Dublin Airport
Developing a Proposed Night Quota System.

Document: 3870-NightQuotaSystem
Date: 4 December 2020
Version: vFinal

Author: Andy Knowles
Reviewed: Jack Naumann
Authorised: Andy Knowles

Anderson Acoustics

Introduction

- In August 2007 Planning Permission was issued for a new runway (North Runway) at Dublin Airport. Construction commenced December 2016.
- This permission came with a number of conditions including, that upon completion of the construction of the North Runway a series of operating restrictions will come into effect, including Conditions 3(d) and 5 of the North Parallel Runway Planning Permission (FCC Reg. Ref:. F04A/1755; ABP Ref: PL06.217429).
- Conditions 3(d) and 5 will restrict the use of the new North Runway during the hours of 23:00 to 07:00 and further restricts the average number of night-time aircraft movements at the airport to a maximum of 65/night.
- Following grant of permission, Dublin Airport experienced a strong sustained growth trajectory, with the current runway system at capacity during peak times.
- The geographical location of Dublin Airport and the 1hr time difference between it and mainland Europe, means that flights need to leave Dublin before 7am to arrive at their destination for the start of the working day.
- In 2019, driven by short haul services operated by aircraft based at Dublin Airport, demand for night flights (23:00-07:00) was over 100/night, with 113/night associated with regularly scheduled services on a typical busy Summer day (aligns with the 92-day summer referenced in North Runway Condition 5).
- With the Covid-19 Pandemic, in 2020, as per all other international airports, Dublin Airport has seen a significant drop in air traffic movements and passenger numbers. Strong sustained growth is expected to return post pandemic.
- Mott McDonald, on behalf of daa, have forecast that 108/night in 2022/23 will be required to sustain the airport's rebound, rising to 113/night when the airport returns to 32m annual passenger traffic levels in around 2025.
- The operating restrictions introduced by Conditions 3(d) and 5 will have a significant impact on short haul services operated by aircraft based at Dublin airport.
- The assessed impact of these restrictions is a loss of 1.1m passengers per year (-3.5%) and a cumulative loss over the 4-year period 2022-2025 of 4.3m passengers.
- As a result, daa is seeking to address the impact arising from Conditions 3(d) and 5 and, in so-doing, mitigate associated noise related effects.
- As part of a proposed package of measures to mitigate the noise related effects of replacing Conditions 3(d) and 5, daa is proposing a Night Quota System (NQS). The NQS proposal includes an Annual Night Quota (ANQ) allowance applied to scheduled operations across the Night Quota Period (23:30 to 06:00).
- This NQS will serve to balance the effects of noise from the forecast growth, encourage the use of quieter aircraft; and will provide a layer of assurance that the overall effects of noise at night arising from the proposed changes are managed and controlled such that they will not exceed those in 2018 and will be less than envisaged at the time of the North Runway Planning Permission.

daa has proposed the following candidate Noise Abatement Objective (cNAO) to enable assessment of proposed measures to reduce noise impact .

"To limit and reduce the adverse effects of long-term exposure to aircraft noise, including health and quality of life, so that long-term noise exposure, particularly at night, does not exceed the situation in 2018. This should be achieved through the application of the Balanced Approach."

daa approach to managing noise and growth in response to the proposed cNAO

1. Overall, effects of noise shall be no worse than originally consented (2004) with North Runway Operating Restrictions forecast for 2025.

The overall adverse effects of aircraft noise on HQL with the NR will not be worse than that forecast for 2025 with the consented NR night-time operation (applying 2004 noise assumptions and 65 movements). Maintains integrity of the original EIA, associated consent and acceptability of effects.

2. Overall, the effects of noise at night will be less than today (2018 baseline).

With the north runway operating at night (11pm-7am), the overall effects of noise as measured by the population exposed >40dB Lnight and population HSD will be no worse than 2018 (applying consistent baseline population).

3. Minimise the potential for significant adverse effects from the proposed change.

To ensure consistency with the EIA.

The ICAO Balanced Approach

Source Noise Reduction

Fleet noise reduction across the night-time period (QC/ATM).

Operating Procedures

Airspace design: reduce overflown population.

Airport operation: reduce overall effects. To replace Condition 3d. Propose no use of NR 00:00 to 06:00; extend NR operation to include 23:00-00:00 & 06:00-07:00

Land Use Planning

Propose NI Grant Scheme: >=55dB L_{night} 2025 Very significant adverse effects (EIAR) >=50dB change >=+9dB. Additional to existing NRIS.

Operating Restrictions

Night Quota System: Annual Night Quota (ANQ) to provide certainty 23:30 to 06:00 (to replace Condition 5)

Monitoring Framework

Regulation 598 Process and Initial Findings

Establish Noise Reduction Policy Objective

- Candidate NAO established, which limits effects of aircraft noise to no worse than granted in original North Runway permission and no worse than recent activity in 2018/19.
- Primary metrics are Highly-Annoyed and Highly Sleep Disturbed populations.

Define Forecast Condition without New Measures

- 32 MPPA forecast year (2025).
- North Runway with no restrictions and fully mixed-mode runway use.
- Includes19 existing and previously planned noise reduction measures.

Define Noise Reduction Measures

- 14 potential additional noise reduction measure categories were considered.
- 8 preferential runway use measures proceeded forward for further analysis.
- Additional sound insulation measure proceeded forward for further analysis.

Quantify Effectiveness of Each Measure

- Noise impacts modelled for the Forecast Conditions without New Measures scenario.
- Noise impacts modelled for 8 preferential runway use scenarios.
- Noise impact reduction evaluated for 55 L_{night} sound insulation scheme.
- Quantify costs of effective measures

Conduct Cost-Effectiveness Analysis

- 3-step evaluation process.
- Scenario 2 (extension of Option 7B into night shoulder hours, preferential runway use; 55dB L_{night} Noise Insulation Scheme (NIS) identified as the most effective set of measures.
- **Annual Night Quota (ANQ)** measure proposed to ensure conditions to 2025 not worse than 2018.
- Cost–effectiveness of Scenario 2 preferential runway use and 55dB L_{night} SIS were evaluated relative to Permitted Conditions 3(d) and 5.

Select Preferred Additional Measures

- Preferred additional measures:
  - Scenario 2 preferential runway use;
  - 55dB L_{night} NIS;
  - **ANQ 23:30 to 06:00**.

Considerations for a Night Quota System

A Night Quota System (NQS) and EU598

- An NQS is designed to limit the overall amount of noise produced by aircraft using an airport based on an allowable Annual Night Quota (ANQ) for a given time period. A QC value is assigned to each individual aircraft movement based on the certified noise level of that aircraft (lower QC for aircraft with lower noise levels, higher QC for noisier aircraft).
- QC accumulates with each ATM against the ANQ across a chosen time period (night quota period, NQP). As such, a greater number of quieter aircraft movements could operate within a given quota, thereby encouraging the use of quieter aircraft at the airport, whilst keeping overall noise levels consistent.
- EU598 considers an NQS measure to be an operating restriction. Analysis indicates that proposals for replacement of Condition 3d and 5 with Scenario 2 (and other measures) are sufficient for cNAO compliance and therefore, consistent with the application of EU598, operating restriction measures are not necessary.
- Whilst analysis indicates that source, operating procedure and land use measures meet the cNAO, daa is proposing an NQS to provide assurances that forecast noise conditions in 2025 will meet the cNAO since part of that compliance will be as a result of airlines updating the fleet operating at Dublin Airport to comprise more, quieter aircraft as indicated in the forecast.

Further Considerations

- An Annual Night Quota (ANQ) is proposed for a Night Quota Period (NQP) of 23:30 to 06:00. This NQP is consistent with airports operating similar QC based systems. The NQP is designed to protect the most sensitive periods of the night-time, whilst balancing growth in the 06:00 to 07:00 period that is essential for the development of European short-haul connectivity (time difference constraints) and will accommodate the forecasted growth in the night period.
- The ANQ is not expected to cause operational constraints up to 2025.
- The overall effects of use of quieter aircraft are already included in the forecast operations for 2025; there is no modelled reduction in noise levels if the ANQ is included, and so the ANQ provides assurances of future fleet noise output.
- As per QC type systems in other jurisdictions, a detailed methodology and procedures would need to be developed and implemented which would need to include provision for late operations and other non-scheduled flights to balance their effects on the local community with the impacts that would arise on the network impact should they be prevented.

Developing a proposed Annual Night Quota

All scheduled and non-scheduled ATMs during the NQP

1 Determine Typical aircraft QC values

- QC values of aircraft types operating at Dublin Airport have been determined.
- Future aircraft types to 2025 are all known currently.

2 Calculate NQP QC Total & QC/ATM

- Using QC values from step 1, Total QC and QC/ATM calculated for each year.
- Historic Actual: 2018, 2019
- Forecast years: 2022-2025

Note: Actuals contain flights not scheduled to operate during the NQP (eg late departures/arrivals and early arrivals and unscheduled ATMs).The forecast does not include such flights and assumes on-time operation.

3 Determine QC/ATM Target value

- The objective is to deliver a reduction of average fleet noise per movement (QC/ATM) in 2025 compared to 2018.
- In 2025, QC/ATM to be <2018 and no greater than 2022.
- Derive the mid-value of QC/ATM between 2018 and 2025. Must be no greater than 2022.

4 Annual Night Quota (ANQ) 2022-2025

- Apply the QC/ATM, derived from step 3, to the total number of ATMs forecast in 2025 to determine an Annual Night Quota to be used for the period 2022-2025 for scheduled ATMs.

Note: The ANQ derived at this stage would only apply to forecast scheduled and non-scheduled ATMs. Additional consideration will be required for late operations in the NQP (flights scheduled before 23:30 but have been found on-occasion to operate after 23:30.
A tolerance is needed to allow for variability inherent in forecasts.

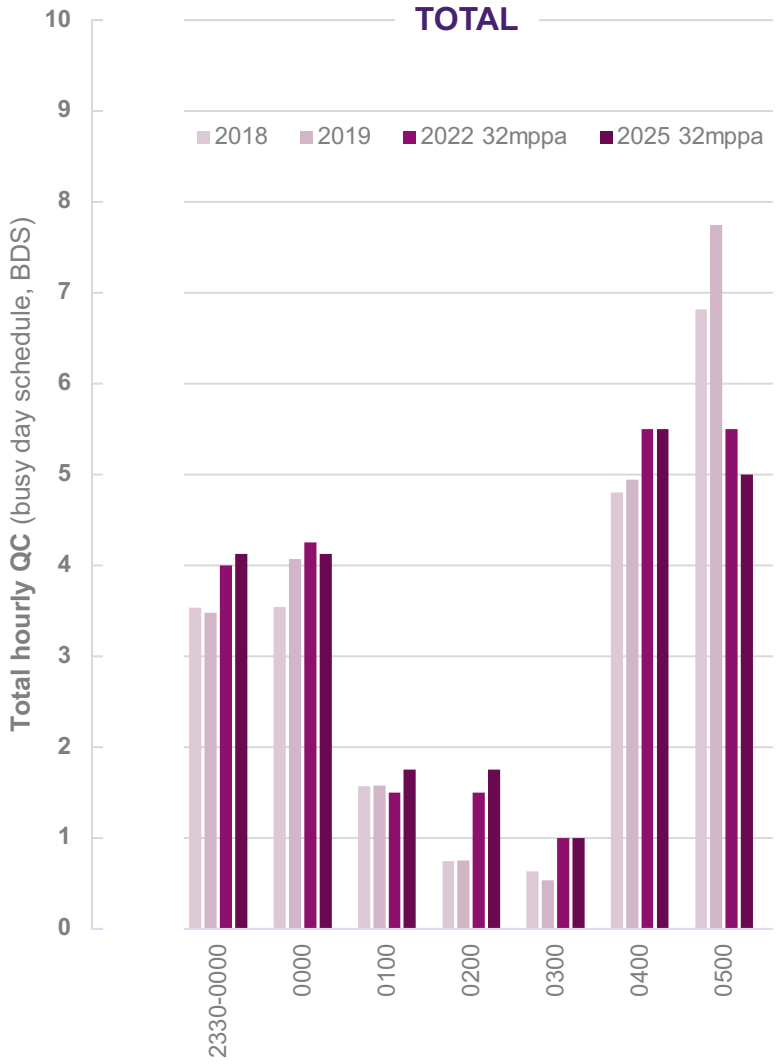
1 Determine Typical Aircraft Type QC Values - Examples

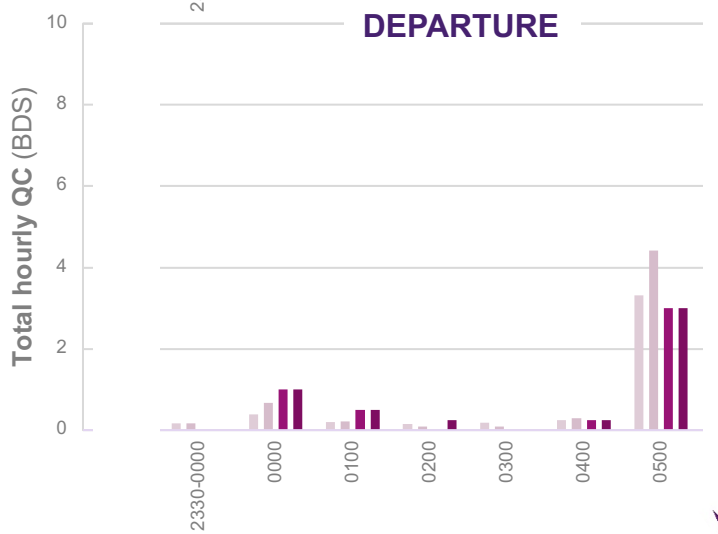
- modernisation of the fleet, replacement aircraft lower QC

Current type			Replacement type	
A320CEO		→	**A320NEO**	
Arrival:	0.25		Arrival:	0.125
Departure:	0.5		Departure:	0.25
737-800		→	**737-800 Max**	
Arrival:	0.5		Arrival:	0.25
Departure:	0.5		Departure:	0.25
A330-300		→	**A350-900**	
Arrival:	0.5		Arrival:	0.5
Departure:	2		Departure:	0.5
B767-300		→	**B787-900**	
Arrival:	1		Arrival:	0.5
Departure:	2		Departure:	1

2 Calculate NQP QC Total and QC/ATM

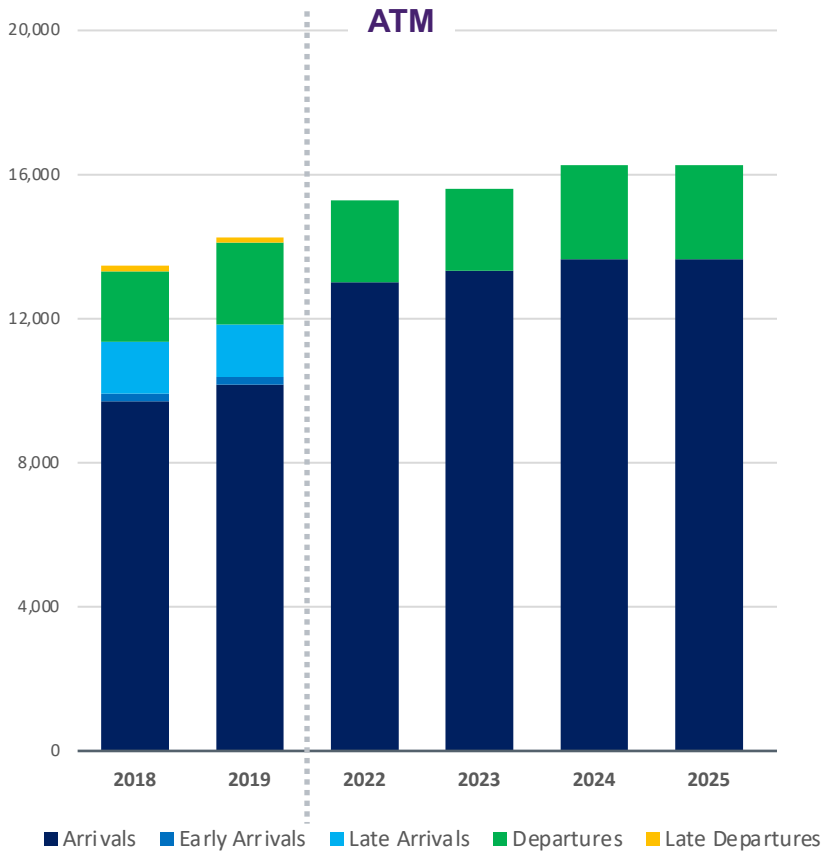
Distribution of flights across the NQP (based on busy day schedule)

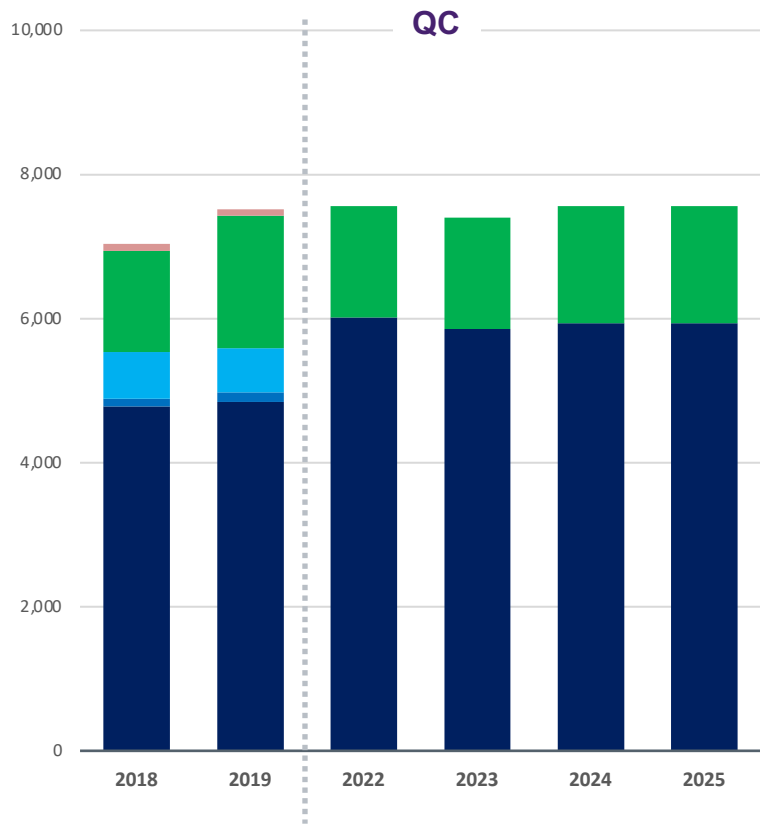




2 **Calculate NQP QC Total** and QC/ATM

Total Annual ATM and QC. Arrivals and departures.
During the NQP ~85% ATMs / 75% QC from arrivals.

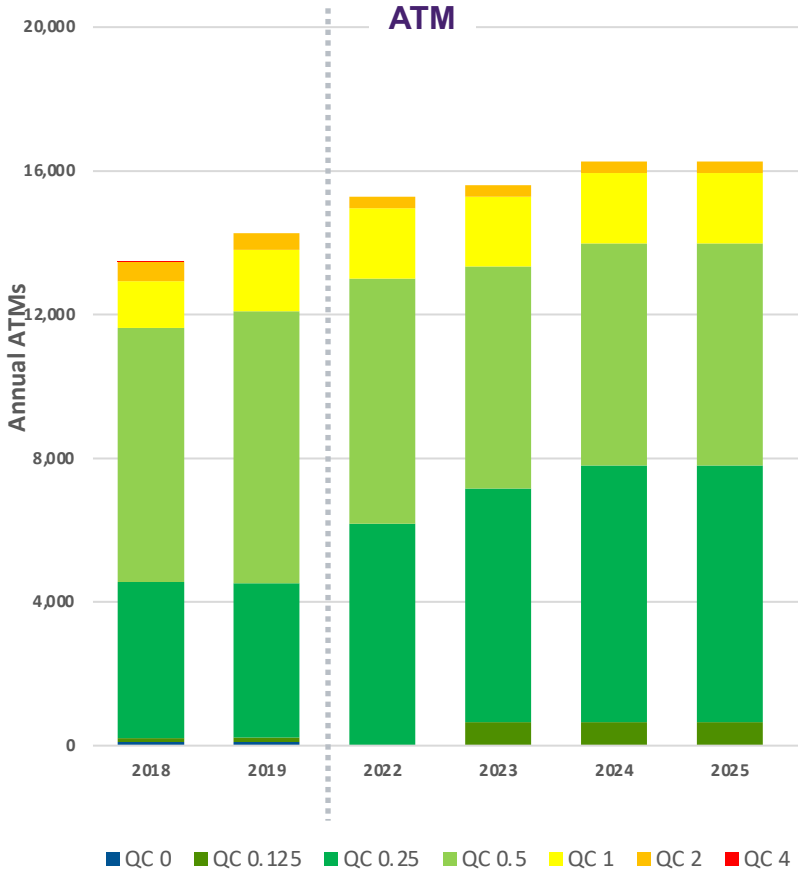


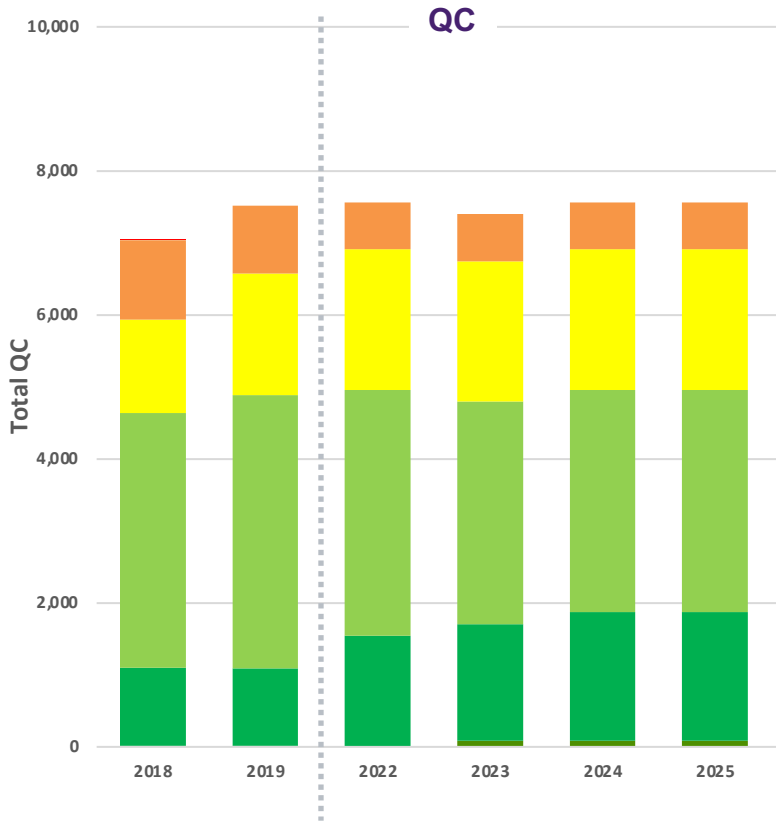


Note: Actuals contain flights not scheduled to operate during the NQP (eg late departures/arrivals and early arrivals). Forecast does not include such flights – assumes on-time operation.

2 Calculate NQP QC Total and QC/ATM

Total Annual ATM and QC. By QC Band. Increased contribution of ATMs by QC 0.125 and 0.25. 2018-2025 21% ATM increase with 7% QC increase.

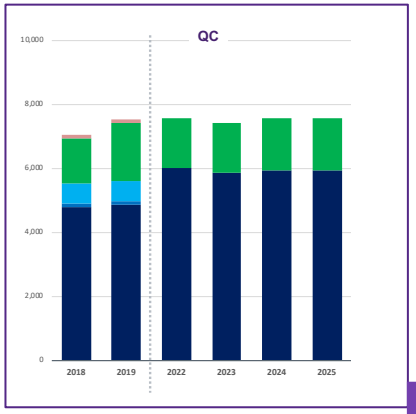


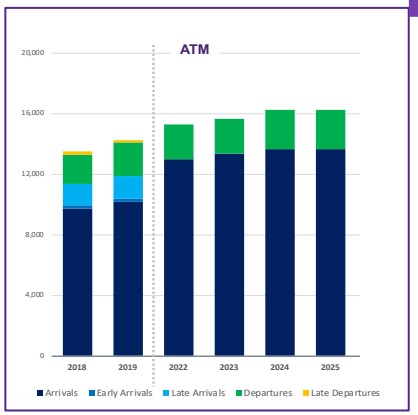


Note: Actuals contain flights not scheduled to operate during the NQP (eg late departures/arrivals and early arrivals). Forecast does not include such flights – assumes on-time operation.

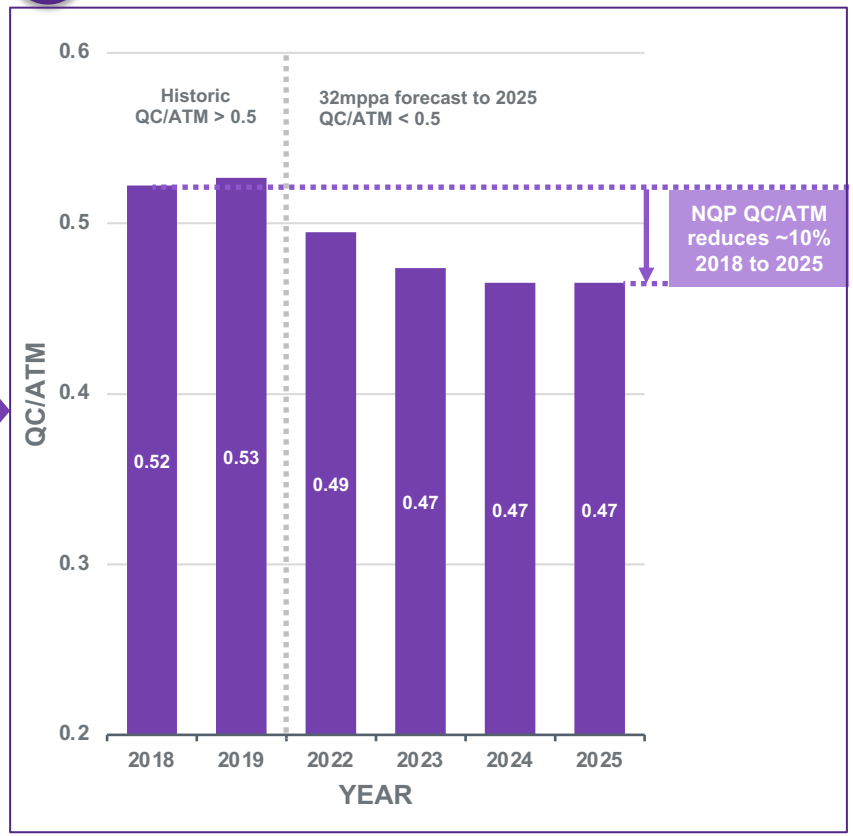
2 Calculate NQP QC Total and QC/ATM and 3 QC/ATM Target

QC/ATM forecast to reduce by 10% from 2018 (0.52) to 2025 (0.47).
QC/ATM mid-value between 2018 and 2025. Target = 0.49.





2 Calculated QC/ATM



3 QC/ATM Target

QC/ATM Target = 0.49

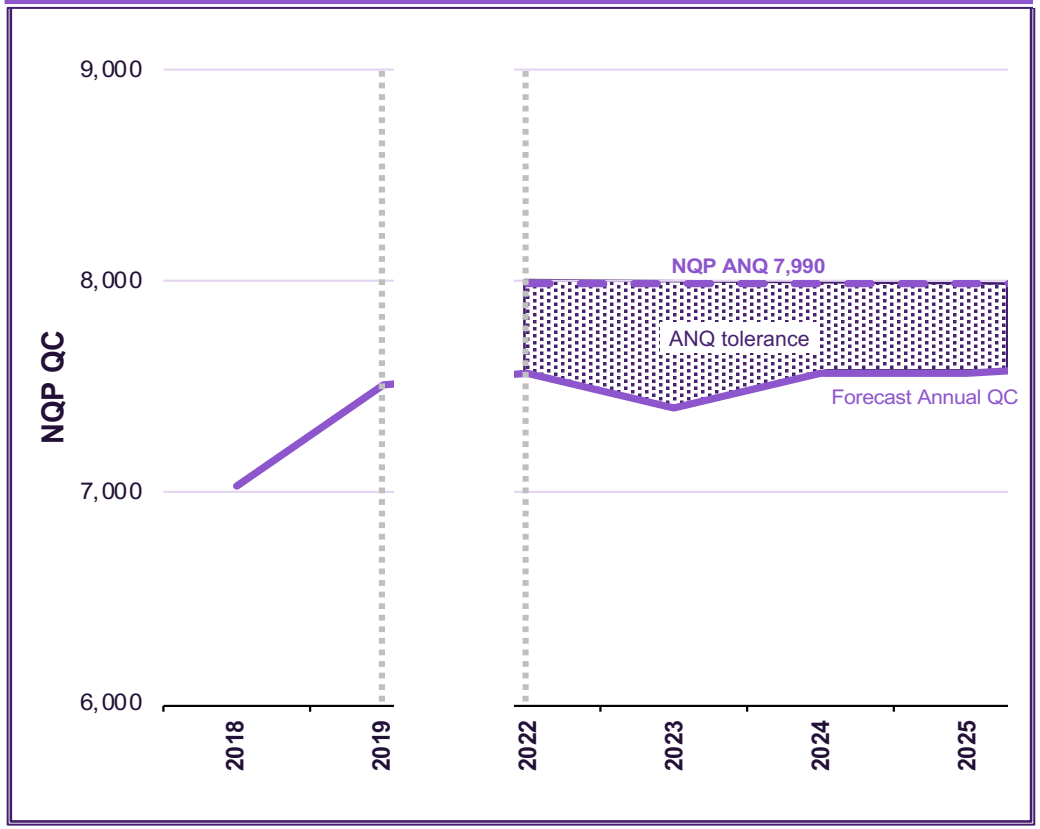
Mid-point 2018-25 and not greater than 2022

4 Calculate NQP Annual Night Quota = 7,990

There is a tolerance of ~5-7% between the forecast Quota use and the calculated ANQ based on the forecast QC/ATM and the target QC/ATM.

3 **QC/ATM Target = 0.49** (midpoint 2018-25)

4 **ANQ = 7,990** 2022-2025



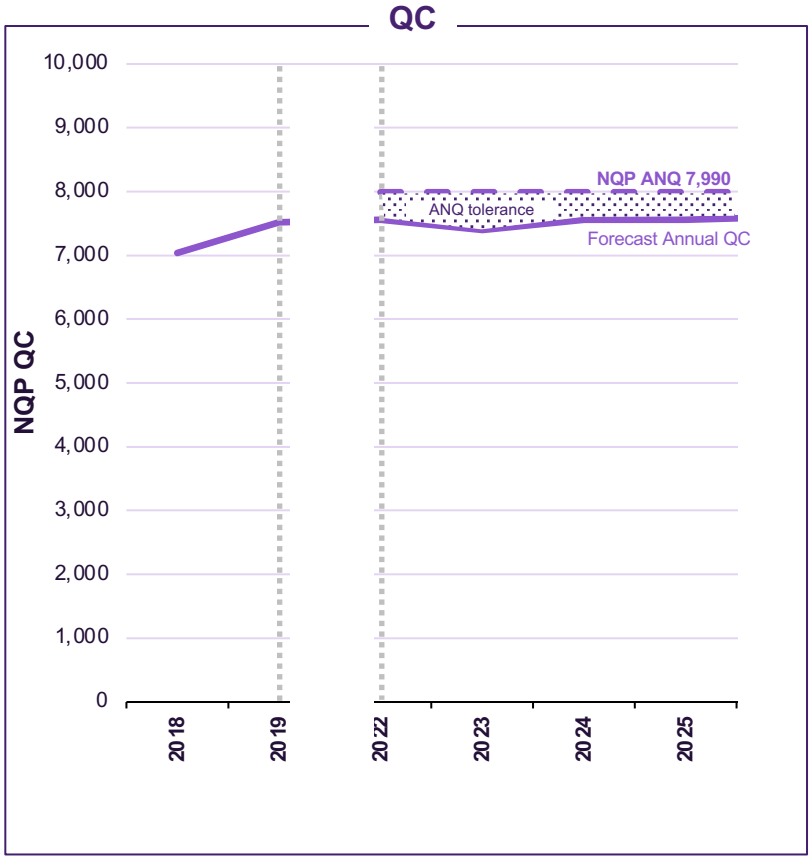
The ANQ tolerance provides an allowance of ~5% for inherent variability associated with forecasts.

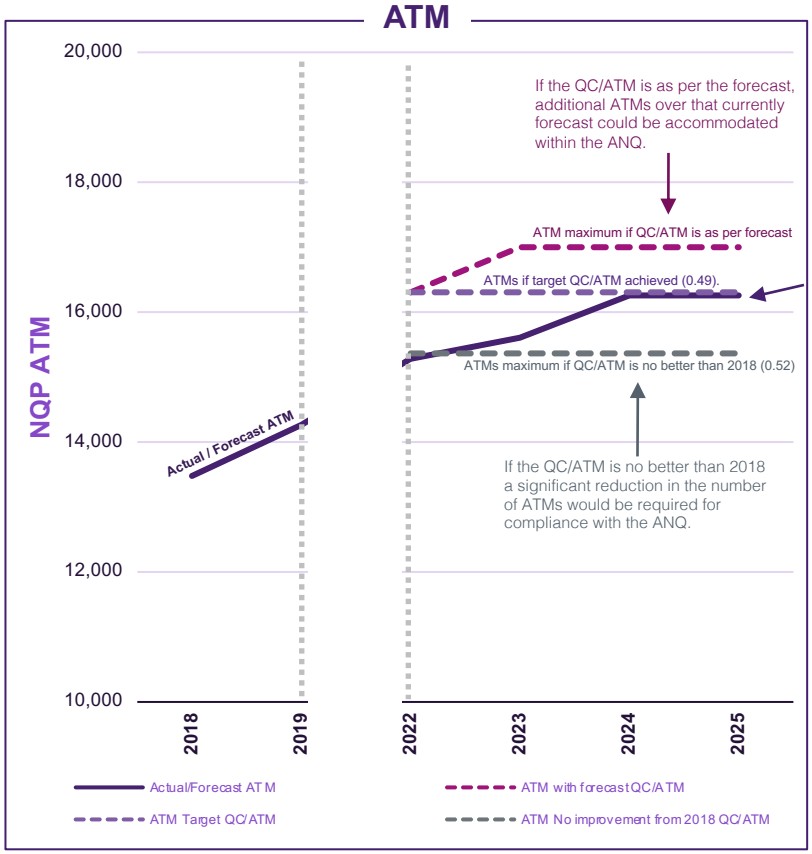
The analysis has assumed a single, typical QC value for each aircraft type. There are a range of QC values that could apply to any one type based on engines and aircraft weight. The ANQ tolerance therefore provides an allowance for some variation between the assumed QC for a flight and the QC for the aircraft that may actually operate.

The next slide provides additional information on the implications for number of ATMs if the QC/ATM is different to that used to derive the target.

NQP QC and ATM Forecast Performance. 2018-2025.

The ANQ encourages the use of quieter aircraft - more ATMs are possible for the same ANQ.
If QC/ATM does not improve relative 2018, achieving the ANQ would require a significant reduction of ATM, conversely if the QC/ATM is as per forecast then an increase in ATM is possible.

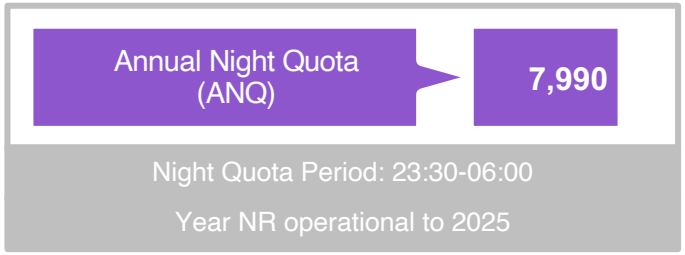




If the QC/ATM is as per the target, the fleet mix and ATMs of the forecasts could be accommodated through to 2025. There could be some capacity for more rapid growth in the early years is demand allowed.

Proposed Night Quota System. Summary.

- A **Night Quota System (NQS)** is proposed as a replacement for the movement cap. This system includes a total **Annual Night Quota (ANQ)** that would apply to scheduled and non-scheduled ATMs; and a separate one for **late flights (ANQL)** that apply to the **Night Quota Period (NQP)**.
- A proposed **NQP of 23:30 to 06:00** which is consistent with airports operating similar systems.
- A proposed **ANQ of 7,990** has been calculated for scheduled ATMs. The ANQ has been determined from a **QC value of 0.49 per ATM** derived from the midpoint of QC/ATM between 2018 and 2025 applied to the forecast ATMs in 2025. This represents a **~5% reduction in QC value per ATM from 2018**.
- The ANQ is proposed to apply through **to 2025**.



- Performance will be monitored through the annual compliance reporting process proposed as part of the application.
- The proposed change from the movement cap to a NQS will allow growth in overall air traffic movements at night to facilitate the passenger growth back to 32mppa whilst ensuring that aircraft source noise reduces per flight as a result of airlines updating the fleet operating at Dublin Airport to comprise more, quieter aircraft.
- The proposed NQS will serve to balance the effects of night noise from the forecast night-time growth, encourage the use of quieter aircraft; and will provide a layer of assurance that the overall effects of noise at night arising from the proposed changes are managed and controlled such that they will be no worse than in 2018, and less than envisaged at the time of the North Runway Planning Permission.
- As per Night Quota Systems in place at other airports (in other countries), a detailed methodology and procedures would need to be developed and implemented. This would need to include provision for late operations to balance their effects on the local community with the impacts that would arise on the network impact should they be prevented from operating.