



ICAO

International Civil Aviation Organization

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

Bangkok, Thailand, 29 June – 03 July 2026

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 2025 TO 31 DECEMBER 2025

(Presented by AAMA)

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 2025 to 31 December 2025. The risk meets the Target Level of Safety (TLS) of 5.0×10^{-9} fatal accidents per flight hour (fapfh). Results show a technical risk of 0.10×10^{-9} , an operational risk of 2.15×10^{-9} and a total risk of 2.24×10^{-9} , all below the TLS. The number of identified LHDs (123) is an increase from the previous year (71). No hot spots were identified.

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 calendar year 2025. 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 2.5×10^{-9} for the technical component of the risk, and 5.0×10^{-9} for the total weighted risk. Some 67 out of the 123 occurrences present non-zero risk (54% of occurrences).

1.4 The results indicate risk below the TLS. The riskiest LHD involved a Category E error (no transfer of coordination information) and occurred on the Melbourne/Jakarta FIR boundary. An airframe appeared in ADS-C surveillance some eight minutes after passing the boundary with no prior coordination. The second riskiest LHD also involved no transfer of coordination information and occurred on the Nadi/Brisbane FIR boundary – an ATC became aware of an airframe that had already spent approximately eight minutes in Brisbane FIR when it called for a request to climb.

1.5 38 of the 123 LHDs (31%) involved coordination errors in the ATC-to-ATC transfer or control responsibility as a result of human factors issues (Category E). Approximately 31% of the operational risk was contributed by Category E LHDs.

2. DISCUSSION

Data Sources

2.1 Traffic Sample Data (TSD): TSD covering four weeks of the month of December 2025 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 calendar year 2025. All FIRs submitted LHD reports for all 12 months, including nil returns.

Summary of LHD Occurrences

2.3 The number of reported LHD occurrences, risk-bearing LHDs, total LHD duration (in minutes), and total number of levels crossed are shown by month in **Table 1**. The number of reported LHDs, duration, and levels crossed are shown in **Figure 1**.

Table 1. Summary of LHD Occurrences by Month for Calendar Year 2025

Month	Number of reported LHDs	Number of risk-bearing LHDs	LHD duration (minutes)	Number of levels crossed
January	9	4	3	3
February	13	4	33	6
March	5	4	16	5
April	12	10	10	18
May	11	6	7.5	9.1
June	7	3	4	4
July	12	7	11	8.5
August	12	4	4	5
September	5	3	2.5	2
October	17	10	23.5	13.5
November	7	2	2	3
December	13	10	10	15
Total	123	65	102	60.1*
Previous year (2024)	71	37	36.8	43.5

**Please note a discrepancy in summing 'flight levels crossed' for some Category E LHDs in previous years has been corrected in analysing 2025 LHDs to align with other Regional Monitoring Agency practice.*

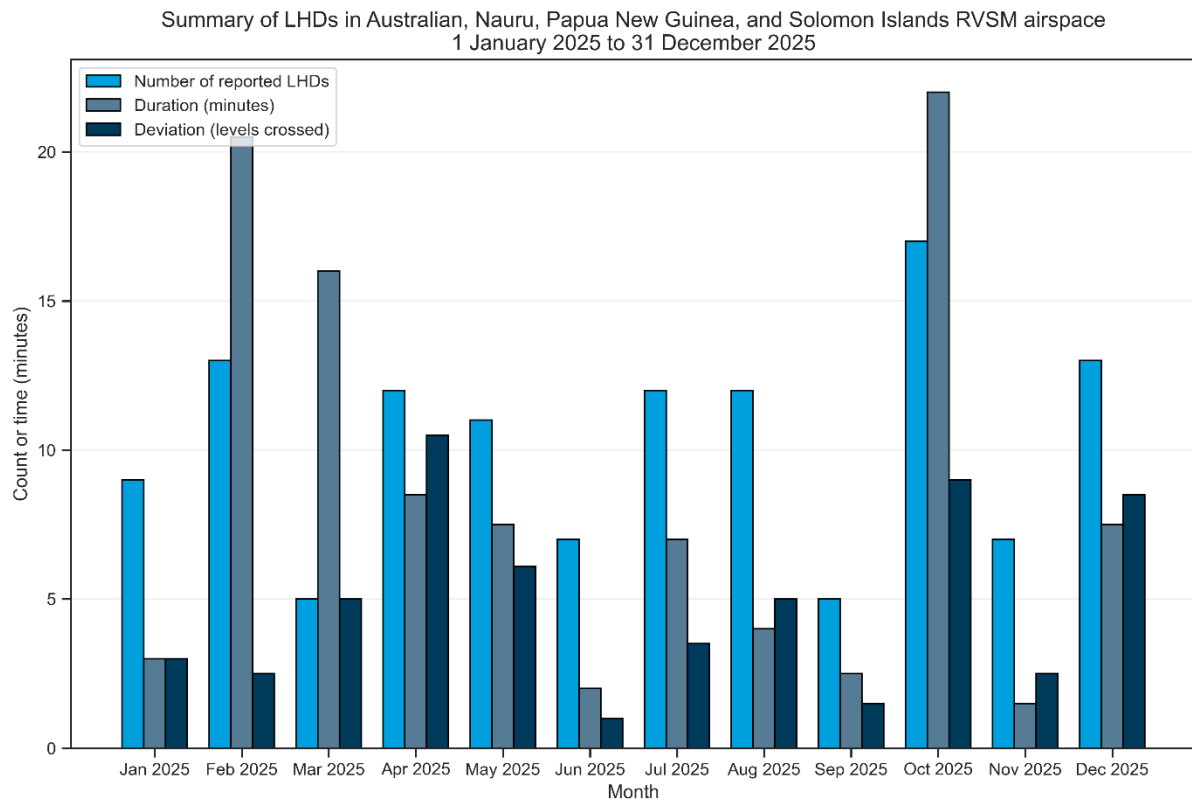


Figure 1. Number of LHDs, duration of LHDs, and number of levels crossed by month.

2.4 The number of reported LHDs, total LHD duration (in minutes), and total number of levels crossed for calendar year 2025 are shown by LHD category in **Table 2** and **Figure 2**. Data for 2024 is shown for comparison.

Table 2. Summary of LHD Occurrences by Category

LHD category	LHD category description	2025			2024		
		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	12	19.5	14	13	5.5	3.5
B	Flight crew climbing/descending without ATC clearance	14	15.5	13.6	10	6.8	8.3
C	Incorrect operation or interpretation of airborne equipment	23	5	3	12	2.5	1.5
D	ATC system loop error	22	17.5	14.5	6	6	5
E	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of human factors issues	38	24.5	2	18	6.5	10.5

F	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of equipment outage or technical issues	1	0	0	1	1	1
G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level	7	7	10	4	4.5	10
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level	3	12	2	0	0	0
I	Deviation due to turbulence or other weather-related cause	0	0	0	2	2	1.7
J	Deviation due to TCAS resolution advisory; flight crew correctly following the resolution advisory	3	1	1	2	1	1
K	Deviation due to TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved	0	0	0	0	0	0
M	Other	0	0	0	3	1	1
R	GNSS Radio Frequency Interference	0	0	0	-	-	-
Total		123	102.0	60.1	71	36.8	43.5

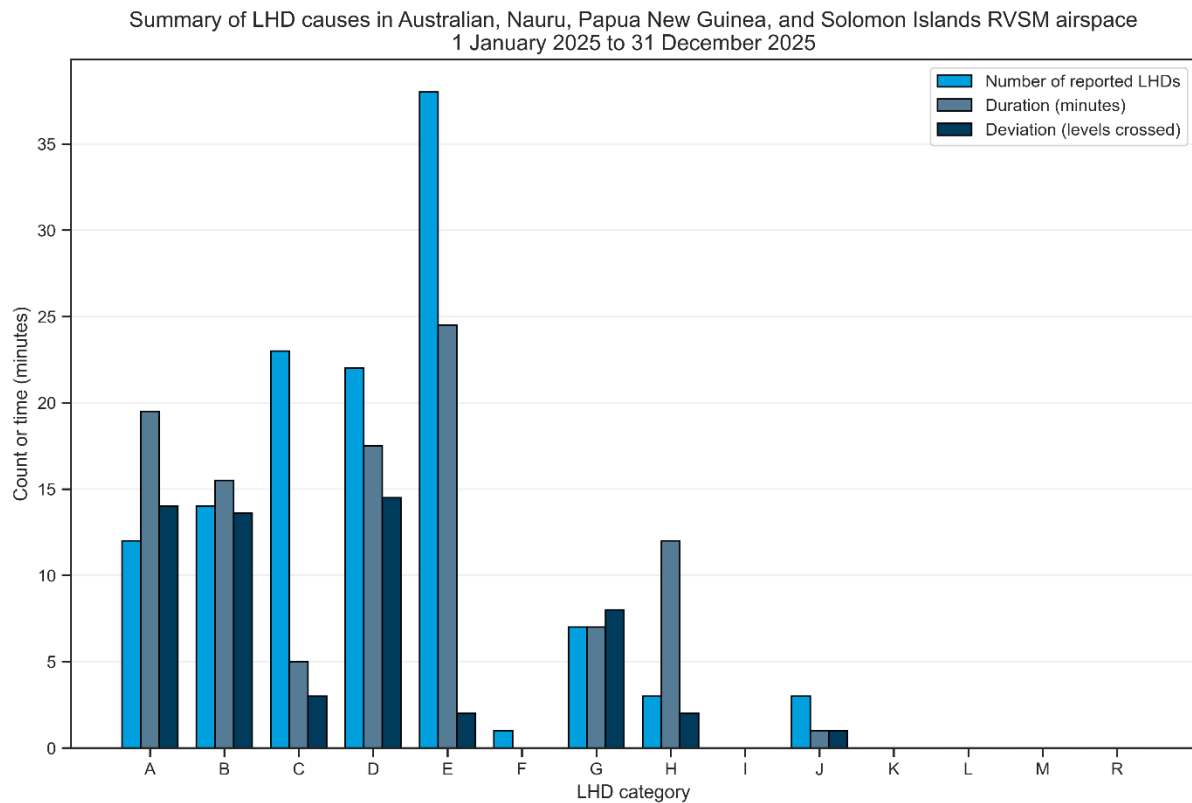


Figure 2. Number of LHDs, Duration of LHDs, and Number of Levels Crossed by LHD Category

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 2025 are detailed in **Table 3**. The technical risk meets the TLS value of no more than 2.5×10^{-9} . The operational and weighted total risk meets the specified TLS value for these components of 5.0×10^{-9} . The number of estimated annual flight hours is 1,354,591 based on the December 2025 TSD.

Table 3. RVSM Risk Estimates for Calendar Year 2025

Source of risk	Risk estimate	TLS	Comparison with TLS
Technical risk	0.10×10^{-9}	2.5×10^{-9}	Below technical TLS
Operational risk	2.1×10^{-9}	-	-
Total risk	2.2×10^{-9}	5.0×10^{-9}	Below total TLS

2.6 The trends of the technical risk, operational risk, and total risk for calendar year 2025 are shown in **Figure 3**.

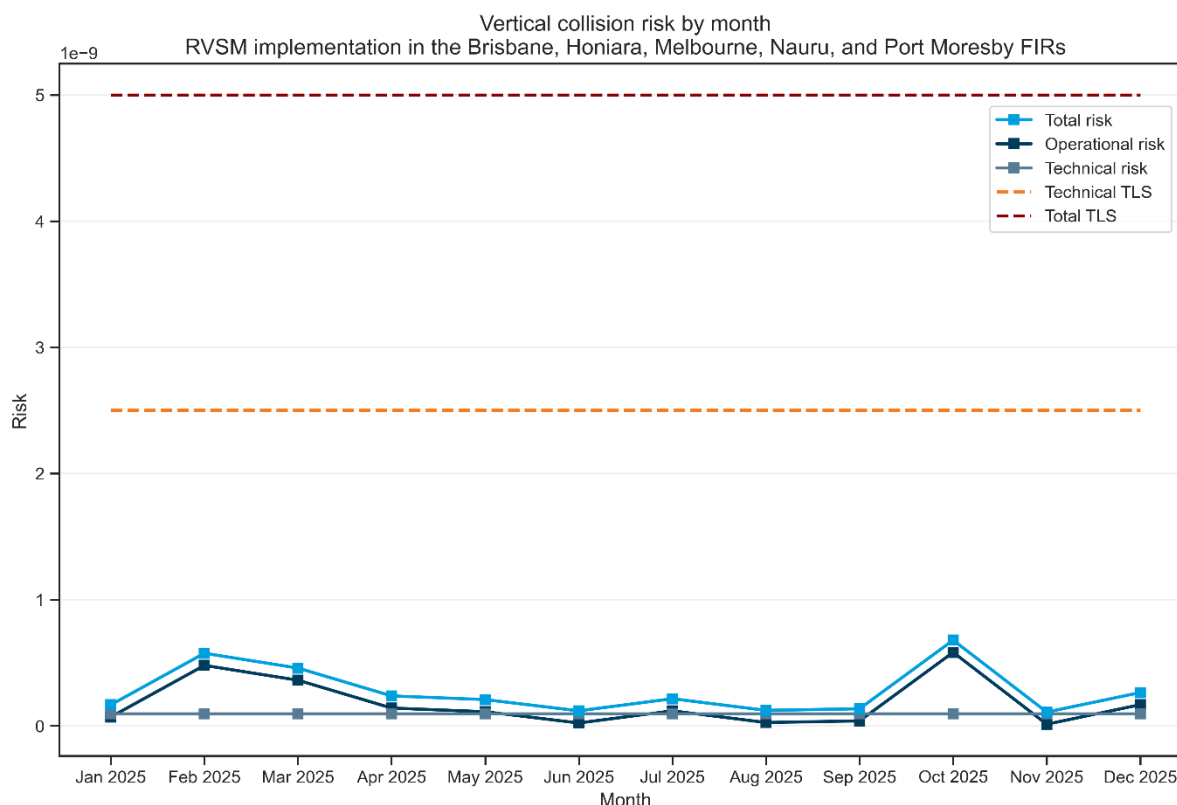


Figure 3. Trends of the Technical, Operational, and Total Risk

Category E Sub-categorisation

2.7 During the 12th meeting of the Monitoring Agencies Working Group (MAWG/12), RMAs agreed to apply sub-categorisation to Category E Large Height Deviations. These LHDs involve coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues. These sub-categories include:

- a) E-NT: No Transfer or Negative Transfer;
- b) E-LT: Late Transfer;
- c) E-RI: No or Late Revision of Transfer Information; and
- d) E-OT: Any Other Types.

2.8 AAMA applied the sub-categorisation system to 2025 LHDs for the FIRs for which it is the responsible RMA.

2.9 One-third of Category E LHDs contributed to the vertical risk profile. The majority of E LHDs belonged to E-RI sub-category (17). **Table 4** summarizes the results of the sub-categorisation.

Table 4. Category E Subcategories for Brisbane, Honiara, Melbourne, Nauru and Port Moresby FIRs

E subcategories	Non-risk bearing LHDs	Risk-bearing LHDs	Total
E-NT	3	4	7
E-LT	9	0	9
E-RI	10	7	17
E-OT	1	4	5
Total	23	15	38

Hot Spot Identification

2.10 A map identifying the geographic location of LHD occurrences 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.

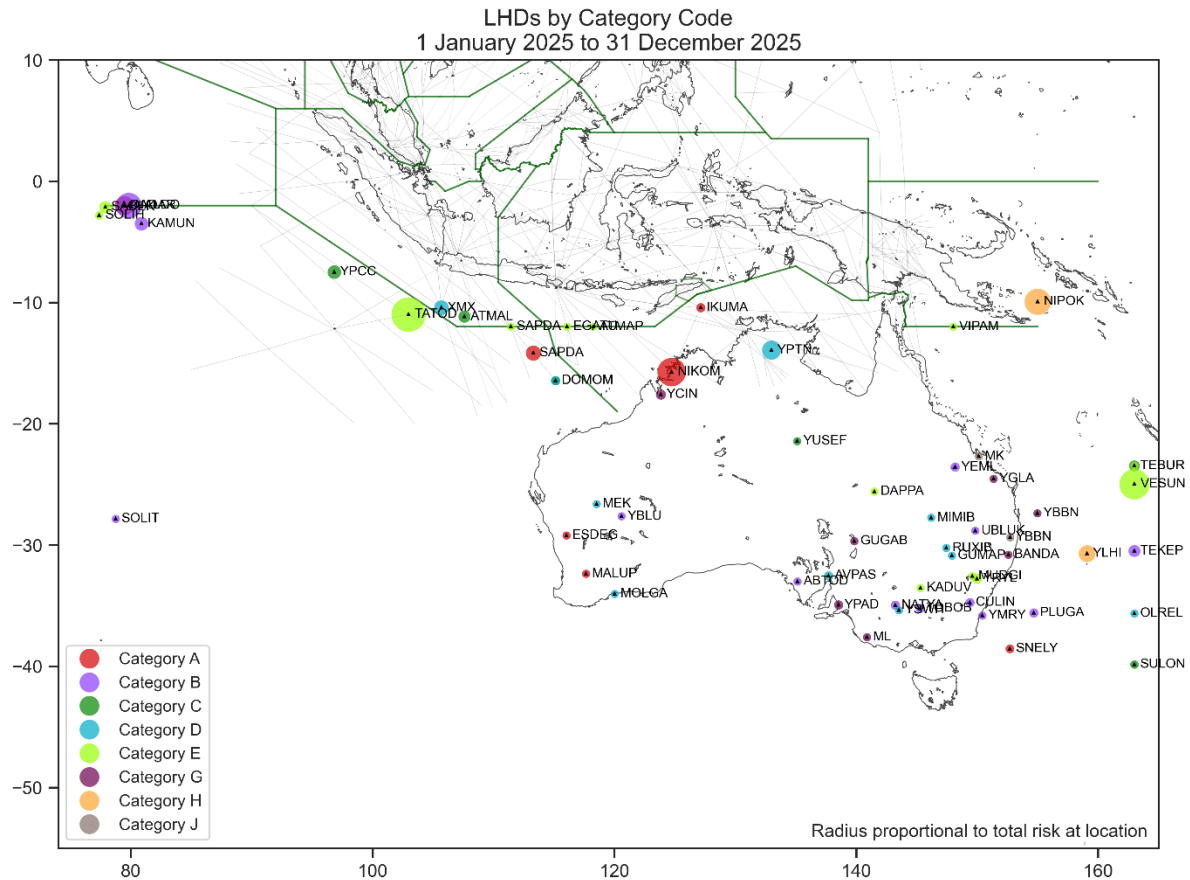


Figure 4. Geolocation of LHDs for Brisbane, Honiara, Melbourne, Nauru, and Port Moresby FIRs for Calendar Year 2025

2.11 A hot spot identification process was developed at MAWG/9. It focuses on visually identifying clusters of LHDs in a given airspace and comparing the number of LHDs and summed risk in each cluster with risk metrics for the region.

2.12 Hot spot identification was conducted for 2025 LHDs. Two clusters were visually identified (and confirmed by comparing the number of LHDs in each geographic area), and results are shown in **Figure 5**. Clusters are found on the Colombo/Melbourne FIR boundary (between SABEK and KAMLIN) and on the Brisbane/Nadi FIR boundary (between TEBUR and LAPIP).

2.13 Hot spot identification results are shown in **Table 5**. The first column details a given metric (or criterion), and each subsequent column details the results for a given identified cluster. The first criterion is the number of LHDs in a given cluster compared with the total number of LHDs divided by the number of clusters plus 1 (41). The second criterion is the summed risk of a given cluster compared with the total operational summed risk divided by the number of clusters plus 1 (7.15×10^{-10}). The third criterion is the summed risk of a given cluster compared to the relevant Target Level of Safety (5×10^{-9}). Under all three criteria, no hot spot was identified.

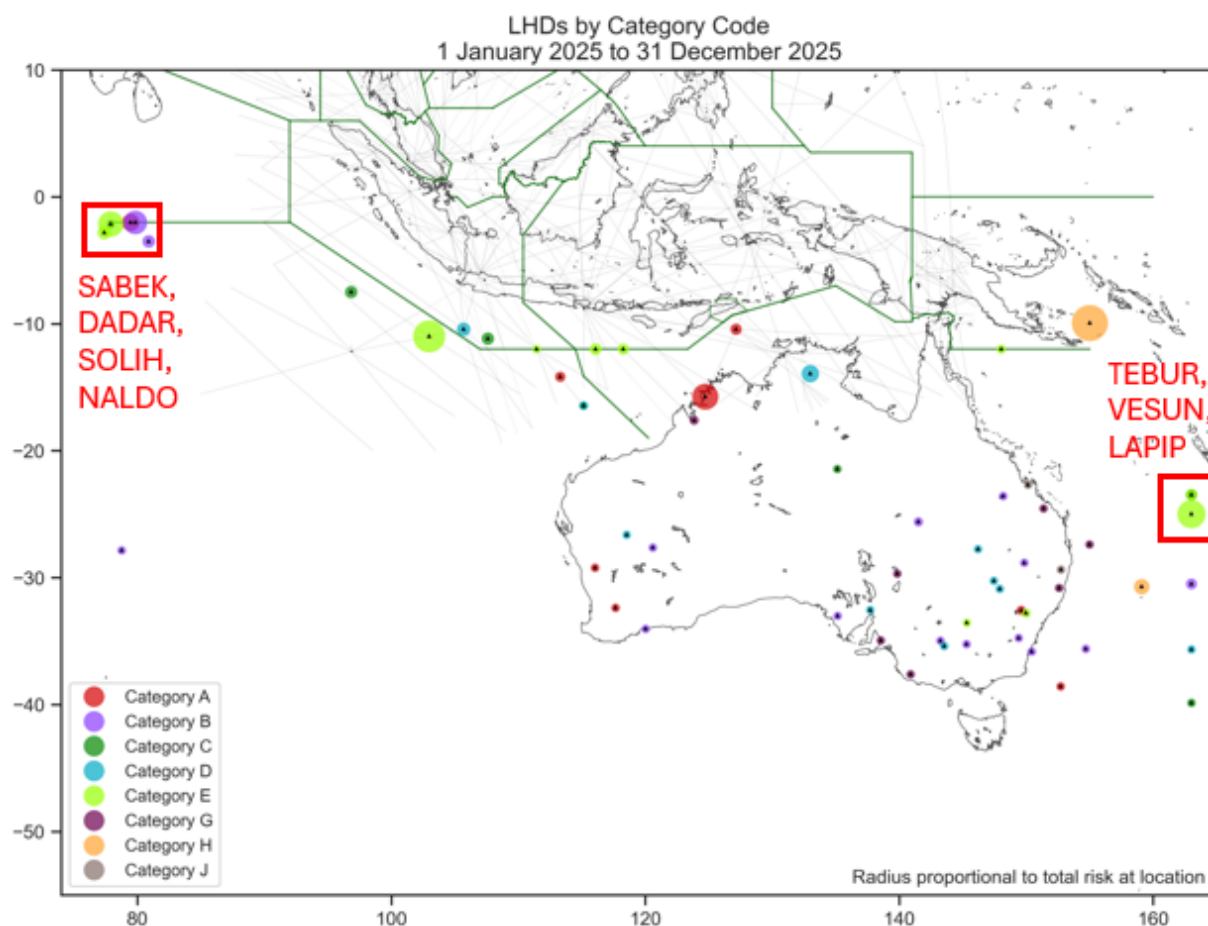


Figure 5. Geolocation of LHD Clusters for Calendar Year 2025

Table 5. Hot Spot Identification Process for 2025 LHDs

2025 clusters (n=2)	SABEK, DADAR, SOLIH, NALDO	TEBUR, VESUN, LAPIP
<i>Number of LHDs</i>	10	4
Criterion: number of LHDs ≥ 41	False	False
<i>Operational risk</i> ($\times 10^{-9}$ fapfh)	0.31	0.27
Criterion: operational risk $\geq 7.15 \times 10^{10}$	False	False
Criterion: TLS (5×10^{-9} fapfh)	False	False

Assessment of Safety Reporting Culture

2.14 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.

2.15 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 6**.

Table 6. Safety Culture Metric for Australia, Nauru, Papua New Guinea, and Solomon Islands by LHD Attribution for 2025

Attribution	Number of reports	Flight hours	Number of reports per flight hour (x 10 ⁻⁵)
Pilot/Aircrew (A, B, C)	61	1354591	4.5
ATC (D, E, F)	48	1354591	3.54
Other	14	1354591	1.03

2.16 Reports were consistently made by both pilots and ATC. 61 LHDs with Pilot/Aircrew were reported along with 48 LHDs with ATC attribution.

2.17 Of the 38 Category E LHDs, 24 reports corresponded to errors made by neighbouring ATCs and 14 corresponded to errors made by Australian ATC.

Summary and Discussion

2.18 There were 123 LHDs identified in 2025, compared with 71 the previous year. Similarly, the total risk (2.24×10^9) is also greater (0.92×10^9 reported at RASMAG/30).

2.19 Category E was the most common LHD category (38), and a third of those were assessed as risk-bearing (contributing 31% of the total operational risk). 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.

— END —