



DUTCH  
SAFETY BOARD

# Summary

## Schiphol air traffic safety



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*Photo cover: Stockphoto of Amsterdam Airport Schiphol. Source: Shutterstock/ Pieter Beeks*

## **Dutch Safety Board**

When accidents or disasters happen, the Dutch Safety Board investigates how it was possible for them to occur, with the aim of learning lessons for the future and, ultimately, improving safety in the Netherlands. The Safety Board is independent and is free to decide which incidents to investigate. In particular, it focuses on situations in which people's personal safety is dependent on third parties, such as the government or companies. In certain cases the Board is under an obligation to carry out an investigation. Its investigations do not address issues of blame or liability.

	<b>Dutch Safety Board</b>		
Chairman:	T.H.J. Joustra E.R. Muller M.B.A. van Asselt		
Secretary Director:	C.A.J.F. Verheij		
Visiting address:	Anna van Saksenlaan 50 2593 HT The Hague The Netherlands	Postal address:	PO Box 95404 2509 CK The Hague The Netherlands
Telephone:	+31 (0)70 333 7000	Fax:	+31 (0)70 333 7077
Website:	<a href="http://www.safetyboard.nl">www.safetyboard.nl</a>		

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**Consideration..... 5**

**Main conclusions ..... 7**

**Recommendations..... 9**

In recent decades, Amsterdam Airport Schiphol has expanded to become one of Europe's main civil aviation hubs. The airport is sandwiched between densely populated urban areas, so trade-offs must continually be made between growth and the consequences thereof for the surrounding area. Safety needs to have a prominent place in these trade-offs, as the effects and impacts of civil aviation accidents can be substantial.

Following a series of incidents (some of which occurred more than once), the Dutch Safety Board carried out an investigation to identify any vulnerabilities in the safety system around Schiphol. The investigation found no evidence to suggest that safety at Schiphol is inadequate. However, the investigation did reveal a number of safety risks that need to be tackled integrally and systematically in order to guarantee safety both now and in the future.

Schiphol is a complex airport, both in terms of its infrastructure and in terms of how air traffic is handled. This complexity entails certain risks for air traffic. Schiphol's rapid growth is increasing that complexity further. Air traffic controllers' workload is high, partly due to systematic capacity shortages. The control tower's work positions are all fully occupied, and on the ground there is not enough room for parking aeroplanes. The increase in air traffic since 2014 has gone hand in hand with an increase in the number of significant incidents. All this indicates that Schiphol is approaching the limits of its ability to handle air traffic safely within the current operational concept. At Schiphol, a pattern is emerging. The parties concerned tend to accept new risks, for example due to economic or environmental considerations, and then take steps to mitigate any adverse effects on safety. Additional risks are, by example, posed by the large number of daily runway configuration changes, traffic crossing the take-off and landing runways each day, deviations from procedures to handle the traffic, and capacity shortages at air traffic control. This results in an accumulation of risk mitigation measures which, in turn, creates new risks. The Dutch Safety Board believes that, where reasonably possible, it is preferable to avoid risks rather than to mitigate them.

No single party at Schiphol takes responsibility for the integral safety of air traffic at and around the airport. Ultimately, the State has final responsibility for safety at Schiphol, but this responsibility has been largely delegated to the sector parties. However, the sector parties have been unable to deliver comprehensive, collective safety guarantees. The Schiphol Safety Platform (VpS) was originally founded to develop an integrated safety management system for the airport. However, the level of cooperation within this body is inadequate. The VpS is primarily reactive. In addition, it is limited to the operational level and to matters where the parties place common interests above their own interests.

Within the system, the role taken by the Ministry of Infrastructure and the Environment is primarily that of a process manager, rather than the party with final responsibility. The Ministry's policy focuses neither on subject matter, nor on the overall results of individual

parties' safety efforts. The Ministry has no overall picture of aviation safety at and around Schiphol, nor is it able to determine whether the main safety objectives are being achieved. In addition, the Human Environment and Transport Inspectorate (ILT) lacks the knowledge and resources required to maintain effective in-depth oversight of the parties operating at Schiphol.

The decision-making process is dominated by the trade-off between growth and boosting network quality on the one hand, and noise abatement on the other. Safety's role is implicit, in the form of a precondition. Everyone assumes that it is properly regulated. But whether this is really the case, and exactly how that is determined, is not made clear. Here, too, the State has stepped back from the decision-making process with regard to Schiphol's development and the trade-offs involved, which have actually been delegated to the Schiphol Community Council (*Omgevingsraad Schiphol*).

The manner in which safety is treated as a precondition in the decision-making process is inadequate in a number of ways. For example, there is no single criterion for assessing the overall safety performance of air traffic at and around the airport, or for which the State can be accountable. The new standards and enforcement system, which provides a framework for the usage of Schiphol up to and including 2020, has not been subjected to an integral safety analysis. The safety effects of changes to the air traffic control system are assessed using a standard that covers only a part of the operational risks involved. The overall impact on safety of successive changes has not been determined. With regard to external safety, there are no clear and enforceable standards for group risk. The standard for local risk provides no guidance to the sector parties.

In the Netherlands, as in the rest of the world, there is a growing societal demand for air travel. The question is whether and, if so, how that demand should be accommodated at Schiphol. This investigation makes clear that further growth of Schiphol will require more than marginal adjustments to the existing policy. Indeed, this calls for a fundamental debate on the future of aviation in the Netherlands and on the options and limitations regarding Schiphol's further growth. From the standpoint of safety, the current system is approaching its limits. Many are calling for measures to be implemented, before 2021, that will enable Schiphol to grow beyond its current ceiling of 500,000 movements. The Dutch Safety Board feels that it will not be possible to make a decision on further growth, either before or after 2021, until the measures recommended in this report have been implemented and current and future risks have been systematically mitigated.

# MAIN CONCLUSIONS

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1. Both Amsterdam Airport Schiphol's physical infrastructure, its formal usage framework and its everyday operations are highly complex, giving rise to safety risks.
  - a. The complexity involved in handling air traffic at Schiphol is largely due to historical and recent choices regarding the airport's design, layout and operation.
  - b. Schiphol's plan and layout are complex in nature. The numerous taxiways, runway exits and entries, the relative (sometimes converging) runway orientations, maintenance hangar locations and the location of the S-platform (cargo) introduce risks of incidents and accidents.
  - c. The complexity in handling air traffic stems from:
    - the implemented concept of operations involving a 'wave system', featuring peaks in traffic levels;
    - the terms of operation relating to noise annoyance mitigation; noise preferential flight operations result in many runway configuration changes;
    - the way parties organise their processes.
  - d. The increase in air traffic adds to the complexity. Since 2014, the increase in air traffic has gone hand in hand with an increase in the number of incidents.
  - e. Schiphol airport is approaching the limits of its ability to handle air traffic safely within the current operational concept.
  
2. In decision-making processes about Amsterdam Airport Schiphol, safety is taken into account as a precondition. The impact on safety of various noise abatement measures is factored into the assessment. The way in which safety (as a precondition) is implemented, has the following shortcomings:
  - a. Decisions are tested against the ATC standard, in which a maximum acceptable accident risk per flight is defined for the air traffic control system. This safety standard covers only a small part of the operational safety risks at and around Schiphol.
  - b. Prior to the introduction of the new standards and enforcement system, no integral analysis took place of the effects on safety. The safety effects of frequent runway configuration changes have not been examined.
  - c. The external safety policy is of marginal significance to the safety of local residents. The standard for local risk provides scant guidance to the sector parties. There are no clear standards for group risk.
  
3. The cooperation in the field of safety between the main sector parties at Schiphol has a number of shortcomings.
  - a. At strategic level, there are no safety consultations with common agendas and common safety goals.
  - b. Cooperation within the Schiphol Safety Platform (*Veiligheidsplatform Schiphol*) is too noncommittal, primarily reactive, and limited to the operational level.
  - c. The Schiphol Safety Platform lacks the authority to enforce safety measures at the parties involved.

4. The State assumes responsibility for the integral safety of air traffic at and around Schiphol in a way that is too limited.
  - a. In the system that is to guarantee air traffic safety at and around Schiphol, the Ministry for Infrastructure and the Environment fulfils several roles that are at odds with each other.
  - b. the Ministry for Infrastructure and the Environment has no idea about the total level of safety of air traffic at and around Schiphol and the effect of the total amount of changes on that safety level. A testable criterion for integral air traffic safety is lacking. It is unclear how it can be ascertained that safety on the whole is improving.
  - c. Safety is not given enough priority in the decision-making with regard to the development of Schiphol airport.
  - d. The Ministry for Infrastructure and the Environment leaves the role of safety watchdog in the Schiphol Community Council (*Omgevingsraad Schiphol*) to Air Traffic Control the Netherlands (*Luchtverkeersleiding Nederland*).
  - e. Subject-knowledge and capacity of the Human Environment and Transport Inspectorate (*Inspectie Leefomgeving en Transport*) are inadequate for maintaining effective oversight of air traffic safety at and around Schiphol. The Human Environment and Transport Inspectorate has only a limited idea about the safety effects of successive changes to the ATM system.
  - f. The Aviation Occurrence Analysis Bureau (*Analysebureau Luchtvaartvoorvallen*) fails in its functions as feedback mechanism for policy and oversight and as an instrument for proactive risks identification.



# RECOMMENDATIONS

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The Dutch Safety Board's recommendations are as follows:

## **Mitigation of safety risks**

*To Schiphol Group and Air Traffic Control the Netherlands (LVNL):*

1. Develop a new, future-proof operational concept for handling air traffic at Amsterdam Airport Schiphol that will mitigate current and future safety risks. This could include the following measures:
  - a. reduce the number of runway configuration changes;
  - b. reduce the complexity of the airport's infrastructure.
2. Mitigate current and future safety risks by implementing measures such as:
  - a. minimising the number of crossings of active runways;
  - b. monitoring and evaluating any deviations from procedures and standards by air traffic controllers;
  - c. assessing the risks of an accumulation of safety risks and the associated mitigation measures;
  - d. systematically reducing the number of runway incursions.
3. Carry out in advance an integral investigation of the impact of an air traffic increase on safety, and take measures to systematically manage this impact.

## **Cooperating on safety**

*To Schiphol Group, Air Traffic Control the Netherlands (LVNL) and airlines in the Schiphol Safety Platform (VpS):*

4. Draw up a shared vision on safety at Schiphol, specifically including details of the safety targets to be achieved, together with the corresponding deadlines.
5. Set up an Integrated Safety Management System (IVMS) to which all of the parties in the VpS are committed. This system must include at least the following elements:
  - a. Joint approach to the safety risks associated with relationships and interactions between the individual parties (interfaces).
  - b. Joint investigations of incidents, and proactive safety analyses.
6. See to it that the Schiphol Safety Platform is given a formal status and the authority to enforce operational and strategic decisions on safety at Amsterdam Airport Schiphol.

## **Final responsibility**

*To the Secretary of State of the Ministry of Infrastructure and the Environment*

7. Further flesh out the role of the party with final responsibility for the safety of air traffic at and around Schiphol, by implementing measures such as:
  - a. drawing up a clear, verifiable criterion for the safety of air traffic at and around Schiphol and a clear criterion for how safety (as a precondition) is implemented;

- b. preparing a comprehensive review of the safety of air traffic at and around Schiphol;
  - c. carrying out a comprehensive assessment of the safety impacts deriving from key decisions about Schiphol (including its growth);
  - d. establishing enforceable standards and targets for the safety at and around the airport, and using these to permanently improve safety;
  - e. actively monitoring the safety aspects of air traffic and regularly performing trend analyses;
  - f. boosting the effectiveness of air traffic monitoring at and around Schiphol by deploying more manpower and greater resources, by investing in inspectors' subject knowledge, by carrying out more in-depth inspections, and by improving the performance of the Aviation Occurrence Analysis Bureau (Analysebureau Luchtvaartvoorvallen);
  - g. monitoring the joint strategic safety vision of LVNL, Schiphol Group and the airlines, and modifying this where necessary;
  - h. monitoring the organisation and performance of the Schiphol Safety Platform, and modifying this where necessary;
  - i. giving the external safety policy greater clout, to better serve local residents, by including features such as clear and enforceable standards for the risks posed to local residents and businesses.
8. At regular intervals, be regularly publicly accountable for the role of the party with final responsibility for safety at Schiphol.



**Visiting Address**  
Anna van Saksenlaan 50  
2593 HT The Hague  
T +31(0)70 333 70 00  
F +31(0)70 333 70 77

**Postal Address**  
PO Box 95404  
2509 CK The Hague

[www.safetyboard.nl](http://www.safetyboard.nl)