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To: EK-postbus <postbus@eerstekamer.nl>
Subject: FW: Publicatie OVV notitie opvolging aanbevelingen 'Touchdown before threshold'

Attachments:

reactie-onderzoeksraad-op-opvolging-aanbevelingen-touchdown-before-threshold.pdf

Van: 5.1.2.e <5.1.2.e@onderzoeksraad.nl>
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Aan: EK-voorzitter <voorzitter@eerstekamer.nl>
Onderwerp: Publicatie OVV notitie opvolging aanbevelingen 'Touchdown before threshold'

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Geachte prof. Bruijn,

Hierbij ontvangt u de notitie met de reactie van de Onderzoeksraad voor Veiligheid op de opvolging van de aanbevelingen van het onderzoeksrapport *Touchdown before threshold*. Deze notitie hebben wij woensdag 11 juni 2025 gepubliceerd op de [onderzoekspagina op onze website](#). Daar zijn tevens de reactie van de aanbevelingspartij en het onderzoeksrapport te vinden.

Met vriendelijke groet,

5.1.2.e



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Follow-up to recommendations: Touchdown before threshold. Risks associated with a large aircraft landing on a short runway

Publication date of the report: 18 July 2024

1. About this report

On 12 January 2023, a large commercial air transport aircraft flew an approach to the shortest of six runways at Amsterdam Airport Schiphol, Runway 22. The Airbus A330-300 descended below the final approach path. During the subsequent landing, the main landing gear touched down in the grass, 11 metres before the runway threshold. The aircraft continued its landing, slowed down before the end of the runway and taxied to the gate uneventfully. The aircraft sustained only minor damage. None of the crew or passengers were injured.

The incident highlighted a complex interplay of technical, environmental and human factors. While the Airbus A330-300 was capable of safely landing on Runway 22, the crew's skewed risk perception led to the aircraft touching down before the runway threshold. This was influenced by environmental challenges, a lower-than-desired threshold crossing height resulting from following the precision approach path indicator (PAPI), and operational decisions. This event underscored the necessity of comprehensive risk analysis, pilot training tailored to specific operational scenarios and a systemic review to ensure better awareness and decision-making regarding the suitability of runways for different types of aircraft. The incident highlighted the importance of an integral approach to safety, encompassing both operational planning and runway suitability evaluation.

The Dutch Safety Board concluded that while Runway 22 at Amsterdam Airport Schiphol is structurally capable of accommodating the landing of an Airbus A330, the configuration of the instrument landing system (ILS) and PAPI-system offered insufficient threshold crossing clearance for large and long aircraft. The ILS and PAPI did not meet ICAO and EASA standards for Eye-to-Wheel Height Category 4 aircraft.

In the investigation report, the Dutch Safety Board recommended that Amsterdam Airport Schiphol restrict the use of Runway 22 for Eye-to-Wheel Height Category 4 aircraft landings, until adjustments have been made to ensure the minimum threshold clearance for such aircraft can be achieved.

The Schiphol Group responded to the recommendations on 15 October 2024. The full response is published on the website of the Dutch Safety Board. In March 2025 the Board asked what the current status is.

This memorandum contains a general conclusion on the follow-up to the recommendation, as well as a short summary of the received response and a conclusion about its adequacy.

2. General conclusion on follow-up to the recommendation

The Dutch Safety Board assesses the follow-up to the recommendation made to Amsterdam Airport Schiphol as partially adequate.

The recommendation advised restricting the use of Runway 22 for landings by Eye-to-Wheel Height Category 4 aircraft until adjustments have been made to ensure minimum threshold crossing clearance. Schiphol did not impose this restriction, based on a sector-wide risk assessment that determined such a measure could lead to increased operational risks under specific weather and traffic conditions.

Schiphol has taken concrete steps to address the underlying safety issue. In February 2025, the Integrated Safety Management System (ISMS) TOP Safety Action Group (TOP SAG) decided to relocate the PAPI and aiming point marker to improve threshold crossing clearance and meet the applicable EASA standards. These measures are expected to mitigate the identified risks, although implementation is still pending.

In light of the actions underway, and considering the structured safety management process supporting these efforts, the Dutch Safety Board recognises meaningful progress. The Board will monitor the further implementation of the measures.

Overview of follow-up per recommendation

When assessing the follow-up to recommendations from aviation reports, the Board uses the classification and assessment criteria developed by the European Network of Civil Aviation Safety Authorities (ENCASIA) (see Appendix 1).

Recommendations to	(Core of) Recommendation	Follow-up
Amsterdam Airport Schiphol	Restrict the use of Runway 22 for Eye-to-Wheel Height Category 4 aircraft landings, until adjustments have been made to ensure the minimum threshold clearance for such aircraft can be achieved.	Partially adequate

3. Follow-up per recommendation

Recommendation 1

To Amsterdam Airport Schiphol

Restrict the use of Runway 22 for Eye-to-Wheel Height Category 4 aircraft landings, until adjustments have been made to ensure the minimum threshold clearance for such aircraft can be achieved.

Response by Amsterdam Airport Schiphol

Regarding restricting Runway 22 until adjustments have been made

Amsterdam Airport Schiphol report that it considered restricting Runway 22 for landings by large aircraft until the adjustments were implemented. However, a risk assessment by the Netherlands Aerospace Centre (NLR)¹ indicated that such a restriction could lead to greater operational and safety risks. Specifically, the analysis estimated that the current risk of an undershoot event resulting in serious injury or lasting health effects is low - with a frequency of once every 100 to 1,000 years. Runway 22 is mainly used when weather conditions, such as strong southwesterly winds, require it. Restricting its use under those conditions would lead to an increase in landings with high crosswind values on alternative runways. This could in turn increase the likelihood of runway excursions, abnormal runway contacts, or loss of control on the ground. Additional impacts include a higher number of missed approaches, holding patterns, potential diversions, and aircraft reaching low-fuel states due to increased congestion in terminal airspace. Based on this analysis, the ISMS TOP SAG decided to temporarily accept the risk of continued operations under the current configuration of Runway 22, pending the implementation of the planned modifications.

Regarding the PAPI

In the response of 15 October 2024 Amsterdam Airport Schiphol acknowledges that the PAPI system on Runway 22 does not meet the EASA standards applicable to Eye-to-Wheel Height Category 4 aircraft. The airport indicates that the aviation sector is working on corrective measures to address this issue, and a formal action plan will be submitted to the Human Environment and Transport Inspectorate. As part of the Management of Change process, the sector will also assess whether the proposed adjustments may introduce new or increased risks. The response states that TOP SAG will make a decision on the implementation of these measures in February 2025.

¹ *Risicoanalyse ILS/PAPI baan 22, NLR, Oktober 2024.*

In March 2025 the Dutch Safety Board informed the outcome of the decision on the implementation of the aforementioned measures. The Board learned that the ISMS TOP SAG decided to implement adjustments to improve threshold crossing clearance. The plan includes relocating both the PAPI and the aiming point marker to a new position 345 metres from the runway threshold. The length of the aiming point marking will be reduced from 60 to 55 metres to align with the new touchdown zone. These measures are intended to ensure compliance with the applicable EASA requirements for large aircraft operations.

Regarding the Instrument Landing System (ILS)

In the response of 15 October 2024 Schiphol states that the ILS CAT I for Runway 22 meets the ICAO Standards and Recommended Practices (SARPs), and that its Reference Datum Height (RDH) of 46 feet, while below the recommended 50 feet, is acceptable for CAT I approaches under ICAO Annex 10. This RDH was validated by a national procedure design working group in 2009, including oversight by the regulator. However, the aforementioned analysis by the (NLR)² concluded that the current ILS glide path does not provide sufficient vertical margin above the runway threshold for a significant proportion of landings, particularly for EWH Category 4 aircraft. According to NLR, 28% of landings between January 2018 and June 2024 were made by aircraft that did not meet the recommended vertical clearance of 9.2 metres above the threshold.

Assessment of follow-up

The Dutch Safety Board assesses the follow-up to the recommendation as partially adequate.

The recommendation issued to Amsterdam Airport Schiphol consisted of two elements:

1. Restricting the use of Runway 22 for landings by Eye-to-Wheel Height Category 4 aircraft until adjustments have been made, and
2. Implementing adjustments to ensure minimum threshold crossing clearance is achieved.

Schiphol did not implement the restriction of Runway 22, citing a risk assessment by the Netherlands Aerospace Centre (NLR) which concluded that restricting the runway for large aircraft may result in greater safety risks under certain meteorological and traffic conditions. Based on this analysis, the ISMS TOP SAG decided to accept the current level of risk associated with continued operations on Runway 22.

At the same time, the airport operator has taken clear steps toward addressing the underlying safety issue. In February 2025, the ISMS TOP SAG decided to relocate the PAPI and the aiming point marker to provide improved vertical guidance and threshold crossing clearance for large aircraft. These adjustments are intended to align the visual glide path with a safer touchdown zone, in accordance with EASA requirements.

² *Risicoanalyse ILS/PAPI baan 22*, NLR, Oktober 2024.

Regarding the ILS, Schiphol stated that the ILS CAT I configuration complies with ICAO standards. However, the NLR analysis concluded that the current glide path does not provide sufficient vertical clearance for a significant number of aircraft, particularly those in Eye-to-Wheel Height Category 4. This discrepancy highlights the need to consider both visual (PAPI) and electronic (ILS) guidance systems in tandem, especially in low-visibility conditions or under high pilot workload.

The Board recognises that implementation of the recommended adjustments has not yet been completed and that the operational restriction was not enacted. However, the decision to proceed with concrete safety improvements - combined with a structured risk analysis and sector-wide coordination - demonstrates meaningful progress. The Dutch Safety Board would like to provide Amsterdam Airport Schiphol with the following considerations:

- Compliance with safety standards remains a way to achieve the ultimate objective of safety. The acceptance of current risks by the sector does not eliminate the need to meet ICAO and EASA standards for threshold crossing clearance. Temporary acceptance of risks must be supported by concrete steps towards full compliance.
- Potential divergence between PAPI and ILS should be assessed. If only the PAPI system is relocated and the ILS glide path remains unchanged, this could result in a misalignment between visual and electronic vertical guidance systems. Such a divergence can lead to pilot confusion or unstable approaches, especially under low-visibility conditions or for flight crews unfamiliar with the runway. Although it is currently unclear whether the ILS glide path will also be adjusted, any resulting differences between the guidance systems should be assessed as part of the implementation process to determine whether operational mitigations are needed.
- Threshold crossing height must be monitored, not assumed. The Board encourages the continued monitoring of actual threshold crossing heights during approaches to Runway 22, particularly for Eye-to-Wheel Height Category 4 aircraft, until the adjusted configuration is in place.
- Scenario-based restrictions could enhance risk management. Even without a blanket restriction on Runway 22, Schiphol could consider conditional limitations (e.g. under certain wind conditions, low visibility, or in wet runway scenarios) to reduce the likelihood of undershoot events during the interim period.

Appendix 1. Assessment criteria for aviation

In assessing responses to recommendations made to the aviation sector, the Safety Board uses the guideline issued by ENCASIA on the EU Regulation on the Investigation and Prevention of Accidents and Incidents in Civil Aviation (Regulation (EU) No 996/2010). ENCASIA is the European Network of Civil Aviation Safety Investigation Authorities. The classifications and associated assessment criteria are as follows:

Category	Guidance
Adequate	<p>The response clearly shows that the safety issue identified by the recommendation has been addressed.</p> <p>The response shows that there is a high probability the action will be taken in the future to address the safety issue or intent.</p> <p>The response may not meet the intent of the recommendation as written but does address the underlying safety issue or has been superseded by other evidence/action.</p>
Partially adequate	<p>The response goes some way to addressing the intent of the recommendation or safety issue in that some action is taking place, but there is:</p> <ul style="list-style-type: none"> • a likelihood the action may not take place, or • little or no likelihood of any further action by the addressee.
Not adequate	<p>The recommendation response did not address the intent or safety issue, or the recommendation was rejected by the addressee and is not likely to be acted upon by them.</p>
Awaiting response	<p>Awaiting the first response from the addressee.</p>
Superseded	<p>The safety recommendation has been superseded.</p>

The recommendations, associated reactions and classifications are included in the European Safety Recommendations Information System (SRIS) database, publicly available via <https://sris.aviationreporting.eu/safety-recommendations>.