Ministry of Infrastructure
and Water Management

Consultation document

Stakeholder consultation
Balanced Approach procedure for Schiphol

March 2023

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Contents

Introduction

In the Dutch Cabinet's Coalition Agreement, it was agreed that an effort should be made to reduce the negative effects of aviation on people, the environment and nature. In the Schiphol Outline Letter of June 2022 outlining the policy on the airport, the Cabinet states that it wishes to change to steering on the basis of standards aimed at continuous reductions in the negative external effects of aviation. To this end, a set of standards will need to be developed and then constantly tightened. When determining these standards, the Cabinet will use the environmental effects of a maximum of 440,000 flight movements as the upper limit.

Noise nuisance is one of the environmental effects. Despite attempts to reduce noise nuisance, the trend is still upwards. Despite the use of quieter aircraft, for example, there is an increasing perception of severe nuisance, as various studies show. The World Health Organization (WHO), and consequently also the National Institute for Public Health and the Environment (hereinafter also "RIVM") and the Regional Medical Assistance Organisation (hereinafter also "GGD GHOR"), point to the negative effects on health of noise nuisance and disrupted sleep. Furthermore, local residents cannot evoke the legally established noise standards.

As a result, reducing the noise that local residents are exposed to has acquired a high priority. The desired reduction in noise exposure in the short term has been formulated as a quantitative noise objective and measures to achieve that objective have been catalogued. Explicit objectives and measures have also been considered for reducing noise nuisance at night, including the planned reduction in the number of night flights from 32,000 to 29,000. The noise objective must be achieved by November 2024. This is an intermediate phase en route to a new system that enables a focus on the effects of noise.

EU regulation 598/2014 sets out rules and procedures for the introduction of noise-related limitations on the operations of airports. The Balanced Approach procedure, as it is termed, must be followed when a member state wishes to introduce restrictions on the operation of an airport with more than 50,000 flight movements per year. Consulting stakeholders is an important step in this procedure.

The present consultation document and the associated appendices contain the material on which all the stakeholders will be consulted. Stakeholders participating in the consultation will be invited at any rate to give their views on the selection, composition, effect and desirability of the three combinations of measures presented in this document. The participants will also be invited to suggest alternative measures or combinations of measures that could achieve the noise objective and be implemented by November 2024.

The target groups for this consultation have been defined even more broadly than required by the EU regulation and consist of local residents, bodies representing businesses, trade unions and bodies representing employees, nature and environmental organisations, airport operators, aviation companies, air traffic control organisations and the network manager.

The Ministry of Infrastructure and Water Management will use the outcomes of the consultation to decide on the final combination of measures and notify the European Commission.

Reading guide

Readers familiar with the issue

Readers familiar with the issue who have interests at stake with the restrictions on the number of flights from and to Schiphol can start with chapters 4, 5 and 6, which discuss the noise objective, the potential measures and the expected effects. Readers are also advised to read Chapter 7 with information about the Balanced Approach procedure, the opportunities for stakeholders to have an input and the planned decision-making process.

Guide to each chapter

The summary is a non-technical summary for readers with little time who are looking for the key messages without necessarily knowing the specifics of the Schiphol situation.

Chapter 1 outlines the context in which the Cabinet took its decision. It discusses the interrelated challenges of the area around Schiphol and why reducing noise levels has become a priority. The chapter explains how setting a maximum for noise in the short term is one of the three phases aimed at the continuous abatement of noise nuisance.

Chapter 2 gives readers unfamiliar with Schiphol a short introduction to the development of the airport, the use of runways at Schiphol and the method used to determine noise.

Chapter 3 discusses how the restriction of noise nuisance has been implemented to date, the legal framework within which that has been done and what the results have been.

Chapters 4, 5 and 6 comprise the essence of the material that is the subject of the consultation. They are also the most technical parts of the consultation document. Chapter 4 describes the noise objective, split into day and night. Chapter 5 presents the potential measures. Chapter 6 presents various combinations of measures and shows the extent to which they can help achieve the noise objective. It also considers their relative cost-effectiveness.

Chapter 7 positions the consultation document within the Balanced Approach procedure, the broader dialogue with stakeholders, the liaison with the slot coordinator and the national decision-making process after the Balanced Approach procedure has finished. It also discusses the national and international legislation and regulations, frameworks and treaties that the measures must comply with.

Chapter 8 contains the invitation to the participants in the consultation to give their views of the measures, with supporting arguments, and to propose alternative solutions if so desired.

Summary

EU regulation 598/2014 sets out rules and procedures for the introduction of noise-related limitations on the operations of airports. The Balanced Approach procedure, as it is termed, must be followed when a member state wishes to introduce restrictions on the operation of an airport with more than 50,000 flight movements per year. One aspect of this procedure is the consultation of all stakeholders. The present consultation document enables all stakeholders to respond to the proposed measures aimed at reducing the noise nuisance caused by Schiphol Airport based on their own position and interests. The invitation to the participants in this consultation can be found in the blue box at the end of the summary.

Schiphol Airport is one of Europe's largest hubs

Schiphol Airport plays a key role in connecting the Netherlands to the rest of the world. Over time, it has become one of Europe's largest hubs. A hub is an airport where passengers are taken from other airports to change to different flights. The hub model explains why Schiphol has far more direct connections with continental and intercontinental destinations than would be expected based on the size of the Dutch domestic market. This is an important element in the Dutch economy: many international organisations and companies choose to set up operations in the Netherlands because of the accessibility. It also makes the Netherlands an attractive place to work for international employees of Dutch companies, as they have good access to their families abroad.

The number of flight movements at Schiphol for commercial traffic has increased steadily over the past fifteen years, with the inevitable fluctuations (for example due to the economic crisis of 2008–2010) from around 410,000 movements in 2000 to nearly 450,000 movements in 2015 and almost 500,000 flight movements in the pre-Covid year of 2019.

Schiphol is a key factor in broader challenges facing society

The Netherlands, with an average of 519 inhabitants per square kilometre, faces several major social challenges, for example relating to the environment and health, the climate, infrastructure, housebuilding and the energy transition. The effects are particularly acute in the area around Schiphol Airport and aviation has relatively large negative effects on health, nature and the environment. The national challenges that are relevant here are curbing the negative impact of aviation on the living environment, making local businesses and the aviation industry more sustainable, transitions in agriculture, strengthening the energy grid (needed in part to reduce the use of fossil fuels), the construction of large volumes of new housing, and the improvement of liveability, nature conservation and nature restoration. All these challenges are closely interrelated and influence the quality of life in the vicinity of the airport. Policy must be based on a consideration of all the public interests and social challenges facing us in the area around Schiphol and beyond.

Urgency and background of the Cabinet's decision in June 2022

The Cabinet wants to reduce the negative impact of Schiphol Airport on people, the environment and nature while at the same time maintaining the airport's economic function. That is why a new balance needs to be found between the quality of the Netherlands' connections with the rest of the world on the one hand, an aspect where Schiphol Airport plays a key role, and the airport's effects on nature, public health, liveability and the environment on the other. In this context, it is also relevant to note that Schiphol Airport does not yet have a nature permit and the legal position of local residents needs to be reinforced.

In the Schiphol Outline Letter of June 2022 outlining the policy on the airport, the Cabinet states that it wishes to change to steering on the basis of standards, aimed at continuous reductions in future in the negative external effects of aviation, in line with the 2020-2050 Aviaton White Paper. To this end, a set of standards will need to be developed and then constantly tightened. When determining these standards, the Cabinet will use the environmental effects of a maximum of 440,000 flight movements as the upper limit.

Noise nuisance is one of the environmental effects. Despite attempts to reduce noise nuisance, the trend is still upwards. Despite the use of quieter aircraft, there is still an increasing perception of severe nuisance, as various studies show. The World Health Organization (WHO), and consequently also the National Institute for Public Health and the Environment (hereinafter also "RIVM") and the Regional Medical Assistance Organisation (hereinafter also "GGD GHOR"), point to the negative effects on health of noise

nuisance and disrupted sleep. Furthermore, local residents cannot evoke the legally established noise standards.

As a result, reducing the noise that local residents are exposed to has acquired a high priority. The desired reduction in noise exposure in the short term has been formulated as a quantitative noise objective and measures to achieve that objective have been catalogued. Explicit objectives and measures have also been considered for reducing noise nuisance at night, including the reduction – proposed in 2010 – in the number of night flights from 32,000 to 29,000. The noise objective must be achieved by November 2024. This is an intermediate phase en route to a new system that enables a focus on the effects of noise through the use of standards.

The future noise regulatory system, to be developed in partnership with stakeholders, will contain standards to replace the fixed number of flight movements per year. In anticipation of the development of this system, measures are needed for the short term.

Noise nuisance restrictions are falling short

Starting in 2006, a large number of measures have been taken to mitigate noise nuisance in the vicinity of Schiphol based on intensive consultation between stakeholders – a unique approach, internationally. These are measures targeting the source of the noise (e.g. encouraging the use of quieter aircraft), land-use planning/management (e.g.home insulation), operational flight procedures (e.g. changing flight paths) and operating restrictions (the proposed but not implemented limit on the number of night flights).

Despite all the efforts, there has not been an absolute decrease in the noise nuisance. Various studies have shown that the trend in noise nuisance is still upwards. Potential reductions in noise nuisance, including abatement thanks to the use of ever quieter aircraft, have been accompanied by growth in the number of flights. The net effect has not been an improvement for local residents.

In short, more needs to be done than has been done to date or can be expected from autonomous developments or innovations such as quieter aircraft.

Implementing the Cabinet's decision

The Cabinet intends to work on implementing the decision of June 2022 in three phases. The first phase involves stopping what is termed 'anticipatory non-enforcement'. Ever since 2010, flights have been based on a system of strictly preferential runway use in anticipation of the New Standards and Enforcement System for Schiphol (hereinafter also "NNHS"). While waiting for a new Schiphol Airport Traffic Decree (Luchthavenverkeerbesluit, hereinafter also "LVB"), there has been no more enforcement since 2015 of the applicable legal setup with enforcement points. As a result, local residents cannot appeal to noise standards that are laid down in law and enforced. Following a signal from the Environment and Transport Inspectorate (hereinafter also "ILT"), the Cabinet has decided to stop its 'anticipatory non-enforcement' policy to restore the legal position of local residents.

The second phase is introducing measures that set a maximum for effects on the surrounding area. Noise nuisance is an important aspect of that. The Balanced Approach procedure, which includes the present consultation, concerns the abatement of noise nuisance in this second phase.

This will be followed by the third phase, introducing a new system that will make it possible to target reductions in the effects on the surrounding.

The three phases together will turn the upward trend in negative external effects, including noise nuisance, into a downward trend. The new system of standards – the third phase – is a prerequisite for the desired continuous reduction in adverse environmental effects in the longer term.

Noise objective for November 2024

The noise objective to be achieved in the second phase, by November 2024, is expressed as percentages with respect to a baseline situation. The baseline is the traffic flow and impact on noise exposure that would occur in November 2024 without any additional measures. A time point in the future has been chosen that does justice to the effect of autonomous developments, such as fleet renewal with quieter aircraft, and measures that have already been planned. This enables the effects of new measures to be assessed based on their independent contributions to noise nuisance abatement. Indeed, EU regulation 598/2014 (Annex I) stipulates that a forecast must be made that includes measures already in the pipeline but excludes the additional measures.

The indicators were formulated in units (L_{den} and L_{night}) that are in line with the EU Environmental Noise Directive on determining noise nuisance. They are also enshrined in Dutch legislation and regulations[1]. They indicate the

[1] These indicators and geographical contours are already incorporated in the policy and regulations in the Netherlands as the criteria for equivalent protection. For information purposes, the underlying studies also express the effect of measures in terms of the geographical contours that are prescribed in the Environmental Noise Directive for the five-yearly report on the change in the noise in the Schiphol Action Plan.

amount of noise over a 24-hour period or over the night-time period respectively for a number of homes or people.[2]

Table S.1 Noise objective in the short term – November 2024 – compared against the baseline[2]

Indicator	Homes	People
Number of homes with noise exposure of 58 dB(A) L_{den} or more	minus 20 per cent	
Number of people experiencing severe disruption with noise exposure of 48 dB(A) L_{den} or more		minus 20 per cent
Number of homes with noise exposure of 48 dB(A) L_{night} or more	minus 15 per cent	
Number of people experiencing severe sleep disturbance with noise exposure of 40 dB(A) L_{night} or more		minus 15 per cent

A slightly smaller reduction is used for the night-time than for the 24-hour period as per the Schiphol Outline Letter of 24 June 2022, which gives a proportionately greater planned reduction in the total number of flights compared with the reduction in night-time flights.

Achieving the above noise objective by November 2024 would be a significant step in noise nuisance abatement. In the longer term – the third phase – the Cabinet wishes to achieve a more far-reaching decrease in the noise nuisance. To do this, a new system of noise standards needs to be developed first that allows steering based on environmental standards rather than the number of flight movements.

Measures that could help achieve the noise objective

In partnership with independent research firms, a list was drawn up of measures that could help achieve the noise objective. These potential measures were assessed as to the feasibility of implementing them by November 2024. Other criteria were also assessed, including safety (no worsening), emissions of substances (no additional emissions) and compliance with legislation and regulations.

There were six potential measures that had an effect on all four indicators for the noise objective and that passed this test. There was also one potential measure specifically aimed at the objective for the night-time that passed this test. These measures were assessed with regard to the noise objective and their cost-effectiveness. The following conclusions have been drawn regarding these measures:

1. There is no single individual measure that is capable of achieving the noise objective in full for all four indicators.
2. The most cost-effective individual measure (reducing secondary runway use) makes only a limited contribution to the noise objective.
3. The least cost-effective individual measure (overall reduction in airport capacity) makes a large contribution to the noise objective.
4. A combination of measures is needed to achieve the noise objective in full.

Combinations were formulated based on their logical cohesiveness, also taking account of the interacting effects. For example, one measure could either amplify the effect of another measure or could undermine that effect. The five resulting combinations were then assessed as to their cost-effectiveness (in combination) and contribution to the noise objective. Three of the five combinations (combinations B, C and D) would achieve the noise objective. They are shown below.

[2] Based on residential situation 2021

Table S.2 Final combinations of measures

Combination B	Combination C	Combination D
• Reduce secondary runway use • Extend night regime (evening + morning) • Reduce use of the Buitenveldert Runway • Encourage airlines to use quieter aircraft • Reduce capacity to 440k overall / 29k night flights	• Reduce secondary runway use • Extend night regime (evening + morning) • Reduce use of the Buitenveldert Runway • Encourage airlines to use quieter aircraft • Reduce capacity night flights 25k (500k overall)	• Extend night regime (evening + morning) • Encourage airlines to use quieter aircraft • Reduce capacity to 440k overall / 29k night flights

Combination B was created by taking the most cost-effective measures. However, these measures alone are not enough to achieve the objective, so a reduction in the capacity during the day has been added. With this addition, the combination of measures achieves the noise objective in full, comfortably overshooting the target for three of the four indicators.

Combination C is the most cost-effective of the three combinations. The capacity reduction included is specifically at night-time (as an alternative to an overall capacity reduction) to achieve the noise objective. The target is narrowly achieved for one of the indicators, with the targets for the other three indicators being achieved comfortably.

Combination D achieves the targets narrowly for three of the four indicators. As having a combination of operational measures could make it more difficult to implement the measures in time for November 2024, this combination only has one operational measure (in combination with a general capacity reduction and an incentive measure). This combination is the least cost-effective of the three.

In parallel with the consultation, the potential measures will also be checked by Air Traffic Control Netherlands and Schiphol Airport, focusing on their safety and operational feasibility. In addition, the measures ultimately preferred will also be assessed by the Environment and Transport Inspectorate (ILT).

Incorporating the Balanced Approach procedure for night flight reductions

The 2020-2050 Aviation White Paper (Luchtvaartnota) states that the next change to the Schiphol Airport Traffic Decree (Luchthavenverkeersbesluit) will include a reduction in the number of permitted night flights from 32,000 to 29,000. A Balanced Approach procedure must be followed to implement this. To avoid having two procedures running in parallel and, even more importantly, to be able to consider all the measures together with their interrelationships, reducing the number of night flights has been incorporated in the present consultation. That is why indicators for noise nuisance at night are part of the noise objective. The reduction at night also helps achieve the noise objective for the 24-hour period as measures targeting the night-time affect the total amount of noise in a 24-hour period. That is why variants of the reduction to 29,000 flights are also presented in line with the 2020-2050 Aviation White Paper, namely 27,000 and 25,000 flights. The variant with 25,000 flights is included in the above-mentioned Combination C.

Consistency with international regulations and treaties

The measures that are ultimately selected will need to be consistent with various EU regulations, which have differing objectives. It is possible that different regulations overlap in the scope of their application and multiple standards will need to be met as a consequence. In such cases, various public interests will need to be weighed up; this is also the assumption in EU regulations. They are (1) the Environmental Noise Directive, (2) the regulation on noise-related operating restrictions at EU airports, (3) the Slot Regulations, (4) the Regulation on the operation of air transport services, and (5) the Habitats Directive.

Alignment with the slot coordinator

The EU Slot Regulations stipulate that the allocation of capacity at coordinated airports in the EU must be carried out by a slot coordinator that is independent both functionally and financially. In the Netherlands, exclusive authorisation for the allocation of slots has been assigned to Airport Coordination Netherlands (ACNL). On 14 February 2023, the slot coordinator issued an advisory report and draft policy rules (including the reduction methodology). The advisory report discusses the various steps in the process to be taken by the parties involved (the state, the airport, the slot coordinator), based on their individual responsibilities in order to achieve a reduction.

It should be noted that the capacity statement resulting from the Balanced Approach procedure determines the allocation of slots by ACNL. In accordance with Regulation 598/2014, the outcome of the Balanced Approach procedure must be announced at least two months before defining the

coordination parameters for the 2024/2025 IATA winter season. Furthermore, the environmental standard must be incorporated in rules and regulations, after which Schiphol needs to discuss the capacity statement in the Coordination Committee Netherlands before it is fixed at the start of May 2024. The capacity statement will act as the basis for ACNL's slot allocation for the 2024/2025 IATA winter season.

Invitation to those participating in this consultation

To ensure the eventual selection of measures is underpinned by careful consideration, all the potential measures that were assessed are presented here, as well as the possible combinations of measures. Three such combinations have been identified as viable in relation to achieving the noise target by November 2024.

Stakeholders participating in the consultation are invited at any rate to give their views on the selection, composition, effect and desirability of the three combinations of measures presented in this document. The participants are also invited to suggest alternative measures or alternative combinations of measures that could achieve the noise objective and be implemented by November 2024.

The Ministry of Infrastructure and Water Management will use the outcomes of the consultation to decide on the final combination of measures and notify the European Commission.

National decision-making after completing the Balanced Approach procedure

The measures chosen by the Cabinet after completing the Balanced Approach procedure need to be incorporated in the Schiphol Airport Traffic Decree (Luchthavenverkeerbesluit, hereinafter also "LVB"). As input to the draft amendment of the LVB for the NNHS, an environmental impact assessment (EIA) has already been produced. This EIA needs to be updated.

The draft amendment to the LVB will be published and everyone will have four weeks in which to submit their wishes and objections (also known as the 'opinions'). The Cabinet will then draw up a response and the draft decree will be amended if necessary.

At the same time, the draft decree will be submitted to parliament (the Lower and Upper Houses of the States General). They can discuss the draft decree with the minister if so desired. They are not formally required to approve the draft.

Afterwards, the draft decree will be submitted to the Advisory Department of the Council of State (Raad van State) for its recommendations. It generally delivers its recommendations within three months.

The Cabinet then produces a report on those recommendations and the draft decree is amended accordingly if necessary.

Then the draft decree is submitted together with the report to the King for his signature (known as 'assent'). The final decree is published in the Bulletin of Acts and Decrees and comes into effect on the date stated in the decree.

Finally, the outlook

It is essential to put the Cabinet's decision in the context of its goal of achieving ongoing noise nuisance abatement and the outlook this entails for all stakeholders. There is an urgent need for measures that can achieve a basic level for the maximum permissible noise nuisance. That may leave room for growth in the aviation sector if the noise effects are reduced further through innovations and measures, first benefitting the local area and later benefitting the aviation sector. This principle will be fleshed out in a future system of standards.

1 Policy context

Introduction

Schiphol Airport plays a key role in connecting the Netherlands to the rest of the world and it is therefore a cornerstone of the Dutch economy. However, the impact of the airport on the environment, public health and liveability in the vicinity of Schiphol Airport is also significant – an impact that has grown to such an extent that the government deems intervention necessary. These include noise pollution, which is the subject of this consultation paper, but also, for example, emissions of CO_2, nitrogen oxides and particulates. These various aspects cannot be considered in isolation. The Cabinet wants to develop a new system with standards for noise and emissions of substances. These norms will replace fixed numbers of flight movements per year. Developing such a system, which will be done in collaboration with stakeholders, will however take time. Short-term measures are therefore needed as precursors. Capping noise pollution levels has been prioritised.

The Cabinet wants to make sure that the upward trend in noise nuisance is turned into a permanent downward trend: '*Bending the curve in noise abatement*'.

That is outlined in the rest of this document, including the positioning of the noise issue in a broader social context and its urgency. Following on from that, the decision taken by the Cabinet on 24 June 2022 will be explained.

The elaboration of the Cabinet's decision into a concrete noise target and cost-effective measures to achieve can be found in other chapters, namely chapters 4, 5 and 6.

1.1 The social context and urgency of finding solutions

The broader task within society

The Netherlands, with an average of 519 inhabitants per square kilometre, faces several major social challenges, for example relating to the environment and health, the climate, infrastructure, housebuilding and the energy transition. The effects are particularly acute in the area around Schiphol Airport and aviation has relatively large negative effects on health, nature and the environment. The national challenges that are relevant here are curbing the negative impact of aviation on the living environment, making local businesses and the aviation industry more sustainable, transitions in agriculture, strengthening the energy grid (needed in part to reduce the use of fossil fuels), the construction of large volumes of new housing, and the improvement of liveability, nature conservation and nature restoration. All these challenges are closely interrelated and influence the quality of life in the vicinity of the airport. Policy must be based on a consideration of all the public interests and social challenges facing us in the area around Schiphol and beyond. These tasks cannot be tackled in

isolation and a system of standards for noise and emissions will eventually have to be put in place. However, the short-term urgency already demands that steps should be taken, albeit temporarily, to restore the balance around Schiphol.

Urgency

The Cabinet wants to reduce the negative impact of Schiphol Airport on people, the environment and nature. That is why a new balance needs to be found between the quality of the Netherlands' connections with the rest of the world on the one hand, an aspect where Schiphol Airport plays a key role, and the airport's effects on nature, public health, liveability and the environment on the other. In this context, it is also relevant to note that Schiphol Airport does not yet have a nature permit and the legal position of local residents needs to be reinforced.

Schiphol ought to have a nature permit. That follows from the individual European and national regulations based on the European Habitats and Birds Directive and the Dutch Nature Conservation Act. The airport's application for a nature permit is ongoing and separate from this consultation.

The number of aircraft movements to and from Schiphol increased to a maximum of 500,000 in 2016 and then remained there until the start of the Covid-19 pandemic. This maximum number was agreed between residents and the aviation sector at what was known as Alderstafel.[3] Despite flights using increasingly quiet aircraft on average with other measures that have been and are being taken to reduce noise nuisance as much as possible, that nuisance has still increased. The World Health Organization (WHO), and consequently also the National Institute for Public Health and the Environment (hereinafter also "RIVM") and the Regional Medical Assistance Organisation (hereinafter also "GGD GHOR"), point to the negative effects on health of noise nuisance and disrupted sleep. For this reason, the Cabinet has already stated in the Aerospace Memorandum that noise levels and thus nuisance must be reduced for the benefit of the health of local residents and to improve the quality of the living environment.

Since 2010, flights at Schiphol have been operated under the runway use rules of the New Schiphol Standards and Enforcement System (hereinafter also "NNHS"), a system known as 'strict preferential runway use'. This means that the runways that cause the least disturbance to the surrounding area are used as much as possible; more about runway use at Schiphol can be read in Chapter 2. Since 2015, there has been what is termed 'anticipatory non-enforcement' by the Environment and Transport Inspectorate (ILT). This means that no sanction will follow when noise standards (limit values) are exceeded at enforcement points as long as strict preferential runway use has been applied. Following a signal from the Environment and Transport Inspectorate (ILT), the Cabinet decided to stop the 'anticipatory non-enforcement' policy as of 1 November 2023 to restore the legal position of local residents. When doing so, strict preferential runway use will be continued as much as possible.[4]

1.2 From an upward to a downward trend in noise nuisance

Cabinet decision of 24 June 2022

The Schiphol Outline Letter[5] of 24 June 2022 sets out an approach that the Dutch Cabinet will elaborate and implement in the coming years. Within the scope of the EC Regulation No. 598/2014 (known as the 'Balanced Approach'), this consultation paper only discusses noise-related policy goals and the operating restrictions for the airport resulting from the introduction of what is known as a 'noise cap', including the measures required for this purpose. When reading the elaboration of noise measures in this consultation document, it is however important to realise that they are part of a wider-ranging consideration. The decision to cap the environmental effects of Schiphol – of which noise nuisance is one – is an important step towards achieving a balance in the larger social tasks focused around Schiphol. The final choice of measures for reducing environmental impacts will be based on this balance of the wider public interests. The Dutch Cabinet's decision included an assessment of what was proportionate. Retaining the airport's international connectivity was part of that. The Cabinet is basing this on a study it commissioned of international connectivity. That study has been included in the appendices to the Schiphol Outline Letter.

Imposing a maximum on environmental effects

To steer the detailing of the package of measures to be developed, the Cabinet decision imposes a precondition that the maximum permissible environmental and health effects must be in line with the environmental effects that arise with 440,000 aircraft movements at the airport. This helps steer the setting of standards and also the measures

[3] The Alderstafel forum was a consultative structure in which stakeholders made agreements with each other about inter alia the growth of Schiphol and the conditions for it (see Chapter 2).

[4] Experimenteerregeling Schiphol

[5] Hoofdlijnenbrief Schiphol (Schiphol Outline Letter); English version: Annex E of this consultation document

used for the purpose. Note that this is talking about environmental effects, of which noise is one. In this consultation document, the focus is entirely on noise mitigation because the Balanced Approach procedure explicitly requires it. However, the final choice of specific measures may also include considerations relating to other environmental effects, as well as the limits of operational feasibility.

Noise nuisance abatement has been translated into a noise target and potential measures. There are combinations of measures that achieve the noise nuisance target and the cost-effectiveness of each such combination has been assessed. Limiting the capacity of the airport is one of the possible measures in those combinations.

Implementing the Cabinet decision of 24 June 2022

The Cabinet intends to work on implementing the decision in three phases. The first phase involves stopping what is termed 'anticipatory non-enforcement', as described above. The aim of this step is to restore the legal position of local residents.

The second phase is introducing measures that set a maximum for the noise nuisance. The Balanced Approach procedure, which includes the present consultation, focuses on reducing noise nuisance in the second phase.

This will be followed by the third phase, introducing a new regulatory system on noise that will make it possible to target reductions in the effects on the surrounding area. The second and third phases of the implementation of the Cabinet decision will make sure that the upward trend in noise nuisance is reversed into a downward one. The new system of noise standards – the third phase – is a prerequisite for the desired continuous reduction in noise nuisance in the longer term.

Perspective for all stakeholders

It is essential to put the Cabinet's decision in the context of its goal of achieving ongoing reductions in noise nuisance and the outlook this entails for all stakeholders. There is an urgent need for measures that can achieve a basic level for the maximum permissible noise nuisance. That may leave room for growth in the aviation sector if the noise effects are reduced further through innovations and measures, first benefitting the local area and later benefitting the aviation sector. This principle will be fleshed out in a future system of standards.

1.3 Lelystad Airport

The opening of Lelystad Airport may affect the composition of the air traffic handled at Schiphol. Decisions about Lelystad Airport cannot be taken before mid-2024 as announced in the Schiphol Outline Letter; that is separate from this consultation.

Lelystad Airport is intended to be Schiphol's overflow airport, freeing up space at Schiphol for flights that strengthen the European and intercontinental network. The Schiphol-Lelystad air traffic split rule was drawn up for this purpose. The Netherlands notified the European Commission about this air traffic distribution rule in March 2019, with approval subsequently being obtained in September 2019. Like Schiphol, Lelystad Airport needs to have a nature permit as per the Nature Conservation Act. In addition, a further adjustment will be needed in the routing structure (what are known as the 'low flight paths').

2 Schiphol: an introduction

To provide an introduction, a brief sketch follows of the airport, the runway use – characteristic of Schiphol – and the noise regulations that apply.

2.1 Development of the airport

Over the course of time, Schiphol has become one of the largest European hubs. A hub is an airport where passengers travel to from other airports (the spokes) to transfer to connecting flights. The hub model explains why Schiphol has far more direct connections with continental and intercontinental destinations than would be expected based on the size of the Dutch domestic market.

Growth in aircraft movements

The number of flight movements at Schiphol for commercial traffic has increased steadily over the past fifteen years, with the inevitable fluctuations (for example caused by the economic crisis of 2008–2010) from around 410,000 movements in 2000 to nearly 450,000 movements in 2015 and almost 500,000 flight movements in the pre-Covid year of 2019.

The numbers that characterise Schiphol[6]

The fact that Schiphol is a hub airport par excellence is reflected in the number of destinations. There are direct connections to over 300 destinations (313 in 2022, including 129 intercontinental).

There were 52.5 million passengers in 2022, 37% of them transferring to another flight at Schiphol. The number of aircraft movements in 2022 was close on 400,000, 20% down on nearly 500,000 in the pre-Covid year of 2019.

Schiphol processed 1.44 million tons of cargo in 2022, down 9% from 2019 (1.57 million tons). There were 18,340 full cargo flights, a 30% increase compared to 2019 (14,156 cargo flights).

2.2 Runway use as it affects noise

Preferential runway use

Schiphol has a total of six take-off and landing runways: the Kaag, Polder, Zwanenburg, Aalsmeer, Buitenveldert and East runways. The East Runway is principally used for small aircraft.

[6] Source: Schiphol Airport website

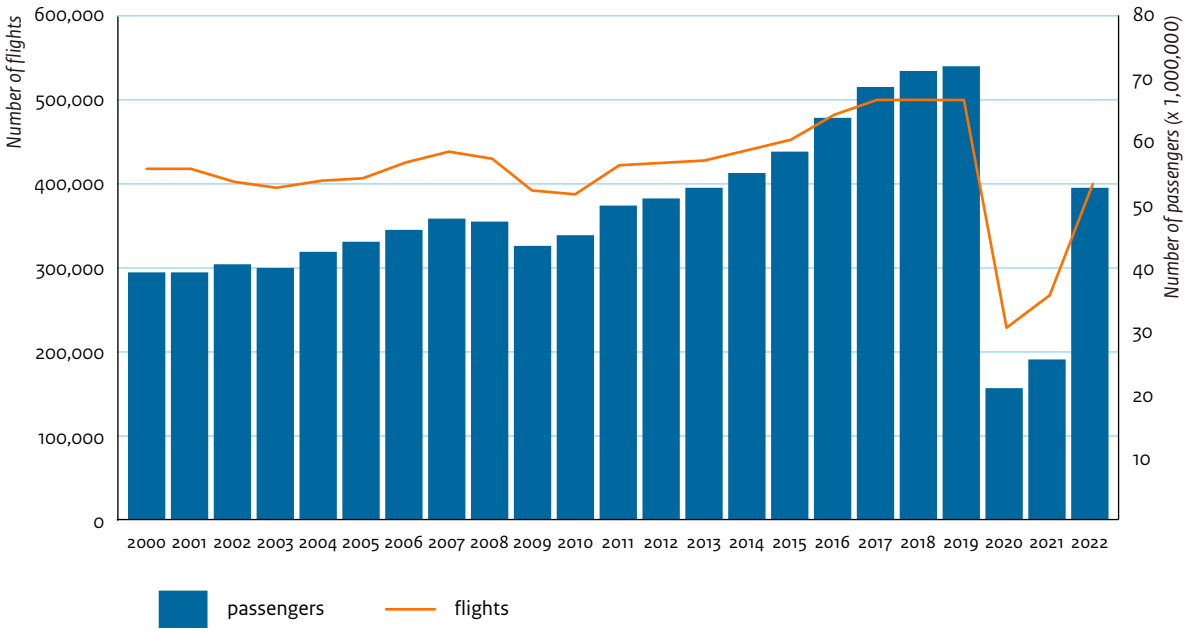

Figure 2.1 Number of flights and passengers (source: Statistics Netherlands)

Figure 2.2 The system of runways at Schiphol
Source: Schiphol Airport

Runway use is regulated by a system of what is known as 'preferential runway use'. Winds, cloud bases and visibility restrictions can make it necessary to use different runway combinations all the time, depending on the conditions. One major factor is avoiding one-sided and disproportionate noise impact on a limited area. Choosing the runway combinations to be used is done using what is termed the 'preference order', aiming to use the runways that cause the least noise nuisance. This concept is referred to as 'preferential runway use'. In terms of noise nuisance, the Kaag Runway and Polder Runway are deemed to be preferential. There are always at least two runways in use, one for air traffic taking off and one for landing. At peak times, three or four runways may be in use. At night, the principle is that only the Polder Runway and the Kaag Runway may be used.

The currently applicable system with enforcement points and noise standards

The currently applicable noise nuisance system for Schiphol Airport is based on threshold values for the noise nuisance at what are known as 'enforcement points'. Around the airport, there are two types of enforcement points: 35 points for the all-day (24-hour) period and 25 for the night-time period. Every enforcement point has a limit value that must not be exceeded during the operating year. In practice, the actual utilisation of runways has been found to deviate from forecasts. The consequence has been that noise levels in practice are distributed differently within the surrounding area than was expected. For that reason, rules for runway use were formulated in 2010. Rules ensuring 'strict preferential runway use' have been implemented by air traffic control and airport since then. Those rules comprise the New Standards and Enforcement System for Schiphol (NNHS[7]). Chapter 1, in referring to the end of anticipatory non-enforcement, has already explained a few things about the method of enforcement by the Environment and Transport Inspectorate (ILT) and changes to it as of 1 November 2023.

[7] Mlieueffectrapportage Nieuw Normen- en Handhavingstelsel Schiphol

3 Noise nuisance mitigation at Schiphol over the course of time

It is not necessary to read this chapter to understand the content of the following chapters, which present the noise target and potential measures. Nonetheless, it gives a picture of the efforts made by all the stakeholders to find solutions, of the legal framework within which those efforts are being made, and of how urgently measures that will significantly reduce noise pollution in the short term need to be taken.

Introduction

Noise nuisance has been a major issue in relation to the growth of Schiphol Airport since the 1960s. Since then, it has been a balancing act between the growth and development of Schiphol on the one hand and improving the quality of the living environment and increasing the options for using the space around Schiphol on the other.

There has been a great deal of consultation, research, experimentation and implementation to reduce noise nuisance. This chapter deals with:

- the consultative structures in which the stakeholders meet.
- the legal framework covering noise.
- a description of the types of measures that have been put in place.
- the conclusion that noise nuisance is increasing despite all the measures.

3.1 Consultative structures

To make the balancing act discussed in the introduction possible, there have been various consultative structures since the 1990s in which the stakeholders have been represented. Initially, the Schiphol Noise Commission (Commissie Geluidshinder Schiphol) was established under the direction and responsibility of the Ministry of Infrastructure and Water Management. In 2003, that committee was included in the Dutch Aviation Act as the Schiphol Airport Regional Consultative Committee (Commissie Regionaal Overleg Luchthaven Schiphol, hereinafter also “CROS”). CROS has consisted of delegations – often multiple ones – from the aviation sector (Schiphol Airport, Netherlands Air Traffic Control, KLM, Transavia and Martinair), local authorities (3 provinces and 33 municipalities) and residents’ representatives.

In 2006, a new consultative structure was established alongside CROS, known as the Alderstafel. This consists of Schiphol Airport, Air Traffic Control Netherlands, KLM, other airlines (through BARIN[8]), the Schiphol Administrative Region (BRS, cooperating provinces and municipalities), representatives of the CROS residents’ organisations and united local residents’ platforms, plus the Ministry of

[8] Board of Airline Representatives In the Netherlands; the industry association for airlines undertaking business in the Netherlands.

Infrastructure and Water Management. The purpose of the Alderstafel forum has been to produce substantiated advice for the government on the use of Schiphol as it affects the surrounding area, largely concerning the growth of Schiphol and the conditions under which this can take place.

In 2015, the Alderstafel and CROS merged to become the Schiphol Environmental Council (Omgevingsraad Schiphol, ORS). In addition to the members of the former CROS and Alderstafel, the employers (Confederation of Netherlands Industry and Employers, VNO-NCW) and the North Holland Environmental Federation (Milieufederatie Noord-Holland) also joined.

In 2019, Mr Alders (the chairman) reported in his final recommendations to the minister of Infrastructure and Water Management that there is no longer any backing in the surrounding region for further growth of Schiphol and, as a result, it is no longer possible to provide recommendations with such backing. His successor, Mr van Geel, concluded in 2020 that the ORS no longer functions as intended and that a new consultative structure and forms of public participation are needed. This was confirmed by the decision by the BRS to cancel its membership of the ORS from 1-Jan-2022. Work is currently being done to create the Schiphol Civil Council (Maatschappelijke Raad Schiphol, MRS) and the Omgevingshuis (Environment House), as the successor to the ORS. In addition to seats for residents' organisations, the MRS will have seats for organisations representing a broad spectrum of social interests as well as knowledge institutes. The aviation industry, the BRS and the Ministry of Infrastructure and Water Management no longer have formal seats but will take part as dialogue partners. The MRS advises the Ministry of Infrastructure and Water Management.

3.2 Noise nuisance and the legal framework

The current legal framework for Schiphol is the amended Schiphol Airport Traffic Decree (Luchthavenverkeerbesluit, hereinafter also "LVB") of 18 September 2008[9]. This LVB has been updated by amendment decrees of 22 February 2010[10] (amended approach and departure flight paths and amended limit values), 24 July 2010[11] (amended approach and departure flight paths), 11 August 2012[12] (extension to the night-time period), 2016[13] (bringing forward the night-time period) and 2018[14] (imposing a ceiling of 32,000 night flights). Aspects addressed by the LVB include setting noise impact limits through fixed enforcement points for the night-time period and daytime periods. In addition, what is known as the 'equivalence principle' applies, whereby the LVB implements Article 8.17 of the Aviation Act: on balance, the level of protection provided by the new LVB must be equivalent to or better than that of the preceding decree. The changes set out in the 2010, 2012 and 2016 decrees were studied and experimented with. All decisions received positive recommendations from either the Alderstafel or the ORS.

The Dutch Aviation Act (Wet luchtvaart) and Aviation Environmental Noise Regulations (Regeling omgevingslawaai) implement Directive 2002/49/EC, about evaluating and managing environmental noise. A noise map is determined once every five years that shows the number of homes, other noise-sensitive buildings and noise-sensitive areas exposed to various noise burdens. An environmental noise action plan is determined every five years that includes a planned threshold for aircraft noise (expressed as noise levels L_{den} and L_{night}). The action plan states what measures are being considered or are in the process of being implemented to prevent or reverse cases where the planned threshold is exceeded. The current action plan will be updated via a supplement, in parallel with the Balanced Approach procedure.

[9] Decree of 18 September 2008 amending the Schiphol Airport Traffic Decree in connection with better utilisation of environmental space and modifying eastward departure flight paths from the Zwanenburg Runway (Bulletin of Acts and Decrees 2008, 390)

[10] Decree of 22 February 2010 amending the Schiphol Airport Traffic Decree in connection with the modification of various departure flight paths from the Schiphol East Runway, the Polder Runway, the Kaag Runway and the Buitenveldert Runway (Bulletin of Acts and Decrees 2010, 125)

[11] Decree of 24 July 2010 amending the Schiphol Airport Traffic Decree in connection with the modification of departure flight paths from the Schiphol East Runway, the Polder Runway, the Kaag Runway, the Zwanenburg Runway, the Aalsmeer Runway and the Buitenveldert Runway (Bulletin of Acts and Decrees 2010, 329)

[12] Decree of 11 August 2012 amending the Schiphol Airport Traffic Decree in connection with the offering of the possibility to extend the period for the night-time approach and departure procedures (Bulletin of Acts and Decrees 2012, 382)

[13] Decree of 4 July 2016 amending the Schiphol Airport Traffic Decree in connection with the offering of the possibility to bring forward and extend the period for the night-time approach and departure procedures (Bulletin of Acts and Decrees 2016, 280)

[14] Decree of 19 September 2018 amending the Schiphol Airport Traffic Decree in connection with the determination of a maximum number of night flights at Schiphol Airport and amending the Aviation Competence Decree in connection with the postponed application of the requirements for glider, balloon and recreational aviation certification in EU Order 1178/2011 (Bulletin of Acts and Decrees 2018, 366)

3.3 Measures that have been implemented or proposed

A large number of measures have been taken since 2006 to reduce noise nuisance in the vicinity of Schiphol. These measures largely came from recommendations by the Alderstafel and the ORS; they were then worked out in detail in the Covenant on Nuisance Limitation and Development of Schiphol in the Medium Term[15]. For a full overview of the measures implemented, refer to the Schiphol Environmental Noise Action Plan 2008-2013[16], the Schiphol Environmental Noise Action Plan 2013-2018[17] and the Schiphol Action Plan 2018-2023[18].

At the request of the Minister of Infrastructure and Water Management[19], Schiphol Airport (in collaboration with other parties from the aviation sector) drew up a supplementary noise nuisance reduction plan, the Schiphol Noise Nuisance Reduction Implementation Plan. This plan is a package of 43 measures and studies of runway use, aircraft types, ground noise, flight paths and procedures for daytime and night flights. This nuisance abatement plan focuses on lowering the perceived level of nuisance irrespective of the number of aircraft movements and should therefore be seen in that context.
For an overview of the measures intended and partially or completely implemented, see https://minderhinderschiphol.nl/.

As per EU regulation 598/2014, measures can be categorised into those aimed at:
1. Noise sources.
2. Land-use planning and management.
3. Operations and/or procedures.
4. Limitation of commercial exploitation.

A description of each type of measure is given below along with some illustrations of such measures as implemented. For a complete picture of the measures, refer to the action plans (see footnotes) and the website mentioned above, https://minderhinderschiphol.nl.

Measures at the source of noise

Measures at the source focus on mitigating noise from aircraft and are generic in nature. These measures have an effect on the surrounding environment as a whole. Fleet renewal is a measure at the source in which older aircraft types are replaced by newer types that are quieter, reducing the overall noise impact. Source measures implemented by Schiphol include setting increased take-off and landing fees for aircraft during Schiphol's night-time period – for which the fee can rise to more than six times that for the daytime period – and an increased fee for the noisier aircraft that can be up to five times the fee for the quietest aircraft.

Land-use planning and management measures

Through the Schiphol Noise Insulation Programme (PROGIS), 15,000 premises in the vicinity of Schiphol have been insulated. In the GIS-1, 2 and 3 programmes, the last of which was completed in 2012, some 13,000 premises were isolated at a cost of about €577 million[20]. To reduce noise nuisance further, the Cabinet has announced a new insulation programme, following up a parliamentary letter of 10 December 2021[21]. The internet consultation for the proposed Wall Insulation Regulations for Schiphol 2023 was completed on 5 February 2023.

There is also the Stichting Leefomgeving Schiphol (Schiphol Living Environment Foundation) in which the province of Noord-Holland, Schiphol Airport and the central government have each provided 20 million euros for the period 2008-2020 as what is termed a 'Livability Fund' (Leefbaarheidsfonds). That money was spent on insulation, buying out owners, potentially followed by demolition. The Aerospace Memorandum announced what is called the Omgevingsfonds (Environment Fund), which will play a similar role in the coming years.

Operational and procedural measures

The bulk of the measures are operational or procedural in nature. One of the key measures is the NNHS (New Standards and Enforcement System for Schiphol). The core of this system is what is known as 'strict preferential runway use', meaning that the runways that cause the least noise nuisance in the surrounding area are used as much as possible. You can read more about runway use at Schiphol in Chapter 2 and the details of what is termed 'anticipatory non-enforcement' and its cessation in Chapter 1. Other measures include optimising the location of take-off flight paths (SIDs), applying quieter take-off procedures, higher approaches and fixed approach routes.

[15] Appendix to Parliamentary Paper 29665, no. 115
[16] Actieplan omgevingslawaai Schiphol 2008-2013
[17] Actieplan omgevingslawaai Schiphol 2013-2018
[18] Actieplan Schiphol 2018-2023
[19] Parliamentary Paper 31936, no. 646

[20] GIS policy evaluation
[21] Parliamentary Paper 29665, no. 418

Measures that restrict the commercial operation

A typical example of a measure that limits operations is the (planned) reduction from 32,000 to 29,000 night flights. This reduction has already long been a topic of discussion, first at the Alderstafel and later in the ORS. Originally, the proposal was compensation for not being able to achieve the number of gliding flights (known as CDAs) in the late evening and night.

The 2020-2050 Aviation White Paper (Luchtvaartnota) states that the next change to the Schiphol Airport Traffic Decree (LVB) will include a reduction in the number of permitted night flights from 32,000 to 29,000. A Balanced Approach procedure must be followed to implement this. To avoid having two procedures running in parallel and, even more importantly, to be able to consider all the measures together with their interrelationships, reducing the number of night flights has been incorporated in the present consultation. That is why indicators for noise nuisance at night are part of the noise objective. The reduction at night also helps achieve the noise objective for the 24-hour period, given that measures targeting the night-time affect the total amount of noise in a 24-hour period. Variants of the 'reduction to 29,000' measure have therefore also been presented (see Chapter 4 for the noise target, Chapter 5 for all potential measures and Chapter 6 for the cost-effectiveness of combinations of measures, respectively).

3.4 Current and proposed measures

The Alderstafel forum noted back in 2013[22] that noise mitigation options were becoming exhausted. Operational measures such as e.g. adjusting flight paths tend to displace noise nuisance rather than solve it: noise abatement in one area affects new people or worsens the burden on them in another area.

One recommendation made by the Alderstafel was linking Schiphol's growth to the environmental space created by implementing noise abatement measures. In practice, despite the noise abatement measures taken and the increased proportion of quieter aircraft, the number of residents experiencing severe noise nuisance has risen[23], even when population growth is taken into account. This rise in noise nuisance is a direct consequence of the increased growth in the number of flights. As shown in the figure below, a decrease in severe noise pollution has only been achieved in the years when there was a substantial drop in the number of flights due to the credit crunch and the coronavirus pandemic. This development in noise nuisance is also reflected in ILT reports, e.g. The State of Schiphol 2020[24] and The State of Schiphol 2021[25]. The graph follows basically the same pattern as the trend in numbers of flights described in Chapter 1.

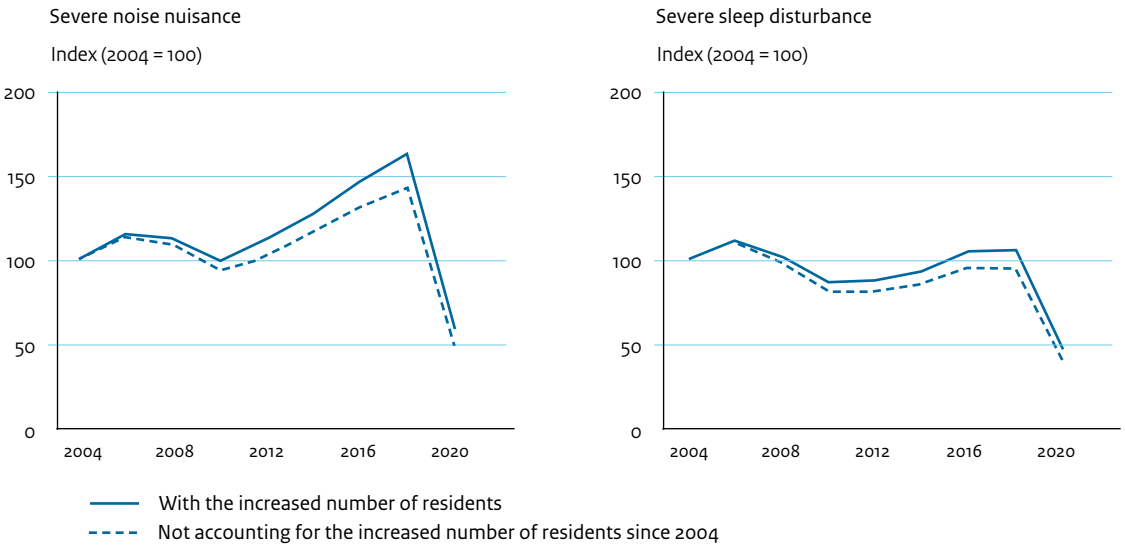

Figure 3.1 Severe noise nuisance and sleep disturbance in Schiphol surroundings
Source: NLR, CBS, PBL

[22] Parliamentary Paper 29665, no. 190
[23] https://www.clo.nl/indicatoren/nl2161-ernstige-hinder-en-ernstige-slaapverstoring-rond-schiphol
[24] De Staat van Schiphol 2020
[25] De Staat van Schiphol 2021

A similar picture can be seen in the annual reporting in the Usage Forecast for Schiphol (Gebruiksprognose), which includes the progression in the numbers of people experiencing severe noise nuisance and those whose sleep is severely disturbed. Between 2000 and 2004, the number of homes in the 58 dB(A) L_{den} contour and the number of people experiencing severe disruption in the 48 dB(A) L_{den} contour decreased substantially. This was primarily because the Polder Runway was opened. That runway was created so that flight paths over relatively thinly populated areas could be used, thereby reducing the noise nuisance for local residents overall. The first year in which the Polder Runway was in full operation was 2004. From 2004 onwards, there has been an upward trend in these indicators, other than the effect mentioned earlier due to declines in air traffic caused by economic crises and the coronavirus pandemic, which caused temporary declines[26].

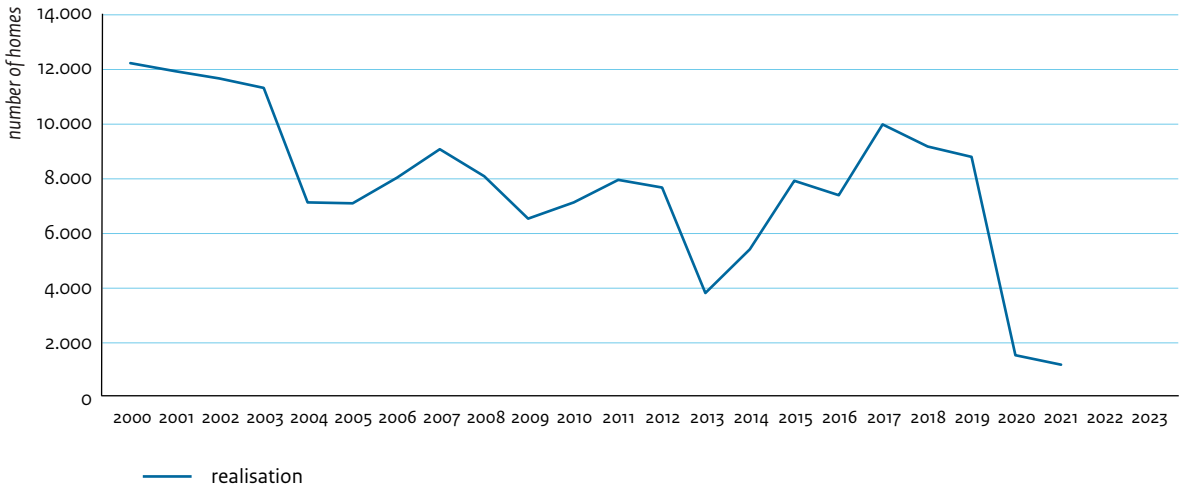

Figure 3.2 Evolution of the number of homes with noise exposure of 58 dB(A) L_{den} or more
Source: Gebruiksprognose Schiphol (Schiphol Usage Forecast)

Figure 3.3 Evolution of the number of people experiencing severe disruption with noise exposure of 48 dB(A) L_{den} or more. Source: Gebruiksprognose Schiphol (Schiphol Usage Forecast)

[26] The evolution of noise nuisance levels as shown in these two diagrams was determined for the Schiphol usage forecast using the 2005 housing stock. This differs from how the noise target in Chapter 4 was determined, as that uses the more recent housing stock parameters from 2021. These figures were also drawn up using the NRM determination method; the analysis in Chapter 4 onwards uses the European determination method, Doc29.

Perceived noise nuisance is increasing

Alders concluded in his final recommendations in 2019 that a calculated reduction achieved in overall noise burden levels does not mean that it is perceived as such by local residents. This is mainly caused by the fact that the noise nuisance mitigation achieved by the aviation sector through increasingly less noisy aircraft is barely perceptible (if at all) at the height at which the aircraft pass. Especially in what is termed the 'inner area', each individual overflying aircraft – including modern types that have lower noise emissions – produces a high volume of noise for local residents. Mr Alders calls this a paradox: any noise reduction leads to a significant increase in traffic volume that goes hand in hand with increased nuisance in the 'inner area', while local residents do not perceive anything in terms of the nuisance reduction realised.

Population surveys[27] that have been carried out show that the perception of severe nuisance as a result of aircraft noise increased between 2016 and 2020. In 20 of the 31 municipalities around Schiphol, the numbers of local residents experiencing severe nuisance due to aircraft noise increased in 2020 compared to 2016, despite the decrease in air traffic due to the coronavirus pandemic and the noise abatement measures mentioned above. These 31 municipalities include both some that are close to the airport and others that are relatively far away (e.g. Bodegraven-Reeuwijk and Laren). In all 31 municipalities included in that study, the absolute level of noise nuisance was higher than the average for the Netherlands (which is 3.7 per cent). In half the municipalities, the percentage of severe noise nuisance is above 10 per cent; in about a fifth of the municipalities, it is above 20 per cent. In Aalsmeer, as many as 40 per cent of residents aged between 18 and 64 experience severe noise nuisance from air traffic. Those are worrying levels. In terms of sleep disturbance, these measurements also give a serious picture. There are also high levels of sleep disturbance in all municipalities where there is severe noise nuisance. Compared to the national average, all the municipalities in the study have relatively high levels of people whose sleep is disturbed by air traffic. In more than a quarter of the municipalities surveyed, the proportion of people whose sleep is disrupted by air traffic exceeds 10 per cent (national average: 1.6 per cent). Sleep disturbance is also common outside the legally designated contours for the equivalence criteria (40 dB(A) L_{night}).

The National Institute for Public Health and the Environment (RIVM) surveyed residents living near 14 airports[28], including Schiphol, about how much noise they were exposed to and how this affected the level of noise nuisance and sleep disturbance. The picture is that severe noise nuisance has risen rather substantial.

Increased levels of perceived nuisance are also reflected in the number of noise nuisance reports made to the Schiphol Residents' Contact Centre (Bewonersaanspreekpunt Schiphol, BAS)[29]. The number of reports increases every year, both for local residents within the L_{den} contour for 48 dB(A) and for those outside it[30].

Conclusion

Despite attempts to reduce noise nuisance, the trend is still upwards. Despite the use of ever-quieter aircraft, there is still an increasing perception of severe nuisance, as various studies show. The World Health Organization (WHO), and consequently also the National Institute for Public Health and the Environment (hereinafter also "RIVM") and the Regional Medical Assistance Organisation (hereinafter also "GGD GHOR"), point to the negative effects on health of noise nuisance and disrupted sleep.

More is needed than has been done to date. The next chapter translates the need to reverse the upward trend in noise nuisance into a downward one into a concrete noise target for the short term. This is followed by potential new measures and various combinations of measures that could make the noise target feasible.

[27] GGD GHOR, 2022, Perceptiestudie geluidsoverlast en slaapverstoring door luchtvaart in 2020 (Perception study of noise nuisance and sleep disturbance caused by aviation in 2020) – *Belevingsonderzoek geluidshinder in slaapverstoring luchtvaart 2020 (Perception study of noise nuisance in sleep disturbance caused by aviation in 2020)*

[28] RIVM, Relaties vliegtuiggeluid – hinder en slaapverstoring 2020 (Relationships between aircraft noise and nuisance/sleep disturbance 2020). Civiele en militaire vliegvelden in Nederland (Civil and military airfields in the Netherlands)

[29] https://bezoekbas.nl/

[30] See Staat van Schiphol 2020 (The State of Schiphol 2020), p. 62

4 Noise objective

It was stated in Chapter 1 that there is an urgent need for a substantial reduction in noise nuisance in the short term. From that point on, further continuous reductions are needed in the noise nuisance. The efforts made to date to mitigate such nuisance have not, on balance, had sufficient effect. The same can be expected for the implementation of the noise abatement measures that the aviation sector has announced it plans to introduce in the short term.

EU regulation no. 598/2014 stipulates that noise reduction objectives that may require operational restrictions to be imposed should be explicitly described. The noise objective for the short term is described below. In addition, a broad outline is given of the longer-term objective.

4.1 Guiding principles for the noise objective

The guiding principles in determining the short-term noise objective

The noise objective for the short term has been quantified as a percentage reduction in the noise for various categories of groups affected. This choice was made because a percentage reduction is a measurable real-world figure for the government's goal of reducing noise nuisance in the short term. The percentages show that the first step must lead to a significant improvement for local residents. The percentages also require a reference situation (baseline) to be defined with specific indicators and scores. These numbers allow more objective monitoring of the effects and progress, rather than purely qualitative monitoring.

The aim is to achieve the short-term targets by November 2024, which marks the start of the operating year 2025. The reduction is a cut relative to the situation that would apply in 2024 if no measures were taken. The situation in 2024 without measures is the reference situation against which measures are assessed as to their cost-effectiveness and whether they achieve the objective.

For that reason, the noise objective allows for the implementation of noise abatement measures that the aviation sector has announced it will implement before November 2024. The same applies to the autonomous progress of fleet renewal at the airport. After all, the said autonomous development will take place regardless of the move announced by the Dutch government to impose an upper limit on environmental effects.

This produces an unbiased comparison of the measures presented in the following chapters in terms of noise reduction relative to a situation without these measures, and their cost-effectiveness.

Indicators

The criteria and indicators that have been used are already incorporated in the policy and regulations in the Netherlands[31]. The quantitative objective for the short term comprises a target for noise in a 24-hour period and a specific target for night-time. Noise nuisance from night flights, e.g. as sleep disturbance, can have different health impacts to noise nuisance during the day. The idea is to reduce the noise exposure both close to the airport (termed the 'inner area') and somewhat further away, termed the 'outer area'. The inner area is defined as the area within the 58 dB(A) L_{den} contour for the noise over a 24-hour period and the 48 dB(A) L_{night} contour for the noise at night. The outer area is defined as the area beyond the inner area and within the 48 dB(A) L_{den} contour for noise over a 24-hour period and the 40 dB(A) L_{night} contour for noise at night. Targets have been defined for both the 24-hour period and the night-time.

The indicators used to express the degree of noise nuisance are:

- Number of homes with noise exposure of 58 dB(A) L_{den} or more.
- Number of people experiencing severe disruption with noise exposure of 48 dB(A) L_{den} or more.
- Number of homes with noise exposure of 48 dB(A) L_{night} or more.
- Number of people experiencing severe sleep disturbance with noise exposure of 40 dB(A) L_{night} or more.

The calculations use the European method for determining the noise, known as DOC29. This is a model calculation of the noise exposure rather than a measured noise exposure. This is in line with the approach used in policy for expressing noise exposure.

[31] These indicators and geographical contours are already incorporated in the policy and regulations in the Netherlands as the criteria for equivalent protection. For information purposes, the underlying studies also express the effect of measures in terms of the geographical contours that are prescribed in the Environmental Noise Directive for the four-yearly report on the change in the noise in the Schiphol Action Plan.

4.2 Baseline

The objective requires a reference indicating the baseline for the objective. To do justice to the effects of autonomous developments and the measures that are already scheduled to be implemented, they are incorporated in the reference. After all, this is necessary to determine the effects of the new measures as accurately as possible. The EU regulation (see Appendix I) also stipulates that a forecast must be made that includes measures that are already planned but excludes the additional measures. The reference is therefore based on the traffic flow and the noise exposure impact corresponding to the situation in November 2024, namely 500,000 flight movements for commercial flights of which 32,000 are at night. The same reference is used for the specific study of the night-time. The reference takes account of the autonomous progress in fleet renewal up to November 2024, the increased use of the continuous descent approach (whereby approaching aircraft descend slowly in a continuous movement), increased runway capacity and the more frequent use of reduced landing flaps. See Appendix A for more on this.

The noise exposure and noise nuisance for the reference situation in November 2024, without additional measures, are shown in the table below.

Table 4.1 Noise exposure and noise nuisance in the reference situation – November 2024

Indicator	Homes	People
Number of homes with noise exposure of 58 dB(A) L_{den} or more	7,081	
Number of people experiencing severe disruption with noise exposure of 48 dB(A) L_{den} or more		113,862
Number of homes with noise exposure of 48 dB(A) L_{night} or more	5,685	
Number of people experiencing severe sleep disturbance with noise exposure of 40 dB(A) L_{night} or more		24,365

* Numbers based on housing stock in 2021. Source: To70 (2023)

Appendix A shows the traffic scenario used in the calculations.

4.3 Noise objective

Noise objective for November 2024

The short-term noise target – to be achieved by November 2024 – is expressed in percentages compared to the baseline.

Table 4.2 Noise objective in the short term – November 2024 – compared against the reference

Indicator	Homes	People
Number of homes with noise exposure of 58 dB(A) L_{den} or more	minus 20 per cent	
Number of people experiencing severe disruption with noise exposure of 48 dB(A) L_{den} or more		minus 20 per cent
Number of homes with noise exposure of 48 dB(A) L_{night} or more	minus 15 per cent	
Number of people experiencing severe sleep disturbance with noise exposure of 40 dB(A) L_{night} or more		minus 15 per cent

A slightly smaller reduction is used for the night-time than for the 24-hour period in line with what was stated in the Schiphol Outline Letter of 24 June 2022, which gives a proportionately greater planned reduction in the total number of flights compared with the reduction in night-time flights.

Achieving the above noise objective by November 2024 would be a significant step in noise nuisance abatement. In the longer term, the Cabinet wishes to achieve a more far-reaching decrease in noise nuisance. To do this, a new system of noise standards needs to be developed first that allows steering based on environmental standards rather than the number of flight movements.

Longer-term objective

As yet, the longer-term goal – from 2027 onwards – is a qualitative one, namely the continuous reduction of noise nuisance. This will require a new system of noise standards to be developed. Such a new system is a precondition for objective and predictable noise abatement, including periodic updating of noise standards. When making decisions about introducing these standards, the extent and pace at which noise nuisance will have to be reduced will be considered; this will then be factored into the process of defining and enforcing the standards.

Chapters 5 and 6 take a look ahead to the period after 2024, including defining the types of measures that could be part of a further decreasing trend in noise nuisance. This will all depend on the specifics of the standards being developed.

5 Potential noise abatement measures

This chapter elaborates upon the set of potential measures that have been identified to enable the noise objective to be achieved. A two-step approach was applied. First, a longlist of possible measures was developed. Next, this longlist was checked against several criteria to arrive at a shortlist of potential measures. For this shortlist, the noise impact and cost-effectiveness were analysed. Section 5.1 provides the longlist of potential measures, section 5.2 introduces the criteria that have been applied and section 5.3 summarises the resulting shortlist. Section 5.4 introduces the measures, specifically addressing the noise objective for the night-time period.

The content of this chapter is based on a synthesis of the assessment carried out by the consultants To70/Decision/ Beelining and Adecs/CE. Detailed information on the measures and criteria is included in their reports, which are provided as appendices to this consultation document.

5.1 Potential measures on the longlist

As a first step to come up with a set of viable measures to meet the noise objective, an extensive list of potential measures were identified. This was done by desk research using various sources, including:

- The measures as mentioned in the existing plan to reduce noise nuisance at Schiphol[32].
- Selection of operational and other measures implemented at other major hub airports throughout Europe.
- Land-use planning/insulation measures as initiated by the Dutch government or by the Schiphol Group.
- Potential operational measures identified in research projects specifically for Schiphol Airport.

Potential measures are identified for each of the four pillars of the Balanced Approach: (i) reduction of noise at source, (ii) land-use planning and management, (iii) noise abatement operational procedures, and (iv) operating restrictions. The longlist is provided below with a brief description of each measure. The measures that were selected for the shortlist are described in more detail in section 5.3.

1. For reduction of noise at source:
   - Encourage use of quieter aircraft through differentiation of airport charges.

[32] https://minderhinderschiphol.nl/

- Encourage fleet renewal through noise performance monitoring.
- Encourage aircraft retrofitting for noise reduction (winglets, engine exhaust modifications, etc.).

2. For land-use planning and management:
   - Insulation (conventional insulation, noise cancelling windows, etc.).
   - Expropriation.
   - Building conditions and restrictions (including noise adaptive building programmes).
   - Change function of buildings (conversion of offices to homes and vice versa).
3. For noise abatement operational procedures:
   - Increase the number of continuous descent approaches (on top of autonomous development).
   - Increase the number of aircraft performing N-1 taxi operations/taxibot taxi operations.
   - Route optimisations to reduce overall number of people experiencing severe disruption.
   - Optimisation of current procedures (minimise level segments, optimise climb-out speed, intersection take-offs, reduced thrust take-off etc.).
   - Introduce new procedures (including RNP-AR approaches during parallel approaches).
   - Increase concentration of flight paths to minimise overall noise exposure.
   - Extend the night regime using the primary runways (both in the evening and during early morning).
   - Runway closure (full runway closure or during specific circumstances).
   - Increase runway capacity (on top of autonomous development).
   - Increase crosswind and tailwind limits for runway selection process.
   - Minimise the use of the secondary runways through optimisation of flight schedule.
4. For operating restrictions:
   - Introduce a ban on noisy aircraft (overall or during specific times of the day).
   - Cap the number of annual movements (e.g. Dutch Cabinet decision to reduce number of movements to 440,000).
   - Cap the number of movements during the night time.
   - Curfew/night-time closure.
   - Additional slot criteria.

5.2 Selection criteria for the shortlist

The measures in the longlist above were not only analysed to determine e.g. feasibility of timely implementation in meeting the noise objectives. Consideration of other factors is important as well. As such, the selection criteria that were applied to the longlist of potential measures are the following:

- Safety → the measure should not introduce a safety risk.
- Achievability → the measure should have achieved its effect by November 2024 (introduction of the noise reduction target).
- Compliance with legislation → the measure should not conflict with European or national legislation.
- Reliability of the operation → the measure should not significantly decrease the reliability of the operation.
- Distribution of nuisance → the measure should not simply shift nuisance to other areas around the airport.
- Quality of the network connectivity → the measure should not result in an irreversible negative effect on the quality of the network connectivity.
- Emissions → the measure should not achieve a reduction in noise at the expense of a significant increase in emissions.
- Modelling → it must be possible to determine the effect of the measure using ECAC Doc29 noise modelling as implemented for Schiphol Airport.

Each measure on the longlist was assessed against these criteria. The results of this analysis are provided in the table below.

Table 5.1

Pillar	Measure	Safety	Achievability in 2024	Compliance with legislation	Quality of network connectivity	Reliability of operation	Distribution of nuisance	Emissions	Modelling
Reduce noise at source	Encourage use of quieter aircraft through differentiation of airport charges	+	+	+	+	+	+	+	+
	Encourage use of quieter aircraft through noise performance monitoring	+	o	+	+	+	+	+	-
	Encourage noise-reducing aircraft retrofitting (winglets, engine exhaust modifications, etc.)	+	o	+	+	+	+	+	o
Land-use planning and management	Insulation (conventional insulation, noise-cancelling windows, etc.)	+	-	+	+	+	+	+	-
	Expropriation	+	-	+	+	+	+	+	-
	Building conditions and restrictions (including noise adaptive building programmes)	+	+	+	+	+	+	+	-
	Change function of buildings (conversion of offices to homes and vice versa)	+	-	+	+	+	+	+	-
Noise abatement operational procedures	Increase the number of continuous descent approaches (on top of autonomous development)	+	-	+	+	+	+	+	+
	Increase the number of aircraft performing N-1 taxi operations / taxibot taxi operations	+	-	+	+	+	+	+	-
	Route optimisations to reduce overall number of highly affected people	+	-	+	+	o	+	+	o
	Optimisation of current procedures (minimise level segments, optimise climb-out speed, intersection take-offs, reduced thrust take-off etc.)	o	o	+	+	o	o	o	o
	Introduce new procedures (including RNP-AR approaches during parallel approaches)	+	-	+	+	+	+	+	o
	Increase concentration of flight paths to minimise overall noise exposure	+	-	+	+	o	+	o	o
	Extend the night regime using the primary runways (both in the evening and during early morning)	+	+	+	o	o	+	+	+
	Runway closure (full runway closure or during specific circumstances)	+	+	+	+	o	+	+	+
	Increase runway capacity (on top of autonomous development)	+	-	+	+	+	+	+	+
	Increase crosswind and tailwind limits for runway selection process	o	o	+	+	o	+	+	o
	Minimise the use of the secondary runways	+	o	+	+	o	+	+	+
Operating restrictions	Introduce a ban on noisy aircraft (overall or during specific times of the day)	+	+	-	+	+	+	+	+
	Cap the number of annual movements (e.g. Dutch Cabinet decision to reduce number of movements to 440,000)	+	+	o[33]	o	o	+	+	+
	Cap the number of movements during the night time	+	+	+	o	o	+	+	+
	Curfew/night-time closure	+	+	+	-	-	+	+	+
	Additional slot criteria	+	-	-	o	+	+	+	-

[33] This 'balanced approach' procedure is part of the process for determining whether the proposed capacity is most cost-effective, hence the neutral score

A number of observations and explanations should be made on the basis of this table.

1. There is one measure a positive score on all criteria: 'Encourage use of quieter aircraft through differentiation of airport charges'. This measure has been selected for the shortlist.
2. All measures that score positively on their achievability by November 2024 have been selected for the shortlist, except:
   a. Measures that cannot be modelled. This excludes 'Encourage fleet renewal through noise performance monitoring' and 'Building conditions and restrictions'.
   b. Those measures that have been considered as (currently) in conflict with the applicable legislation. This excludes a ban on noisy aircraft.
   c. Those measures that seriously harm the hub function. This is the case for 'night curfews or full nighttime closure'.
3. Measures where there are doubts about the safety implications are automatically excluded.

In addition to the initial assessment by the consultants of the individual measures regarding aspects such as achievability and safety, the Ministry of Infrastructure and Water Management will ask the Dutch ATM service provider Air Traffic Control the Netherlands (LVNL) to carry out an implementation test, during the consultation period.

The outcome will be taken into account in the final notification to the Commission of measures to be implemented.

5.3 Potential measures on the shortlist

The measures that together form the shortlist of potential measures, as briefly introduced above, are further described in this section. The numbering corresponds to the noise modelling identification tags that were used in the support studies (appendices A and B).

Measure 1: Encourage airlines to use quieter aircraft through differentiation of airport charges

The measure aims at reducing noise impact by encouraging airlines to replace noisy aircraft types by quieter types through a stronger differentiation of airport charges. This measure falls under Pillar 1 of the Balanced Approach (reduce aircraft noise at source). Airport charges at Schiphol are already differentiated based on the noise production of the aircraft. Schiphol distinguishes 7 categories of aircraft ranging from S1 (most noisy in their class) to S7 (least noisy). The measure assumes:

- S1: Charge increase
- S2 – S3: No change
- S4 – S7: Charge decrease (by the same absolute amount as the increase in charges for category S1)

EU Directive 2009/12/EC on airport charges states that airport charges should be cost-based. A charge increase for a specific noise category should therefore be accompanied by a decrease in one or more other categories.

Measure 7: Extension of night regime

During the night Schiphol only operates the two noise-preferential runways (Kaag Runway and Polder Runway), as compared to the simultaneous use of three or four runways in peak hours during the day (see Chapter 2 for the description of the operational concept and preferential runway use). Extending the night period would mean that only the two noise preferential runways are in use for a larger part of the day. This measure falls under Pillar 3 of the Balanced Approach (noise abatement operational procedure)

- Current situation: Night regime is in force from 22:40 to 06:40.
- The measure has two variants:
  - M7a: Extension in the evening (+1hr): 21:40 – 06:40.
  - M7b: Extension in the evening + morning until 07:00: 21:40 – 07:00.

Measure 8: Closure of runway

This measure falls under Pillar 3 of the Balanced Approach (noise abatement operational procedure). The departure and approach routes for the Buitenveldert Runway (09-27) cross a densely populated residential area. Reduced deployment of this runway will therefore have a relatively large impact on noise nuisance. The impact on airport operations will be relatively limited as it is not one of the widely used preferential runways.

The measure is defined as follows:

- The Buitenveldert Runway remains available during weather conditions where operational data shows that the Buitenveldert Runway is the only runway available. This is mainly when there are strong (easterly) winds.

- The Buitenveldert Runway remains available during conditions of bad visibility, even if other runways are available and/or more frequently used.
- The Buitenveldert Runway remains available during weather conditions where operational data shows that the Buitenveldert Runway is the most appropriate runway. This is usually when there are specific combinations of high wind speed and wind direction conditions.
- The Buitenveldert Runway is not selected during weather conditions where operational data shows one or more other runways are appropriate.

Overall, this implies a reduced deployment of the runway compared to the baseline.

Measure 10: Minimise use of secondary runways
The runways at Schiphol can be characterised as either a primary or secondary runways. The primary runways are preferred as they minimise the overall number of highly affected people. Minimising the use of secondary runways therefore reduces the noise impact in relatively densely populated areas by shifting arrivals and/or departures to the primary runways. A scenario has therefore been defined where the threshold for utilising these secondary runways is increased. Increased use of primary runways without increasing the runway capacity will result in delays and other operational inefficiencies. These should be considered when looking at the cost-effectiveness of this measure.

Measure 14: Reduce total number of flights at the airport
Limiting the overall capacity of Schiphol is another measure that has been considered. This measure falls under Pillar 4 of the Balanced Approach (operating restrictions). The measure that is analysed is a reduction to 440,000 movements annually. This follows from the announcement made by the Dutch Cabinet, as has been highlighted in Chapter 1.

- Current situation: Maximum capacity of 500,000 movements
- Measure: Reducing the annual capacity from 500,000 movements to 440,000 (minus 12 per cent) might have a relatively large impact on noise as the least noise-preferential runways are needed less
  - Variant M14a: Reduce capacity to 440,000 overall, of which 29,000 night flights
  - Variant M14b: Reduce capacity to 440,000 overall, of which 32,000 night flights

Measure 15: Reduce total number of flights at the airport during the night
Night flights lead to sleep disturbance, which might have an impact on health. Reducing the number of night flights could therefore be an effective way to reduce the noise impact around the airport. A reduction of noise in the night also affects the noise objective for the indicators in L_{night}. This measure falls under Pillar 4 of the Balanced Approach (operating restrictions).

- Current situation: Schiphol is allowed to operate a maximum of 32,000 night flights.
- Measure: Reducing the annual capacity during the night from 32,000 movements in the night to:
  - Variant M15a: 29,000 movements
  - Variant M15b: 27,000 movements
  - Variant M15c: 25,000 movements.

5.4 Specific measures addressing the noise objective for the night period

Chapter 4 sets specific goals for the night-time period. Six measures have been identified that could potentially contribute to the set goals.

The 2020-2050 Aviation Memorandum states that the number of night flights allowed will be reduced from 32,000 to 29,000 in the next amendment to the Schiphol Airport Traffic Decree. Measure N/o includes this intention. In addition to measure N/o five alternative measures have been assessed as well. After the explanation of the measures, an assessment follows of the feasibility of the measure achieving its effect by November 2024.

Measure N/o: Reduce total number of flights at the airport during the night
Night flights lead to sleep disturbance, which might have an impact on health. Reducing the number of night flights could therefore be an effective way to reduce the noise impact around the airport. This

measure falls under Pillar 4 of the Balanced Approach (operating restrictions).

- Current situation: Schiphol is allowed to operate a maximum of 32,000 night flights.
- Measure: Reducing the annual capacity during the night from a maximum of 32,000 movements in the night to a maximum of 29,000 movements in the night. For this specific measure related to the night period, it is assumed that the reduction is achieved by shifting flights to the daytime hours. Hence, no overall capacity reduction is assumed.

Measure N/1: Enforce fleet renewal

If a constant fleet renewal rate is assumed over the years while the number of night flights remains the same and the average size of the aircraft remains the same, the number of people suffering from severe sleep disturbance will decrease. With such a constant fleet renewal, a similar number of people whose sleep is severely disturbed and dwellings is projected for 2027 compared to the scenario with 29,000 aircraft movements during the night. If the fleet renewal were to be accelerated, a greater reduction in people whose sleep is severely disturbed would be possible. Despite incentivising instruments however, there is a lack of policy instruments to enforce faster fleet renewal.

Noise reduction resulting from fleet renewal can also be 'used' to deploy larger aircraft, with the possible consequence that the number of people whose sleep is severely disturbed remains the same as in the baseline. Fleet renewal can only permanently reduce the number of people whose sleep is severely disturbed if a hard limit is legally established. Schiphol is slot-regulated, and airlines can choose the type of aircraft to be used. A legal obligation is therefore not an option.

Measure N/2: Phase out noisiest aircraft during night-time hours

A relatively small number of aircraft cause a relatively large amount of noise nuisance at night. Phasing out these aircraft through a legal arrangement can reduce noise nuisance. This measure involves phasing out the noisiest aircraft (in terms of cumulative noise level and cumulative noise margin). Aircraft types such as the Boeing 747-400 are then no longer allowed to take off or land at night. There are two variants of this measure. The 'soft' variant replaces these aircraft with the most logical new aircraft (given the current fleet), while the 'hard' variant replaces them with aircraft that meet the new, stricter noise standard, even if this requires a different type of aircraft.

Measure N/3: Wider application of Continuous Descent Approach

When aircraft descend gradually, they cause less noise pollution than when they descend in stages, as is usually the case (part of the descent approach is performed horizontally, between 2,000 and 3,000 feet). Wider application of the so-called Continuous Descent Approach (CDA) therefore reduces noise nuisance. Within this measure, one scenario has been applied: all landings (i.e. 100 per cent) during the night will follow the CDA procedure.

Measure N/4: Remove dwellings

When there are fewer houses within the noise contour lines, the number of people suffering from severe sleep disturbance decreases as well. In the modelling, dwellings have been removed until the number of people with severely disturbed sleep corresponds to the numbers achieved with 29,000 night flights, the capacity reduction that was proposed. Dwellings within the contours of the reference situation move from high to low in terms of L_{night} dB(A) levels. It is assumed that new housing will not be built elsewhere within the 40 dB(A) L_{night} contour.

Measure N/5: Insulate dwellings

To reduce the number of people whose sleep is severely disturbed, there is also the option of improving the sound insulation of dwellings. In the model, the dwellings are insulated by 5 dB(A) until the same number of individuals whose sleep is severely disturbed is reached as for the scenario of night-time reduction to a maximum of 29,000 night flights.

The modelled approach to insulating can lead to a situation where a specific dwelling is insulated but an adjacent one is not, because the targeted number of people whose sleep is severely disturbed has already been reached. This may not be realistic, however. The results are purely an indication of the number of

insulated dwellings needed to achieve the same result as would be achieved with the scenario to reduce the number of flights during the night. Apart from the insulation, it is also assumed that residents sleep with closed windows. If residents sleep with open windows, insulation will not have the desired and modelled effect.

It is also important to note that insulation is not included in the noise enforcement system of Schiphol. After all, it is the noise value at the outer wall of a dwelling that counts. This means that investigating the effect of insulation is mainly indicative. It may be desirable to implement insulation measures for the surrounding area, but this will not affect enforcement.

Feasibility by November 2024

Like all the measures, the measures specifically aimed at the night noise objectives are assessed on the feasibility of achieving their effect by November 2024 (introduction of the noise reduction objective).

Conclusion regarding night measures

After assessing the specific night measures (N/0 up to and including N/5), the conclusion is that there is only one measure that is feasible and can be fully effective for the November 2024 objective. That is measure N/0, reducing the total number of flight during the night to a maximum of 29,000. It is a measure that in principle has already been agreed upon by stakeholders in the Omgevingsraad Schiphol (ORS, Schiphol Environment Council) and needs no further investigation concerning feasibility.

Table 5.2 Feasibility of potential noise abatement measures for the night period

Measure	Feasibility by Nov 2024	Explanation
Measure N/0: Reduce total number of flights at the airport during the night	Yes	
Measure N/1: Enforce fleet renewal	No	The results of measure 1 show that with autonomous fleet renewal, the number of people whose sleep is severely disturbed and dwellings of measure 0 will be matched by measure 1 only in operational year 2027. It is unrealistic for this number of people whose sleep is severely disturbed and dwellings to be achieved by the end of 2024 through fleet renewal. Instruments to enforce fleet renewal are not available.
Measure N/2: Phase out noisiest aircraft during night hours	No	Both the 'hard' and 'soft' scenarios for phasing out the noisiest aircraft are unrealistic for the end of 2024 due to the longer delivery times of aircraft, with the result that airlines would have to suspend their operations.
Measure N/3: Wider application of Continuous Descent Approach	Partial	One would expect that as soon as full application of CDA procedures during the night is feasible technically and capacity-wise, Schiphol and LVNL (air traffic control) will implement this as such. The most challenging part concerns the early morning (between 06:00 and 07:00) due to the greater number of flights. In part given the history (see 'Background'), this measure is not expected to be fully implemented before the end of 2024. Besides, this measure was also part of a widely agreed reduced nuisance plan from 2008.
Measure N/4: Remove dwellings	No	In view of the current housing market crisis, the size of the measure and the implication for the people living in these houses, measure 4 cannot realistically be expected to be implemented before the end of 2024.
Measure N/5: Insulate dwellings	No	In view of the significant shortages in the building industry and the lead time to implement an insulation programme, including development of the legal basis for such a programme, and given the size of the measure, measure 5 cannot realistically be expected to be implemented and completed before the end of 2024[34].

[34] In February 2022 the Dutch Cabinet decided to introduce a new acoustic insulation scheme for houses in the vicinity of the airport. The legal basis is currently being finalised and it is expected that the first houses will start receiving acoustic insulation in the latter part of 2023 with the whole programme taking up to four years.

6 Noise impact and cost-effectiveness

This chapter presents the results of the noise impact analysis and the cost-effectiveness of the measures on the shortlist. The chapter starts with a brief introduction to the approach used to derive the results. Then the results of the analysis are presented.

6.1 Approach

Determining the noise impact

For each of the measures on the shortlist, the noise impact was determined. This is expressed as the contribution of the measure to the achievement of the noise objective (the four indicators). Each measure was turned into an operational scenario for the year 2024, which was analysed using the Doc29 modelling tool. The result is eventually assessed as the number of homes, people experiencing severe disruption or people whose sleep is severely disturbed within the relevant noise contour lines for the noise objective (see chapter 4). This result is then compared with the baseline to determine the relative effect of the measure. More details on this approach are provided in Annex A.

Determining the cost-effectiveness

The operational scenario used to determine the noise impact is input to assess the costs of a measure. The noise impact is then used to calculate the cost-effectiveness. In more detail:

- An assessment of the costs of the measures has been made for four stakeholder categories:
  - Passengers and air freight sector: changes in consumer surplus / generalised travel costs (ticket price, travel time).
  - Airlines, airport and ANSP: changes in producer surplus / profits (scarcity rents, operational costs).
  - Government: additional allowances and changes in tax revenues.
  - Society: changes in health, safety and climate impacts, regional economic impact of Schiphol (agglomeration effect).
- In addition, the impact of each measure on gross direct and indirect (backward) employment and value added has been estimated.
- The assessment was quantitative wherever possible. A few cost categories, however, have only been addressed qualitatively. The following cost categories were assessed quantitatively: (i) operational costs for airlines, (ii) costs for passengers and freight, by valuing their generalised travel costs, government costs (additional allowances and changes in tax revenues), climate and emission costs

(NO_x, PM_{10}) and the regional economic impact (agglomeration effect)[35].
- The analysis was carried out using a cross-border perspective to acknowledge the impact on non-Dutch actors. This deviates from traditional cost-benefit studies in the Netherlands in which a national perspective is applied.
- Redistribution effects are not calculated or estimated. These are effects where the cost for one actor is a benefit for another actor. As such, the costs estimate is on a net basis.
- The total costs of a measure, i.e. the sum of the costs for airlines and passengers/freight, are divided by the noise impact of that same measure, to arrive at the costs per unit reduction in affected homes / people experiencing severe disruption /people whose sleep is severely disturbed.
- With these values, the comparison of measures can be made.

Interpretation

As expressed above, the results for noise and cost-effectiveness will be expressed as an effect relative to the baseline. This will be done for the four indicators of the noise objective. An example of the kind of results obtained is as follows. Note: the numbers in the table are fictitious and for illustrative purposes only.

The table should then read as follows:
- Implementing example measure 1 leads to a 5.2% reduction of the number of homes within the 58 dB L_{den} contour line compared to the baseline.
- It results also in a reduction of 4.5% of the number of people experiencing severe disruption by noise within the 48 dB L_{den} contour.
- For both indicators, the noise objective is to achieve a 20% reduction. Example measure 1 in itself is thus insufficient to meet the objective.
- Example measure 1 has associated cost-effectiveness figures. The costs for reducing the number of homes within the 58 dB L_{den} contour by one home amount to €311,000. The costs for reducing the number of people experiencing severe disruption by noise within the 48 dB L_{den} contour by one person amount to €25,000.
- Example measure 2 makes a smaller contribution to the noise objective than the first measure: 1.1% reduction in the homes within the 58 dB L_{den} contour and 4.1% reduction in the number of people experiencing severe disruption by noise within the 48 dB L_{den} contour.
- However, the cost-effectiveness of this second measure is better than measure 1 for the L_{den} indicators of the noise objective (but not for the L_{night} indicators). After all, the costs of this measure are €105,000 per house no longer within the 58 dB contour and €17,000 per person no longer within the 48 dB L_{den} contour.
- Measure two is thus more cost-effective than measure 1 for the L_{den} indicators of the objective. Neither example measure would achieve the objective target on their own.
- A similar interpretation of the results can be made for the indicators related to the night period.

Table 6.1 Example table

	Houses in 58 dB L_{den}		People experiencing severe disruption in 48 dB L_{den}		Houses in 48 dB L_{night}		People experiencing severe sleep disturbance in 48 dB L_{night}	
Noise objective	**-20%**		**-20%**		**-15%**		**-15%**	
	Impact	**CE (€)**	**Impact**	**CE (€)**	**Impact**	**CE (€)**	**Impact**	**CE (€)**
Example measure 1	-5.2%	-311,000	-4.5%	-25,000	-1.9%	-369,000	-1.6%	-421,000
Example measure 2	-1.1%	-105,000	-4.1%	-17,000	-0.7%	-481,000	-0.3%	-507,000

CE = cost-effectiveness

[35] The assessment of costs has been made taking into the Dutch guidelines for cost-benefit analyses in the domain of aviation: SEO, 2021, Werkwijzer luchtvaartspecifieke MKBA's.

6.2 Results of the assessment of measures

The key results of the assessment of the measures, for both the noise impact and the cost-effectiveness, are shown in the following table. More detail is provided in annexes A (noise impact) and B (cost-effectiveness).

Table 6.2 Contribution to noise objective and cost-effectiveness

	Houses in 58 dB L_{den}		People experiencing severe disruption in 48 dB L_{den}		Houses in 48 dB L_{night}		People experiencing severe sleep disturbance in 48 dB L_{night}	
Noise objective	**-20%**		**-20%**		**-15%**		**-15%**	
	Impact	**CE (€)**	**Impact**	**CE (€)**	**Impact**	**CE (€)**	**Impact**	**CE (€)**
M1 Stimulate airlines to use quieter a/c	-3.6%	-279,000	-3.6%	-18,000	-1.5%	-868,000	-0.5%	-577,000
M7a Extend night regime (evening)	-1.4%	-646,000	-3.0%	-19,000	0.0%	NA	0.0%	NA
M7b Extend night regime (evening + morning)	-3.2%	-397,000	-5.1%	-16,000	-7.4%	-215,000	-5.6%	-66,000
M8 – Reduce use Buitenveldert Rwy	-20.9%	-80,000	-2.3%	-45,000	-5.3%	-391,000	-3.8%	-126,000
M10 – Reduce secondary rwy use	-2.6%	-59,000	-2.9%	-3,000	0.0%	NA	0.0%	NA
M14a – Reduce capacity to 440k overall / 29k night flights	-15.3%	-832,000	-16.7%	-48,000	-13.2%	-1,202000	-10.8%	-345,000
M14b – Reduce capacity to 440k overall / 32k night flights	-14.0%	-892,000	-13.9%	-56,000	0.0%	NA	0.0%	NA
M15a – Reduce capacity night flights 29k (500k overall)	-3.4%	-90,000	-2.8%	-7,000	-13.2%	-29,000	-10.8%	-8,000
M15b – Reduce capacity night flights 27k (500k overall)	-4.9%	-113,000	-4.6%	-7,500	-22.2%	-31,000	-18.6%	-9,000
M15c – Reduce capacity night flights 25k (500k overall)	-6.0%	-173,000	-6.4%	-10,000	-30.4%	-43,000	-26.5%	-11,000

CE = cost-effectiveness

A number of observations can be made from these results:

- The measure to reduce the use of secondary runways (M10) is most cost-effective with respect to the noise objective in L_{den}. The contribution to the overall noise objective in L_{den} is however limited. The measure doesn't contribute specifically to the objective for the night-time period.
- The measure to reduce the capacity in the night (M15) is also cost-effective. This applies both for the noise objective specifically related to the night in L_{night} and to the 24-hour objective in L_{den}. The measure to reduce to 29,000 night flights is the most cost-effective of the three variants of M15. The contribution to the objective in the night is substantial, and the objective would be realised in its entirety with a reduction to 27,000 flights.
- With a view to the noise objective for the people experiencing severe disruption by noise within the 48 dB L_{den} contour, the measure to extend the night regime in the evening and morning (M7) scores best in terms of cost-effectiveness. The contribution to the overall noise objective is around one quarter (5.1% vs the objective of 20%).
- However, when we look at the noise objective to reduce the number of homes within the 58 dB L_{den} contour, the measure to reduce the use of the Buitenveldert runway is the most cost-effective (after M10). With this measure, the noise objective would be achieved for this indicator

(20.7% vs objective of 20%). Unfortunately, the contribution of this measure to the noise objective for the people experiencing severe disruption by noise within the 48 dB L_{den} contour is marginal (2.3% vs objective of 20%). This difference stems from the geographic position of the runway.

- The measure to encourage airlines to use quieter aircraft via tariff differentiation (M1) scores relatively well on cost-effectiveness for the 48 dB L_{den}, but less for the 58 dB L_{den}.
- The measure to reduce overall capacity to 440,000 flights *and* reduce the number of night flights to 29,000 is the least cost-effective. However, the contribution to the overall noise objective is substantial for all four indicators.
- There is not a single measure on the shortlist that on its own would achieve the noise objective for all four indicators. A combination of measures would be required for that.

Measures specifically addressing nuisance in the night period

In order to address the specific noise objective for the night (expressed in two indicators), a set of potential measures were identified and introduced in the previous chapter, Section 5.4.

The assessment of the cost-effectiveness of those measures should be solely interpreted as a means to consider the most cost-effective measure to contribute to the night indicators. The study in which this assessment was made is provided as Appendix D. In parallel, a study was carried out to consider measures for achieving the objective of all 4 indicators of the noise objective and the associated cost-effectiveness. Those results were presented in the previous section.

As for the calculation of the total costs for the measures specifically addressing nuisance in the night period, in deviation from the methodology described in section 6.1, only direct and operational costs were calculated. This causes a number of cost categories to differ from the parallel study addressing all indicators of the noise objective (and thus serving another purpose). For a precise description of the methodology, reference is made to Appendix C and Appendix D.

The key results of the assessment of the night measures, for both the noise impact and the cost-effectiveness, are provided in the following table. The table presents the noise impact and the cost-effectiveness of the capacity reduction to a maximum of 29,000 flights during the night period (23:00 – 07:00), and the five potential alternative measures, as well as the baseline. More detail is provided in Appendix D.

Table 6.3

Measure	Variant	Dwellings	SSD[1]	Total costs in m€	Annual costs in m€	Cost-effectiveness in €[2]
Base scenario 32k GJ2024	–	5,700	24,400	–	–	–
Updated 29k N/O Reduction of flights	29,000	4,900	21,700	–	€ 6.8 – 8.3	€2,500 – € 3,100
Measure N/1 Fleet renewal GJ2027	2027	4,900	21,700	–	–	–
Measure N/2 Remove noisiest aircraft	Soft Hard	4,500 3,800	20,000 17,000	€ 373 € 1.225	€ 38[3] € 124.7[3]	€ 8,600 € 16,900
Measure N/3 100% CDA	Hard	5,500	23,300	–	–	–
Measure N/4 Remove dwellings	–	5,700[4]	21,700	€ 3,374	€ 178	€ 65,900
Measure N/5 Insulate by 5 dB	–	24,000[5]	21,700	€ 1,548	€81.6	€ 30,200

1 severely sleep disturbed
2 cost-effectiveness is the number of euros per reduced severely sleep disturbed per year
3 annual costs based on a one-off cost investment
4 dwellings to be removed in order to get to the number of sleep disturbed of the night-time variant
5 dwellings to be insulated in order to get to the number of sleep disturbed of the night-time variant

Some observations can be made from these results:

- Regarding the measures that were solely considered to contribute to the night indicators, a capacity restriction is most cost-effective. This measure leads to a reduction of 14% in the number of dwellings within the 48 dB L_{night} contour. This measure also leads to a reduction of 11% in the number of people whose sleep is severely disturbed within the 40 dB L_{night} contour.
- The measure to no longer allow the noisiest aircraft to fly at night also contributes substantially to the specific night objectives, but is less cost-effective.
- In the previous chapter, observations were made about the feasibility of implementing the measures by the period set to meet the noise objectives. Apart from a capacity restriction at night, all the alternative measures have been assessed as unachievable by November 2024.

6.3 Combinations of measures

In order to meet the noise objective, a combination of measures is required, as no single measure is sufficient to achieve the objective (see section 6.2). Regulation (EU) No 598/2014 provides the framework for these combinations. However, as the noise objective is expressed in four different indicators and the individual measures score differently on the four indicators of the objective, various combinations of measures are possible.

Furthermore, the noise impact and cost-effectiveness of a combination cannot simply be derived by adding up the results of the individual measures. The reason is that measures in combination may lead to double counting, effects that counteract each other or synergies (i.e. two measures enhancing each other when implemented in combination). An assessment of the noise impact and cost-effectiveness of the various combinations has therefore been made.

Possible combinations of measures

Five logical combinations of measures have been made by assessing the results for noise impact and cost-effectiveness of the individual measures (see section 6.2), in accordance with Regulation (EU) No 598/2014. Combination A consists of the most cost-effective measures (on an individual basis) and measures required to achieve the noise objective for the night indicators. A capacity reduction as a last resort is not included in this combination. Combination B consists again of the most cost-effective measures, but doesn't include an individual capacity reduction for the night. Instead, it includes an overall capacity reduction as a last resort to meet the objective in line with the decision of the Dutch Cabinet.

Combination C includes all operational measures and a capacity reduction for the night as well as a last resort to meet the noise objective. Combination D assumes that combining different operational measures may be a challenge to implement before November 2024 and thus consists of only one operational measure, plus a measure to differentiate airport charges. It includes an overall capacity reduction as a last resort to meet the objective in line with the decision of the Dutch Cabinet. Finally, combination E also includes only one operational measure, like in combination D, and a capacity reduction for the night period as a last resort to meet the noise objective.

The combinations are presented in the table below.

Table 6.4 Combinations of measures

Combination	Consists of measures
A	M10 – Reduce secondary runway use M15a – Reduce capacity for night flights to 29k (500k overall) M7b – Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft
B	M10 – reduce secondary runway use M7b – Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft M14 – Reduce capacity to 440k overall / 29k night flights
C	M10 – Reduce secondary runway use M7b – Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft M15c – Reduce capacity for night flights to 25k (500k overall)
D	M7b – Extend night regime (evening + morning) M1 – Encourage airlines to use quieter aircraft M14 – Reduce capacity to 440k overall / 29k night flights
E	M7a – Extend night regime (evening) M15b – Reduce capacity for night flights to 27k (500k overall)

More detail on the rationale for these combinations is provided in Appendix 1. For a more detailed description of the content of each measure, reference is made to chapter 5.

Results for the noise impact and cost-effectiveness of combinations of measures

Each of the five combinations has been assessed on noise impact and cost-effectiveness. This assessment involved considering where the measures in combination (total package scenario) result in synergies or whether there is any double counting (related to noise impact and costs). These results are depicted in the table below. The red cells indicate indicators where the noise objective is not achieved.

Table 6.5 Noise impact and cost-effectiveness of combinations

		Impact on target				Cost effectiveness (cost per reduced unit)				Total costs/ year m €
	Target:	-20%	-20%	-15%	-15%					
Combi	Measures	*Houses in 58 dB L_{den}*	*People experiencing severe disruption in 48 dB L_{den}*	*Houses in 48 dB L_{night}*	*People experiencing severe sleep disturbance in 40 dB L_{night}*	*Houses in 58 dB L_{den}*	*People experiencing severe disruption in 48 dB L_{den}*	*Houses in 48 dB L_{night}*	*People experiencing severe sleep disturbance in 40 dB L_{night}*	
A	M10 – Reduce secondary rwy use M15a – Reduce capacity night flights M7b – Extend night regime (evening M8 – Reduce use Buitenveldert M1 – Stimulate airlines to use quieter	-35.5%	-17.6%	25.7%	-18.6%	-129,000	-16,000	-223,000	-72,000	-325
B	M10 – reduce secondary rwy use M7b – Extend night regime (evening + morning) M8 – Reduce use Buitenveldert Rwy M1 – Stimulate airlines to use quieter a/c M14 – Reduce capacity to 440k overall / 29k night	-49.5%	-29.8%	-25.7%	-18.6%	-333,000	-34,000	-800,000	-258,000	-1,168
C	M10 – Reduce secondary rwy use M7b – Extend night regime (evening + morning) M8 – Reduce use Buitenveldert Rwy M1 – Stimulate airlines to use quieter a/c M15c – Reduce capacity night flights 25k (500k overall)	-42.5%	-21.1%	-56.8%	-33.8%	-145,000	-18,000	-135,000	-53,000	-436
D	M7b – Extend night regime (evening + morning) M1 – Stimulate airlines to use quieter a/c M14 – Reduce capacity to 440k overall / 29k night	-20.4%	-24.1%	-22.0%	-14.9%	-721,000	-38,000	-835,000	-287,000	-1,042
E	"M7a – Extend night regime (evening) M15b – Reduce capacity night flights 27k (500k overall)"	-8.0%	-9.2%	-28.4%	-21.2%	-189,000	-10,000	-67,000	-21,000	-108

Looking at these results, a number of observations can be made:

- Combinations A and E fail to achieve the noise objective completely. A capacity reduction (combination A) or an additional capacity reduction (combination E) is needed to achieve the noise objective in its entirety.
- Combinations B, C and D result in an 'overshoot' of at least some of the indicators of the noise objective. The extent to which this occurs differs per combination. This 'overshoot' is most significant for three indicators of the noise objective for combination B, and least significant for three indicators for D.
- Combination E is relatively cost-effective for three of the four indicators of the noise objective. However, as said, it fails to achieve the noise objective. The same holds for A.
- For those combinations that do achieve the noise objective in its entirety, combination C is the most cost-effective. Also the total annual costs are the lowest in this combination.

- In the underlying studies (Annexes A and B), an estimate of the 'marginal impact' of the individual measures was also made. This is an analysis in which individual measures are added to a combination to assess the effect of that extra measure in the combination (e.g. for combination A: adding M7b to the results of the combination M10+M15a). See Annex A for this analysis. There are three key results to highlight:
  - Contradictory effects of M7 versus M8 and M10:
    - M7 (extend the night regime) leads to an increased use of the Buitenveldert runway.
    - M8 (reduce the deployment of the Buitenveldert runway) and M10 (decrease the use of secondary runways) both decrease the use of the Buitenveldert Runway.
    - As such, while the individual measures may be cost-effective, their combination is less so.
  - Adding M1 (differentiate charges to encourage the use of quieter aircraft) to a combination results in a decrease of the cost-effectiveness of the combination.
  - Adding M15c (the capacity reduction in the night to 25,000 movements) has a more positive effect on the cost-effectiveness to achieving the night-time noise objective for the overall combination C compared to excluding it from combination C.

6.4 Other impacts

The cost-effectiveness results, as presented above, include the effects on the climate, emissions and employment (expressed in monetary terms). To provide a complete overview, this section shows the impacts on the climate, emissions and employment in unit terms for the five combinations.

The impact on CO_2 and other emissions is shown in the following table.

Table 6.6 Impact on CO_2 and other emissions per combination of measures

	Combination A*	Combination B	Combination C*	Combination D	Combination E*
CO_2 (tonnes)	–	-153,726	–	-153,726	–
PM_{10} (kg)	–	-86,577	–	-86,577	–
Nox (kg)	–	-6,317	–	-6,317	–

Only the two combinations with a capacity reduction during daytime result in a reduction of emissions and CO_2. The impacts are net impacts on the global scale. The monetised values of these emissions have been included in the cost-effectiveness analysis as presented in the sections above.

The impact on employment is shown below. It should be noted that – given the fact that the labour supply is tight within the Dutch economy – any change in employment within the Dutch aviation industry (direct effect) or at suppliers (indirect backward effect) will likely result in a shift in employment to other industries, not in a net change in employment. Because we are assessing the effect in the short term (2024), there will be a temporary effect of frictional unemployment. This means additional government costs in unemployment benefits and decreasing tax revenues. These costs have been included in the cost-effectiveness analysis as presented in the sections above.

Table 6.7 Employment impact of the combinations of measures

(FTE)	Combination A*	Combination B	Combination C*	Combination D	Combination E*
Gross impact (direct + indirect)	-700	-12,000	-700	-12,000	-
Net impact (short term friction)	-35	-600	-35	-600	-

Combinations B and D both result in a significant gross impact on employment. The net effects however, are relatively limited due to scarcity in the labour market. The impact of these combinations is nevertheless larger than for combinations A and D. See Appendix B for more detail on this.

6.5 Outlook beyond 2024

The assessment provided in this document, and in the underlying studies (appendices A and B) primarily focuses on the noise objective and measures ready for implementation per November 2024. However, as pointed out in Chapter 4, the aim is to further reduce noise beyond 2024. Based on the support study on noise impact (Appendix A), the outlook beyond 2024 and up to 2027 can be characterised as follows. This outlook distinguishes between further autonomous developments and additional measures that can be taken on top of these developments. Clearly, the

impact of both depends on the final decisions to be made in the combination of measures aimed at the noise objective per November 2024.

Autonomous developments up to 2027

A number of autonomous developments are expected to occur up to 2027:

- Further autonomous development of fleet renewal and retrofitting aircraft (winglets, engine exhaust modifications, etc.), expected to result in an additional 0.3 dB reduction for arrivals and 0.6 dB reduction for take-offs (in line with the long-term trend of 0.1 dB reduction for arrivals and 0.2 dB reduction for take-offs per year).
- Improved navigation performance and optimisation of current procedures will make it possible to further minimise the number of affected homes, people experiencing severe disruption and people with severe sleep disturbance on existing routes. The impact will depend on the decision-making process of proposed optimisations. This relates moreover to the discussion whether dispersion or concentration of noise is desired, since the improved navigational performance will allow more concentration of noise.
- Several developments will also result in higher predictability of traffic. More specifically the planning of inbound traffic is expected to improve. This improvement will result in an optimisation of existing capacity and will reduce non-preferential runway use.

Additional possible measures

For the outlook to 2027, the longlist of measures (see Section 5.1) has been used again to identify additional measures which meet all the selection criteria when the achievability criterion is changed from November 2024 to November 2027. The following measures have been identified as meeting all the criteria with the focus on November 2027:

- Encourage fleet renewal further through financial instruments (including airport charges).
- Optimisation of current procedures (minimise level segments, optimise climb-out speed, intersection take-offs, reduced thrust take-off etc.).
- Introduction of new procedures (including RNP-AR approaches during parallel approaches).
- Increase the number of continuous descent approaches.
- Increase concentration of flight paths to minimise overall noise exposure.

The implementation of these measures depends on various variables and broader programmes, such as the Airspace Redesign programme in the Netherlands. If implemented, these measures are expected to result in an additional reduction in noise compared to the November 2024 situation. This is in line with the long-term goal to achieve a continuous decrease in noise.

6.6 Final combinations of measures

The analysis of individual measures and the combinations of measures leads to a number of conclusions.

- There is no single measure that can achieve the noise objective for all four indicators.
- The most cost-effective measure (M10 – reduce secondary runway use) only makes a limited contribution to the noise objective.
- Overall capacity reduction is the least cost-effective, but goes a long way to achieving the noise objective.
- A combination of measures is required to meet the noise objective entirely.
- Combining measures results in double counting of effects, in contradictory effects or in synergies in some cases.
- The impact on airport operations of combining various operational measures is likely to be high.
- The feasibility of implementing combinations of multiple operational measures depends in part on the possibilities at Air Traffic Control the Netherlands, the NL-ANSP and the operational compatibility of measures at the airport. This needs further investigation. The result will be taken into account in the final selection of measures by the Ministry of Infrastructure and Water Management and explained in the notification sent to the European Commission.
- When viewing the results for the noise impact of the combinations of measures, two of the five identified combinations fail to achieve the noise objectives for all four indicators. These combinations (Combinations A and E) are therefore not taken into account any further.

The resulting combinations are combinations B, C and D:

Table 6.8 Final combinations of measuresf measures

Combination B	Combination C	Combination D
M10 – reduce secondary runway use M7b Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft M14 – Reduce capacity to 440k overall / 29k night flights	M10 – reduce secondary runway use M7b Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft M15c – Reduce capacity of night flights to 25k (500k overall)	M7b Extend night regime (evening + morning) M1 – Encourage airlines to use quieter aircraft M14 – Reduce capacity to 440k overall / 29k night flights

Combination B was designed by looking at the most cost-effective individual measures and forming a combination from them. It acknowledges that the measure to reduce the number of movements in the night is the only achievable measure specifically addressing the objective for the night. The least cost-effective measure, which is the capacity reduction to 440,000 movements, has been taken as a last resort. Combination B leads to full achievement of the noise objective. In fact, the noise impact goes beyond the noise objective (for each of the four indicators). This impact is including the contradictory effects of measures 8 and 10 (reducing the use of the Buitenveldert Runway) and measure 7 (increasing the use of the Buitenveldert Runway). Combination B results in a positive impact for the climate and other emissions, while the impact on employment is negative in the short term. From an operational perspective, implementing three operational measures at the same time before November 2024 might be a challenge. The Ministry will therefore ask LVNL to undertake a feasibility/execution test during the consultation period.

Combination C was also designed by looking at the most cost-effective individual measures (measures addressing the source and operational measures) and forming a combination from them. This combination fails to achieve the objective in full, and a capacity reduction in the night to 25,000 movements is required to fully achieve the objective. This impact is including the contradictory effects of measures 8 and 10 (reducing the use of the Buitenveldert Runway) and measure 7 (increasing the use of the Buitenveldert Runway). Combination C is the most cost-effective combination. It also has a noise impact beyond the objective, but for the indicator 'people experiencing severe noise nuisance within the 48 dB L_{den} contour' this 'overshoot' is only one percentage point. Combination C has no net impact on climate, emissions or employment. From an operational perspective, implementing three operational measures at the same time before November 2024 might be a challenge also for this combination. The Ministry will therefore ask LVNL to undertake a feasibility/execution test during the consultation period.

Combination D was formed by including only one operational measure, the most cost-effective one for all indicators of the objective. This assumes that implementing multiple operational measures before November 2024 might be a challenge. The Ministry will ask LVNL to undertake a feasibility/execution test during the consultation period to give their views on this assumption. Combination D also includes the measure to encourage the use of quieter aircraft by differentiating the airport charges. These two measures together fail to achieve the noise objective. A capacity reduction is needed as well to realise this. The measure to reduce capacity to 440,000 flights (of which 29,000 are at night) is therefore included in the combination. The result is that the noise objective is met for all four indicators. The degree to which the noise impact exceeds the objective is relatively limited (for two noise objective indicators) or non-existent (for two noise objective indicators). In terms of cost-effectiveness however, the combination scores the worst of the three. Combination D results in a beneficial impact on the climate and other emissions, while the impact on employment is negative in the short term.

Alternative measures

The three combinations described above are combinations of measures that make it possible to achieve the noise target by November 2024. Participants in this consultation, as stated in Chapter 8, are explicitly asked to suggest alternative measures that are also realisable by November 2024 and make the noise target achievable.

7 The Balanced Approach process

An outline is given below of how alignment and consultation with stakeholders have been structured in the Balanced Approach process. It focuses specifically on coordination with the slot coordinator, ACNL. Furthermore, there is an overview of the international regulations and treaties that the measures have to be consistent with. Lastly, there is an outline of the national-level decision-making following the completion of the Balanced Approach process.

As stated in the previous chapters, the potential measures will in any event be reviewed by Air Traffic Control Netherlands and Schiphol Airport, primarily looking at safety and operational feasibility. In addition, the measures ultimately preferred will also be assessed by the Environment and Transport Inspectorate (ILT).

7.1 The Balanced Approach procedure and coordination with stakeholders

Required coordination with stakeholders

European regulation 598/2014 requires steps to be followed that respectively involve pre-consultation with the aviation industry (technical consultation), consultation with all stakeholders (consultation period) and – after processing this consultation – submission of the proposed measures to the EU for notification (notification period).

The technical consultations comprise a dialogue with airport operators, airlines and air navigation service providers to identify noise abatement measures.

The consultation period concerns all stakeholders (or their representatives) who may be affected by the measures to be taken. The target groups for this consultation have been defined even more broadly than required by the EU regulation and consist of local residents, bodies representing businesses, trade unions and bodies representing employees, nature and environmental organisations, airport operators, aviation companies, air traffic control organisations and the network manager. The notification following the consultation informs the European Commission, EU member states and other stakeholders about the proposed operating restrictions and the steps of the Balanced Approach procedure that have already been completed. The European Commission has the first three months of this six-month notification period to review the proposed measure and the process already undertaken. If it considers that the balanced approach has not been followed properly, it will inform the member state. The European Commission does not issue a final assessment of the proposed measure: it reviews the content and process

against the regulation, makes comments and asks questions. The member state that has gone through the procedure decides on how the measure is to be put into effect.

Implementing the Balanced Approach procedure for Schiphol

The steps in the procedure required by the regulation are being implemented in the Balanced Approach for Schiphol as follows.

Table 7.1 Step in the Balanced Approach for Schiphol

Objective	Form	Target group	When
1. Technical discussions			
Explaining and tightening up the design of the Balanced Approach, the methodology to be used in studies and providing information in advance about targets and possible measures	Three interactive consultations from a studio led by the officials involved with input from subject matter experts/researchers: presentations and Q&A sessions in various formats	Stakeholders and interested airlines, air traffic control organisations and airports or their representatives	• 22-Dec-2022 • 24-Jan-2023 • 8-Mar-2023
2. Consultation			
• Enabling all stakeholders to respond to the measures from their own perspectives and interests • Gathering input for potential tightening up and/or improvement of targets and measures	• Open internet consultation using the consultation document as input • Additional information sessions and dialogue with stakeholders	All stakeholders who may be affected by the measures	• 15-Mar-2023 to • 15-Jun-2023
3. Notification			
• Announcement of measures and substantiation, including the process followed • Answering questions	• Notification document	• EC • EC member states • Stakeholders	• 15-Jul-2023 to 15-Jan-2024

To allow careful consideration in the choice of final measures, not only have all the potential measures identified been presented but also the possible combinations thereof. The consultation document contains the information needed to put the measures in context and to understand the elaboration of targets into measures as well as the rationale for choosing the package of measures. It enables all stakeholders to respond to the measures from their own perspectives and interests.

Ongoing stakeholder dialogue

In addition to the above steps, dialogue with a wide range of stakeholders was in process in parallel. The meetings took place from June 2022 onwards, following the Cabinet decision. These were initiated by the Ministry of Infrastructure and Water Management (IenW) to provide information about the Cabinet's decision, as well as to gather information to so that the Balanced Approach procedure could be carried out carefully and the right information developed for use as input in the various steps. The meetings have taken place both on the initiative of IenW and, just as often, at the request of interested parties.

Non-exhaustive discussions have been held with IATA, various airlines, air traffic control organisations, government representatives from EU member states and elsewhere, local authorities (jointly as the Schiphol Administrative Region) and the Schiphol Environmental Council (social consultation about the airport), and others. An information session, accessible to all interested parties, was held on 15 November about the Cabinet's decision to reduce the number of flights at Schiphol to 440,000 per year. An online information session was held on 8 December for international stakeholders.

There has also been specific coordination with other stakeholders mentioned explicitly in the scheme, i.e. the network operator and slot coordinator. The following summarises what has been agreed with the latter of these.

At the start of the consultation period, IenW will hold an information meeting at which an explanation will be given of the consultation document, along with an opportunity to ask questions and exchange initial views.

7.2 Effects of the measures on slots

Slot coordination at Schiphol

European regulations provide rules for the process of capacity declaration and slot allocation at airports. Schiphol defines its capacity declaration twice annually. The capacity declaration reflects the available capacity for that season, taking account of the technical, operational and environmental constraints. Based on the capacity declaration, the independent slot coordinator allocates slots to airlines for each season. As long as at least 80 per cent of the slot series is actually utilised, the slot regulations entitle an airline to the same slot series in the following comparable season. These are what are referred to as 'historical slots'. If the available capacity is set lower by Schiphol because of a new environmental parameter pursuant to the Cabinet's decision becoming enshrined in regulations, the slot coordinator cannot honour all claims for historical slots. This has consequences for the commercial operation of the airport and thus for airlines' operations. That is why the government is committed to a careful approach, implemented tin practice by following the Balanced Approach.

Airport Coordination Netherlands (ACNL)

The EU Slot Regulations stipulate that the allocation of capacity at coordinated airports in the EU must be carried out by a slot coordinator that is independent both functionally and financially. In the Netherlands, exclusive authorisation for the allocation of slots has been assigned to Airport Coordination Netherlands (ACNL). ACNL allocates slots to airlines in a neutral, non-discriminatory and transparent way, aiming to maximise the use of available airport capacity. ACNL's duties cover Amsterdam Airport Schiphol (AMS), Rotterdam The Hague Airport (RTM) and Eindhoven Airport (EIN).

ACNL is a public-law, independent administrative body appointed pursuant to Article 8a.64 of the Dutch Aviation Act. The foundations for slot allocation include the EU Slot Regulation, the Worldwide Airport Slot Guidelines and the Besluit slotallocatie (Dutch Decree on Slot Allocation). Because the slot coordinator's duties as prescribed in the EU Slot Regulation are to be carried out independently, articles 21 and 22 of the Non-Departmental Public Bodies Framework Act (Kaderwet zelfstandige bestuurorganen) have been declared inapplicable to ACNL. The Ministry of Infrastructure and Water Management has no influence on the process of slot allocation.

The cessation of anticipatory non-enforcement (see Chapter 1), as well as following the Balanced Approach procedure, mean that there is a high probability that the available capacity for Amsterdam Airport Schiphol will be lower than the number of historical slots. European regulations do not provide a methodology for addressing such a situation and the ministry therefore sent a letter at the end of June asking ACNL to investigate how to achieve a reduction in the number of aircraft movements, and the related slots, within the rules and procedures of slot allocation. The ministry also requested that the planned reduction in night movements (from 32,000 to 29,000 aircraft movements annually) should be included.

Recommendations made by ACNL

ACNL issued an advisory report and draft policy rules (containing the reduction methodology) last 14 February. The advisory report discusses the various steps in the process to be taken by the parties involved (the state, the airport, the slot coordinator), based on their individual responsibilities in order to achieve a reduction. The roles and responsibilities are as follows:

1. The Ministry of Infrastructure and Water Management adopts an environmental standard within the applicable frameworks in legislation and regulations.
2. Based on this environmental standard, the airport operator determines the capacity declaration (in terms of the number of slots available for allocation) each season, taking account of the worldwide slot allocation calendar.
3. ACNL allocates the available slots from the capacity declaration to airlines, in compliance with the Slot Regulations. ACNL has no formal role in determining the number of slots available.
4. The airlines are responsible for utilising these slots according to the rules. When doing so, the airlines are free to choose the destinations and types of aircraft flown within the allocated slots. The Environment and Transport Inspectorate (ILT) and ACNL monitor usage.

In addition to the roles and responsibilities, the recommendations discuss the legal, process-related and content-related requirements for these steps and the implications they have for the implementation date. It should be noted that the capacity statement resulting from the Balanced Approach determines the allocation of slots by ACNL. In accordance with Regulation 598/2014, the outcome of the Balanced Approach procedure must be announced at least two months before defining the coordination parameters for the 2024/2025 IATA winter season. Furthermore, the

environmental standard must be incorporated in legislation, after which Schiphol needs to discuss the capacity statement in detail in the Coordination Committee Netherlands before it is fixed at the start of May 2024. Thereafter, ACNL can use the capacity declaration as the foundation for the final allocation for the IATA 2024/2025 winter season.

In parallel with the advisory report, ACNL published draft policy rules regarding the methodology for allocating slots in the case where there are fewer slots available than historical claims. This procedure will be set out in a policy rule (in the sense of the term under the General Administrative Law Act, Algemene Wet Bestuursrecht) and it will be transparent, non-discriminatory and published in good time. The number of slots currently allocated is split among a large number of airlines. A proportional reduction will be applied. ACNL will publish the policy rule after informing the sector parties and will set up a working procedure stating how ACNL will apply the criterion of proportionality in practice and what is expected of the airlines. ACNL intends to publish this working procedure for capacity determination declaration for the IATA 2023/2024 winter season by no later than 4 May 2023. For more information, please refer to the advisory report and the draft policy rules[36].

7.3 National decision-making after completing the Balanced Approach procedure

The limits and rules for Schiphol are set out in the Schiphol Airport Traffic Decree (Luchthavenverkeerbesluit, hereinafter also "LVB"), an order in council under Article 8.15 of the Aviation Act Wet luchtvaart). The measures chosen by the Cabinet after completing the Balanced Approach procedure need to be incorporated in the LVB. As input to the draft amendment of the LVB for the NNHS, an environmental impact assessment (EIA) has already been produced. This EIA needs to be updated.

Pursuant to Article 8.24 in conjunction with articles 8.13 and 8.14 of the Aviation Act, the draft amendment to the LVB will be published publicly and made available to view. All documents and studies underpinning the draft decision, including the amended EIA, will be attached. Everyone will then have four weeks in which to submit their wishes and objections (also known as the 'zienswijzen'). The Cabinet will then draw up a response and the draft decree will be amended if necessary.

At the same time as the procedure for the 'zienswijzen' is announced, the draft decree will be submitted to parliament (the Lower and Upper Houses of the States-General). This process is known as the 'preliminary procedure'. They can discuss the draft decree with the minister if so desired. They are not formally required to approve the draft.

After the viewing and preliminary procedures, the draft decision and its accompanying documents will be submitted to the Council of State's (Raad van State) Advisory Division for recommendations. The Council of State is a state high council, an institution that is provided for in the Dutch Constitution. The Advisory Division of the Council of State is an independent advisor to the Cabinet and parliament about legislation and governance. The Division generally delivers its recommendations within three months.

The Cabinet then produces a report on those recommendations and the draft decree is amended accordingly if necessary.

Then the draft decree is submitted together with the report to the King for his signature (known as 'assent'). The final decree is published in the Bulletin of Acts and Decrees (Staatsblad) and comes into effect on the date stated in the decree.

7.4 International regulations and treaties

The measures that are ultimately selected need to be consistent with various EU regulations, which have differing objectives. It is possible that different regulations overlap in the scope of their application and multiple standards will need to be met as a consequence. In such cases, various public interests will need to be weighed up; this is also the assumption in EU regulations.

This concerns the following regulations (of which the implications of numbers 2 and 3 have already been discussed above, but are mentioned again for completeness):

1. Environmental Noise Directive
   Directive 2002/49/EC from the European Parliament and the Council of Europe dated 25 June 2002 about assessing and managing environmental noise. This directive aims to avoid, prevent or mitigate harmful effects of environmental noise.

[36] Government letter, Adviesrapport en beleidsregel slotreductie van ACNL (ACNL advisory report and policy rules for slot reduction)

2. Regulation on noise-related operational restrictions at airports
   EU regulation no 598/2014 by the European Parliament and the Council of 16 April 2014 on establishing rules and procedures about the introduction of noise-related operational restrictions at airports in the Union as part of a balanced approach. The regulation sets out a procedure and an assessment framework (known as the 'balanced approach') to be followed to achieve operational restrictions.

3. Slot Regulations
   Regulation EEC no. 95/93 of 18 January 1993 on common rules for the allocation of slots at EC airports. The slot regulations aim to distribute access to congested airports fairly, to encourage new entrants to enter, and to optimise the use of available capacity.

4. Regulation for operation of air transport services
   EC regulation no. 1008/2008 by the European Parliament and the Council of 24 September 2008 on common rules for the commercial operation of air services in the Community. This regulation sets forth the rules for operating air transport services in the European Union, including granting of operating licences to EU carriers and price transparency. The regulation aims to ensure the free movement of services.

5. Habitats Directive
   Directive 92/43/EEC of 21 May 1992 by the European Council on the conservation of natural habitats and of wild fauna and flora, as implemented in the Netherlands in the Nature Conservation Act. The Habitats Directive aims to help ensure biological diversity in member states by protecting habitats and species of European importance. This directive (as well as the Birds Directive) was incorporated into the Nature Conservation Act from 1 January 2017.

8 Invitation to those participating in this consultation

To allow careful consideration in the choice of final measures, not only have all the potential measures identified been presented but also the possible combinations thereof. Three such combinations have been identified as viable in relation to achieving the noise target by November 2024.

Stakeholders participating in the consultation are invited at any rate to give their views on the selection, composition, effect and desirability of the three combinations of measures presented in this document. The participants are also invited to suggest alternative measures or alternative combinations of measures that could achieve the noise objective and be implemented by November 2024.

Simultaneously with the consultation period the potential measures will be reviewed by Air Traffic Control Netherlands and Schiphol Airport, primarily considering safety, operational feasibility and impact on their organizations. Explicitly the focus will be on effective enforceability of the combinations of measures. Additionally, the measures selected will also be assessed by the Environment and Transport Inspectorate (ILT).

The Ministry of Infrastructure and Water Management will use the outcomes of the consultation to decide on the final combination of measures and notify the European Commission.

Appendix Combining measures

This appendix provides a rationale for combining measures.

Combination A

- The measure to reduce the use of secondary runway use (M10) is most cost-effective. That measure is therefore the first in this combination.
- However, the impact of this measure on the noise objective for the night period is zero. Reducing the capacity of night flights to 29,000 (M15a) is second best in terms of cost effectiveness (3 out of 4 indicators). It is positive both for the night period as well as for the 24-hour period.
- The specific study for the night period (appendices C and D) has also demonstrated that this measure is the most cost effective of the measures that were solely considered to contribute to the night indicators and the only feasible measure to achieve result in 2024, specifically addressing the night period.
- By adding this measure to the combination, the objective for the night period is largely realised (but not entirely (when simply adding noise impacts, excluding combination effects).
- Subsequently, the measure to extend the night regime in the evening and morning (M7b) is then most cost-effective (for 3 out of 4 indicators). Therefore, this measure is added to the combination as third measure.
- When simply adding up the individual noise impact for the indicators in L_{night}, the objective would be realised. This is not the case for the L_{den} indicators. This is excluding combination effects, but the regulation prescribes selecting individual measures in order of cost effectiveness.
- The next measure, in terms of cost effectiveness (for the 58 dB L_{den}) is then the reduced use of the Buitenveldert Runway (M8). It is more cost-effective than M1.
- However, the objective for the 48 dB L_{den} contour is still not realised when results are summed. The measure to encourage the use of quieter aircraft (M1) is next in line in terms of cost effectiveness.
- However, this would still not meet this specific objective. All measures have been added in this combination (at least the most cost effective sub-variant of a measure).
- A capacity reduction seems to be required to meet the entire noise objective. When assessing the measures on an individual basis, a capacity reduction to 440,000 movements would result in overachievement of the objective.

Combination B

- The measure to reduce the use of secondary runway use (M10) is most cost-effective. Therefore, this measure is the first in this combination.
- Reducing the capacity of night flights to 29,000 (M15a) is second best in terms of cost effectiveness (3 out of 4 indicators). It is positive both for the night period as well as for the 24-hour period. The specific study for the night period (see appendices x and y) has also demonstrated that this measure is the most cost-effective of the measures that were solely considered to contribute to the night indicators and the only feasible measure to achieve result in 2024, specifically addressing the night-time period.
- However, this can be seen as a capacity reduction (although very cost-effective). In this combination it is thus considered a 'last resort' and not yet added to the combination in an early stage.
- Subsequently, the measure to extend the night regime in the evening and morning (M7b) is then most cost-effective (for 3 out of 4 indicators). Therefore, this measure is added to the combination as second measure in the combination.
- The next most cost-effective measure (not being a capacity reduction) is the measure to reduce the use of the Buitenveldert Runway (M8). This is considered the

third combination of the measure. The objective for the 58 dB L_{den} would then be met, but the objective for the three other indicators is not yet met.
- The measure to encourage the use of quieter aircraft (M1) is next in line in terms of cost effectiveness. This seems to result in an achievement of the L_{night} objectives as well. Only the objective for the 48 dB L_{den} indicator is not yet realised.
- The measure to reduce capacity to 440,000 movements overall, of which 29,000 are at night has been added to the combination to achieve the noise objective.

Combination C

- As per combination B: M10, M7b, M8, M1
- This results in achieving three out of four indicators of the noise objective, while summing the results of the measures on an individual basis. Only the objective for the 48 dB L_{den} is not achieved.
- Therefore, measure 15c to reduce the number of night flights to 25,000 has been added to the combination. However, this is not the most cost-effective sub-variant of measure M15.
- When simply adding up the noise impact of the individual measures this would lead to overachievement compared to the objective. However, this is excluding combination effects.

Combination D

- The leading principle is that the combination should not consist of multiple operational measures, as it could be expected that the impact on airport operations of combining various operational measures may be very high.
- Moreover, while assessing the individual measures, the achievability per November 2024 may be feasible, but implementing the combination of multiple operational measures could lead to execution problems at LVNL, the NL-ANSP and insuperable operational problems at the airport. Hence, a feasibility test of a package of measures could lead to a negative result and the conclusion to consider alternatives.
- This combination thus consists of one operational measure, the most cost-effective one contributing to all four indicators of the noise objective. This is the measure to extend the night regime (evening and morning, M7b).
- Additionally, the next cost-effective measure (not being an operational measure or a capacity reduction) is the measure to encourage airlines to use quieter aircraft (M1).
- This does not lead to the objective being achieved.
- Capacity reduction is required to achieve the objective. This is measure 14a: reducing capacity to 440,000 flights, of which 29,000 are at night.

Combination E

- The leading principle is that the combination should not consist of multiple operational measures, since it could be expected that the impact on airport operations of combining various operational measures may be very high.
- Moreover, while assessing the individual measures, the achievability per November 2024 may be feasible, but implementing the combination of multiple operational measures could lead to execution problems at LVNL, the NL-ANSP and insuperable operational problems at the airport. Hence, a feasibility test of a package of measures could lead to a negative result and the conclusion to consider alternatives.
- This combination thus consists of one operational measure, a cost-effective one contributing to all four indicators of the noise objective *and* the one that is considered to result in the least operational challenges. This is the measure to extend the night regime to the evening only (M7a).
- This does not lead to the objective being achieved.
- Capacity reduction is required to achieve the objective. By adding the capacity reduction in the night to 27,000 flights (M15b) to the combination, the objective for the two night indicators is realised.
- A capacity reduction during daytime is required as a last resort to meet the entire objective for all four indicators.

Overview of annexes

Appendix A: To70, Balanced Approach Study, March 2023.

Appendix B: Decisio, Measuring the cost-effectiveness of noise mitigating measures for Schiphol Airport, March 2023.

Appendix C: Adecs Airinfra & CE Delft, Maatregelen nacht-bewegingen Schiphol, Mei 2022 (Measures and night-time aircraft movements at Schiphol, May 2022)

Appendix D:Adecs Airinfra & CE Delft, Actualisatie nacht-vluchten Schiphol in het kader van de Balanced approach-procedure, Februari 2023 (Update on night flights at Schiphol for the Balanced Approach procedure, February 2023).

Appendix E: Schiphol Outline Letter, 24 June 2022

Ministry of Infrastructure and Water Management

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