the four major airports are depicted in **Figure 3.** The trends for Sydney and Melbourne are upwards. More detailed analysis for each airport is presented later in this report.

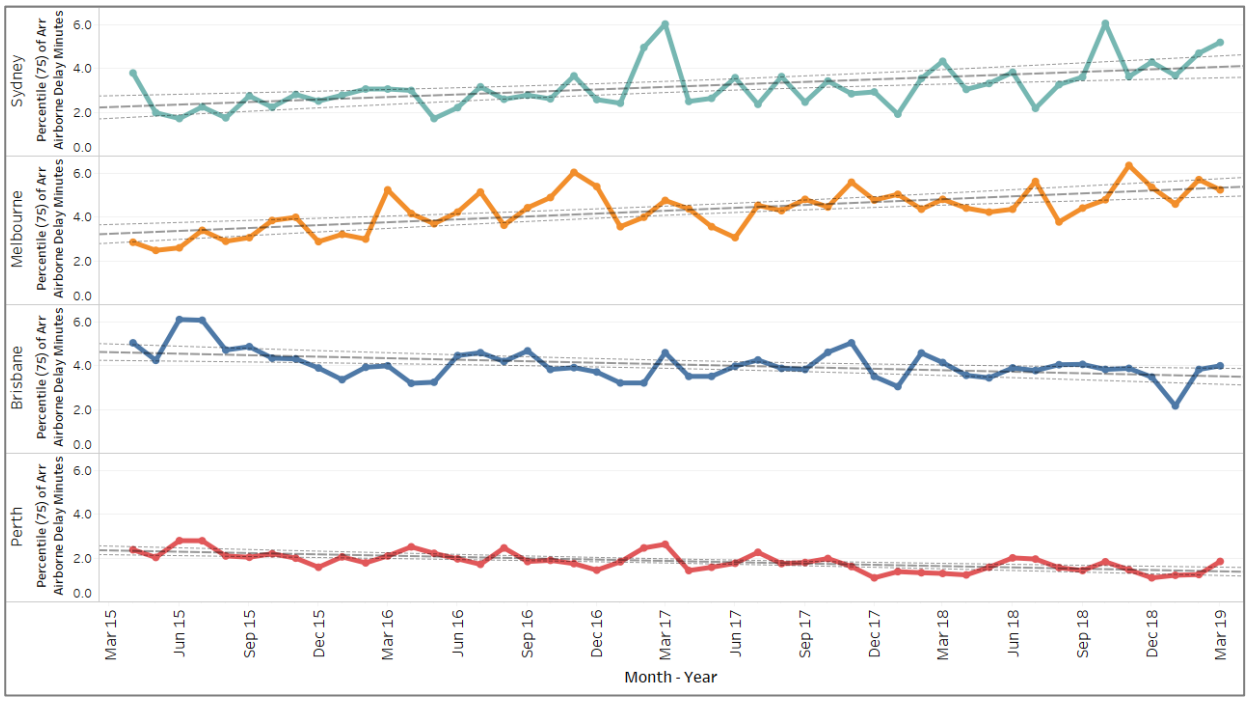

Figure 3: 48-month trend for airborne delay (75th percentile) by airport

The monthly total minutes of airborne delay for Sydney, Melbourne, Brisbane and Perth combined is depicted in **Figure 4**. Figures are adjusted for the number of days in the month. March was the second highest month of adjusted total delay in 2018-19. The trend shows a statistically significant increase.

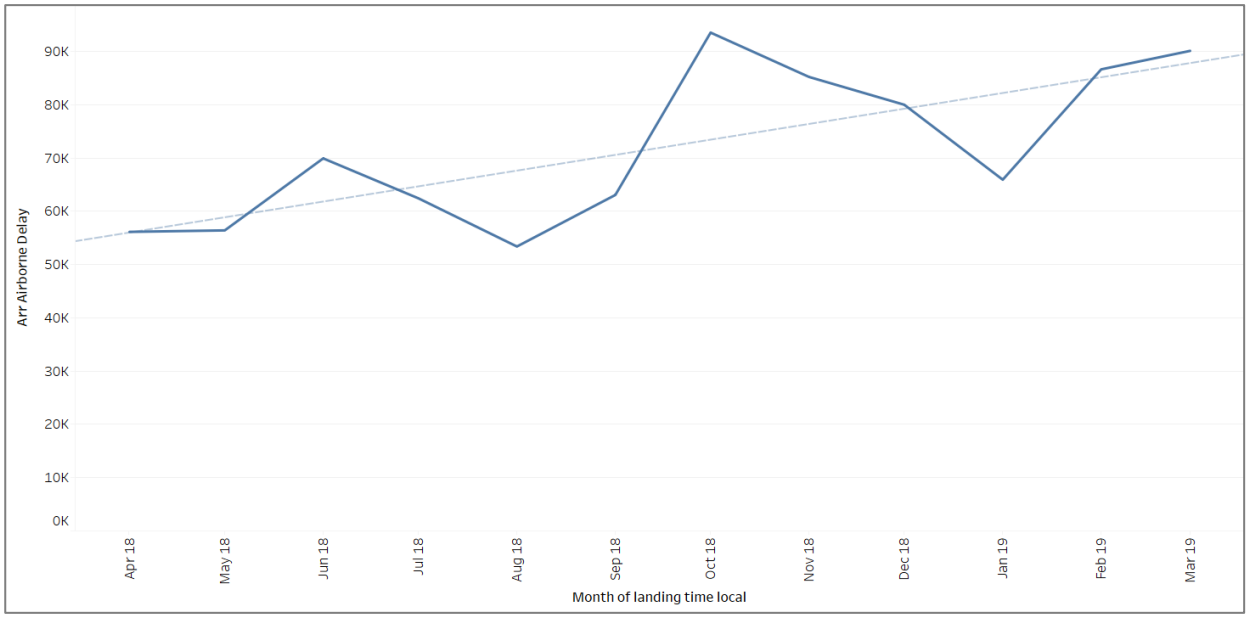

Figure 4: Total amount of airborne delay by month for Sydney, Melbourne, Brisbane and Perth Airports (April 2018 to March 2019, inclusive).

Runway configuration

The runway configuration usage for each airport is shown in **Figure 5**. Compared to the same month last year, usage of parallel runways 16 and 34 was more balanced at Sydney (usage was similar this year while last year the 16 runways were used approximately twice as often). Single runway operations in Melbourne decreased (by 28 hours), with Brisbane getting a little more usage of the crossing runway for arrivals. Perth had an increased usage of single runway operations with usage of these configurations more than double the same time last year.

AIRPORT	Runway mode	March 2018	December 2018	January 2019	February 2019	March 2019
Sydney	16A/16D	329	217	263	221	280
	34A/34D	166	292	256	237	224
	SODPROPS (Single)	11	12	8	12	11
	34A/25D	1				
	25A/25D (Single)	2	6		6	9
	25A/16D					3
	07A/16D	18				
Melbourne	16A/27D	216	255	295	178	241
	16A/16D (Single)	123	91	117	139	64
	34A/34D (Single)	70	79	55	53	89
	27A - 27/34D	58	63	34	69	73
	09A/09D (Single)	9	1	22	6	11
	27/34 LAHSO	46	30	19	22	34
	27A/27D (Single)	36	39	16	37	46
Brisbane	01A/01D (Single)	103	288	309	136	255
	01/14A 01D	27	97	156	48	37
	19A/19D (Single)	397	135	45	291	229
	01/32A 01D		6	17	1	6
	14A/14D (Single)		1			
Perth	21/24A 21D	189	224	237	177	110
	21A/21D (Single)	39	53	81	49	62
	03A 06/03D	75	38	28	62	74
	24A/24D (Single)	12	4	17	5	89
	06A/06D (Single)	4	4	5	20	95
	03A/03D (Single)	49	45		39	2

Figure 5: March runway configuration usage (hours) by airport (Sydney 06-22L, Melbourne 06-23L, Brisbane 06-22L and Perth 06-21L). Single runway configurations indicated in parentheses. Note: Sydney runway mode selection takes into account the Long Term Operating Plan to manage aircraft noise.

Traffic levels and composition changes

Figure 6 show traffic levels and composition changes since the beginning of 2017. Overall traffic levels are relatively steady across all four airports. The changes in total traffic from 2017 to 2018 were 0.0% at Sydney, 1.7% at Melbourne, -1.3% at Brisbane and 0.2% Perth.

However, there have been changes to the domestic-international flight mix during this time. Sydney, Melbourne and Brisbane have all seen an increase in the level of international traffic (orange bars). In 2018, international traffic increased by 4% in Sydney, 10% in Melbourne and 8% in Brisbane compared to 2017. This indicates that there are more flights potentially impacting on the effectiveness Ground Delay Program as ground delay is only applied to domestic flights. An increase in aircraft that are not required to comply to with a regulated arrival time may lead to increases in airborne delay.

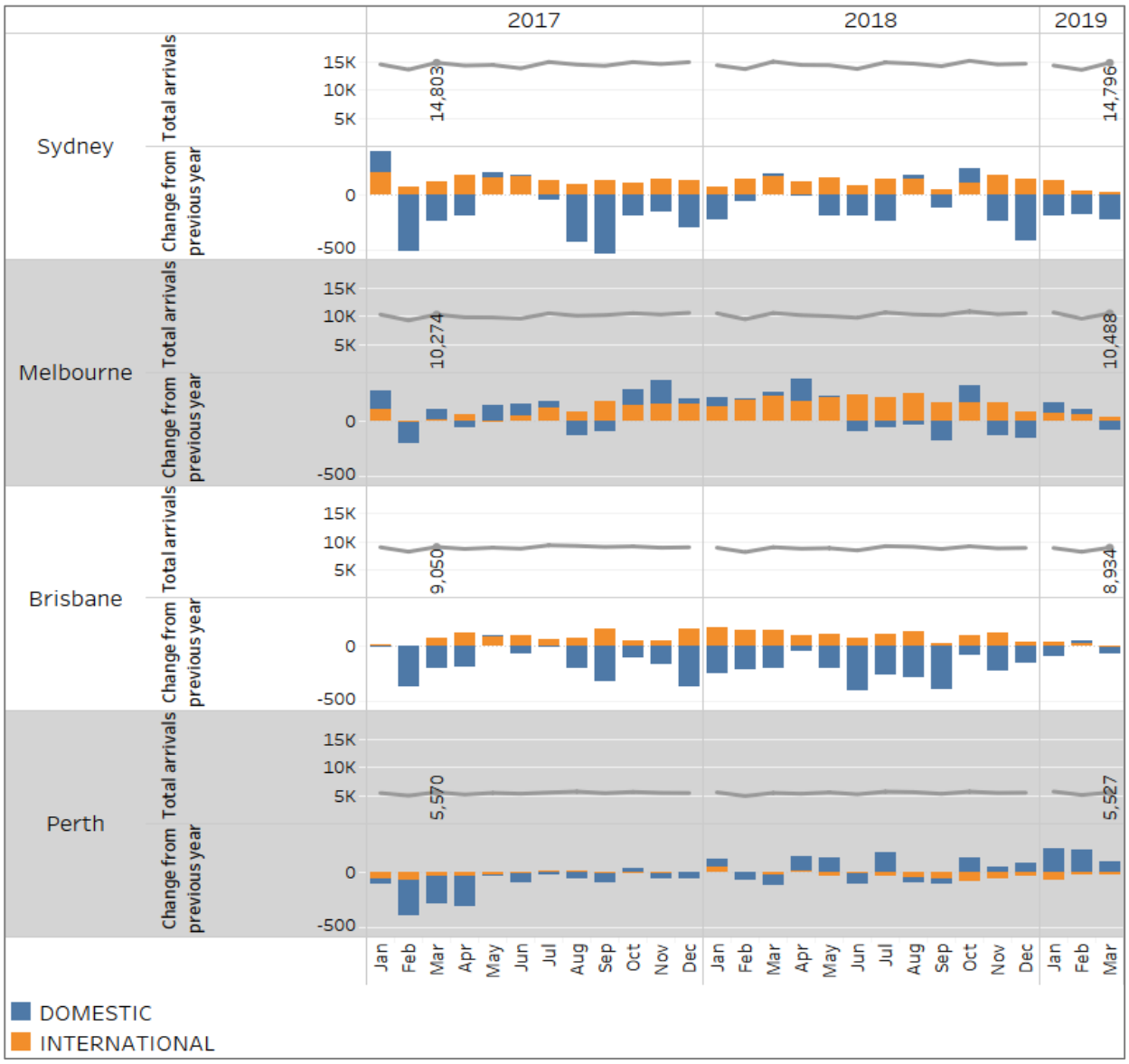

Figure 6: Traffic levels and composition change since January 2017. Grey lines show overall traffic numbers (annotated figures compare current month to same month two years earlier). Coloured bars show change in traffic compared to the same month the previous year for domestic (blue) and international (orange) flights.

CTOT compliance[1]

Figure 7 shows the year-on-year changes to CTOT compliance since 2017. Until mid-2018, late CTOT non-compliance was increasing year-on-year. Since that time, late non-compliance has stabilised or improved for flights to Sydney, Brisbane and Perth. Early CTOT non-compliance has been mostly stable since 2017 with some improvements at Brisbane in 2018 and 2019.

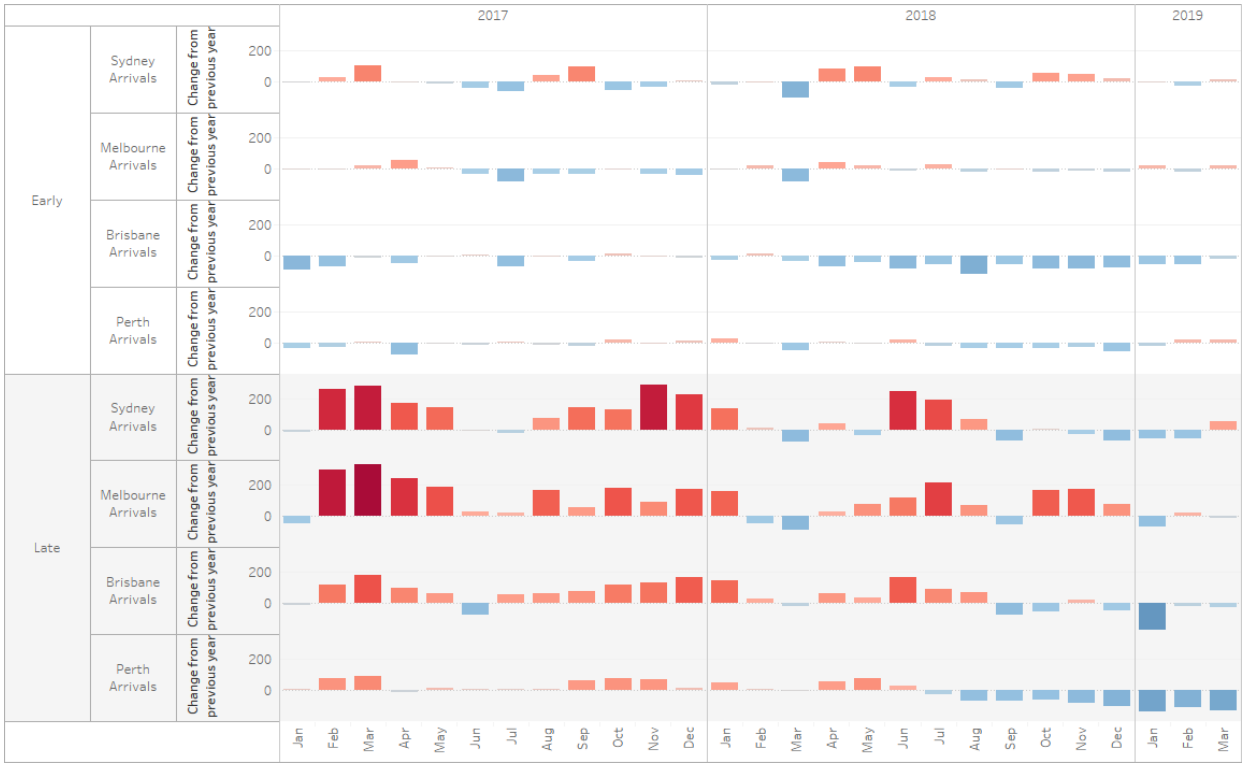

Figure 7: Changes to CTOT compliance since 2017.

[1] Calculated take off time is used as a proxy of off block time compliance. CTOT compliance is indicative of compliance with off-blocks time. However, it is influenced by two key factors. The first is taxi-out delay and the second is inaccuracy of the base taxi time used in Harmony. These should be considered when interpreting these figures.

Demand and capacity

Table 1 details estimates of the number of hours each month where demand is significantly above capacity. Melbourne and Sydney generally experience the highest number of hours with excess demand. All airports experienced fewer hours of excess demand during January corresponding with lower airborne delay outcomes observed that month. Further historical data is being sourced for inclusion in future reports.

	December 2018	January 2019	February 2019	March 2019
Sydney	32	10	16	38
Melbourne	68	51	58	56
Brisbane	23	6	25	30
Perth	2	1	5	5

Table 1: Excess demand estimates. Table indicates number of hours where estimated demand exceeds the METCDM rate for that hour by three or more flights. Demand is estimated using Harmony Base Estimated Landing Time.

Sydney

Airborne delay

The 75th percentile performance figures for airborne delay at Sydney are indicated in **Figure 8.** March performance for the median (1.3 minutes) and the 75th percentile (5.1 minutes) did not meet the targets. Compared to the same month last year, there was an increase in the airborne delay median performance (from 0.8 minutes) and 75th percentile performance (from 4.3 minutes).

The long-term (48-month) and 24-month trends for airborne delay at Sydney are upwards.

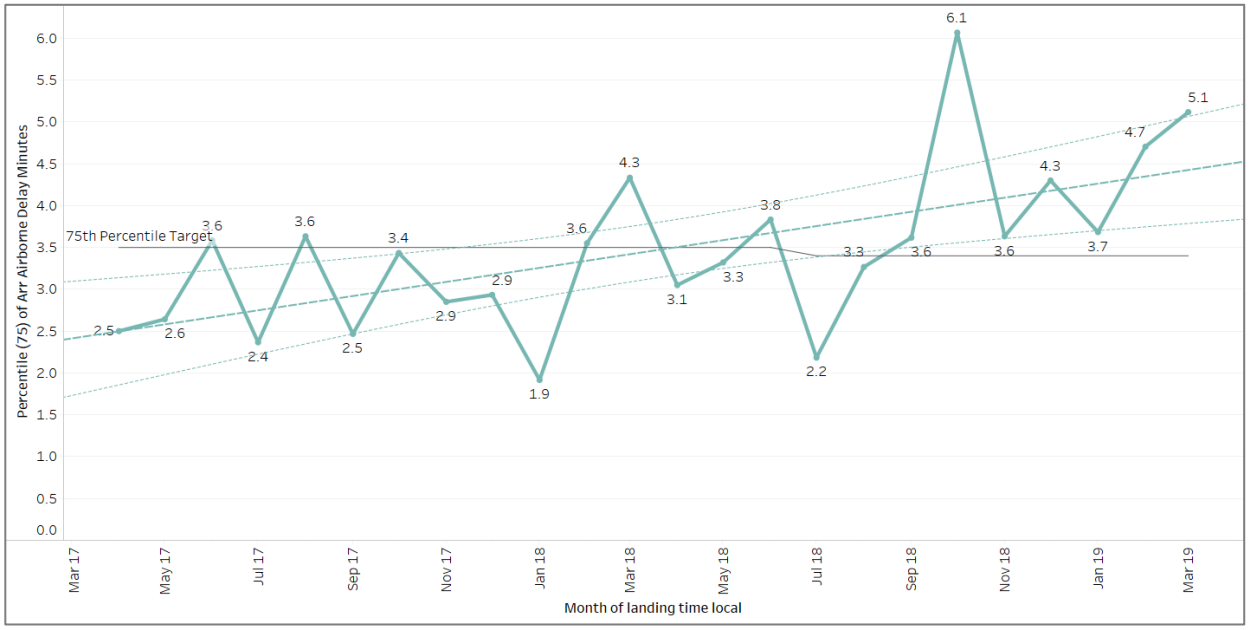

Figure 8: Sydney airborne delay 75th percentile (last 24 months)

Notable events

Table 2 describes the notable airborne delay and other events during March in Sydney.

Day	Local Time	Delay (minutes – 75th percentile)	Event Descriptions (*Contributing causes to increased delays*)
05 March	07-08	3.0	Concentration in demand due to off-schedule international flights during morning peak period.
06 March	15-16	6.1	Reduced capacity in mid-afternoon due to thunderstorms and strong winds.
07 March	07-09	7.1	Reduced capacity during morning peak period due to strong winds. Tactical rates reduced.

09 March	08-09	5.4	Reduced capacity during morning peak period due to strong winds. Tactical rates reduced.
13 March	07-08 & 18-19	8.7	Concentration in demand during the morning peak period due to off-schedule international flights. Concentration in demand in the peak evening period due to longer than anticipated flight times.
14 March	07-09 & 15-22	16.4	Reduced capacity in the morning due to heavy showers. Tactical rates reduced. Reduced capacity in the afternoon and evening due to multiple thunderstorms. Level 1 GDP Revision at 1600L with rates reduced.
15 March	08-09	5.9	Concentration in demand due to late non-compliant and off-schedule internationals flights during morning peak period.
16 March	07-11	15.4	Reduced capacity in the morning peak period due to thunderstorms. Level 1 GDP Revision at 0945L to extend the GDP until 1300L (rates reduced).
17 March	18-20	9.5	Concentration of demand during the evening peak period due to late non-compliant flights.
19 March	18-19	8.8	Reduced capacity during the evening peak period due to heavy showers. Tactical rates reduced.
21 March	07-10	9.0	Reduced capacity in the morning peak period due to low cloud and heavy showers. Tactical rates reduced.
22 March	07-10 & 18-19	7.8	Concentration in demand due to off-schedule international flights during morning peak period. Reduced capacity during the evening peak period due to heavy showers. Tactical rates reduced.
23 March	10-11	4.1	Reduced capacity due AUSCAL operations. Tactical rates reduced.
24 March	13-15	10.0	Concentration of demand due to late non-compliant and medical flights during a period of reduced capacity (low rates due to AUSCAL operations).

27 March	08-09	6.6	Concentration in demand due to off-schedule international flights during morning peak period.
29 March	12-13	4.2	Reduced capacity due to Sydney tower evacuation in response to fire alarm. Tactical rates reduced while tower staff relocated. A ground stop for flights to Sydney was implemented at 1048L. Level 3 GDP Revision was conducted at 1155L with rates reduced. A Level 1 GDP Revision was conducted at 1325 to increase rates back to original capacity.
30 March	17-18	5.5	Concentration due late non-compliant during low capacity period (extended single runway operations).

Table 2: Notable event descriptions for Sydney.

CTOT (Calculated take off time) variations

Variations from CTOT for flights to Sydney arriving during the afternoon hours (1700-2100 local) are the focus of this section due to regular concentration of demand leading to increases in delay. **Table 3** provides the flights within this period that departed either early or late with respect to their CTOTs (-5 to +15 minutes). Flights that appear at least twice (early) or five times (late) have been included. This facilitates collaboration to identify patterns and causes of delay.

The CTOT against the ATOT (actual take off time) measure is used as a proxy until the COBT (calculated off blocks time) against AOBT (actual off blocks time) can be routinely reported on.

CTOT Variation	ACID	ADEP	Local - ALDT HOUR	
Early	QLK230D	Wagga	17	4
	RXA833	Dubbo	18	4
	RXA472	Griffith	17	3
	RXA629	Bathurst	17	3
	JST661	Ayers Rock	17	2
Late	QFA444	Melbourne	17	8
	TGG256	Melbourne	18	7
	VOZ883	Melbourne	20	6
	JST516	Melbourne	17	5
	VOZ863	Melbourne	18	5
	VOZ875	Melbourne	19	5

Table 3: CTOT variation for Sydney arrivals 1700-2100 local – March 2019. Number of occasions (minimum two early; minimum five late) that each flight departed early or late with respect to its CTOT (-5 to +15 minutes).

Melbourne

Airborne delay

The 75th percentile performance figures for airborne delay at Melbourne are indicated in **Figure 9.** March performance for the median (1.5 minutes) and the 75th percentile (5.3 minutes) did not meet the targets. Compared to the same month last year, there was an increase in the airborne delay median performance (from 1.0 minutes) and 75th percentile performance (from 4.4 minutes).

The long-term (48-month) and 24-month trends for airborne delay at Melbourne are upwards.

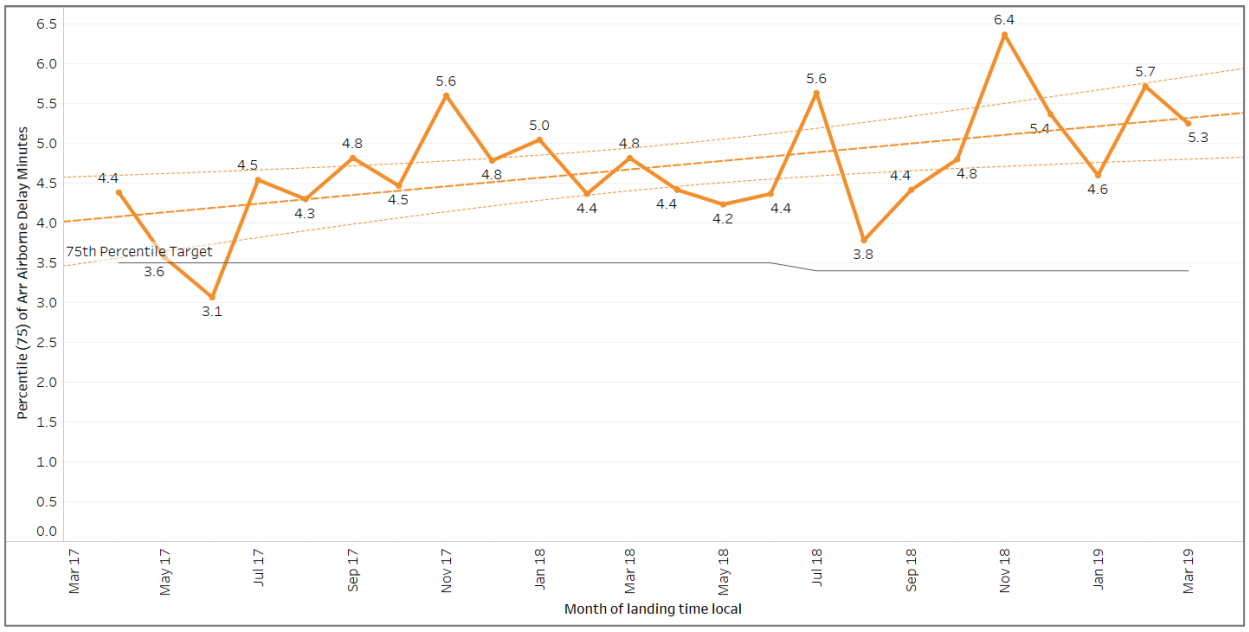

Figure 9: Melbourne airborne delay 75th percentile (last 24 months)

Notable events

Table 4 describes the notable airborne delay events during March in Melbourne.

Day	Local Time	Delay (minutes – 75th percentile)	Event Descriptions (*Contributing causes to increased delays*)
01 March	10-12 & 16-20	16.2	Concentration of demand in the late morning due to late non-compliant and off schedule international flights during a low capacity period (extended single runway operations). Reduced capacity in the afternoon and evening due to thunderstorms. Tactical rates reduced at 1700L and Level 2 GDP Revision at 1935Lwith rates reduced.
05 March	18-19	4.6	Increased delay in the peak evening period due to deviations around thunderstorms.

07 March	18-19	4.2	Concentration of demand due to late non-compliant flights and reduced capacity due to single runway operations extending longer than planned.
15 March	18-19	7.8	Concentration of demand due to late non-compliant flights during low capacity period (single runway operations).
17 March	08-09 & 18-19	6.6	Reduced capacity in peak morning period due to fog. Tactical rates reduced. Concentration of demand during the peak evening period due to late non-compliant flights.
18 March	07-08	6.4	Concentration of demand during the peak morning period due to late non-compliant and off-schedule international flights.
19 March	18-19	6.1	Reduced capacity during the peak evening period due low cloud. Tactical rates reduced.
20 March	11-12 & 18-19	11.1	Reduced capacity in the morning due to low cloud. Level 2 GDP Revision with rates reduced. Reduced capacity due to single runway operations extending longer than planned.
22 March	07-10 & 16-21	19.4	Concentration of demand during morning due to late non-compliant and off-schedule international flights. Reduced capacity in the afternoon and evening due to thunderstorms. Multiple periods with no approaches and several runway changes.
29 March	08-10 & 17-20	13.8	Concentration of demand due to off-schedule internationals during busy morning period. Reduced capacity during evening peak period due to strong winds. Limited approaches for 25 minutes.

Table 4: Notable event descriptions for Melbourne.

CTOT variations

The morning peak (0700-1100 local) is in general the most constrained period of the day in Melbourne. Variations from CTOT during the early morning hours are the focus of this section due to regular concentration of demand leading to increases in delay. **Table 5** provides the flights within this period that departed either early or late with respect to their CTOTs (-5 to +15 minutes). Flights that appear at least twice (early) or five times (late) have been included. This facilitates collaboration to identify patterns and causes of delay.

The CTOT against the ATOT (actual take off time) measure is used as a proxy until the COBT (calculated off blocks time) against AOBT (actual off blocks time) can be routinely reported on.

CTOT Variation	ACID	ADEP	Local - ALDT HOUR	
Early	QLK52D	Devonport	10	3
	RXA3151	Albury	7	3
	RXA3653	Mildura	7	3
	RXA3752	Mount Gambier	8	3
	QLK50D	Devonport	7	2
	QLK77D	Mildura	7	2
	VOZ804	Sydney	7	2
Late	QFA417	Sydney	10	6
	QFA419	Sydney	10	6
	QFA423	Sydney	11	6

Table 5: CTOT variation for Melbourne arrivals 0700-1200 local – March 2019. Number of occasions that each flight departed early or late with respect to its CTOTs (-5 to +15 minutes).

The evening period (1700 to 2100 local) was also analysed as several delay events occurred during this period (**Table 6**).

CTOT Variation	ACID	ADEP	Local - ALDT HOUR	
Early	JTE7485	Adelaide	21	4
	QLK58D	Devonport	19	2
	QLK286D	Launceston	18	2
	RXA3187	Albury	18	2
Late	VOZ742	Gold Coast	17	9
	QFA467	Sydney	21	7
	VOZ874	Sydney	19	7
	VOZ332	Brisbane	17	6
	VOZ878	Sydney	20	6
	VOZ888	Sydney	21	6
	JST523	Sydney	20	5
	JST569	Brisbane	21	5
	QFA463	Sydney	20	5
	QFA623	Brisbane	17	5
	RXA3493	Merimbula	18	5

Table 6: CTOT variation for Melbourne arrivals 1700-2200 local – March 2019. Number of occasions that each flight departed early or late with respect to its CTOTs (-5 to +15 minutes).

Brisbane

Airborne delay

The 75th percentile performance figures for airborne delay at Brisbane are indicated in **Figure 10**. March performance (1.2 minutes median and 4.0 minutes 75th percentile) did not meet the targets. Compared to the same month last year, there was an increase in the airborne delay median performance (from 1.1 minutes) and a decrease in the 75th percentile performance (from 4.2 minutes).

The long-term (48-month) trend for airborne delay at Brisbane is downwards and 24-month trend is steady.

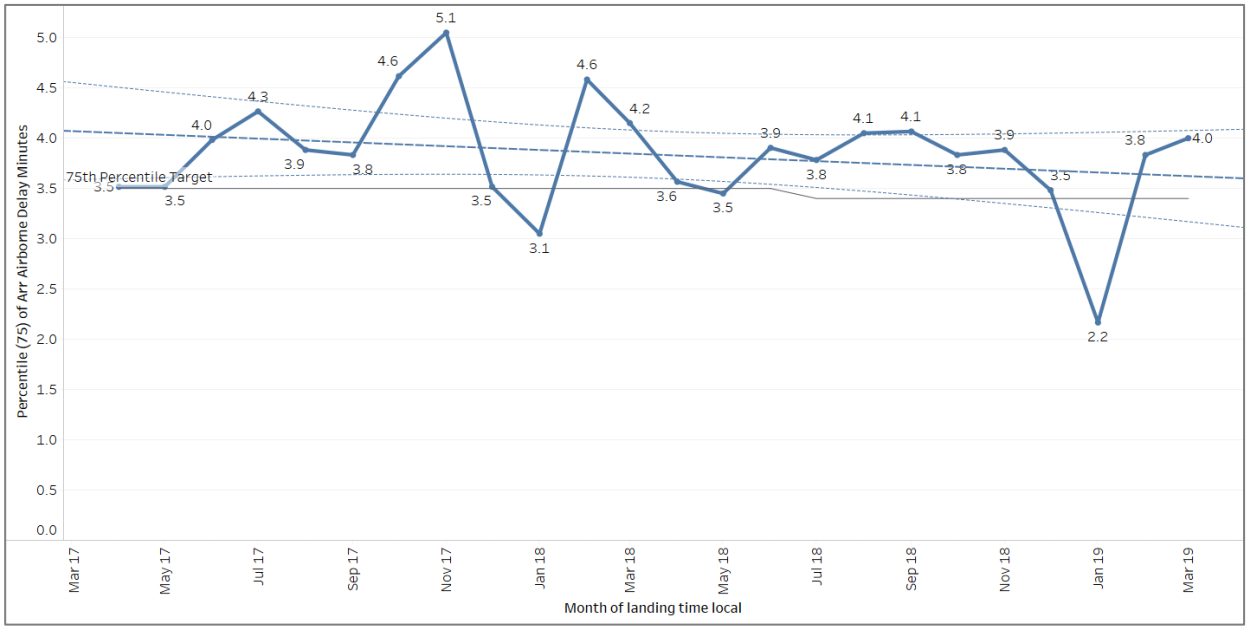

Figure 10: Brisbane airborne delay 75th percentile (last 24 months)

Notable events

Table 7 describes the notable airborne delay events during March in Brisbane.

Day	Local Time	Delay (minutes – 75th percentile)	Event Descriptions (*Contributing causes to increased delays*)
07 March	12-13 & 17-20	9.0	Concentration of demand during middle of the day due to late no-compliant flights. Concentration of demand during peak evening period due late non-compliant and MEDEVAC flights.
13 March	07-08	5.9	Reduced capacity due to unforecast fog in early morning. Tactical rates reduced for the 06L hour causing concentration of demand during the busy morning period.

15 March	16-19	16.8	Reduced capacity during the late afternoon and early evening due to thunderstorms. Ground stop from 1640-1700L. Periods of 21 and 26 minutes with no arrivals. Level 2 GDP Revision with rates increased near end of program.
17 March	16-18	4.7	Increased delay in the afternoon and evening due to deviations around heavy storms.
18 March	14-15	3.8	Reduced capacity during the afternoon due to thunderstorms. No arrivals for 24 minutes.
27 March	17-19	8.3	Reduced capacity during evening peak period due to low visibility from showers and low cloud. Tactical rates reduced.

Table 7: Notable event descriptions for Brisbane.

CTOT variations

Variations from CTOT for flights arriving Brisbane during the afternoon hours (1800-2000 local) are the focus of this section due to regular concentration of demand leading to increases in delay. **Table 8** provides the flights within this period that departed either early or late with respect to their CTOTs (-5 to +15 minutes). Flights that appear at least twice (early) or five times (late) have been included in the table below. This facilitates collaboration to identify patterns and causes of delay.

The CTOT against the ATOT (actual take off time) measure is used as a proxy until the COBT (calculated off blocks time) against AOBT (actual off blocks time) can be routinely reported on.

CTOT Variation	ACID	ADEP	Local - ALDT HOUR	
Early	UJN	Maryborough	19	5
	QLK325	Bundaberg	18	4
	MEH	Maryborough	19	3
	QLK325D	Bundaberg	18	3
	JST833	Proserpine	19	2
	UJS	Maryborough	19	2
Late	JST566	Melbourne	18	6
	QFA546	Sydney	19	6
	QFA628	Melbourne	18	6
	QFA548	Sydney	19	5
	VOZ1225	Canberra	18	5

Table 8: CTOT variation for Brisbane arrivals 1800-2000 local – March 2019. Number of occasions (minimum two early; minimum five late) that each flight departed early or late with respect to its CTOT (-5 to +15 minutes)

Perth

Airborne delay

The 75th percentile performance figures for airborne delay at Perth are indicated in **Figure 11**. March performance (-0.3 minutes median and 1.8 minutes 75th percentile) met the targets. Compared to the same month last year, the airborne delay median performance was unchanged and 75th percentile performance increased (from 1.3 minutes).

The long-term (48-month) trend for airborne delay at Perth is downwards and 24-month trend is steady.

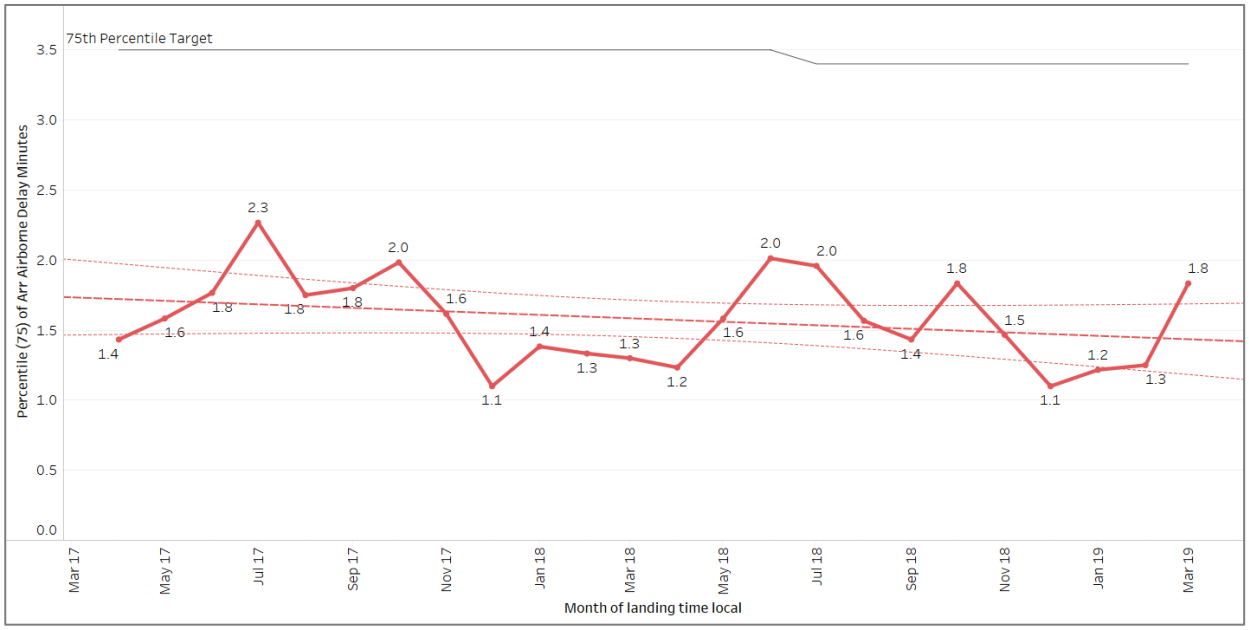

Figure 11: Perth airborne delay 75th percentile (last 24 months)

Notable events

Table 9 describes the notable airborne delay events during March in Perth.

Day	Local Time	Delay (minutes – 75th percentile)	Event Descriptions (*Contributing causes to increased delays*)
05 March	18-19	4.7	Concentration of demand due longer than anticipated flight times during period of reduced capacity (single runway operations continuing longer than planned).
19 March	10-12	6.3	Concentration of demand during late morning peak due to early non-compliance.
20 March	10-11	6.2	Concentration of demand during late morning peak due to missed approach and rescue flight.

Table 9: Notable event descriptions for Perth.

Appendix A

Corporate Plan Key Performance Indicator Profile: Arrival airborne delay

Corporate Plan Description:

The median (and 75th percentile) excess time incurred during the arrival airborne phase of flight in reference to the estimated time of arrival for high-volume operations. (High volume operating environments defined as Brisbane, Melbourne, Perth and Sydney).

Corporate Plan Targets:

Year	18/19	19/20	20/21	21/22
75%	3.4	3.3	3.2	3.1
Median	0.6	0.6	0.6	0.6

What is it: Excess time incurred during the arrival phase of flight.

What is measured: It is measured by comparing the estimated flight time and actual flight time for the portion of the flight within 250 NM of the destination aerodrome.

Why 250NM: The 250NM threshold has been identified as the distance from the aerodrome at which tactical arrival demand/capacity balancing measures start taking effect. It is a true reflection of the tactical arrival management of the flight, and is not skewed by other non-related issues such as congestion at the departure aerodrome.

Why measure Median rather than Average/Mean: In some cases, the actual flight time within 250NM of the destination aerodrome will be less than the estimated flight time (e.g.: ATC has provide track shortening). In the dataset, this translates into a 'negative' value for that particular flight.

The Median shows the mid-point of the data set and allows us to demonstrate our impact on all flights, not just the ones that were delayed. Additionally, over short timeframes and small datasets (such as a daily report), Median measurement is more resilient to data errors and small groups of outliers which may skew the average.

Why measure the 75th percentile: This supplements the Median and is valuable to demonstrate how effectively we have managed the arrival of most of the fleet.

The last 25th percentile can typically contain arrival data from flights that were impacted by non-routine events, such as Medical priority traffic or aircraft in an emergency or diversion.

How do we measure:

Uses the high-fidelity Dalí aircraft trajectory model. For Sydney, some assumptions are built in to calculations as the actual flight path is unique for each flight (open STARs).