International Civil Aviation Organization

Thirtieth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/30)

Bangkok, Thailand, 14 – 17 July 2025

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

RVSM RISK ASSESSMENT IN THE BRISBANE, HONIARA, MELBOURNE, NAURU, AND PORT MORESBY FLIGHT INFORMATION REGIONS

1 JANUARY 2024 TO 31 DECEMBER 2024

(Presented by Australian Airspace Monitoring Agency)

SUMMARY

This paper presents an airspace Safety Review of RVSM airspace risk in the Brisbane, Honiara, Melbourne, Nauru, and Port Moresby Flight Information Regions (FIRs) for the period 1 January 2024 to 31 December 2024. The risk meets the Target Level of Safety (TLS) of 5.0 x 10^{-9} fatal accidents per flight hour (fapfh). A brief quantitative assessment of the safety reporting culture is also conducted.

Results show a technical risk of 0.084 x 10^{-9}, an operational risk of 0.84 x 10^{-9} and a total risk of 0.92 x 10^{-9}, all below the TLS.

1. INTRODUCTION

1.1 This report provides an airspace Safety Review of RVSM airspace risk in the Brisbane, Honiara, Melbourne, Nauru, and Port Moresby FIRs for the period 1 January 2024 to 31 December 2024. The review is undertaken using a 12-month data sample period.

1.2 All airspace safety estimates and TLS values in this report are measured in terms of fatal accidents per flight hour (fapfh).

1.3 The estimated risk is compared to the TLS of no more than 2.5 x 10^{-9} for the technical component of the risk, and 5.0 x 10^{-9} for the total weighted risk.

1.4 The results indicate risk below the TLS. The riskiest LHD is of particular interest, having occurred on a two-way route on the Brisbane/NFFF FIR boundary. A March 2024 LHD assessed as Category E (ATC coordination error as a result of human factor issues) involved one ANSP coordinating an aircraft at the wrong flight level (FL360 instead of FL300, at which the aircraft crossed into the Brisbane FIR) and was reported as lasting 2 minutes in duration.

2. DISCUSSION

Data Sources

2.1 *Traffic Sample Data (TSD):* TSD covering four weeks of the month of December 2024 of aircraft operating in the Brisbane, Honiara, Melbourne, Nauru, and Port Moresby FIRs was used as required by ICAO Regional agreement.

2.2 *Large Height Deviations (LHDs):* A cumulative 12-month data set of LHD reports was used, covering 1 January 2024 to 31 December 2024. All FIRs submitted LHD reports for all 12 months, including nil returns.

Summary of LHD Occurrences

2.3 The number of reported LHD occurrences, non-zero-duration LHDs, total LHD duration (in minutes), and total number of levels crossed for the period 1 January 2023 to 31 December 2023 are shown by month in **Table 1** with unusual values highlighted. The number of reported LHDs, duration, and levels crossed are shown in **Figure 1**.

Table 1: Summary of LHD occurrences by month for the period 1 January 2024 to 31 December 2024.

Month	Number of reported LHDs	Number of non-zero-duration LHDs	LHD duration (minutes)	Number of levels crossed
January	9	4	4	4
February	7	5	5.5	6.5
March	11	5	8	8.5
April	3	1	1	2
May	5	2	1.5	3.5
June	2	1	0.5	3
July	8	4	3	2.7
August	6	4	2.8	4
September	6	2	2	1
October	5	4	3.5	6.1
November	5	1	1	1.2
December	4	3	4	1
Total	**71**	**36**	**36.8**	**43.5**
Previous year (2023)	**65**	**23**	**48.5**	**9.0**

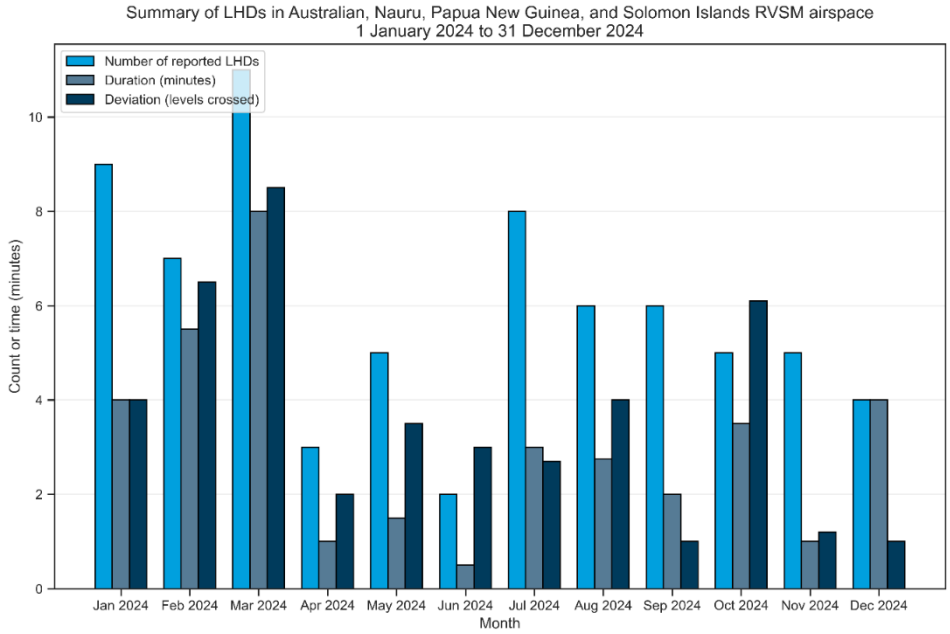

Figure 1: Number of LHDs, duration of LHDs, and number of levels crossed by month for the period 1 January 2024 to 31 December 2024.

2.4 The number of reported LHDs, total LHD duration (in minutes), and total number of levels crossed for the period 1 January 2024 to 31 December 2024 are shown by LHD category in **Table 2** and **Figure 2.**

Table 2: Summary of LHD occurrences by category for 1 January 2024 to 31 December 2024. Data for 2023 is shown for comparison. The March 2024 Category E LHD reported 6 flight levels crossed on the Brisbane/ NFFF FIR boundary.

		2024			2023		
LHD category	**LHD category description**	**Number LHDs**	**Duration of LHDs (minutes)**	**Number of levels crossed**	**Number LHDs**	**Duration of LHDs (minutes)**	**Number of levels crossed**
A	Flight crew failing to climb/descend the aircraft as cleared	13	5.5	3.5	12	11.0	3
B	Flight crew climbing/descending without ATC clearance	10	6.8	8.3	5	3.3	4
C	Incorrect operation or interpretation of airborne equipment	12	2.5	1.5	16	0	0
D	ATC system loop error	6	6	5	15	19.5	0

		2024			2023		
LHD category	**LHD category description**	**Number LHDs**	**Duration of LHDs (minutes)**	**Number of levels crossed**	**Number LHDs**	**Duration of LHDs (minutes)**	**Number of levels crossed**
E	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of human factors issues	18	6.5	10.5	12	13.0	0
F	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of equipment outage or technical issues	1	1	1	1	0	0
G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level	4	4.5	10	1	1.0	1
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level	0	0	0	0	0	0
I	Deviation due to turbulence or other weather-related cause	2	2	1.7	1	0.2	1
J	Deviation due to TCAS resolution advisory; flight crew correctly following the resolution advisory	2	1	1	1	0.5	1
K	Deviation due to TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0	0	0

		2024			2023		
LHD category	**LHD category description**	**Number LHDs**	**Duration of LHDs (minutes)**	**Number of levels crossed**	**Number LHDs**	**Duration of LHDs (minutes)**	**Number of levels crossed**
L	An aircraft being provided with RVSM separation is not RVSM approved	0	0	0	0	0	0
M	Other	3	1	1	1	0	1
Total		**71**	**36.8**	**43.5**	**65**	**48.5**	**9**

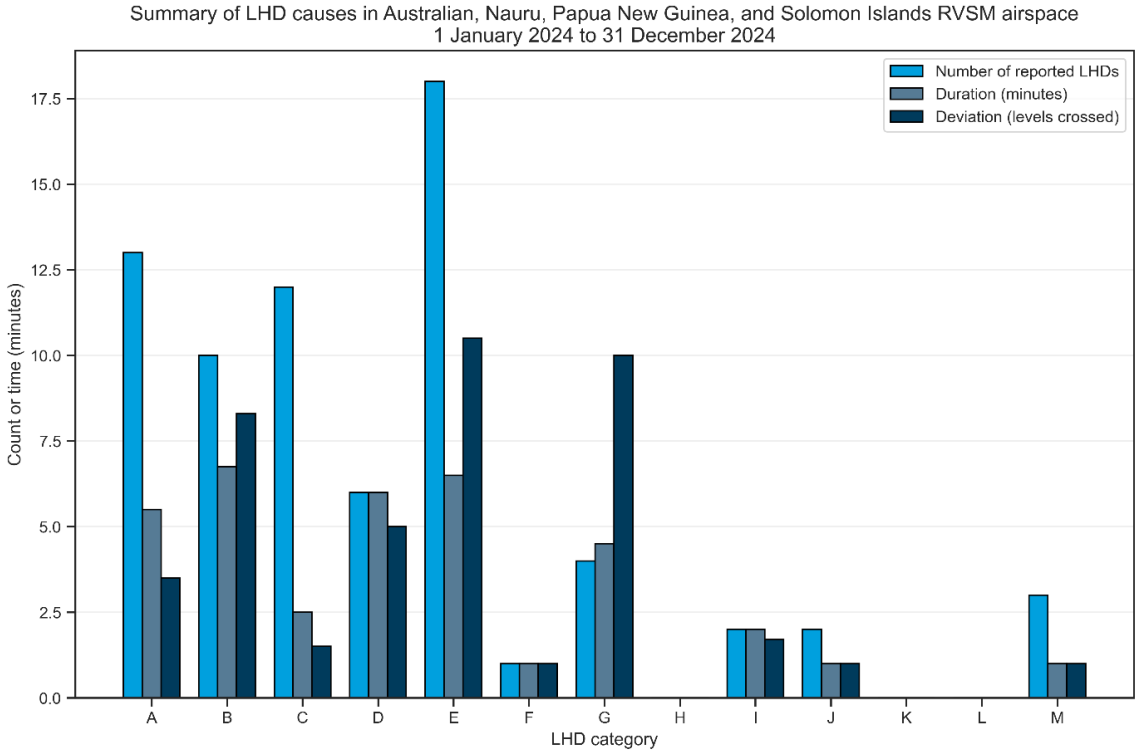

Figure 2: Number of LHDs, duration of LHDs, and number of levels crossed by LHD category for the period 1 January 2024 to 31 December 2024.

Collision Risk Estimate

2.5 The results for the technical, operational, and total risk for the RVSM implementation in Brisbane, Honiara, Melbourne, Nauru, and Port Moresby FIRs for 1 January 2024 to 31 December 2024

are detailed in **Table 3**. The technical risk meets the TLS value of no more than 2.5 x 10^{-9}. The operational and weighted total risk meets the specified TLS value for these components of 5.0 x 10^{-9}.

Table 3: RVSM Risk Estimates for the period 1 January 2024 to 31 December 2024. The number of estimated annual flight hours is 1,245,193 based on the December 2024 TSD.

Source of risk	Risk estimate	TLS	Comparison with TLS
Technical risk	0.084 x 10^{-9}	2.5 x 10^{-9}	Below technical TLS
Operational risk	0.84 x 10^{-9}	-	-
Total risk	**0.93 x 10^{-9}**	**5.0 x 10^{-9}**	**Below total TLS**

2.6 The trends of the technical risk, operational risk, and total risk for the period 1 January 2024 to 31 December 2024 are shown in **Figure 3**.

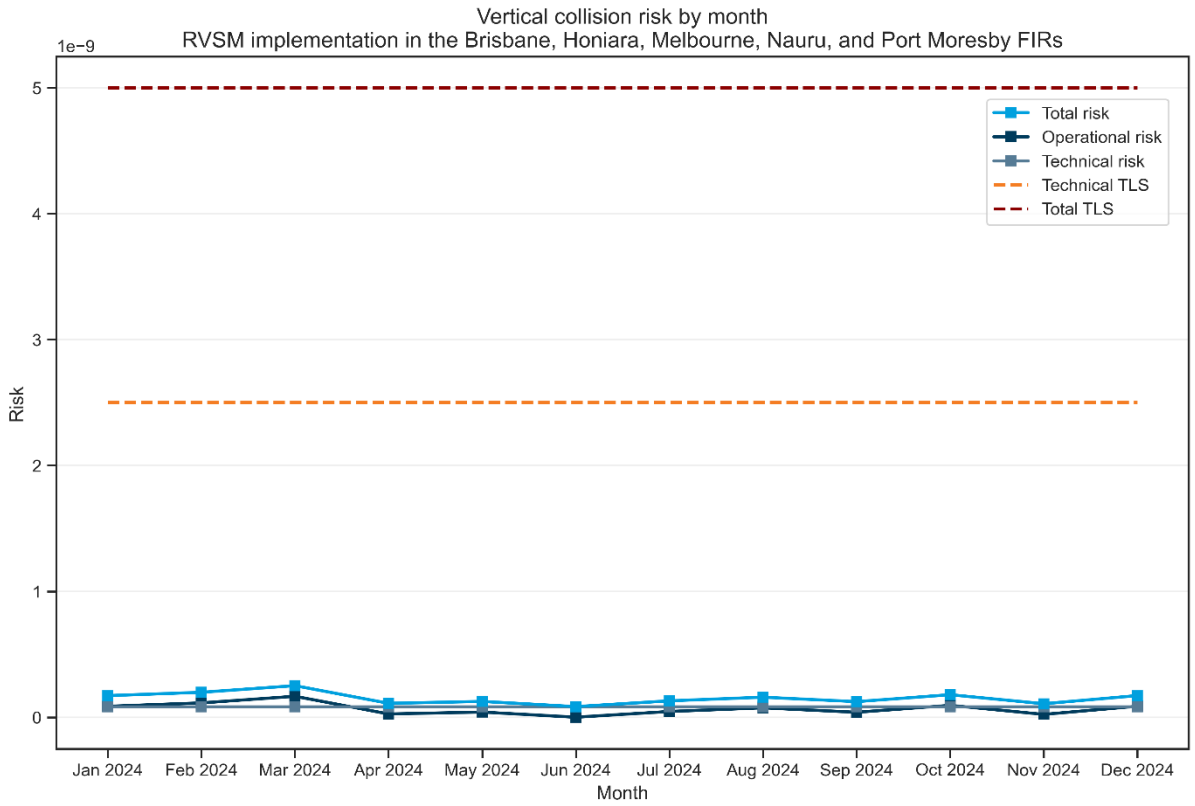

Figure 3: Trends of the technical, operational, and total risk for the period 1 January 2024 to 31 December 2024.

Assessment of Safety Reporting Culture

2.7 The 7th Meeting of the Monitoring Agencies Working Group (MAWG/7) proposed that Regional Monitoring Agencies (RMAs) assess States' reporting culture, since the RVSM risk assessment is dependent on the accuracy and quality of the LHD reports received.

2.8 MAWG/7 proposed that the reporting safety culture metric would be measured by the reporting rate of occurrence per flight hour, with occurrences grouped by attribution: Pilot/Aircrew (Categories A, B, and C), ATC (Categories D, E, and F), and others (Categories G, H, I, J, K, L, and M). The safety culture metric for Australia, Nauru, Papua New Guinea, and Solomon Islands is shown in **Table 4**.

Table 4: Safety culture metric for Australia, Nauru, Papua New Guinea, and Solomon Islands by LHD attribution for the period 1 January 2024 to 31 December 2024.

Attribution	Number of reports	Flight hours	Number of reports per flight hour (x 10^{-5})
Pilot/Aircrew (A, B, C)	35	1 245 193	2.81
ATC (D, E, F)	25	1 245 193	2.00
Other	11	1 245 193	0.88
Total	**71**	**1 245 193**	**5.70**

2.9 Reports were consistently made by both pilots and ATC.

2.10 35 LHDs with Pilot/Aircrew were reported along with 25 LHDs with ATC attribution. A high rate of reporting of occurrences with ATC attribution is an indication of a positive reporting culture, especially if ATC are comfortable reporting on their own errors as part of a 'Just Culture' framework.

2.11 Of the 25 ATC-attributed reports received, 9 reports corresponded to errors made by neighbouring ATCs, 6 corresponded to errors made by Australian ATC, and the remaining 10 corresponded to internal coordination or system loop errors.

Geolocation of LHDs

2.12 A map identifying the geographic location of LHD occurrences for the period 1 January 2024 to 31 December 2024 is shown in **Figure 4**. The occurrences at each location are represented by a coloured circle, with the radius proportional to the total risk at that location. The map is intended to provide a means to identify and visualise risk hot spots related to RVSM operations.

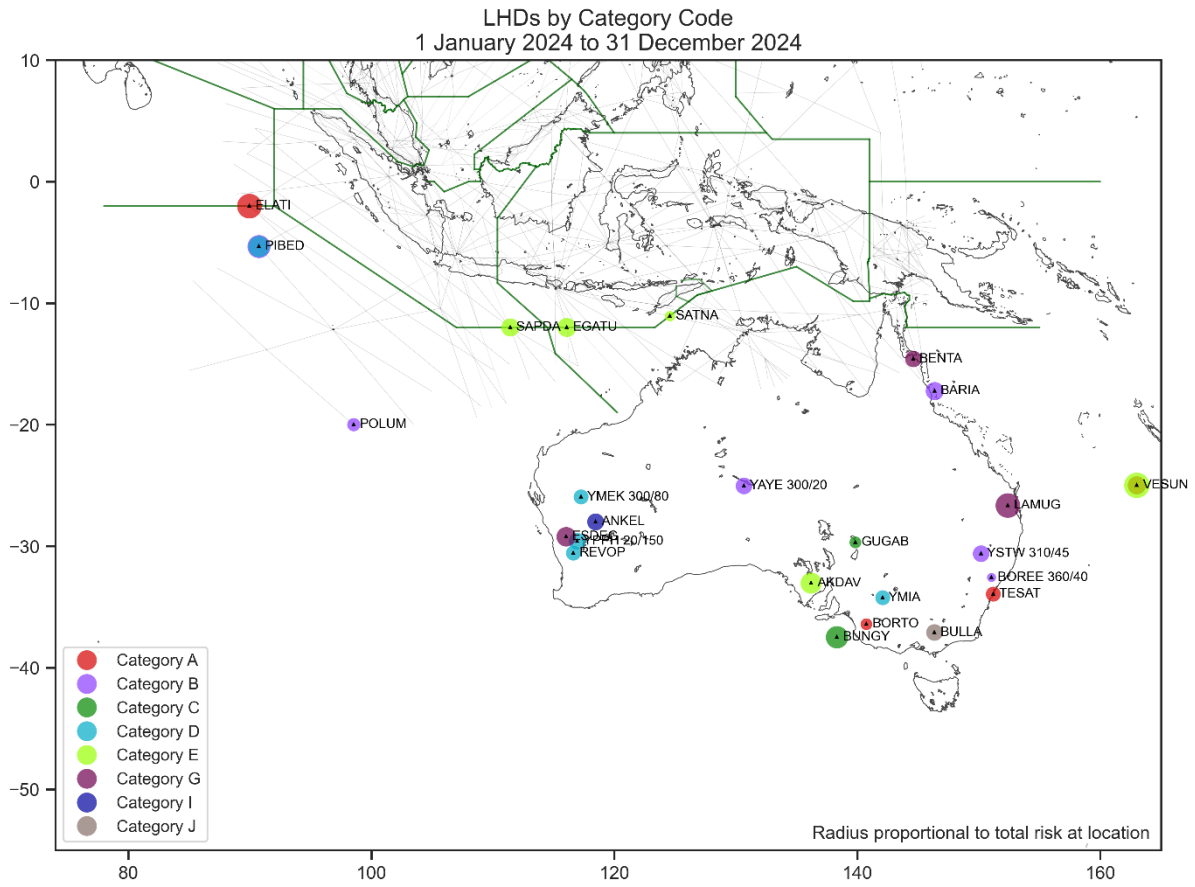

Figure 4: Geolocation of LHDs for Brisbane, Honiara, Melbourne, Nauru, and Port Moresby FIRs for the period 1 January 2024 to 31 December 2024.

Summary and Discussion

2.13 The total risk (0.93×10^{-9}) is less than the risks reported for the last two annual reporting periods (1.51×10^{-9} reported at RASMAG/29 and 1.73×10^{-9} reported at RASMAG/28). Notably more than half of the occurrence risk reported for 2023 was due to a single Category E LHD on the Melbourne/Colombo FIR boundary that lasted 13 minutes and crossed 3 levels.

2.14 Category E was the most common LHD category (18), although only 6 were assessed as risk-bearing. The others mostly involved aircraft coordinated to the relevant FIR boundary at the wrong flight level – mistakes that were queried by receiving ATC and rectified before the aircraft transited the boundary.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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