

# Australian ATFM Meteorological Information

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Australian Government  
Bureau of Meteorology

# Topics

- Australian ATFM
- MET CDM
- Case study

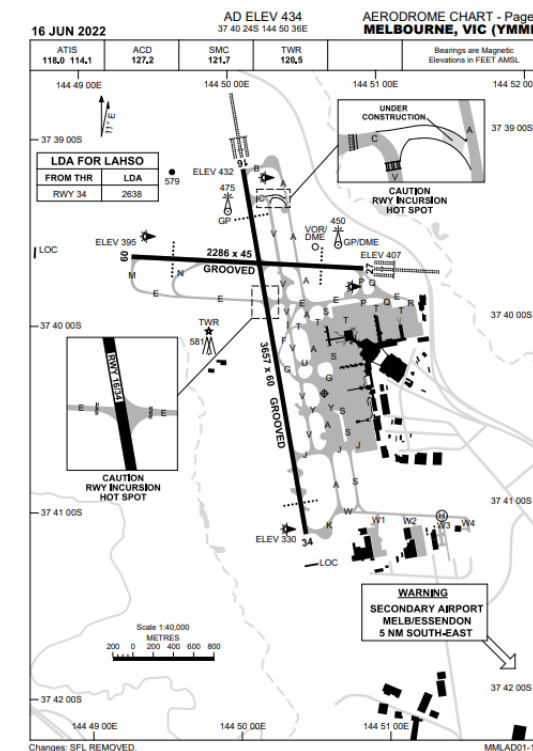
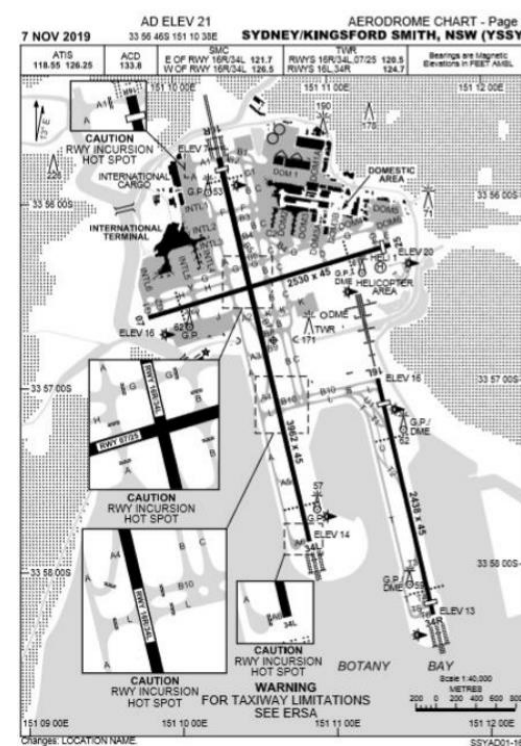




**Australian Government**  
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# The need for MET-CDM

- Weather is the key driver of capacity reduction at Australia's major aerodromes
- Even in VMC, airports as Sydney KSA and Melbourne can experience up to 50% reductions in capacity due to unfavourable wind directions.
- These variations in capacity cause major disruptions and airlines like to plan and adjust schedules a day ahead to inform passengers of changed itineraries
- Strong need for ATFM decision making to be driven by detailed and accurate weather forecasts that are collaboratively established by key stakeholders
- No pre-existing product (e.g. TAF) meets these requirements



# What is MET-CDM?

- MET-CDM → Meteorological Collaborative Decision Making
- Collaborative weather decisions made with Bureau Forecasters and Airline Meteorologist (1)
- Collaborative weather forecast is translated into Airport Arrival Rate (AAR) using set of pre-agreed Business Rules
- ATC reviews MET-CDM proposed AAR and may further adjust for operational restrictions (2)
- NCC subsequently develops Network Plan for next day including proposed ATFM measures, e.g. Ground Delay Programs (3)
- Plan is reviewed (4), discussed if required (5) and then published (6) with GDPs run for the next day
- Process repeated throughout the day of operations as required



## 1. Meteorological Assessment



## 2. Operational Assessment



## 3. Network Plan Development



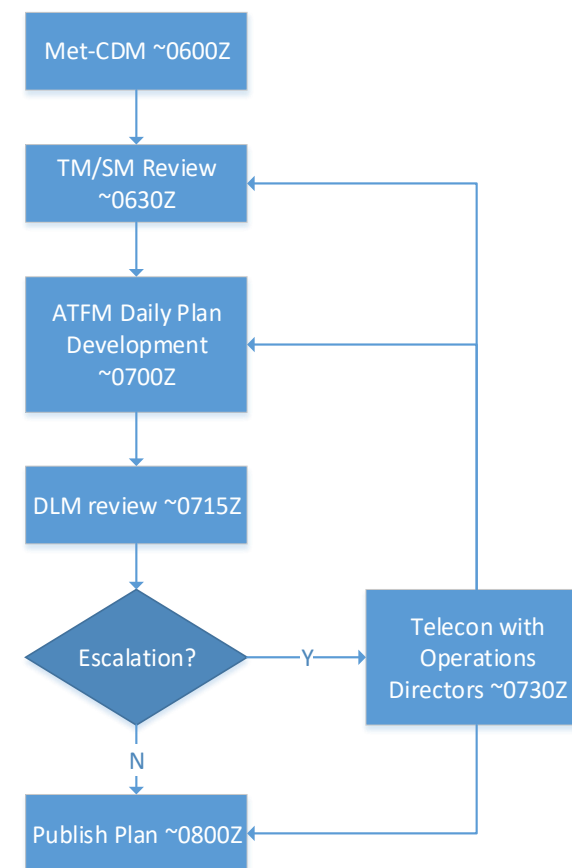
## 4. Plan Review



## 5. Escalation



## 6. Publication



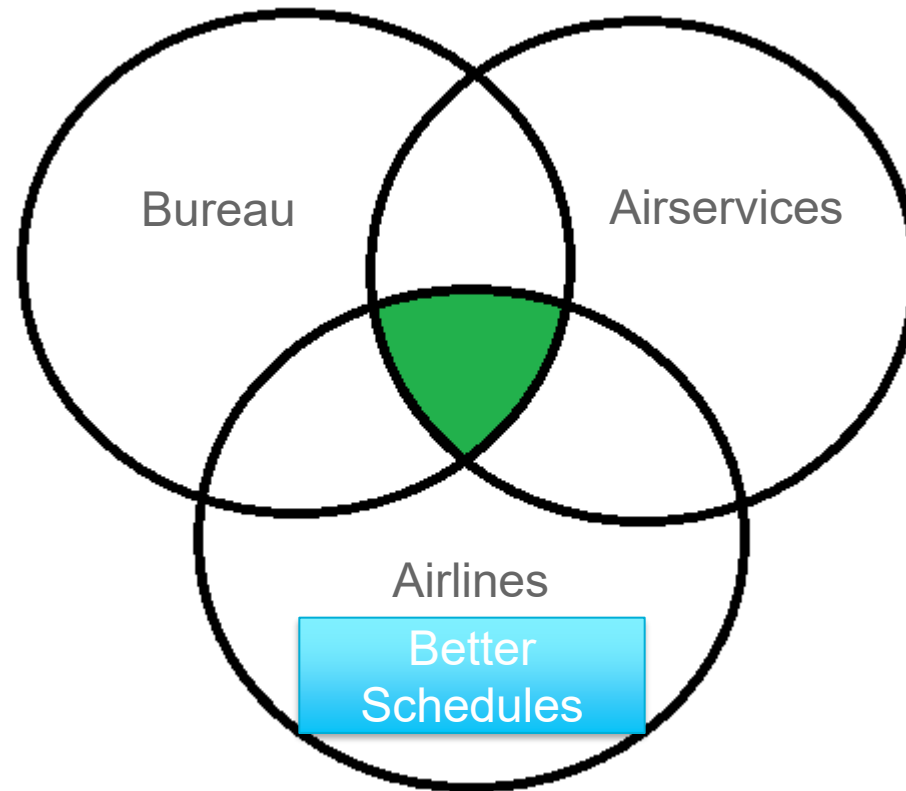


# MET CDM

## Understanding each others business

National Operations  
Management  
Centre(NOMC) MET  
dedicated to ATFM

Flexible and adapting  
products to solve the  
problem



Fully transparent  
process

AVMET units  
collaborate

Transparency and  
better certainty

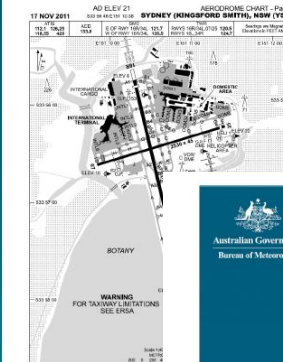
# MET-CDM Reference Cards

- Process requires people with combined expertise in meteorology and ATFM.
- Reference cards developed to date reflect the known parameters that affect traffic flows at the airports.
- They are a reflection of documentation and discussions with Airservices traffic management.
- Cards managed jointly.
- NOMC MET and AV MET Units need to know the cards.



## YSSY Air Traffic Operations

Sydney is the busiest international airport in Australia consisting of twin moderately spaced parallel runways in the direction 16/34 magnetic, and a single cross runway of 07/25 magnetic.

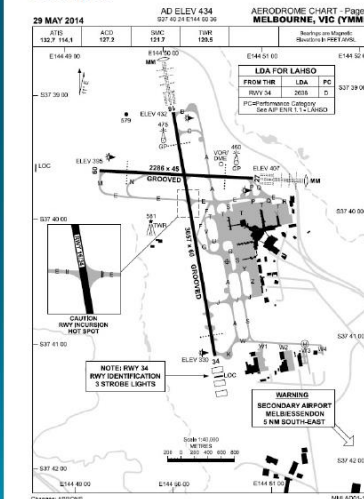


**Curfew**  
Curfew regulates aircraft taking off and landing between the hours of 11p to 6am. A limited number of scheduled approved take-offs and landings are permitted respectively in the 'show periods' of 11pm to midnight and 6am, by Section 12 of the Sydney Curfew Act 1995.

**Aircraft Arrival Rates (AAR)**  
Sydney Airport has a legislated c 80 aircraft movements per hour which cannot be exceeded. For arrivals Sydney Airport has the capacity to rate of 46 or 50 on the parallel runway and 24 on the cross runway.

## YMML Air Traffic Operations

Melbourne is the second busiest international airport in Australia consisting of two intersecting runways in the direction 16/34 magnetic and 09/27 magnetic.



**Noise Abatement**  
There is no curfew at Melbourne airport. However, noise abatement procedures apply. These procedures include a preference to use runway 16 for noise abatement, particularly in the overnight

**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

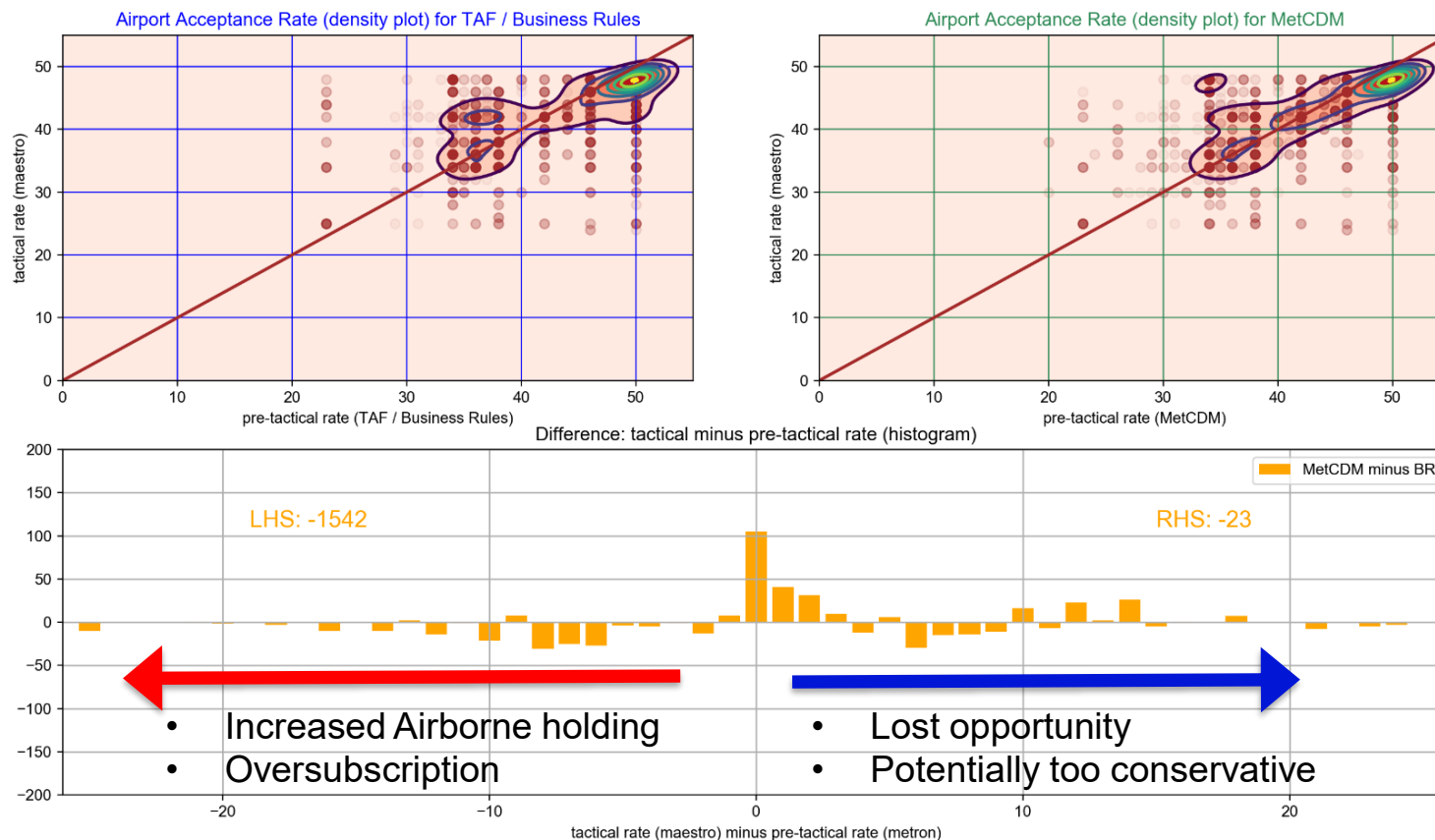
# Example Use Case (Sydney KSA)

YSSY	Thursday, 31 Mar 2022 - Run 2 - Final																First Light: 1942 Last Light: 0617
BUSINESS RULES RATES FROM TAF																	SHOW/HIDE CALCULATIONS
DATE/TIME	301900	302000	302100	302200	302300	310000	310100	310200	310300	310400	310500	310600	310700	310800	310900	311000	311100
BUSINESS RULES SUMMARY																	
BR RWY	16	16	16	16	16	16*	16*	16*	16*	16*	16*	16*	16*	16	16	16	16
Tailwind (Worst)	-29.7	-29.7	-29.7	-29.7	-29.7	-39.1	-39.1	-39.1	-44.0	-44.0	-44.0	-44.0	-44.0	-44.0	-35.2	-35.2	-35.2
Crosswind (Worst)	18.6	18.6	18.6	18.6	18.6	8.3	8.3	8.3	10.4	10.4	10.4	10.4	10.4	10.4	9.4	14.2	14.2
BR Approach Mode	ILSB	ILSB	ILSB	ILSB	ILSB	DVAB*	DVAB*	DVAB*	DVAA*	DVAA*	DVAA*	DVAA*	DVAA*	DVAA*	DVAA	DVAA	DVAA
BR Rate	34	34	34	34	34	36	36	36	38	38	38	38	38	38	42	42	33
RESET BELOW																	EXPAND/COMPACT MET CDM
MET CDM RATE																	
Wind *True	210	210	200	200	190	180	180	180	180	180	180	180	180	180	190	190	200
Significant Wind Speed	28	28	32	32	32	35	35	35	35	35	35	35	35	35	32	32	30
Anticipated RWY	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Tailwind (Main RWY)	-20.8	-20.8	-27.1	-27.1	-29.7	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-25.7	-25.7	-25.4
Crosswind (Main RWY)	18.7	18.7	17.9	17.9	12.0	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	13.1	12.0	11.2	16.9
Tailwind (Cross RWY)																	
Crosswind (Cross RWY)																	
Anticipated Approach	ILSA	ILSA	ILSA	ILSA	ILSB	ILSB	ILSB	ILSA	ILSA	ILSA	DVAB	DVAB	DVAB	DVAB	DVAB	DVAB	DVAB
MET CDM Initial Rate	34	36	36	36	34	34	34	36	36	36	38	38	38	38	38	38	31
MET CDM Notes	1	1	1	1	2	2	2	2	2	2&3	2&3	3	3	3	3	3	3
MET CDM X-Factor	-2	-2	-2	-2	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
MET CDM Final Rate	32	34	34	34	30	30	30	32	32	32	34	34	34	34	34	34	27
TCU SM/TM ADJUSTMENT																	
SM/TM Notes											1	1	1	1			
SM/TM X-Factor											-4	-4	-4	-4			
Adjusted Arrval Rates	32	34	34	34	30	30	30	32	32	32	30	30	30	30	34	34	27
ATFM PLAN APPROVAL																	
DLM Notes																	
DLM X-Factor																	
ATFM Plan Segmentation	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
Final Arrval Rates	32	34	34	34	30	30	30	32	32	32	30	30	30	30	34	34	27
SHOW/HIDE CDM																	
DATE/TIME	301900	302000	302100	302200	302300	310000	310100	310200	310300	310400	310500	310600	310700	310800	310900	311000	311100
Previous Arrval Rates	32	34	34	34	30	30	30	30	30	32	32	34	34	34	34	34	28
Programmed Rates																	
MET CDM Notes	<div>1 A slow moving high pressure system west of Tasmania combined with a low off the north coast of NSW results in a strong pressure gradient over the TMA, thus strong to very strong and gusty S to SW winds are expected. 35 to 45 knots S'yly winds are expected below 3000ft with risk of occasional gusts up to 35 knots at the surface. Cloud 1500-2000ft lifting to 2000-3000ft late morning. Showers, potentially heavy, over sea and along the coastline. X-factor of -2 has been applied for head wind, with heavy showers less likely to impact the aerodrome or northern approaches. Risk of turbulence.</div> <div>2 Winds aloft increasing to 40 to 50 knots, with gusts in excess of 40 knots possible. Showers moving onshore, with occasional heavy falls possible. Isolated thunderstorms are possible in the south and east of the TMA moving to northern parts from 02Z. X-factor has been applied for both the strong winds and the high risk of showers impacting arrivals. Risk of turbulence.</div> <div>3 Cloud 2000-3000ft. Light showers continuing in the area, though less likely to have significant impact to operations. X-factor for strong head winds applied.</div> <div>4</div> <div>5</div> <div>SM/TM NOTES</div> <div>1 due 45kts on final</div> <div>2</div> <div>3</div>																

- Weather impact can be extremely challenging due to combination of low clouds, heavy showers and strong winds (45-50kts)
- MET-CDM (NOMCMET and AV MET) proposed reduction of rates below business rules due to extreme weather.
- ATC proposed further rate reduction in the afternoon due to 45 knots headwind on final.

# Quantitative Benefits of MET-CDM

MetCDM Verification --- Sydney Airport - 2018



Total number of hours displayed: 2894; Tactical rates taken from Terminal OPS

- Validation focusses on difference between ATFM rates established from MET-CDM and from TAF plus Business Rules (BR)
- Negative sum on left hand side of bar plot means that overall MET-CDM correctly estimated lower capacity and therefore reduced risk of oversubscription
- Negative sum on right hand side means that overall MET-CDM may be more conservative than TAF + BR
- In this example for Sydney, the MET-CDM removed 1542 'bad' slots at the cost of '23' good slots.



## Qualitative Benefits of MET-CDM

- MET-CDM provides transparency of ATFM rate setting to external (non ANSP) stakeholders
- Collaboration from airline AV MET increases airline 'buy in' into plan of operation, increasing shared responsibility and more constructive dialogue at times of disruptions