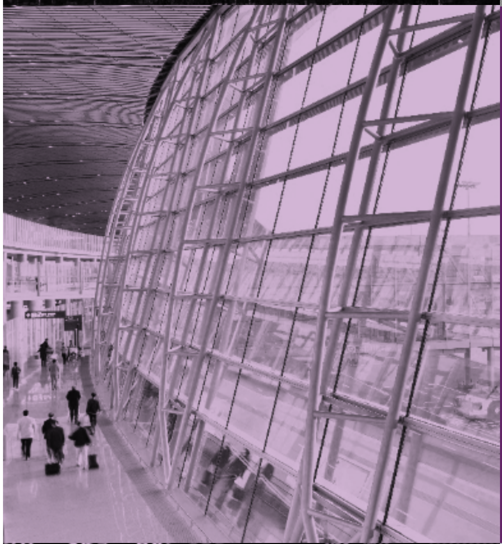
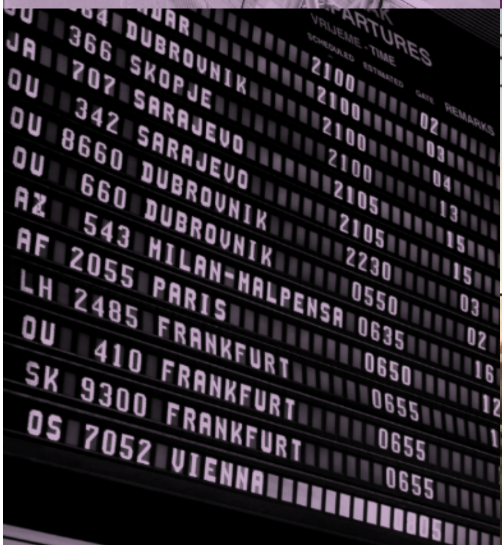


The Socio-Economic Impacts of Night Flying: Model Output Report



Department for Transport

Final Report

July 2026

York Aviation

York Aviation Contacts

Originated by:

James Brass
Partner

T. +44 (0)7767 455614
E. james.brass
@yorkaviation.co.uk

Reviewed by:

James Ager
Principal Consultant

T. +44 (0)1642 6140151
E. james.ager
@yorkaviation.co.uk

Contents

Glossary

Acronyms and Organisations

Term	Definition
ACI Europe	Airports Council International Europe, the trade association representing European airports.
ANNE	Aviation Night Noise Effects study commissioned by the Department for Transport examining the impacts of aviation noise at night.
APD	Air Passenger Duty, a UK tax levied on departing air passengers.
CAA	UK Civil Aviation Authority.
DfT	UK Department for Transport.
FSC	Full-Service Carrier. A network airline typically offering hub connectivity, transfer traffic and multiple cabin classes.
GDP	Gross Domestic Product.
GVA	Gross Value Added, a measure of economic output.
LCC	Low-Cost Carrier.
NQP	Night Quota Period. The regulated night period currently running from 23:30 to 06:00 at the designated airports.
O&D	Origin and Destination traffic. Passengers travelling between their true origin and final destination rather than transferring.
QC	Quota Count. A noise classification system applied to aircraft movements during the Night Quota Period.
TAG	Transport Analysis Guidance published by the Department for Transport.
WEIs	Wider Economic Impacts.

Policy and Regulatory Terms

Term	Definition
Designated Airports	Heathrow, Gatwick and Stansted airports, designated under Section 78 of the Civil Aviation Act 1982 for the purposes of night flight regulation.
Night Flight Regime	The system of restrictions governing night operations at the designated airports, including movement limits, noise quotas and operational rules.
Night Quota Period	The regulated night period currently running from 23:30 to 06:00 at the designated airports. This is the period that is the primary consideration in this research

Night Period	Used in noise assessment and in some local policy contexts. It is the period between 23:00 and 07:00.
Noise Contour	A geographic representation of aircraft noise exposure, typically measured using average noise metrics such as LAeq.
Slot	The right to schedule an arrival or departure at a coordinated airport at a specific time.

Airline and Operational Terms

Term	**Definition**
Aircraft Utilisation	The extent to which an aircraft is used during the day, usually measured in flying hours or rotations per day.
Airport Charges	Charges paid by airlines to airports for using airport infrastructure and services, including landing, passenger and other aeronautical charges.
Bellyhold Cargo	Freight carried in the cargo hold of passenger aircraft.
Capacity balance	The relationship between demand for airport capacity and the amount of capacity available. Where demand exceeds available capacity, access becomes scarce.
Connectivity	The availability, frequency, quality and convenience of air links between origins and destinations.
Coordination rules	The rules used by the airport coordinator to allocate slots at capacity-constrained airports.
Curfew	A restriction or prohibition on aircraft operations during specified hours.
Rotation	A sequence of flights operated by the same aircraft during a day.
Shadow cost / shadow price	The implicit economic value of scarce airport capacity. In this study, it reflects the value of a night-period movement where movement limits, noise quotas or slot availability constrain demand.
Slot release	The rules used by the airport coordinator to allocate slots at capacity-constrained airports.
Transfer Passenger	A passenger changing flights at an intermediate airport as part of a longer journey.

Freight and Logistics Terms

Term	Definition
Express Freight	Time-definite freight services providing guaranteed rapid delivery, typically overnight or next-day.
Integrator	A cargo operator providing end-to-end logistics services combining air and ground distribution, typically operating overnight hub-and-spoke networks.
Inventory Cost	The economic cost associated with holding additional stock due to delays or uncertainty in delivery.
Time-Definite Delivery	A logistics service guaranteeing delivery within a specified timeframe.

Economic and Appraisal Terms

Term	Definition
Consumer Surplus	The difference between what users are willing to pay and what they actually pay.
Elasticity	A measure of how sensitive demand or another variable is to changes in price, time, connectivity or cost.
Generalised Cost	The combined monetary value of fares, travel time, reliability and inconvenience associated with a journey or shipment.
Producer Surplus	The economic surplus earned by producers such as airlines and airports.
Rule of Half	A standard transport appraisal method used to estimate the welfare impact of a change in generalised cost. It assumes that existing users experience the full change in cost, while new or lost users experience, on average, half of that change.
Social Welfare	The total economic benefit to society, including user, producer and government effects.
Transport Economic Efficiency (TEE)	TAG appraisal of user and producer welfare impacts within the transport market.
Wider Economic Impacts	Economic effects beyond direct transport-user benefits, including productivity, trade and labour-market impacts.

Executive Summary

1. This study assesses the economic impacts of changes to the night flight regime at the three designated London airports: Heathrow, Gatwick and Stansted.

2. Using a bespoke modelling framework, the analysis captures how changes to the night flight regime affect:

- passenger volumes, cargo throughput and aircraft movements;
- socio-economic welfare, including impacts on passengers, cargo users, producers and government; and
- wider economic impacts, including productivity and connectivity effects.

3. A key finding of the analysis is that **night flying plays a disproportionately important economic role relative to its scale**, supporting time-sensitive passenger travel, global connectivity and overnight freight operations.

Headline Findings

4. The results show a clear and consistent pattern across all scenarios:

- Tightening the night flight regime (for example through lower movement limits, lower noise quotas, longer night periods, or restricting the type of aircraft able to operate overnight) leads to material economic losses, increasing rapidly as constraints become more binding;

- Relaxation of the night flight regime (for example through higher movement limits, higher noise quotas or shorter night periods allowing additional overnight operations) generates only modest economic gains, reflecting the constrained nature of the aviation system in London more generally; and

- Impacts are highly asymmetric, with losses from tightening of the regime significantly exceeding gains from relaxation.

5. Consistent with aviation appraisal practice, the model produces welfare estimates both for all passengers using the airports and separately for UK passengers only. Unless otherwise stated, the headline welfare figures presented in this report relate to all passengers, including international transfer and foreign-origin passengers, reflecting the role of the designated airports within global aviation markets. UK-passenger-only welfare estimates are also reported separately to support comparison with Green Book and TAG-focused appraisal approaches.

6. Under a full curfew scenario, where no scheduled flights are permitted during the regulated night period at the designated airports (Scenario 1), total impacts over a 10 year period are estimated at:

- **-£11.7 billion** in socio-economic welfare (-£9.0 billion if limited to UK passengers only); and
- **-£26.5 billion to -£40.1 billion** in wider economic impacts.

7. By contrast, removing restrictions entirely results in:

- a welfare gain of approximately **£0.6 billion** (£0.4 billion if limited to UK passengers only); and
- wider impacts of around **£1.9 billion to £2.7 billion**.

8. It should be noted that socio-economic welfare changes and wider economic impacts are not added together to give a combined estimate of the impact of night flying. This is consistent with Transport Analysis Guidance. The two metrics provide a different perspective on the impacts of night flying.

Drivers of Impact

9. These results are driven by three key features of the aviation system:

1. Concentration of value in specific time periods

10. Economic value is not evenly distributed across the day. Instead, it is concentrated in:

- early-morning arrivals supporting connectivity and business travel;
- late-evening and early-morning operations supporting aircraft utilisation; and
- overnight freight cycles underpinning next-day delivery.

11. Changes to the night flight regime during these periods therefore have disproportionate impacts.

2. Structural dependence of key segments

12. Certain user groups and business models are particularly sensitive to night flying:

- business and transfer passengers rely on early arrivals and connections;
- express freight depends on tightly coordinated overnight logistics; and
- low-cost and charter airlines rely on extended operating days.

13. Where these activities are disrupted, the resulting losses cannot be fully offset through retiming or diversion.

3. Capacity constraints limit upside

14. The relatively modest gains observed under scenarios where the night flight regime is relaxed reflect:

- limited runway capacity at Heathrow and Gatwick;
- the structure of airline schedules and fleet utilisation; and
- constrained baseline growth assumptions within the DfT Aviation Forecasts.

15. As a result, even where the night flight regime is relaxed, there is limited scope to accommodate additional activity within the system.

Differences Across Airports

16. The impacts of changes to the night flight regime vary significantly across the three designated airports:

- **Heathrow** is most sensitive to changes affecting early-morning arrivals and long-haul connectivity;

- **Gatwick** shows smaller impacts, reflecting its more varied, point-to-point model and future capacity expansion;

- **Stansted** is consistently the most affected, driven by its role in low-cost operations and express freight.

Role of Freight

17. Freight plays a critical role in the overall economic impact:

- while smaller in absolute terms than passenger impacts, it is highly sensitive to timing;
- express freight in particular depends on overnight operations; and
- disruption to these flows can have wider implications for supply chains and economic activity.

Wider Economic Impacts

18. The analysis indicates that changes to night flying may also have broader implications for productivity and economic performance.

19. These wider impacts:

- are **material in scale**, particularly under restrictive scenarios;
- reinforce the direction of the core welfare results; and
- highlight the importance of aviation in supporting connectivity and economic activity.

20. However, they are presented separately from welfare impacts to avoid double counting and should be interpreted as indicative ranges rather than precise estimates.

Overall Conclusion

21. The analysis demonstrates that the existing pattern of night flying supports economically important activity that is highly concentrated, time-sensitive and structurally embedded within the aviation system.

22. As a result:

- Increased restrictions on night flying can lead to significant economic losses, particularly where they affect key operational windows; and

- the scope for generating additional benefits through relaxation is limited, due to broader system constraints.

- These findings underline the importance of considering not only the scale of night flying, but its functional role within the wider aviation system, when assessing policy options.

1. Introduction

Background and Context

1.1 The regulation of night flying at the designated London airports—Heathrow, Gatwick and Stansted—has long reflected the need to balance the **socio-economic benefits of aviation activity** with the **environmental and distributional impacts**, particularly those associated with aircraft noise during sensitive night-time periods.

1.2 The night flight regime consists of:

- Limits on the number of aircraft movements;
- Noise quotas governing the types of aircraft that may operate; and
- Defined night periods within which these constraints apply.

1.3 These controls are intended to mitigate the impacts of noise on local communities, while still allowing a level of night-time operation necessary to support the functioning of the aviation system.

1.4 At the same time, night flying plays a distinct and important role within that system. In particular, it enables:

- Early-morning arrivals that support business travel and hub connectivity;
- Late-evening departures that maximise aircraft utilisation; and
- Overnight freight operations, including express and time-critical logistics.

1.5 As a result, changes to the night flight regime have the potential to affect not only the volume of aviation activity, but also its **timing, structure and social and economic value**.

1.6 This report presents the scenario modelling results of detailed research into the social and economic value of night flying. It is supported by two earlier reports that provide additional detail on the existing evidence base around the socio-economic effects of night flying and the overall methodological framework through which these effects have been considered:

- The Socio-Economic Impacts of Night Flying: Literature Review (the Literature Review);
- The Socio-Economic Impacts of Night Flying: Methodology Report (the Methodology Report).

Purpose of the Study

1.7 The purpose of this study is to assess the **socio-economic implications of changes to the night flight regime**, with a particular focus on the role that night operations play in generating value for passengers, cargo users, airlines and the wider economy.

1.8 To achieve this, a bespoke modelling framework, as set out in the accompanying Methodology Report, has been developed to:

- Represent the behavioural responses of airlines, airports, passengers and freight users to changes in the night flight regime;
- Capture the resulting changes in aviation activity, including passenger volumes, cargo flows and aircraft movements; and
- Quantify the associated **socio-economic welfare impacts**, expressed in monetised terms.

1.9 The analysis also considers **wider economic impacts**, including productivity and connectivity effects, recognising that aviation activity can influence economic performance beyond direct user and producer (e.g. airlines and airports) impacts.

1.10 It is important to emphasise that this research is not intended to consider the environmental impacts of night flying. These impacts and the costs associated with them are the subject of separate research, notably the Aircraft Night Noise Effects Study (ANNE) and the Aviation Noise Attitudes Survey (ANAS).

Scope of Analysis

1.11 The analysis focuses on the three designated London airports:

- Heathrow;
- Gatwick; and
- Stansted.

1.12 These airports perform distinct roles within the UK aviation system and are subject to differing operational constraints, airline business models and traffic compositions. As such, the impacts of changes to the night flight regime are expected to vary across them, and the analysis reflects these differences explicitly.

1.13 The study considers a range of **illustrative policy scenarios**, spanning both more restrictive and less restrictive regimes, in order to understand:

- The sensitivity of economic outcomes to changes in key policy levers; and
- The extent to which impacts scale with the severity of restrictions.
- Results are presented in terms of:
- Market impacts (passengers, cargo and movements);
- Socio-economic welfare impacts (passengers, cargo users, producers and government); and
- Wider economic impacts (presented separately as indicative ranges).

1.14 The model developed through this process is owned by the Department for Transport and this can be used to test further policy scenarios in the future.

Approach and Methodological Considerations

1.15 The modelling approach is grounded in standard economic appraisal principles, with a focus on **changes in generalised cost and resulting welfare effects**. The model captures how changes to the night flight regime affect:

- The timing and availability of services;
- The behaviour of passengers and cargo users; and
- The operational decisions of airlines.

1.16 These behavioural responses determine the extent to which activity is:

- Retimed;
- Diverted; or
- Lost altogether.

1.17 A key feature of the approach is its explicit representation of **existing capacity constraints within the aviation system**, particularly at Heathrow and, in the short term, Gatwick. The baseline forecasts used within the model are derived from the Department for Transport's Aviation Model which incorporate these constraints. This ensures that the results reflect the reality that the system is, in many cases, already operating close to capacity, particularly during peak daytime periods.

1.18 Consistent with aviation appraisal practice, the model produces welfare estimates both for all passengers using the airports and separately for UK passengers only. Unless otherwise stated, the headline welfare figures presented in this report relate to all passengers, including international transfer and foreign-origin passengers, reflecting the role of the designated airports within global aviation markets. UK-passenger-only welfare estimates are also reported separately to support comparison with Green Book and TAG-focused appraisal approaches.

Important Caveat on Model Application

1.19 It is important to note that the modelling framework developed for this study has been **specifically designed to assess the socio-economic effects of night flying**.

1.20 In particular, the model focuses on:

- The role of night operations in supporting time-sensitive connectivity;
- The interaction between night flying and aircraft utilisation;
- The dependence of freight and certain passenger segments on overnight activity; and
- The constraints imposed by the existing airport capacity environment.

1.21 While the underlying principles of the model—such as the treatment of generalised cost and behavioural response—are consistent with broader transport appraisal practice, such as the Department for Transport's Transport Analysis Guidance (TAG), the calibration and structure of the model are tailored to the specific characteristics of night flying.

1.22 As a result, while it may be possible to draw insights from this analysis in other contexts, **care should be taken in transferring or applying the results directly**. In particular:

- The relative importance of timing effects may differ in other markets;
- Capacity constraints may operate differently outside the London airport system; and
- The role of freight and overnight operations may not be comparable.

1.23 Any such application should therefore be undertaken with appropriate caution and, where necessary, supported by additional analysis.

Structure of the Report

1.24 The remainder of this report is structured as follows:

- Section 2 reviews current night flying activity at the designated airports, including movements, passenger volumes and cargo flows;
- Section 3 summarises the findings of the literature review on the economic role of night flying and aviation connectivity;
- Section 4 sets out the methodological framework and modelling approach;
- Section 5 defines the illustrative policy scenarios tested; and
- Section 6 presents the results, including market impacts, socio-economic welfare impacts and wider economic impacts.

2. Night Flying at the Designated Airports Currently

Introduction

2.1 This section provides an overview of current night flying activity at the three designated London airports—Heathrow, Gatwick and Stansted—and the policy framework within which it operates.

2.2 Understanding the **existing pattern of operations** is critical to interpreting the results of the modelling presented later in this report. Night flying represents a relatively small share of total aviation activity in volume terms, but plays a **disproportionately important role** in supporting:

- Time-sensitive passenger journeys, particularly early-morning arrivals;
- Aircraft utilisation across airline fleets; and
- Overnight freight and logistics operations.

2.3 The current night flight regime therefore shapes not only the level of activity, but also its **timing, structure and economic value**.

2.4 This section first summarises the key features of the existing policy framework. It then examines the current distribution of night flights across the three airports, including movements, passenger volumes and cargo flows, highlighting the different operational roles played by each airport.

2.5 The section draws from a number of sources of data to provide a picture of night flying activity in the UK:

- OAG Schedules Data;
- CAA Statistics;
- Airport Operational Data.

Current Night Flight Policy Framework

2.6 Night flying at Heathrow, Gatwick and Stansted is governed by a set of measures established by the Department for Transport. These are designed to balance the economic benefits of aviation activity with the need to mitigate noise impacts during sensitive night-time periods.

2.7 The framework comprises three principal elements:

- A defined **Night Quota Period (NQP)**, typically covering the core night hours (23:30-06:00);
- Limits on the **number of aircraft movements** permitted during this period (the movement limit); and
- A **noise quota system**, which assigns quota counts (QCs) to aircraft based on their noise performance and caps the total noise permitted (the quota limit).

2.8 In addition to the NQP, **shoulder periods** apply immediately before and after the core night period, within which additional restrictions are imposed on the noisiest aircraft types.

2.9 These controls operate together to:

- Limit the number of flights and overall noise (through the QC limit);
- Influence the mix of aircraft types; and

- Shape the timing of operations within the 24-hour schedule.

2.10 While the framework is common across the three airports, the specific limits and operational impacts differ, reflecting their distinct roles within the aviation system.

2.11 **Table 2.1** below summarises the limits that have been set for the three airports for each of the six operating seasons between October 2025 and October 2028.

Table 2.1 – Designated Airport Movement and Noise Quote Limits (October 2025 to October 2028)

Airport	Season	Movement Limit	Noise Quota Limit
Heathrow	Winter	2,550	2,415
	Summer	3,250	2,735
Gatwick	Winter	3,250	1,785
	Summer	11,200	5,150
Stansted	Winter	5,600	3,310
	Summer	8,100	4,650

2.12 In addition to the night flight regime set by the Department for Transport, Stansted Airport is also subject to local planning controls that constrain the noise impacts of its operations. Under the previous planning framework, associated with permission to operate up to 35 million passengers per annum, the airport was already subject to a daytime noise contour limit, based on the 57 dB LAeq,16h contour. The subsequent 2021 permission, which allowed passenger throughput to increase to 43 million passengers per annum while retaining the existing 274,000 annual aircraft movement limit, introduced an additional noise contour control for the full 23:00–07:00 night period, based on the 48 dB LAeq,8h contour. However, this additional night-time contour control is linked to the airport reaching 35 million passengers per annum and is not expected to become binding until that threshold is passed. The more recent 2025/26 permission for application UTT/25/1542/FUL, which allows passenger throughput to increase to up to 51 million passengers per annum while retaining the existing annual movement limit, carries forward this local noise contour control framework.

2.13 These local planning controls are important because they constrain the spatial extent of aircraft noise exposure alongside the national movement and quota-count limits. In particular, the inclusion of a night-time contour condition means that Stansted's future growth is constrained not only by the number of aircraft movements and their quota count classification, but also by the overall noise footprint generated across the 23:00–07:00 night period. This provides an additional local noise control alongside the DfT night flight regime. In practice, any further growth in passenger throughput must therefore be accommodated within fixed aircraft movement and noise-contour constraints, principally through quieter aircraft, improved load factors, operational efficiencies and the distribution of movements across the operating day and night.

Current Patterns of Night Flying Activity

2.14 Night flying activity across Heathrow, Gatwick and Stansted exhibits a clear and deliberate structure, reflecting the way in which airlines and logistics operators have adapted to both the constraints of the current policy regime and the operational requirements of the wider aviation system.

2.15 While night flights account for only a relatively small proportion of total daily movements, typically between 1.2% and 6.5%, their distribution through the night is far from uniform. Instead, activity is concentrated in specific windows where it delivers the greatest operational and economic value. These windows differ across airports, but in each case reflect a combination of airline scheduling needs, passenger demand characteristics and, critically, the requirements of freight and logistics operations.

2.16 At a system level, three distinct patterns can be observed. At Heathrow, activity is heavily concentrated in the early morning, reflecting the importance of long-haul arrivals timed to connect into the daytime network. At Stansted, activity is more evenly split between late evening and early morning periods, driven by both low-cost carrier utilisation and overnight freight operations. Gatwick sits between these two models, with a more distributed pattern of activity throughout the night reflecting its mixed portfolio of short-haul and long-haul services.

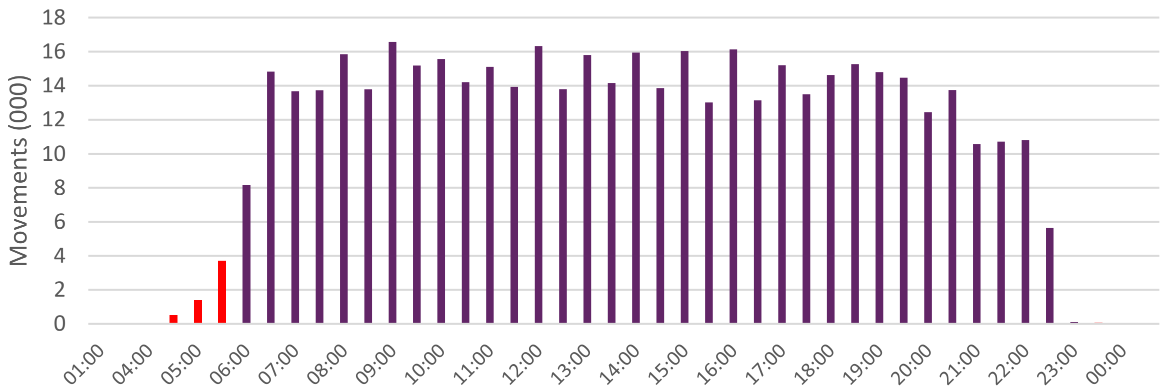
2.17 These patterns are not incidental. They represent the outcome of a system that is already highly optimised within existing constraints, with night capacity being used selectively to support those elements of the schedule that derive the greatest benefit from operating outside the daytime peak.

Heathrow

2.18 At Heathrow, the structure of night flying is closely aligned with its role as the UK's primary long-haul hub. Activity during the night period is dominated by early-morning arrivals, primarily from intercontinental routes. These arrivals are carefully timed to feed into the first wave of daytime departures, enabling onward connections across the global network.

2.19 **Figure 2.1** also shows the number of ATMs operated in the night quota period relative to the day period, in red. In total, 5,694 aircraft operated in the night quota period in 2024, equating to 1.2% of the total annual movements. It should be noted that Heathrow has a voluntary ban in place that prevents flights scheduled between 04:30 and 06:00 landing before 04:30.

Figure 2.1 – Heathrow Airport Aircraft Movements split into 30 minute time bands (night quota period in red) - 2024



Source: Heathrow Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

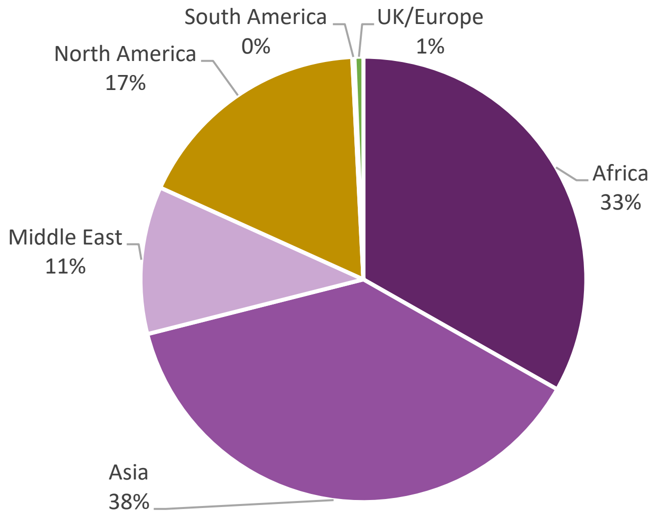
2.20 Although the absolute number of night movements at Heathrow is relatively limited, their functional importance is significant. Early arrivals allow passengers to connect onto short-haul European services or domestic flights, facilitating same-day business travel and supporting the overall connectivity of the hub. At the same time, these flights carry substantial volumes of bellyhold cargo, much of which is time-sensitive and dependent on rapid onward distribution. Airline stakeholders, as part of consultations for this research, identified the central importance of these dynamics at Heathrow for their operations.

2.21 Night Quota ATMs at Heathrow in 2024 had a distinct profile as follows:

- Nearly all of the movements (99.5%) were passenger movements.

- 99% of the movements in the night quota period operated in the early morning hours (04:00 to 06:00), with very few flights operating in the late evening period beyond 23:30.
- 5,628 (99%) of these flights were arriving into Heathrow. **Figure 2.2** below shows the origin of these arriving flights:
  - 38% of these flights originated in Asia, with Africa providing the origin for 33%.
  - The top three cities of origin were Johannesburg, Singapore and Hong Kong, contributing 31% of all early morning arrivals before 06:00.

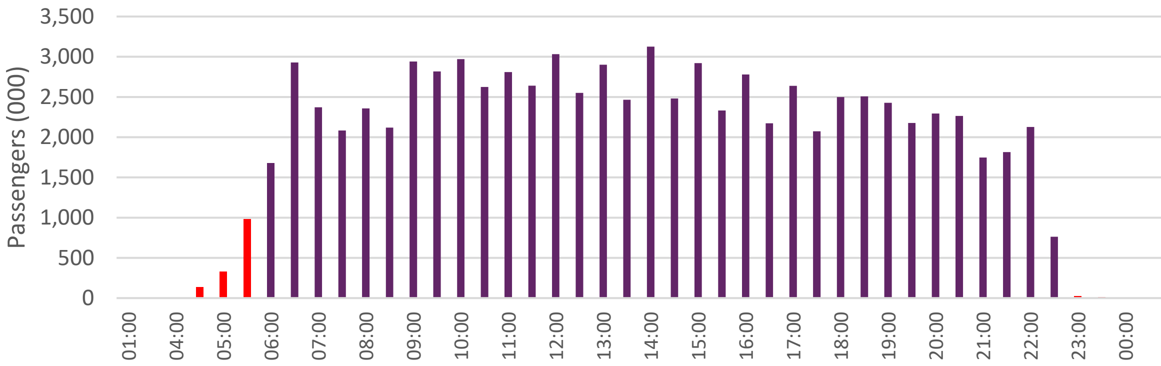
Figure 2.2 – Heathrow Airport – Origin of Early Morning Arrivals before 06:00 – 2024 ATMs



Source: Heathrow Airport AODB, CAA Statistics and OAG.

2.22 Figure 2.3 shows the distribution of passenger volumes at Heathrow across the day, presented in 30-minute time bands. The profile closely mirrors that of aircraft movements, with a relatively steady flow of passengers throughout the daytime period and only a modest tapering in activity into the late evening. What is immediately apparent, however, is the **sharp concentration of activity immediately after the night quota period**, with passenger volumes rising rapidly from the early morning onwards.

Figure 2.3 – Heathrow Airport Passenger Volumes split into 30 minute time bands (night quota period in red) - 2024

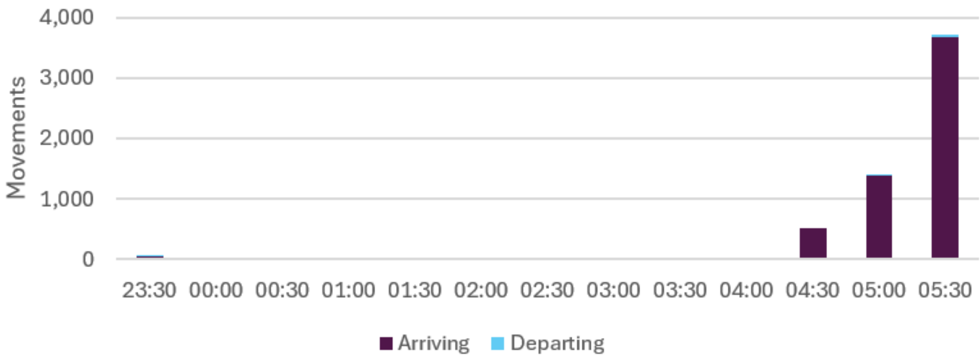


Source: Heathrow Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.23 This pattern reflects the role of Heathrow as a long-haul hub. While total passenger throughput reached approximately **83.9 million passengers in 2024**, only a small proportion of this activity occurs within the night quota period itself. Passenger volumes between 23:30 and 06:00 amounted to around **1.46 million passengers**, equivalent to approximately **1.7% of total annual passengers**. This underlines the relatively limited scale of night activity in volume terms.

2.24 However, the distribution of these passengers within the night period is highly skewed. As with aircraft movements, almost all passenger traffic during this period is associated with **arrivals in the early morning window between 04:00 and 06:00**, with very little departure activity. In effect, the night period at Heathrow is not characterised by continuous activity, but by a **focused arrival wave**, which feeds directly into the daytime schedule, as shown in Figure 2.4.

Figure 2.4 – Aircraft Movements in the NQP at Heathrow – by 30 Minute Time Band - 2024



Source: Gatwick Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

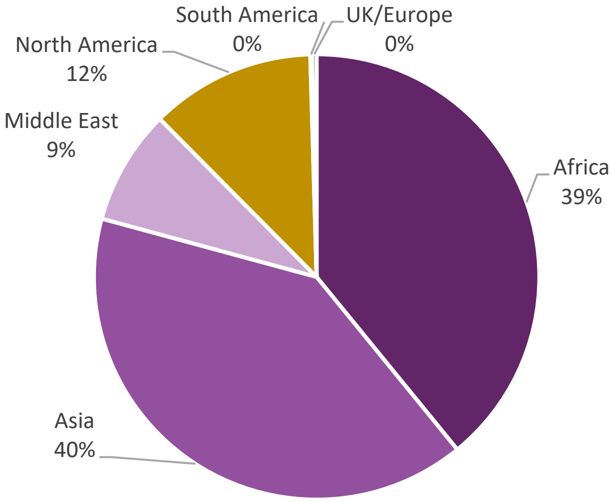
2.25 The importance of these early-morning arrivals is further illustrated in Figure 2.4, which shows the geographic origin of passengers arriving before 06:00. The distribution is heavily weighted towards **long-haul markets**, with Asia accounting for approximately **40%** of passengers and Africa a further **39%**. North America and the Middle East make smaller but still material contributions, while there is negligible short-haul or European activity in this window.

2.26 This pattern reflects the underlying economics and geography of long-haul aviation. Flights from Asia and parts of Africa are typically scheduled to depart in the late evening local time, arriving into Heathrow in the early morning. These timings are driven by a combination of passenger preference, aircraft utilisation and network connectivity. In particular, early arrivals into Heathrow allow passengers to connect onto the first wave of European and domestic departures by providing a sufficient connecting to time to maximise connectivity, while also enabling same-day business travel into London. This pattern of activity is strongly supported by evidence from the airline stakeholders consulted as part of the research.

2.27 As a result, the value of these flights is not determined simply by the number of passengers carried, but by their **position within the wider network**. Early-morning arrivals support a much larger system of onward connections and downstream economic activity because of their positioning at the very beginning of the day and particularly with a broad connection window before the first outbound wave. They also carry significant volumes of bellyhold cargo, much of which is time-sensitive and aligned with the same overnight logistics cycles.

2.28 Taken together, the evidence from Figures 2.3 and 2.5 highlights a key feature of Heathrow's night operations: a relatively small volume of highly concentrated activity supports a disproportionately large share of connectivity and economic value. This concentration of economically important, time-sensitive arrivals reflects several overlapping characteristics of Heathrow's overnight operation. The flights concerned are predominantly long-haul services, many carrying relatively high proportions of business and transfer passengers, alongside significant volumes of bellyhold freight. Evidence from airline yield data and stakeholder engagement also suggests that these early morning arrivals tend to generate higher average passenger yields than many other parts of the schedule, reflecting both their long-haul nature and their role in supporting same-day business travel and onward connectivity. Taken together, these characteristics help explain why a relatively small number of overnight movements can support a disproportionately large share of wider economic and connectivity value.

Figure 2.5– Heathrow Airport – Origin of Early Morning Arrivals before 06:00 – 2024 Passengers



Source: Heathrow Airport, CAA Statistics and OAG.

2.29 Cargo activity at Heathrow is substantial in absolute terms, with a total of **1.58 million tonnes handled in 2024**. Only a relatively small proportion of this activity occurs during the night quota period, with approximately **47,000 tonnes** passing through between 23:30 and 06:00, equivalent to around **3.0% of total annual cargo**. While this share is modest in volume terms, it is notably higher than the proportion of aircraft movements operating in the night period (approximately 1.2%), indicating that **night flights carry a disproportionately large share of cargo relative to their frequency**.

2.30 This reflects the close alignment between cargo flows and the structure of long-haul passenger operations. Heathrow functions primarily as a bellyhold cargo hub, with approximately **94.7% of all cargo carried in passenger aircraft** across the full day. Within the night quota period, this reliance becomes even more pronounced, with **almost all cargo (around 99.6%) transported in the bellyhold of passenger flights**. This highlights the extent to which cargo activity at Heathrow is dependent on the timing and structure of passenger services, particularly long-haul arrivals.

2.31 As with passenger traffic, cargo flows within the night period are highly concentrated in the **early-morning arrival window between 04:00 and 06:00**. These flights form part of a coordinated overnight cycle, linking production and distribution centres in long-haul markets with early-morning access to the UK and onward European markets. The timing of these arrivals is critical, enabling cargo to be processed and distributed within the same day.

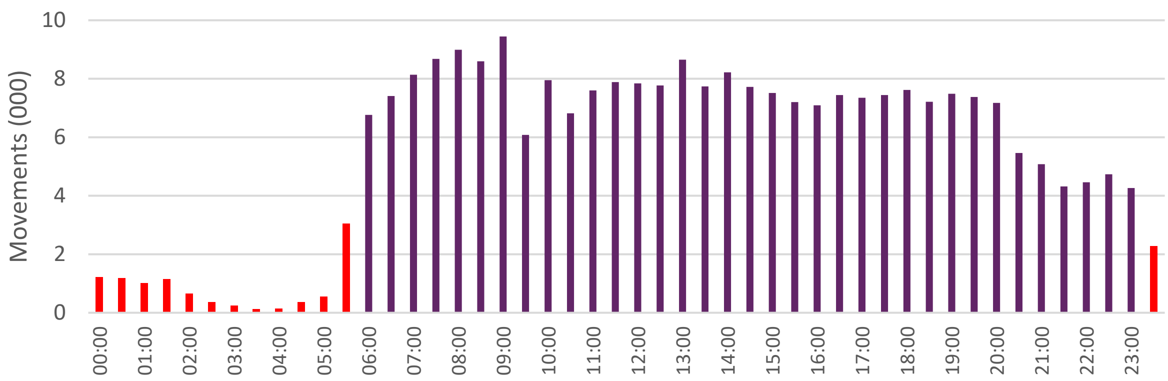
2.32 The geographic distribution of these flows reinforces this pattern. A significant majority of early-morning inbound services originate from **Asia and Africa**, with these regions accounting for approximately **71% of arrivals in the 04:00–06:00 window**. Their importance is even more pronounced when measured in terms of cargo carried, with these flights accounting for around 82% of inbound cargo volumes during this period. This reflects the long-haul nature of these markets, the cargo capacity available on the aircraft types used, and evidence from airline stakeholders that the cargo carried on these services tends to be higher-yielding and more time-sensitive than cargo carried at other points in the day. While cargo is not assumed to be the sole driver of scheduling decisions, it is an important contributor to the economic value of these early-morning arrivals.

2.33 Taken together, these patterns demonstrate that, as with passengers, the economic importance of night operations for cargo is not determined simply by the volume handled during the night period. Rather, it reflects the role of these flights within a **time-critical logistics chain**, where early-morning arrivals are essential to maintaining reliability and speed of delivery. The concentration of cargo within a small number of strategically timed flights means that **relatively small changes in the availability or timing of night operations can have disproportionate effects on overall cargo performance**.

Gatwick Airport

2.34 Figure 2.6 illustrates the distribution of aircraft movements at Gatwick across the day. The profile shows a relatively even spread of activity throughout daylight hours, with movements remaining consistently high before tapering off in the late evening. Unlike Heathrow, there is less evidence of a sharply defined early morning arrival wave – around 90% of the 3,054 NQP flights between 05:30 at 06:00 are departures, primarily by easyJet - reflecting Gatwick's more point-to-point operating model. The profile of flying during the course of the day between summer and winter flying at Gatwick is broadly consistent, with one notable exception. There is significantly less flying in the NQP – about 2.0% of flying in Winter takes place in the NQP, compared to 5.5% in the summer. The strong early morning departure wave out of Gatwick remains throughout the year, and then the number of movements remains consistently robust for the remainder of the day until around 20:00 when movement numbers taper off.

Figure 2.6 – Gatwick Airport Aircraft Movements split into 30 minute time bands (night quota period in red) - 2024

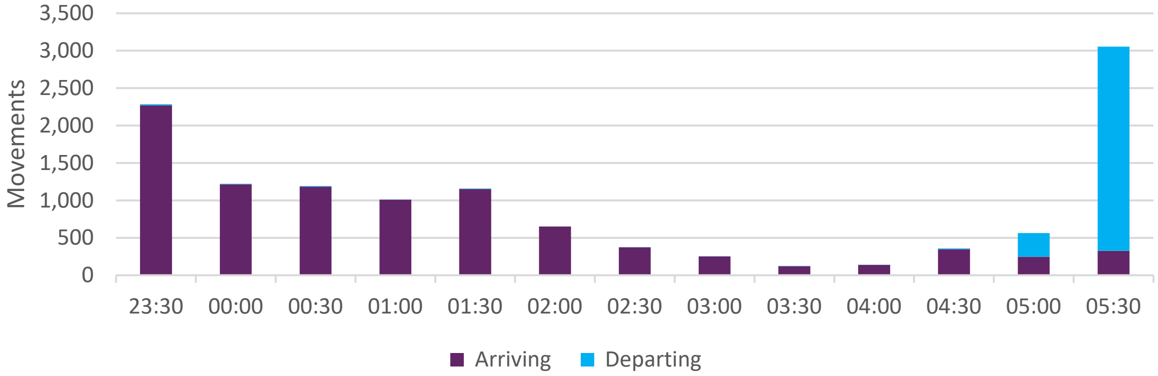


Source: Gatwick Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.35 In total, Gatwick handled approximately **264,000 aircraft movements in 2024**, of which **12,386 occurred within the night quota period**, equivalent to around **4.7% of annual movements**. This proportion is notably higher than at Heathrow, indicating a greater reliance on the night period as part of the overall operating schedule.

2.36 The distribution of these movements within the night period is shown in Figure 2.7 and differs markedly from the highly concentrated pattern observed at Heathrow. Rather than being clustered into a narrow early-morning window, Gatwick's night movements are spread across the full period between 23:30 and 06:00. Only around **one-third of flights (33%) operate between 04:00 and 06:00**, compared to almost all movements at Heathrow (notwithstanding Heathrow's voluntary ban on arrivals before 04:30).

Figure 2.7 – Aircraft Movements in the NQP at Gatwick – by 30 Minute Time Band - 2024

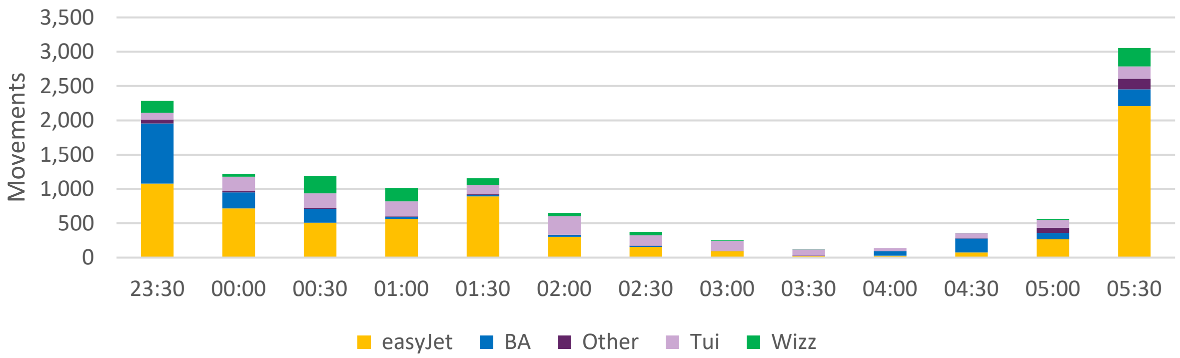


Source: Gatwick Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.37 This more distributed pattern reflects the underlying structure of operations at Gatwick. Approximately **75% of night flights are arrivals and 25% departures**, a much more balanced split than at Heathrow. However, departures are highly concentrated in the early morning, with almost all outbound flights operating between 04:00 and 06:00 (unlike at Heathrow, where arrivals dominate) This reflects the importance of early departures in initiating the daily operating cycle for aircraft based at Gatwick.

2.38 The composition of airlines operating during the night further reinforces this pattern. As shown in Figure 2.8, activity is dominated by a small number of carriers—primarily **easyJet, British Airways, TUI and Wizz Air**—which together account for the vast majority (97%) of night movements. These airlines are predominantly low-cost and leisure-focused operators, and their use of the night period is closely linked to **maximising aircraft utilisation**. Aircraft typically return late in the evening from longer leisure routes and depart again in the early morning, allowing for multiple rotations within a single day.

Figure 2.8 – Gatwick Airport – Mix of Airlines Operating during the NQP – 2024 ATMs



Source: Gatwick Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.39 The nature of inbound flights during the deeper night period also reflects Gatwick's market orientation. Movements between approximately 00:30 and 03:30 are largely arrivals from longer leisure destinations, including the Eastern Mediterranean, North Africa and the Canary Islands. These are not part of a coordinated hub structure, but rather represent the efficient completion of extended aircraft rotations. This fits closely with the evidence provided by airlines as part of this project and with known general operating patterns for the industry.

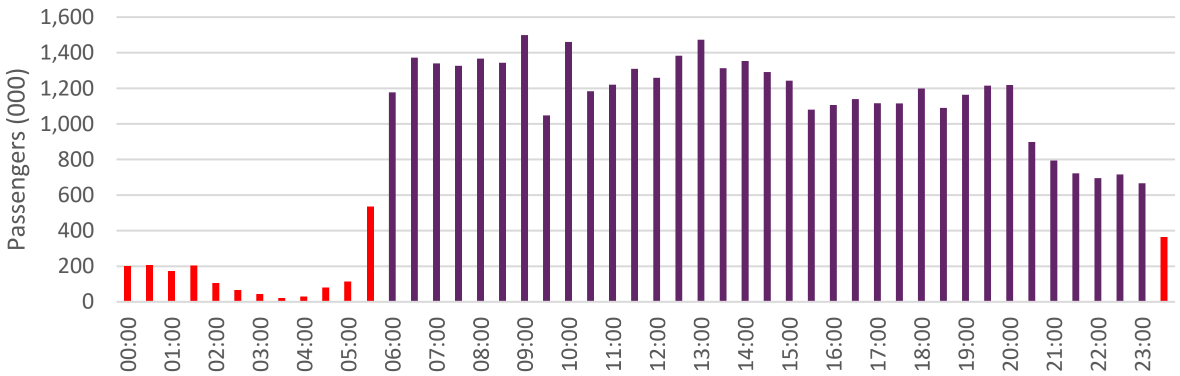
2.40 Taken together, the evidence from Figures 2.6 to 2.8 shows that night flying at Gatwick plays a **supporting but operationally important role**, enabling airlines to extend the usable day and maintain efficient fleet utilisation, rather than underpinning tightly structured connectivity in the way observed at Heathrow.

2.41 The passenger profile at Gatwick closely mirrors the pattern of aircraft movements. As shown in Figure 2.9, passenger volumes are distributed relatively evenly across the day, with a gradual tapering into the late evening rather than a sharp concentration in any particular time window.

2.42 Total passenger throughput reached approximately **43.0 million in 2024**, with around **2.14 million passengers travelling during the night quota period**, equivalent to **5.0% of total passengers**. This proportion is higher than at Heathrow and reflects the greater prevalence of night-time operations across both arrivals and departures.

2.43 Unlike Heathrow, where night passengers are overwhelmingly concentrated in early-morning arrivals, Gatwick's passenger flows are more evenly spread across the night period. This reflects the mix of inbound leisure traffic during the late night and outbound departures in the early morning. As a result, the role of night flying is less about enabling connectivity and more about **supporting the timing, utilisation of aircraft and efficiency of point-to-point services**.

Figure 2.9 – Gatwick Airport Passenger Volumes split into 30 minute time bands (night quota period in red) – 2024



Source: Gatwick Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.44 Cargo activity at Gatwick is relatively modest compared to Heathrow and Stansted, with approximately **103,000 tonnes handled in 2024**. Almost all of this cargo is carried in the bellyhold of passenger aircraft, with no significant presence of dedicated freighter operations.

2.45 The composition of cargo flows reflects the airport's long-haul network, with a small number of airlines—including **British Airways, Emirates, China Eastern, Air China and Norse**—accounting for the majority of tonnage carried.

2.46 Within the night quota period, cargo volumes are limited. Only just over **3,000 tonnes** were handled during this period, equivalent to around **3.2% of annual cargo**. This is notably lower than the proportion of aircraft movements operating at night (5.0%), reflecting the dominance of short-haul and low-cost services during this period, which typically carry little or no cargo.

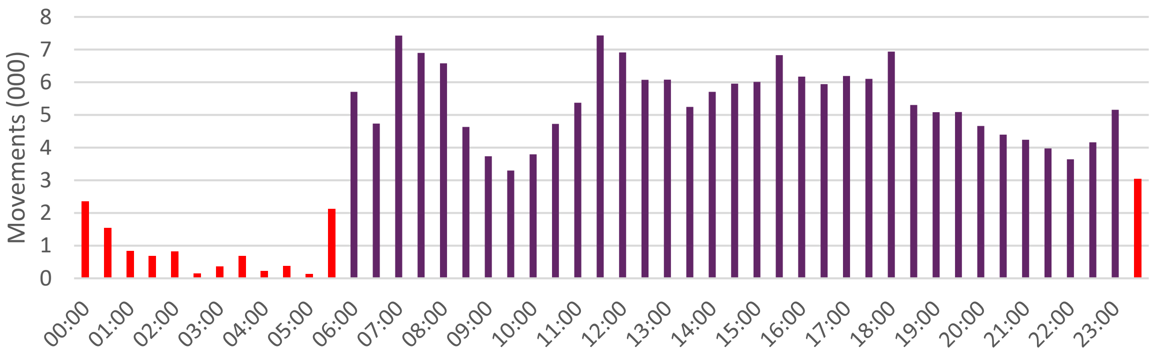
2.47 The cargo that is carried during the night period is concentrated on a small number of long-haul routes, including services to **Accra, Doha, Bangkok, Mauritius, Addis Ababa, Lagos and Beijing**. These flows are aligned with the early-morning departure and arrival structure but do not represent a core driver of night operations in the same way as at Heathrow.

2.48 Overall, the evidence indicates that cargo plays a **secondary role** in shaping night flying at Gatwick. While it contributes to the value of certain long-haul services, the primary driver of night activity is the need to support efficient aircraft utilisation within a predominantly passenger-focused network.

Stansted

2.49 The pattern of aircraft movements at Stansted differs markedly from both Heathrow and Gatwick, reflecting the airport's distinctive operational model. As shown in Figure 2.10, activity is characterised by pronounced peaks and troughs across the day, rather than the relatively stable profiles observed at the other airports.

Figure 2.10 – Stansted Airport Aircraft Movements split into 30 minute time bands (night quota period in red) - 2024



Source: Stansted Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.50 This pattern is closely linked to the dominance of low-cost carriers, particularly Ryanair. A large proportion of aircraft depart early in the morning—typically before 08:30—before returning later in the day after completing their first rotation. This creates a noticeable dip in activity during the mid-morning period, followed by a resurgence later in the day.

2.51 Activity then tapers in the evening before increasing again sharply around **23:00–23:30**, as a significant number of aircraft return to their Stansted Airport base. This late-evening peak highlights the importance of **maximising aircraft utilisation across the full operating day**, extending into the night period.

2.52 In total, Stansted handled just over **203,000 aircraft movements in 2024**, of which **13,325 occurred during the night quota period**, equivalent to approximately **6.5% of total movements**. This is the highest proportion among the three airports, underlining the importance of night operations to Stansted's overall activity.

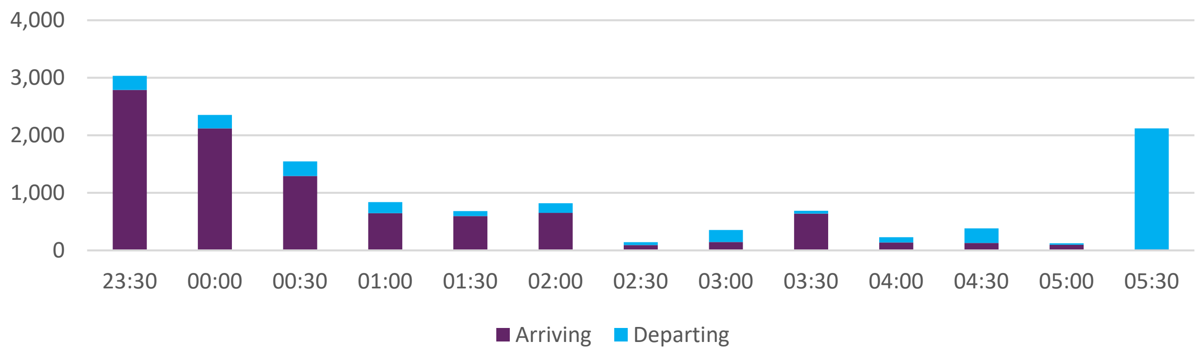
2.53 Figures 2.11 and 2.12 show that, as at Gatwick, night movements are distributed across the full night period rather than concentrated in a narrow window. Only around **21% of movements occur between 04:00 and 06:00**, compared to much higher concentrations at Heathrow and Gatwick.

2.54 The composition of activity during the night period reveals two distinct elements. The first is the continuation of low-cost and charter operations, with aircraft returning late at night and departing again in the early morning. These movements are dominated by Ryanair, alongside TUI and Jet2, and reflect the extension of the operating day to maximise aircraft productivity.

2.55 The second, and defining feature of Stansted's night operations, is the **significant presence of cargo flights**. As shown in Figure 2.12, cargo operations account for approximately **25% of total night movements**, rising to over **50% of activity between 01:00 and 05:30**. During the deepest night hours, cargo flights constitute the majority of movements.

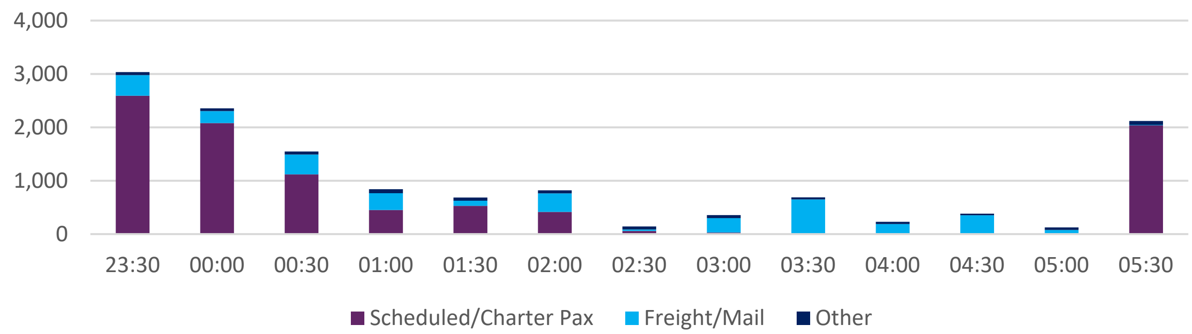
2.56 This dual structure—combining intensive low-cost carrier operations with a substantial freight component—gives Stansted a fundamentally different night profile from both Heathrow and Gatwick.

Figure 2.11 – Aircraft Movements Arriving and Departing in the NQP at Stansted – by 30 Minute Time Band - 2024



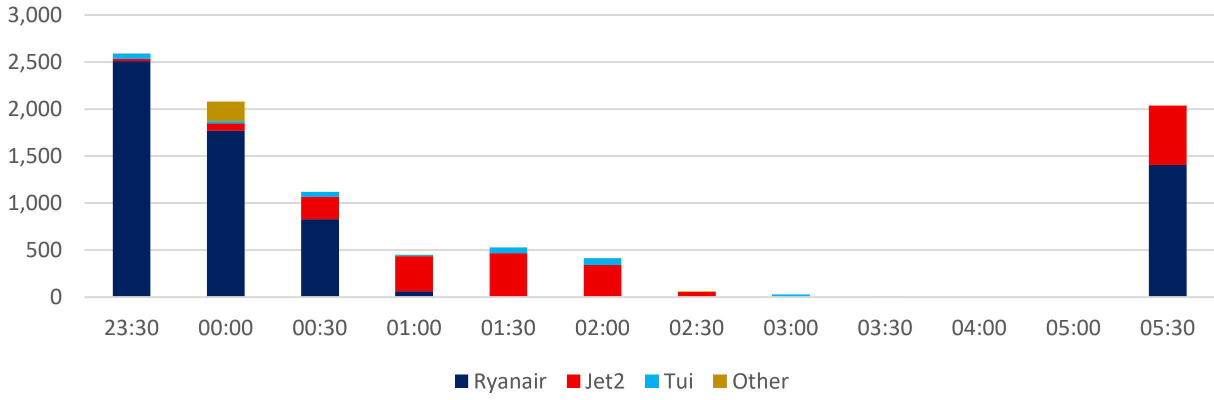
Source: Stansted Airport AODB, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

Figure 2.12 – Aircraft Movements by Flight Type in the NQP at Stansted – by 30 Minute Time Band - 2024



Source: Stansted Airport AODB, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

Figure 2.13 – Stansted Airport – Mix of Airlines Operating Scheduled and Charter Flights during the NQP – 2024 ATMs



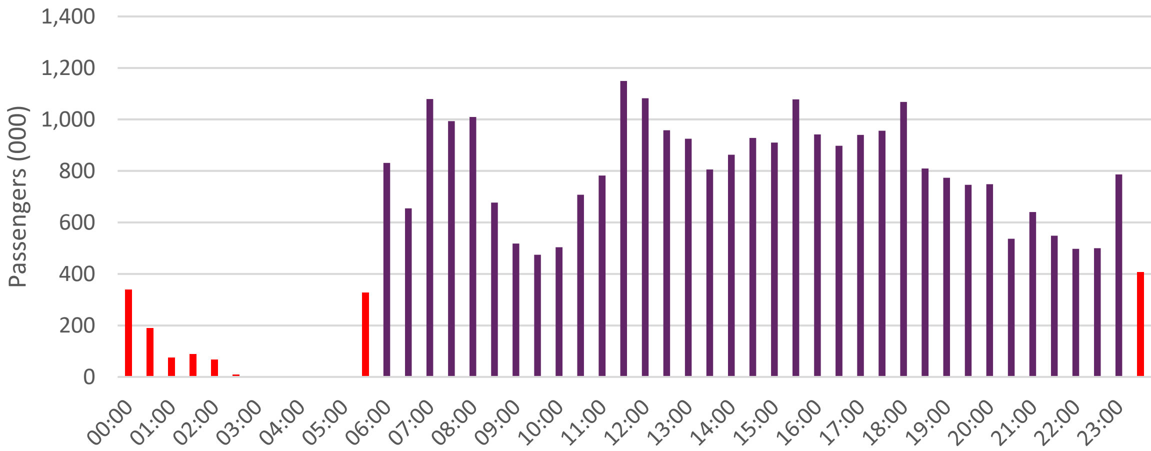
Source: Stansted Airport AODB, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.57 Passenger activity at Stansted reflects the same underlying structure as aircraft movements. As shown in Figure 2.14, volumes peak sharply in the early morning during the initial wave of departures, before declining during the mid-morning period as aircraft are operating away from the airport.

2.58 Total passenger throughput reached approximately **29.8 million in 2024**, with around **1.51 million passengers travelling during the night quota period**, equivalent to **5.1% of total passengers**. This is broadly comparable to Gatwick and reflects the importance of early departures and late arrivals in the low-cost carrier model.

2.59 Unlike Heathrow, where passenger flows during the night are concentrated in arrivals, Stansted exhibits a more balanced pattern, with both inbound and outbound traffic playing a role. However, the economic significance of these passengers is primarily linked to **aircraft utilisation and network efficiency**, rather than connectivity or time-sensitive travel.

Figure 2.14 – Stansted Airport Passenger Volumes split into 30 minute time bands (night quota period in red) – 2024



Source: Stansted Airport, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

2.60 Cargo activity at Stansted is both substantial and structurally different from that at Heathrow and Gatwick. Approximately **308,000 tonnes of cargo** were handled in 2024, with most freight and mail – approx. 94% by weight - carried by dedicated freighter aircraft rather than in passenger bellyholds.

2.61 As illustrated in Figures 2.15 and 2.16, cargo movements and tonnage are distributed relatively evenly across the night period, reflecting the operation of integrated logistics networks. Unlike passenger services, which are concentrated in specific time windows, cargo flights operate continuously through the night to support sorting, processing and onward distribution. The criticality of this process and logistics chain was emphasised strongly by the express freight operators consulted during the research. This is explored further in the Literature Review.

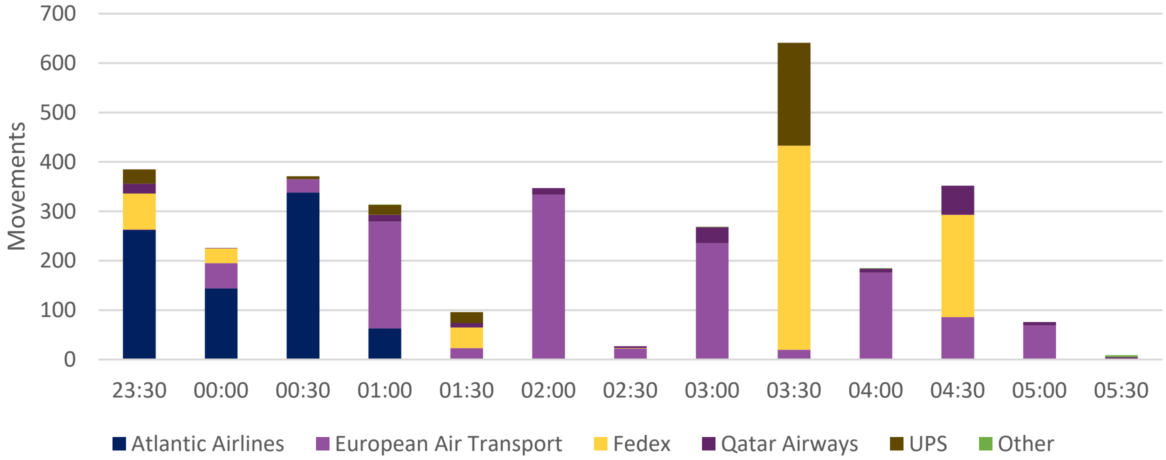
2.62 The cargo market at Stansted is dominated by a small number of specialist operators, including **DHL (European Air Transport), FedEx, UPS, Atlantic Airlines and Qatar Airways Cargo**, which together account for virtually all freight movements during the night period. These operators serve both express freight and mail markets, with strong links to major European and global hubs such as Leipzig, Cologne and Memphis.

2.63 The structure of these operations is **highly time-sensitive** because express freight networks are built around overnight collection, sorting and onward distribution cycles. Shipments are typically collected during the day or early evening, flown into a hub during the night, sorted within a narrow processing window, and then flown or trucked onwards in time for next-day delivery. This means that **the value of the service depends not only on the flight operating, but on its arrival and departure timing relative to the wider logistics chain**.

2.64 At Stansted, this is reflected in the concentration of specialist freight operators and the balance of inbound tonnage. While approximately **60% of freight flights are inbound, these account for around 76% of total cargo carried**, reflecting the importance of inbound flows into the UK distribution network. Retiming these services is therefore not simply a matter of moving a flight to a different hour; doing so can affect sorting windows, onward trucking connections, delivery commitments and the ability of integrators to maintain next-day service reliability.

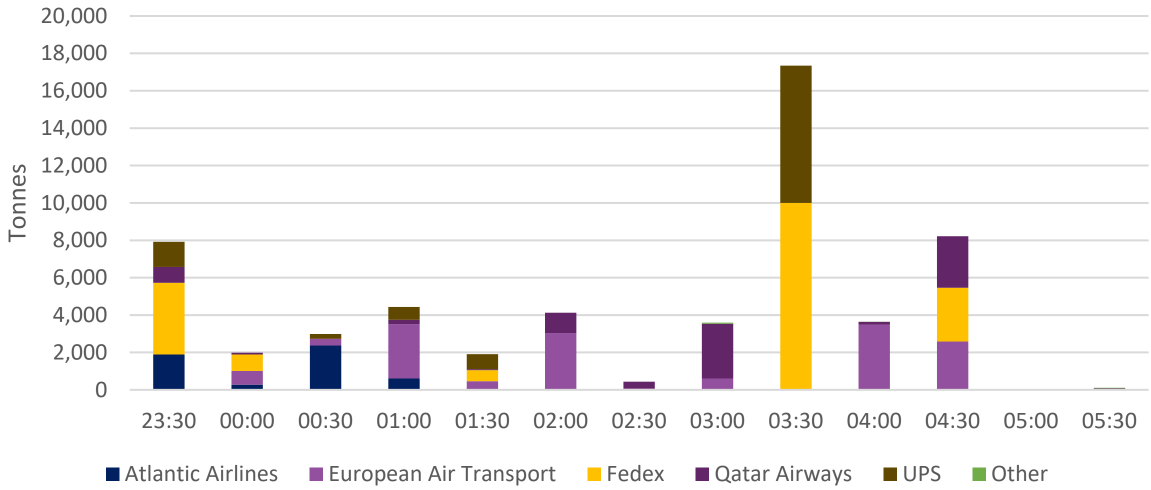
2.65 Overall, the evidence shows that **cargo is a central driver of night flying at Stansted**, in contrast to Gatwick and, to a lesser extent, Heathrow. The reliance on dedicated freight operations and integrated logistics networks means that night activity at Stansted is operationally important for the express freight operators and relatively inflexible. It is therefore particularly sensitive to changes in the night flight regime.

Figure 2.15 – Stansted Airport Cargo Movements split into 30 minute time bands– 2024



Source: Stansted Airport AODB, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

Figure 2.16– Stansted Airport Cargo Movements split into 30 minute time bands – 2024



Source: Stansted Airport AODB, CAA Statistics and OAG.
Note: 30 minute time bands, so that "05:30" covers all flights scheduled to operate between 05:30 and 05:59

3. Summary of the Literature Review

Introduction

3.1 As part of the first stage of this study, two foundational pieces of work were undertaken to support the development of the economic impact model: a Literature Review and a Methodology Report. This section summarises the findings of the literature review, highlighting the main evidence base and the implications for the appraisal of night flying.

3.2 The full review (see The Socio-Economic Impacts of Night Flying: Literature Review) drew together more than thirty studies examining the economic and social value of aviation activity, with a particular focus on night flying at the UK's designated airports. It also considered the applicability of different analytical approaches to support future Department for Transport appraisal. This summary is intended to provide an overview of the key findings. The summary does not directly reference individual sources. These are set out in the Literature Review.

3.3 The review was structured around four core questions:

- whether night flying generates economic value, and through what mechanisms;
- how airlines, passengers, freight operators and airports respond to policy change;
- how freight can be incorporated into a TAG-consistent appraisal framework; and
- how wider economic impacts can be captured without double counting.

3.4 The findings of the literature review have directly informed the development of the modelling framework used in this study. In particular, they provide the conceptual foundation for understanding how relatively small volumes of night activity can generate disproportionate economic value.

Summary of Key Findings

3.5 The overarching conclusion from the literature is that night flying delivers concentrated economic value because it supports the most time-sensitive parts of the aviation system, rather than simply adding to overall volumes of activity.

3.6 A consistent theme across the evidence is that timing matters more than scale. The highest-value periods are not evenly distributed across a 24-hour period, but are concentrated in specific windows—most notably:

- early-morning arrivals;
- first-wave departures;
- late-evening returns; and
- overnight freight sorting periods.

3.7 These windows are critical because they enable the effective functioning of wider systems. For example, early-morning arrivals underpin hub connectivity and same-day business travel, while overnight freight operations support next-day delivery commitments within integrated logistics networks.

3.8 The literature also highlights that impacts vary significantly across user groups. Business and transfer passengers are particularly sensitive to restrictions affecting early and late time windows, with evidence pointing to high schedule-delay and connection penalties when these periods are constrained, especially at Heathrow. Leisure passengers, by contrast, are affected more indirectly, primarily through changes in fares and trip convenience arising from reduced aircraft utilisation.

3.9 Freight—particularly express freight—is identified as structurally dependent on night operations. Integrator networks rely on overnight collection, sorting and distribution cycles, meaning that increased restrictions can have immediate and disproportionate impacts on service reliability and network viability.

3.10 Another key finding is that retiming and diversion only partially offset the loss of night activity. While some flights can be moved into adjacent periods or alternative airports, these adjustments do not fully recreate the original economic value, particularly in capacity-constrained systems where alternative slots are limited.

3.11 Finally, the literature emphasises that freight should be treated as a core component of appraisal, rather than a peripheral consideration. It also supports the inclusion of wider economic impacts, but with the important caveat that these should be handled separately from core welfare analysis to avoid double counting.

Implications for decision-makers

3.12 The implications of the literature for policy are summarised in Table 3.1.

Table 3.1: Implications for Decision Makers

Question	Implication from the literature
Does night flying create economic value?	Yes, but unevenly. Value is concentrated in specific hours, airports and market segments.
Can lost night activity simply move elsewhere?	Only partially. Recovery is limited by capacity constraints, connection structures, airline utilisation requirements and freight commitments.
Does freight belong in the core analytical story?	Yes. Freight, particularly express operations, is central to the economic case.
How should wider impacts be treated?	As complementary evidence, reported separately from core welfare analysis and supported by transparent assumptions.

3.13 A key insight from the literature is that the value of night flying is highly differentiated. This means that the economic importance of a flight depends not only on whether it operates during the night period, but on the specific function it performs within the wider aviation system. Some night flights support early-morning long-haul connectivity, some enable aircraft to complete or begin high-utilisation daily rotations, and some form part of tightly timed overnight freight networks. Others may be more discretionary or more capable of being retimed with limited loss of economic value.

3.14 This distinction is important for policy analysis because it means that the impact of a change to the night flight regime will depend heavily on which flights, airports and time windows are affected. A restriction affecting operationally critical early-morning arrivals or overnight express freight movements may have a materially greater effect than an equivalent numerical reduction affecting more flexible activity. The modelling framework therefore reflects the literature by differentiating movements according to timing, airport, airline type, passenger mix, freight role and operational flexibility, rather than applying a uniform value to all night flights.

Implications for Stakeholders

3.15 The literature review also highlights that the impacts of changes to night flying policy vary significantly across stakeholder groups.

3.16 Rather than affecting all users uniformly, changes to night flying policy tend to fall most heavily on those segments with the greatest dependence on timing and limited scope for substitution. These include business passengers, transfer traffic, express freight operators and airline business models reliant on high aircraft utilisation.

3.17 Table 3.2 summarises the evidence on how different stakeholders are affected.

Table 3.2 – Implications of Night Flying Policy Changes on Stakeholders

Stakeholder	Main source of value	Likely effect of increased restrictions	Overall reading
Business passengers	Same-day travel, early arrival, late return, lower overnight-stay requirement	Higher generalised cost, weaker same-day trip patterns, more retiming or overnight stays	High sensitivity
Transfer passengers	Integrity of hub banks and onward domestic/European connections	Reduced minimum-connect pairings and reduced route viability	High sensitivity at Heathrow
Leisure passengers	Lower fares and better trip length from higher aircraft utilisation	Moderate fare increases and reduced schedule choice	Medium sensitivity
Express freight	Overnight sorting and next-day delivery commitments	Potential rerouting or relocation of hub activity, reliability loss	Very high sensitivity
General cargo	Reliable early delivery and onward distribution	More warehousing, rerouting and some quality loss	Medium sensitivity
Low-cost / charter airlines	Aircraft utilisation and two-rotation patterns	Higher unit costs and selective capacity withdrawal	High sensitivity
Airports	Peak smoothing, competitiveness and route retention	Higher congestion, fewer entry opportunities and weaker competitive position	Material system effects

3.18 Across these groups, the strongest evidence of structural dependence is found in express freight operations, hub connectivity and airline models that rely on extending the operating day. Leisure impacts are generally more moderate, but remain material where capacity constraints limit the ability to absorb changes through retiming.

Why Night Flying Matters

3.19 The literature identifies three principal channels through which night flying generates economic value: passenger connectivity, freight and logistics, and airline and airport efficiency.

3.20 For passengers, the primary source of value lies in **schedule utility**. Early arrivals enable a full working day and reduce the need for overnight stays, while late departures preserve same-day travel patterns. For transfer passengers, the integrity of connection banks—particularly at hub airports such as Heathrow—is critically dependent on these time windows.

3.21 For leisure passengers, the benefits are more indirect but still important. Greater flexibility at the start and end of the day allows airlines to utilise aircraft more intensively, which in turn supports lower fares, greater capacity and improved trip duration.

3.22 For freight, the literature identifies the strongest structural dependence. Express and time-critical logistics operations rely on overnight processing cycles to meet next-day delivery commitments. While general cargo is less sensitive, it still benefits materially from early arrivals and reliable onward distribution.

3.23 Finally, night flying supports **airline and airport efficiency**. For airlines, it enables higher aircraft utilisation and supports network structures. For airports, it helps smooth demand, maintain competitiveness and support route retention in capacity-constrained environments.

How Markets React to Change

3.24 The literature and discussions with stakeholders provide clear evidence on how markets would respond to changes in existing night flying restrictions.

3.25 In most cases, adjustment occurs through a combination of:

- retiming;
- diversion; and
- some loss of activity.

3.26 However, these responses do not fully preserve the original value. Retimed flights may operate at less optimal times, diverted traffic may incur additional cost or reduced connectivity, and some high-value activity may be lost altogether.

3.27 The ability of the system to absorb change depends critically on capacity. At unconstrained airports, a greater proportion of activity can be retimed. At constrained airports—particularly Heathrow—restrictions are more likely to result in lost connectivity, broken transfer flows and higher generalised costs.

3.28 An important theme emerging from the literature is **asymmetry**. The removal of access to high-value time windows can generate large losses, while the benefits of reducing restrictions are often more limited. This reflects the fact that value is concentrated in specific parts of the schedule, and cannot easily be recreated once lost.

Integrating Freight into Appraisal

3.29 The literature identifies freight as a key gap in conventional aviation appraisal and provides a clear pathway for its integration.

3.30 A central recommendation is to treat freight within a framework analogous to passenger welfare analysis. This involves:

- modelling shipper surplus in place of passenger user surplus;
- representing logistics provider impacts alongside operator surplus; and
- capturing freight generalised cost, including time and reliability.

3.31 The evidence strongly supports the use of differentiated values of time for freight, reflecting the wide variation in urgency and value across different types of shipment. Express freight sits at the upper end of this range, with high sensitivity to both delay and reliability.

3.32 The literature also emphasises that **reliability is as important as time**. Missing a processing window or delivery commitment can result in disproportionate losses, particularly within integrator networks.

Wider Economic Impacts

3.33 The literature also considers the role of wider economic impacts, recognising that aviation can influence productivity, trade and regional economic performance beyond direct user and producer effects.

3.34 A range of methodological approaches is identified, including:

- input-output modelling;
- econometric connectivity-productivity analysis;
- computable general equilibrium models; and
- regional employment elasticity approaches.

3.35 The key lesson is not that one method is preferred, but that wider impacts should be treated as **complementary evidence**, reported separately from core welfare analysis and based on conservative and transparent assumptions.

3.36 This is particularly relevant in the context of night flying, where high-value passenger and freight activity is concentrated in specific time windows. Changes to these windows may therefore have wider implications for connectivity and economic performance that are not fully captured within standard welfare metrics.

Areas of Uncertainty and Caution

3.37 The literature review also highlights important limitations in the evidence base.

3.38 Not all studies are consistent in quality or methodology, and some rely on older data or assumptions that may not fully reflect current market conditions. In addition, some estimates of wider economic impacts are based on correlations rather than clearly established causal relationships.

3.39 As a result, the strongest interpretation of the evidence is a differentiated one. The literature supports the importance of night flying, but does not imply that all night flights are of equal economic value or that all operations are equally dependent on the night period. Rather, the evidence indicates that value is concentrated in particular types of activity, at particular airports and in particular time windows. Policy analysis should therefore focus on the specific functions performed by night flights — including hub connectivity, express freight, aircraft utilisation and schedule-sensitive passenger movements — rather than assuming uniform impacts across all night activity.

Overall Conclusion

3.40 The literature review provides a consistent and robust answer to the central question: night flying matters economically because it supports the most time-sensitive and structurally important elements of the aviation system.

3.41 The literature review indicates that the economic value associated with night flying is not evenly distributed across all overnight operations. Rather, value is concentrated in activities where timing is operationally or commercially critical, including:

- early morning arrivals supporting business-day utilisation;
- long-haul hub connectivity and transfer scheduling;
- integrator and express freight operations dependent on overnight processing windows; and
- airline business models reliant on extended aircraft utilisation.

3.42 While many current night flights fall within one or more of these categories, the evidence also suggests that the degree of dependency and resulting economic value varies materially by airport, airline type, route function and freight intensity.

3.43 Where increased restrictions are introduced, markets adjust through retiming, diversion and substitution, but these responses do not fully preserve the original value. Freight is particularly important in this regard and should be treated as a core component of analysis.

3.44 The review supports a **layered appraisal approach**, combining:

- TAG-consistent welfare analysis;
- explicit treatment of freight;
- and separate reporting of wider economic impacts.

3.45 This framework provides the foundation for the modelling and results presented in the remainder of this report.

3.46 The Socio-Economic Impacts of Night Flying: Literature Review is published alongside this report.

4. Summary of the Methodology Report

Introduction

4.1 This section summarises the Methodology Report. The role of the Methodology Report (see The Socio-Economic Impacts of Night Flying: Methodology Report) was not to produce results, but to establish the analytical framework through which the impacts of changes to night flying policy could be assessed in a structured and consistent way. In particular, it defined:

- how different stakeholders—airports, airlines, passengers and cargo users—respond to changes in existing night flight restrictions; and
- how these behavioural responses can be translated into monetised economic impacts.

4.2 A key principle underpinning the methodology is that responses are not uniform. They vary by:

- airline business model (e.g. full service, low-cost, cargo);
- passenger segment (e.g. business, leisure, transfer); and
- the specific policy lever being adjusted (e.g. movement limits, noise quotas, timing of the night period).

4.3 The framework is therefore explicitly designed to capture these differences, recognising that the impacts of policy change are inherently heterogeneous.

4.4 The Socio-Economic Impacts of Night Flying: Methodology Report is published alongside this report. The Technical Annex at the end of this report of this report provides additional detail on the modelling structure, behavioural assumptions, calibration approach, appraisal parameters and TAG/Green Book-consistent values used within the analysis.

The Central Proposition

4.5 The methodology is built around the central conclusion of the Literature Review: that night flying can generate economic and social value through improved timing, connectivity and asset utilisation, particularly in schedule-sensitive passenger and freight markets. The modelling framework therefore seeks to quantify how changes to the night flight regime affect these sources of value under different operational and market conditions.

4.6 Changes to the night flight regime affect these three drivers directly. All subsequent impacts within the model flow from this initial shift in operating conditions compared to the existing night flights regime.

4.7 For scenarios involving tighter restrictions, the existing night flight regime forms the baseline against which additional constraints are assessed. The model then considers how the market would adjust if fewer movements, lower quota limits or longer restricted periods were applied.

4.8 For scenarios involving relaxation, the analysis considers whether additional flexibility within the night period would allow forecast demand to be accommodated more efficiently than under the existing regime. The benefit of relaxation is therefore measured as the difference between the existing regime and a less constrained operating environment, but only where underlying demand and wider airport capacity assumptions indicate that additional activity could realistically be supported.

4.9 This distinction is important because relaxing the night flight regime does not automatically generate additional economic value. Additional value only arises where there is forecast demand that cannot otherwise be accommodated, and where airport, airline and operational constraints allow that demand to be served through additional or better-timed night operations.

4.10 In this context, the night flight regime is treated as a set of measures that reshape:

- how airports allocate capacity;
- how airlines structure their schedules and networks; and
- how passengers and cargo users respond to changes in service quality.

4.11 The framework is designed to be:

- **bidirectional**, allowing both tightening and relaxation of the regime to be tested;
- **policy-neutral**, with outcomes determined by behavioural response rather than assumed a priori; and
- **modular**, separating direct welfare effects from wider economic impacts to minimise the risk of double counting.

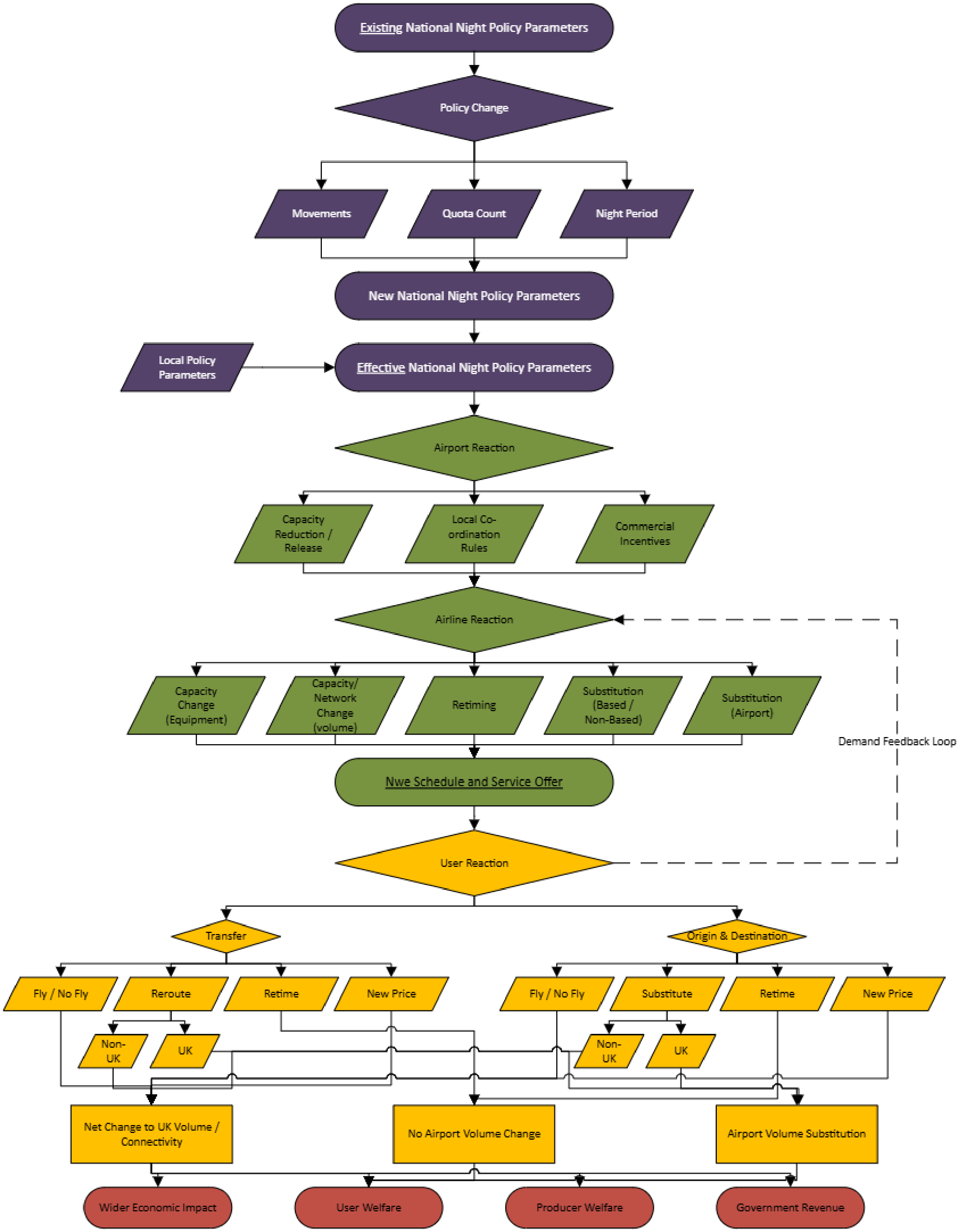
4.12 The modelling framework treats the existing night flight regime as the core policy baseline. For scenarios involving increased restrictions, the model begins with the existing overnight schedule and tests how airlines and airports respond as additional constraints are imposed.

4.13 For scenarios involving reduction of restrictions, the model first allows additional overnight scheduling flexibility relative to the existing regime and then assesses the extent to which underlying forecast demand is able to make productive use of this additional capacity.

4.14 Importantly, references to 'capacity constraints' within this report generally relate to overall operational airport capacity constraints within the DfT aviation forecasts and airport infrastructure assumptions, rather than solely the night flight regime itself. In several cases, the analysis indicates that wider daytime or runway capacity constraints limit the degree to which additional overnight flexibility can generate incremental activity.

4.15 Figure 4.1 illustrates the overall logic of the framework, showing how a change in policy is transmitted through the system and ultimately expressed as economic impacts. It follows the path from the a change in the night policy parameters, such as the changes to the number of movements allowed, the quota count or the definition of the night period, through the reactions of different parties, to the ultimate socio-economic impacts.

Figure 4.1: Main Methodological Flow



Overall Analytical Structure

4.16 At its core, the methodology follows a clear causal sequence.

4.17 A policy change first alters the effective operating constraints faced by airports. These changes influence how airports manage capacity and allocate access to the night period, including whether activity can be accommodated within existing limits or whether capacity becomes more scarce. Airlines then respond to these revised conditions by adjusting schedules, fleets and network structures. The behavioural responses represented in the model — including retiming, diversion, changes in aircraft deployment and cancellation — are drawn from the findings of the Literature Review and from stakeholder consultations undertaken with airports, airlines and freight operators as part of this study.

4.18 These supply-side responses reshape the service offering available to passengers and cargo users, who in turn adjust their behaviour. The resulting changes in activity—across passengers, freight and aircraft movements—are then translated into welfare and wider economic impacts.

4.19 This sequence is critical. It ensures that the analysis reflects how the aviation system actually functions, rather than assuming a direct link between policy change and economic outcome.

Table 4.1: How the main component parts are driven

Component	What drives it	Main outputs
Policy scenario	Definition of night period, movement limits, quota count rules and any local restrictions.	Changes to effective operating constraints by airport.
Airport reaction	Balance between demand for night operations and the amount of capacity available under the night flight regime; the value of scarce night capacity; airport charges; and slot coordination rules.	Availability and cost of night-period access for airlines.
Airline reaction	Profitability of each night movement, network value, connectivity needs, aircraft utilisation and retiming options.	Schedule, fleet, frequency, relocation or cancellation decisions.
Passenger reaction	Changes in fare, timing, reliability, airport choice and connection quality.	Trip retiming, switching, rerouting, mode shift or suppressed demand.
Cargo user reaction	Changes in delivery timing, reliability, cut-off times, next-day service availability, routing options and logistics costs. These effects are particularly important in express freight markets, where users are already paying a premium for time-sensitive and reliable overnight delivery services.	Rerouting, UK/non-UK handling, inventory and logistics adjustments, downgraded service quality or lost shipments.
TAG welfare	Generalised cost changes for passengers and cargo, plus operator profits and tax receipts.	User welfare, producer welfare and government revenue.
Wider economic impacts	Structural changes in connectivity, trade access, supply-chain timing and regional gateway effects.	Indicative GVA, productivity and employment impacts.

Baseline and Scenario definition

4.20 All analysis is undertaken relative to a consistent baseline, representing how the aviation system would evolve in the absence of policy change.

4.21 The baseline is constructed using:

- detailed airport operational data for the designated airports;
- fares data from published sources, notably AirportIS;
- airline report and accounts;
- airline operating cost data from US Department of Transportation;
- insights from airline and airport stakeholders from consultations undertaken for this project. It should be noted that much of the information provided through this process is commercially confidential;
- OAG schedules and CAA data for the wider airport system; and
- Department for Transport aviation forecasts to project demand over the appraisal period;
- All timings within the model are scheduled times, which reflect stand times for aircraft movements, i.e. the time a flight is scheduled to depart/arrive at the stand/gate. This is for consistency with published schedules data.

4.22 This approach, referencing any change back to a consistent baseline position, ensures that the model distinguishes between:

- changes driven by policy; and
- changes that would occur anyway as a result of underlying demand and capacity trends.

4.23 Policy scenarios are then defined by varying key elements of the night flight regime, including:

- the timing of the night period;
- movement limits; and
- noise quota constraints.

4.24 All results are expressed relative to this baseline- which is the current night flight regime- ensuring consistency and comparability across scenarios.

Supply side: how airports and airlines are driven

4.25 The methodology treats supply-side behaviour as the primary driver of system response.

Airports

4.26 Airports respond to changes in the night flight regime through the interaction of demand and capacity. Where demand for night operations exceeds available capacity, restrictions create scarcity, which is reflected in:

- increased shadow pricing of night access;
- adjustments to slot allocation and coordination rules; and
- changes in charging structures.

4.27 These responses determine the effective cost and availability of night operations for airlines.

Airlines

4.28 Airlines respond to these conditions based on the profitability and strategic value of each movement. Crucially, the methodology does not treat flights in isolation. Instead, it recognises that:

- a single night movement can underpin an entire day of aircraft utilisation;
- early arrivals and departures are often embedded within wider network structures; and
- changes to one part of the schedule can have cascading effects.

4.29 Airlines therefore consider a range of responses, including:

- retaining flights at current times;
- retiming services;
- switching aircraft or frequencies;
- relocating operations; or
- cancelling services altogether.

4.30 The sequence of these decisions is important, reflecting the non-linear nature of the system. The loss of a single critical time slot can disrupt multiple downstream activities.

Demand side: how passengers and cargo users are driven

4.31 Once supply-side adjustments have been made, passengers and cargo users respond to the revised service offering.

Passengers

4.32 Passenger behaviour is driven by changes in **generalised cost**, which combines:

- fares;
- travel time;
- schedule inconvenience; and
- reliability.

4.33 The methodology segments passengers into distinct groups, recognising that sensitivity to these factors varies significantly. Business and transfer passengers are highly time-sensitive, while leisure passengers are more price-sensitive.

4.34 Passengers respond by:

- accepting revised services;
- switching airline or airport;
- rerouting journeys; or
- abandoning travel altogether.

Cargo Users

4.35 For cargo users, service quality is the primary driver. This includes:

- delivery time;
- reliability;
- cut-off times; and

- network coverage.

4.36 Express freight is particularly sensitive, as it depends on tightly coordinated overnight logistics cycles and next-day delivery commitments. General cargo is typically more operationally flexible, although this flexibility may come at the cost of longer transit times, reduced delivery reliability, increased inventory requirements or lower service quality.

Integration with TAG welfare analysis

4.37 The model translates these behavioural responses into economic impacts using standard TAG-consistent welfare principles (see Department for Transport TAG Unit A5.2 Aviation Appraisal).

4.38 For both passengers and cargo users, impacts are measured through changes in generalised cost. These are monetised using the rule-of-half, capturing the value of changes across both existing and marginal users.

4.39 Generalised cost is defined to reflect the specific characteristics of each group:

- for passengers, it includes fares, time, schedule delay and reliability;
- for freight, it includes shipping cost, time, reliability and inventory effects.

4.40 Producer welfare is calculated as the change in net profitability for airlines and airports, while government revenue is captured through changes in taxation, including Air Passenger Duty.

4.41 A key feature of the approach is the clear separation of:

- user welfare;
- producer welfare; and
- government revenue.

4.42 This ensures transparency and avoids double counting, particularly where transfers occur within the aviation sector.

Wider Economic Impacts

4.43 The methodology also incorporates a separate assessment of wider economic impacts, reflecting the broader role of aviation in supporting productivity, market access, supply-chain performance and economic competitiveness.

4.44 Standard TAG wider economic impact metrics are not applied directly, as these are primarily designed for domestic transport interventions affecting labour-market access, agglomeration and imperfect competition. Aviation connectivity operates through a different set of mechanisms, including international business connectivity, trade access, supply-chain timing and global network efficiency.

4.45 Instead, the framework adopts two complementary approaches:

- a connectivity-productivity approach, linking structural changes in effective international connectivity to economic performance using published elasticities; and

- a regional catalytic approach, examining how changes in air traffic influence employment, productivity and regional economic performance.

4.46 These estimates should be interpreted with caution. Wider economic impacts are inherently more uncertain than direct welfare impacts, reflecting both the complexity of the relationship between air connectivity and economic performance and the difficulty of separating cause and effect. The approaches therefore produce indicative ranges rather than precise point estimates.

4.47 To minimise the risk of double counting, wider impacts are reported separately from core welfare results and are not added to them. They are also applied only to structural connectivity changes, rather than to the direct time, fare, reliability or cost impacts already captured in the welfare analysis. This means they should be interpreted as complementary evidence on the broader economic significance of night flying, rather than as additional benefits or costs to be summed with the core welfare results.

Treatment of Tourism Effects

4.48 Changes to night-flying connectivity may also influence tourism flows, particularly inbound leisure travel and short-break markets that depend on early-morning arrivals or late-evening departures. Improved connectivity can support inbound visitor expenditure and the wider tourism economy, while reduced connectivity may weaken the attractiveness or accessibility of some UK destinations.

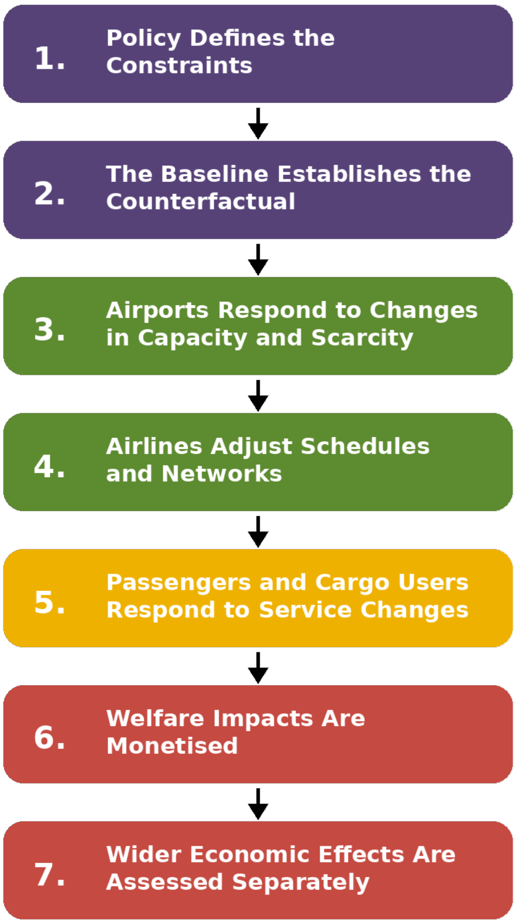
4.49 However, the treatment of tourism effects within wider economic analysis is complex and requires careful interpretation. Inbound tourism expenditure represents an injection of demand into the UK economy and can therefore contribute positively to economic activity. By contrast, outbound tourism expenditure does not represent a simple economic loss to the UK, as it reflects discretionary household consumption that may otherwise have been spent on alternative goods and services within the economy. The net economic implications therefore depend on wider behavioural responses, substitution effects and broader market adjustments.

4.50 Given these conceptual complexities, the wider economic impact framework does not separately estimate tourism multiplier effects in either direction. Instead, tourism-related impacts are captured only indirectly through the broader connectivity, passenger-demand and productivity mechanisms embedded within the welfare and wider-economic-impact analysis. This approach is intended to remain conservative and to avoid overstating effects that are difficult to isolate robustly.

Overall Analytical Logic

4.51 The methodology can be understood as a sequence of interconnected components, each driven by a small number of core mechanisms, as set out in Figure 4.2.

Figure 4.2: Main Methodological Flow



4.52 This sequencing is fundamental. It ensures that the analysis reflects real-world behaviour and maintains a clear line of causality from policy change to economic outcome.

Key Analytical Messages

4.53 Several key insights emerge from the methodology:

- Night flying is a small share of activity but a high-leverage component of the system;
- Timing, rather than volume, is the primary driver of value;
- Impacts are highly segment-specific and cannot be treated uniformly;
- The system is inherently non-linear, with small changes potentially generating large effects; and
- A clear separation between welfare and wider impacts is essential for robust appraisal.

Conclusion

4.54 The Methodology Report provides a comprehensive framework for assessing the economic impacts of changes to night flying policy.

4.55 At its core, it maps how policy changes alter operating constraints, how these changes influence airport and airline behaviour, and how resulting adjustments affect passengers, cargo users and the wider economy.

4.56 The approach ensures that:

- impacts are grounded in realistic behavioural responses;
- value is linked explicitly to timing, connectivity and utilisation; and
- results are presented transparently, with clear separation between welfare and wider economic effects.

4.57 This framework underpins the modelling results presented in this report and provides a robust basis for interpreting the socio-economic implications of changes to the night flight regime.

5. Illustrative Night Flight Regime Scenarios Tested

Introduction

5.1 This section sets out the range of illustrative scenarios tested using the economic impact model. The purpose of these scenarios is not to identify an optimal policy configuration in isolation, but rather to establish a structured evidence base that illustrates how changes to the key components of the night flight regime influence economic outcomes. They should not be seen as reflecting any potential policy direction that the Department for Transport are considering.

5.2 As described in the Methodology Report, the value generated by night flying is driven by a combination of **timing, connectivity and aircraft utilisation**. Policy changes affect these drivers through three principal levers:

- The **number of aircraft movements** permitted during the Night Quota Period (NQP);
- The **noise quota limits** and associated restrictions on aircraft types; and
- The **timing of the NQP itself**.

5.3 The scenarios have been designed to isolate and combine these levers in order to understand:

- The relative importance of each policy mechanism; and
- The extent to which impacts are linear or exhibit threshold effects as measures tighten or relax.

5.4 A deliberately wide range of scenarios has been included, spanning both **more restrictive and less restrictive regimes**, including extreme cases such as a full night flight ban and the removal of all restrictions. This approach enables the model to capture the full range of potential behavioural responses across airports, airlines and users. The Department for Transport owns the model and can use it to examine other policy scenarios in the future.

Structure of the Scenario Set

5.5 The scenarios fall into three broad categories:

Increased Restriction Scenarios

5.6 These scenarios test the effects of tightening the night flight regime through:

- Reductions in noise quota limits (Scenarios 2a–2c);
- Reductions in movement limits (Scenarios 3a–3c);
- Combined reductions in both (Scenarios 4a–4c); and
- Changes to the timing of the night period (Scenarios 5 and 6).

5.7 In addition, Scenario 1 (No Night Flights) represents a **full curfew**, providing an upper bound on the potential economic impacts of restricting night operations.

Decreased Restriction Scenarios

5.8 These scenarios examine the effects of relaxing constraints through:

- Increases in noise quota limits (Scenarios 8a–8c);
- Increases in movement limits (Scenarios 9a–9c); and

- Combined increases in both (Scenarios 10a–10c).
- Scenario 7 (No Restrictions) represents the opposite extreme to Scenario 1, allowing night operations to be determined solely by operational and commercial considerations.

Combined and Incremental Scenarios

5.9 The inclusion of multiple percentage changes (10%, 30% and 50%) allows the analysis to test:

- Whether impacts scale proportionally; and
- Whether there are non-linear effects, particularly where capacity constraints begin to bind or where key scheduling thresholds are crossed.

5.10 The illustrative scenarios are set out in Table 5.1.

Table 5.1 – Initial Scenarios to be Tested

Direction of Policy Change	Scenario No.	Scenario Name	Changes to the aircraft movement limit	Changes to the noise quota limit and restrictions on QC types	Other change
Increased Night Flight Restrictions	1	No Night Flights	No flights allowed during the 6.5hr NQP (23:30-06:00)	N/A	N/A
Increased Night Flight Restrictions	2a	10% QC Reduction	N/A	10% reduction in noise quota limits in each season	N/A
Increased Night Flight Restrictions	2b	30% QC Reduction	N/A	30% reduction in noise quota limits in each season	N/A
Increased Night Flight Restrictions	2c	50% QC Reduction	N/A	50% reduction in noise quota limits in each season	N/A
Increased Night Flight Restrictions	3a	10% Movement Reduction	10% reduction in movement limits in each season	N/A	N/A
Increased Night Flight Restrictions	3b	30% Movement Reduction	30% reduction in movement limits in each season	N/A	N/A
Increased Night Flight Restrictions	3c	50% Movement Reduction	50% reduction in movement limits in each season	N/A	N/A
Increased Night Flight Restrictions	4a	10% QC & Movement Reduction	10% reduction in movement limits in each season	10% reduction in noise quota limits in each season	N/A
Increased Night Flight Restrictions	4b	30% QC & Movement Reduction	30% reduction in movement limits in each season	30% reduction in noise quota limits in each season	N/A
Increased Night Flight Restrictions	4c	50% QC & Movement Reduction	50% reduction in movement limits in each season	50% reduction in noise quota limits in each season	N/A

Direction of Policy Change	Scenario No.	Scenario Name	Changes to the aircraft movement limit	Changes to the noise quota limit and restrictions on QC types	Other change
Increased Night Flight Restrictions	5	06:30 NQP	N/A	N/A	Extend NQP to 06:30 rather than 06:00
Increased Night Flight Restrictions	6	23:00 NQP	N/A	N/A	Start NQP at 23:00 rather than 23:30
Decreased Night Flight Restrictions	7	No Restrictions	No movement limit. Movements only constrained by operational capacity.	No quota count or restrictions on QC types.	N/A
Decreased Night Flight Restrictions	8a	10% QC increase	N/A	10% increase in noise quota limits in each season	N/A
Decreased Night Flight Restrictions	8b	30% QC increase	N/A	30% increase in noise quota limits in each season	N/A
Decreased Night Flight Restrictions	8c	50% QC increase	N/A	50% increase in noise quota limits in each season	N/A
Decreased Night Flight Restrictions	9a	10% Movement increase	10% increase in movement limits in each season	N/A	N/A
Decreased Night Flight Restrictions	9b	30% Movement increase	30% increase in movement limits in each season	N/A	N/A
Decreased Night Flight Restrictions	9c	50% Movement increase	50% increase in movement limits in each season	N/A	N/A
Decreased Night Flight Restrictions	10a	10% QC & Movement increase	10% increase in movement limits in each season	10% increase in noise quota limits in each season	N/A
Decreased Night Flight Restrictions	10b	30% QC & Movement increase	30% increase in movement limits in each season	30% increase in noise quota limits in each season	N/A
Decreased Night Flight Restrictions	10c	50% QC & Movement increase	50% increase in movement limits in each season	50% increase in noise quota limits in each season	N/A

Interpretation of the Scenario Framework

The scenario framework is designed to reflect the way in which the aviation system responds to policy change in practice.

First, changes to the regime alter the **effective operating constraints** faced by airports and airlines. These constraints then drive airline decisions regarding whether to:

- Retain flights at existing times;

- Retiming services into shoulder or daytime periods;
- Divert operations to alternative airports; or
- Cancel services where no viable alternative exists.

5.11 These supply-side responses in turn determine how passengers and cargo users adjust, resulting in:

- Changes in passenger volumes and travel patterns;
- Changes in freight flows and service quality; and
- Changes in aircraft movements across the system.

5.12 The scenarios therefore provide a structured way of testing how these behavioural responses evolve as policy becomes more or less restrictive.

6. Economic Impact of Changes to Night Flying Restrictions

Introduction

6.1 This section presents the results of applying the model to the illustrative scenarios described in Section 5. The analysis translates the behavioural responses of airports, airlines, passengers and cargo users into both **market outcomes** and **monetised economic impacts**.

6.2 The results are structured in three parts:

- An overview of the **headline impacts across scenarios**, including changes in passenger volumes, cargo throughput and total socio-economic welfare;
- A detailed assessment of **socio-economic welfare impacts**, disaggregated into passenger users, cargo users, producers and government; and
- A concluding subsection on **wider economic impacts**, capturing productivity and connectivity effects beyond the core welfare framework.

6.3 As set out in the Methodology Report, **core socio-economic welfare impacts and wider economic impacts are presented separately** and are not aggregated, reflecting both methodological differences and the need to avoid double counting.

6.4 The results should be interpreted in the context of the **underlying capacity constraints within the UK aviation system**, particularly at Heathrow and Gatwick. The baseline forecasts used within the model for the purpose of the illustrative scenario analysis are derived from the Department for Transport's Aviation Model, which already incorporate these general capacity constraints. As a result:

- Growth in passenger volumes is inherently limited by available runway and terminal capacity; and
- The system is, in many cases, already operating close to its efficient frontier.

6.5 This has important implications for the interpretation of the results, particularly in scenarios where restrictions are decreased. In such cases, the limited availability of additional capacity—especially during peak daytime periods—means that the scope for additional activity is constrained, even where policy allows it.

6.6 Unless otherwise stated, all monetised values are presented in 2023 prices and discounted to a 2023 present value base consistent with HM Treasury Green Book conventions.

Overview of Results

6.7 Table 6.1 summarises the results across all scenarios, presenting across a 10 year appraisal period starting in 2028:

- Changes in passenger volumes over the appraisal period;
- Changes in cargo tonnage;
- Total socio-economic welfare impacts; and
- Wider economic impacts, expressed as a range based on alternative estimation approaches.

6.8 In relation to socio-economic welfare impacts, two versions of the results are presented. The first shows the impact if <u>all</u> passengers are included within the analysis. The second adjusts this result to reflect impacts accruing only to UK resident passengers. This latter analysis is based on CAA Passenger Survey data for 2024 at a whole airport level. Such data at individual flight or market level can have relatively small sample sizes and, hence, an aggregated assumption has been used.

6.9 A 10-year appraisal period (2028–2038) has been adopted for the analysis. This period was selected to align with previous assessments of the socio-economic impacts of night flying and to reflect the medium-term period over which airline scheduling structures, fleet deployment and airport operational responses are likely to adjust meaningfully to changes in the regime.

6.10 Taken together, these metrics provide a comprehensive view of how changes to the night flight regime affect both the **scale of aviation activity** and its **economic value**, including impacts that extend beyond direct market transactions.

6.11 The results are broadly consistent with the findings of the Literature Review. A clear pattern emerges across the scenarios: more restrictive scenarios lead to reductions in passenger volumes and cargo throughput, accompanied by material losses in both socio-economic welfare and wider economic impacts. Conversely, scenarios involving relaxation of the existing night flight regime generate positive effects, but these are generally more modest in scale and concentrated at specific airports. This reflects the literature review finding that night flying is economically important, but that its value is differentiated by airport, airline type, time period, passenger market and freight function.

Table 6.1: Summary of Net Impacts by Scenario (2023 prices, 2023 Discounting Base Year)

No.	Scenario Name	Airport	10 Year Passenger Impact (m)	10 Year Cargo Tonnage Impact	10 Year Socio Economic Welfare – All Passengers (NPV, £m)	10 Year Socio Economic Welfare – UK Passengers Only (NPV, £m)	10 Year Wider Economic Impacts (PV, £m)
1	**No Night Flights**	LHR	-1	-133,000	-£2,757	-£2,025	-£2,534 to -£5,017
		LGW	-54	-8,000	-£3,166	-£2,526	-£8,267 to -£12,715
		STN	-103	-121,000	-£5,760	-£4,442	-£15,723 to -£22,326
		Total	**-159**	**-262,000**	**-£11,684**	**-£8,993**	**-£26,525 to -£40,058**
2a	**10% QC Reduction**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	-26	-26,000	-£1,644	-£1,236	-£3,919 to -£5,566
		Total	**-26**	**-26,000**	**-£1,644**	**-£1,236**	**-£3,919 to -£5,566**
2b	**30% QC Reduction**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	-37	-39,000	-£2,303	-£1,739	-£5,609 to -£7,966
		Total	**-37**	**-39,000**	**-£2,303**	**-£1,739**	**-£5,609 to -£7,966**
2c	**50% QC Reduction**	LHR	0	-37,000	-£623	-£488	-£711 to -£1,412
		LGW	-7	0	-£228	-£176	-£985 to -£1,518
		STN	-72	-45,000	-£3,470	-£2,541	-£10,301 to -£14,640
		Total	**-79**	**-82,000**	**-£4,321**	**-£3,204**	**-£11,997 to -£17,569**
3a	**10% Movement Reduction**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	-26	-26,000	-£1,644	-£1,236	-£3,919 to -£5,566
		Total	**-26**	**-26,000**	**-£1,644**	**-£1,236**	**-£3,919 to -£5,566**

No.	Scenario Name	Airport	10 Year Passenger Impact (m)	10 Year Cargo Tonnage Impact	10 Year Socio Economic Welfare – All Passengers (NPV, £m)	10 Year Socio Economic Welfare – UK Passengers Only (NPV, £m)	10 Year Wider Economic Impacts (PV, £m)
3b	**30% Movement Reduction**	LHR	0	-28,000	-£514	-£393	-£539 to -£1,071
		LGW	-2	0	-£93	-£73	-£356 to -£548
		STN	-37	-39,000	-£2,303	-£1,739	-£5,609 to -£7,966
		Total	**-40**	**-67,000**	**-£2,910**	**-£2,206**	**-£6,504 to -£9,585**
3c	**50% Movement Reduction**	LHR	-1	-57,000	-£1,083	-£824	-£1,105 to -£2,202
		LGW	-13	0	-£619	-£484	-£1,939 to -£2,987
		STN	-59	-42,000	-£3,028	-£2,237	-£8,504 to -£12,085
		Total	**-72**	**-99,000**	**-£4,731**	**-£3,545**	**-£11,549 to -£17,274**
4a	**10% QC & Movement Reduction**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	-26	-26,000	-£1,644	-£1,236	-£3,919 to -£5,566
		Total	**-26**	**-26,000**	**-£1,644**	**-£1,236**	**-£3,919 to -£5,566**
4b	**30% QC & Movement Reduction**	LHR	0	-28,000	-£514	-£393	-£539 to -£1,071
		LGW	-2	0	-£93	-£73	-£356 to -£548
		STN	-37	-39,000	-£2,303	-£1,739	-£5,609 to -£7,966
		Total	**-40**	**-67,000**	**-£2,910**	**-£2,206**	**-£6,504 to -£9,585**
4c	**50% QC & Movement Reduction**	LHR	-1	-57,000	-£1,083	-£824	-£1,105 to -£2,202
		LGW	-13	0	-£619	-£484	-£1,939 to -£2,987
		STN	-72	-45,000	-£3,470	-£2,541	-£10,301 to -£14,640
		Total	**-85**	**-102,000**	**-£5,173**	**-£3,849**	**-£13,345 to -£19,829**
5	**06:30 NQP**	LHR	-2	-120,000	-£3,860	-£2,660	-£2,602 to -£5,377
		LGW	-7	0	-£260	-£203	-£1,001 to -£1,541
		STN	-53	-42,000	-£2,810	-£2,093	-£7,755 to -£11,018
		Total	**-62**	**-162,000**	**-£6,930**	**-£4,956**	**-£11,358 to -£17,937**
6	**23:00 NQP**	LHR	0	0	£0	£0	£0 to £0
		LGW	-7	0	-£295	-£232	-£1,036 to -£1,595
		STN	-45	-41,000	-£2,517	-£1,886	-£6,635 to -£9,425
		Total	**-52**	**-41,000**	**-£2,812**	**-£2,118**	**-£7,670 to -£11,020**
7	**No Restrictions**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
8a	**10% QC increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688

No.	Scenario Name	Airport	10 Year Passenger Impact (m)	10 Year Cargo Tonnage Impact	10 Year Socio Economic Welfare – All Passengers (NPV, £m)	10 Year Socio Economic Welfare – UK Passengers Only (NPV, £m)	10 Year Wider Economic Impacts (PV, £m)
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
8b	**30% QC increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
8c	**50% QC increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
9a	**10% Movement increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
9b	**30% Movement increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
9c	**50% Movement increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
10a	**10% QC & Movement increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
10b	**30% QC & Movement increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**
10c	**50% QC & Movement increase**	LHR	0	0	£0	£0	£0 to £0
		LGW	0	0	£0	£0	£0 to £0
		STN	+14	+1,000	+£616	+£413	£1,889 to £2,688
		Total	**+14**	**+1,000**	**+£616**	**+£413**	**£1,889 to £2,688**

Asymmetry Between Restriction and Relaxation

6.12 The results demonstrate a clear and consistent asymmetry between tightening and relaxing the night flight regime.

6.13 Under more restrictive scenarios, impacts are both negative and substantial across all metrics. For example, a full curfew (Scenario 1) results in:

- A total welfare loss of approximately **£11.7 billion (£9.0 billion UK passengers only)**; and
- Wider economic impacts in the range of **-£26.5 billion to -£40.1 billion**.

6.14 These losses are accompanied by significant reductions in passenger volumes and cargo throughput across all three airports.

6.15 By contrast, scenarios involving reduction of restrictions generate positive but relatively modest gains. Across Scenarios 7, 8 and 9a, total welfare gains are approximately **£0.6 billion (£0.4 billion UK passengers only)**, with wider economic impacts in the order of **£1.9 billion to £2.7 billion**, driven entirely by activity at Stansted.

6.16 This asymmetry reflects several reinforcing effects.

6.17 First, high-value activity is concentrated within particular overnight and early morning scheduling windows. Restrictions affecting these periods can therefore remove economically important connectivity, aircraft utilisation and freight logistics benefits that are difficult to fully replicate elsewhere in the schedule.

6.18 Second, the ability of airports and airlines to make productive use of additional overnight flexibility is constrained by wider operational and infrastructure limitations. In many cases, the airport system is already forecast to operate close to practical daytime capacity limits, meaning that additional night flexibility does not automatically translate into proportionate increases in passenger or cargo activity.

6.19 This is particularly evident at Heathrow, where wider runway and operational constraints already limit the extent of forecast growth within the baseline. At Gatwick, the introduction of the Northern Runway from 2029 provides additional daytime capacity through which forecast growth can largely be accommodated without requiring material additional use of the night period. As a result, the economic benefits associated with reducing night restrictions at Gatwick are more limited than might otherwise be expected.

6.20 More generally, the scale of potential upside under relaxation scenarios is ultimately constrained by the extent of underlying demand growth within the forecasting framework. Once forecast passenger and cargo demand has largely been accommodated within the wider airport system, additional overnight flexibility does not necessarily generate proportionate incremental activity.

6.21 The results should therefore not be interpreted as implying that relaxation scenarios are unrealistic or economically unimportant. Rather, they indicate that within the specific forecasting, infrastructure and capacity assumptions applied in this study, the marginal economic gains associated with additional night flexibility are generally more limited than the losses associated with removing established overnight operations.

Interaction with Baseline Demand Growth Assumptions

6.22 The limited gains observed under scenarios where the night flight regime is relaxed are also a direct function of the baseline demand assumptions underpinning the model.

6.23 The DfT Aviation Forecasts reflect:

- The ongoing, well known broader capacity constraints at Heathrow;
- Gradual expansion and optimisation at Gatwick followed by the opening of the Northern Runway in 2029; and
- Additional capacity at Stansted, Luton and London City.

6.24 This means that:

- Where baseline growth is already constrained (e.g. Heathrow), relaxing the night flight regime does not unlock significant additional demand or wider economic activity;
- Where growth can be accommodated within the daytime schedule (e.g. Gatwick, particularly with the North Runway), there is less need to utilise the night period for incremental capacity.

6.25 This is clearly reflected in both the welfare and wider impact results:

- Heathrow shows no material change in many relaxation scenarios;
- Gatwick similarly shows limited response, reflecting its ability to accommodate growth outside the night period;
- Stansted shows the only consistent positive response, albeit modest in scale in both welfare and wider economic terms.

Market Adjustment Mechanisms

6.26 The market impacts reported in Table 6.1 provide important context for interpreting both the welfare and wider economic results.

6.27 Across scenarios, the aviation system adjusts through a combination of:

- Retiming, where flights are moved into adjacent periods;
- Diversion, where activity shifts to alternative airports; and
- Demand loss, where services cannot be viably re-accommodated.

6.28 The results indicate that:

- Under modest constraints, retiming dominates, limiting both welfare loss and wider economic impact;
- As constraints tighten, retiming becomes increasingly infeasible, particularly at capacity-constrained airports;
- At this point, demand loss and displacement increase sharply, driving much larger impacts across both welfare and wider economic measures.

6.29 This transition is particularly evident when comparing:

- Scenario 2a (minimal impact) with Scenario 2c (material losses); and
- Scenario 3a with Scenario 3c.

6.30 In these cases, relatively small changes in policy result in disproportionately large increases in both welfare losses and wider economic impacts, reflecting the non-linear nature of the system.

6.31 The model allows for substantial retiming and operational adjustment before demand loss occurs. However, this flexibility varies materially by market segment. Passenger operations are generally able to retime within adjacent shoulder periods to a greater extent than integrator and express freight operations, where overnight sorting windows and next-day delivery commitments create stronger timing dependencies.

6.32 The resulting freight impacts should therefore be interpreted as reflecting the loss of economically viable overnight operating patterns rather than an assumption that all displaced freight demand is permanently lost from the airport system.

Differences Across Airports

6.33 The results show a clear differentiation across airports, which is consistent across both welfare and wider economic impacts.

- **Heathrow**:
  - Highly sensitive to scenarios affecting early-morning arrivals;
  - Significant cargo impacts under stronger restrictions (e.g. 57,000 tonnes lost in Scenario 3c);
  - Material wider economic impacts reflecting its role in global connectivity;
  - Limited response to relaxation scenarios reflects wider runway and operational capacity constraints within the baseline aviation forecasts. The analysis does not assume the delivery of a third runway at Heathrow.
- **Gatwick**:
  - Generally smaller impacts across all scenarios;
  - Reflects its ability to accommodate a significant proportion of forecast growth within the daytime schedule, particularly following the assumed introduction of the Northern Runway from 2029. Consistent with published airport commitments, the analysis assumes that the additional runway capacity is not primarily used to facilitate material growth in night operations;
  - Impacts are primarily associated with leisure traffic and marginal scheduling adjustments;
  - Correspondingly more limited wider economic impacts.
- **Stansted**:
  - Consistently the largest total impacts across both welfare and wider measures;
  - High sensitivity due to low-cost carrier utilisation patterns and concentration of express freight operations;

- Stronger response to both restriction and relaxation scenarios;
- Disproportionately large wider economic impacts, reflecting the role of freight and logistics in driving productivity effects.

6.34 The airport-specific infrastructure and operational assumptions underpinning the modelling framework are described in more detail within the Technical Annex.

Socio Economic Welfare Impacts

6.35 Table 6.2 presents the detailed socio-economic welfare results for all passengers, regardless of residency, broken down into:

- Passenger welfare;
- Cargo user impacts;
- Producer surplus; and
- Government revenue.

Table 6.2: Socio-Economic Welfare Impacts by Scenario – All Passengers (10 Year NPV, £m, 2023 prices, 2023 Discounting Base Year)

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
1	**No Night Flights**	LHR	-£1,403	-£21	-£1,318	-£15	-£2,742	-£2,757
		LGW	-£3,061	-£3	-£943	+£841	-£4,007	-£3,166
		STN	-£4,595	-£1,285	-£1,916	+£2,035	-£7,796	-£5,760
		Total	**-£9,059**	**-£1,308**	**-£4,177**	**+£2,861**	**-£14,545**	**-£11,684**
2a	**10% QC Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,421	-£298	-£442	+£516	-£2,160	-£1,644
		Total	**-£1,421**	**-£298**	**-£442**	**+£516**	**-£2,160**	**-£1,644**
2b	**30% QC Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,966	-£431	-£646	+£740	-£3,043	-£2,303
		Total	**-£1,966**	**-£431**	**-£646**	**+£740**	**-£3,043**	**-£2,303**
2c	**50% QC Reduction**	LHR	-£258	-£4	-£357	-£3	-£619	-£623
		LGW	-£250	£0	-£60	+£81	-£309	-£228
		STN	-£3,240	-£438	-£1,201	+£1,410	-£4,880	-£3,470
		Total	**-£3,748**	**-£443**	**-£1,618**	**+£1,488**	**-£5,809**	**-£4,321**
3a	**10% Movement Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,421	-£298	-£442	+£516	-£2,160	-£1,644
		Total	**-£1,421**	**-£298**	**-£442**	**+£516**	**-£2,160**	**-£1,644**
3b	**30% Movement Reduction**	LHR	-£232	-£4	-£277	-+£2	-£512	-£514
		LGW	-£95	£0	-£21	+£23	-£116	-£93
		STN	-£1,966	-£431	-£646	+£740	-£3,043	-£2,303
		Total	**-£2,293**	**-£435**	**-£944**	**+£761**	**-£3,671**	**-£2,910**

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
3c	**50% Movement Reduction**	LHR	-£497	-£7	-£575	-£5	-£1,078	-£1,083
		LGW	-£644	£0	-£177	+£202	-£821	-£619
		STN	-£2,759	-£435	-£991	+£1,156	-£4,184	-£3,028
		Total	**-£3,899**	**-£442**	**-£1,743**	**+£1,353**	**-£6,084**	**-£4,731**
4a	**10% QC & Movement Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,421	-£298	-£442	+£516	-£2,160	-£1,644
		Total	**-£1,421**	**-£298**	**-£442**	**+£516**	**-£2,160**	**-£1,644**
4b	**30% QC & Movement Reduction**	LHR	-£232	-£4	-£277	-£2	-£512	-£514
		LGW	-£95	£0	-£21	+£23	-£116	-£93
		STN	-£1,966	-£431	-£646	+£740	-£3,043	-£2,303
		Total	**-£2,293**	**-£435**	**-£944**	**+£761**	**-£3,671**	**-£2,910**
4c	**50% QC & Movement Reduction**	LHR	-£497	-£7	-£575	-£5	-£1,078	-£1,083
		LGW	-£644	£0	-£177	+£202	-£821	-£619
		STN	-£3,240	-£438	-£1,201	+£1,410	-£4,880	-£3,470
		Total	**-£4,381**	**-£445**	**-£1,953**	**+£1,607**	**-£6,779**	**-£5,173**
5	**06:30 NQP**	LHR	-£2,300	-£49	-£1,500	-£11	-£3,849	-£3,860
		LGW	-£270	£0	-£73	+£83	-£343	-£260
		STN	-£2,500	-£430	-£920	+£1,040	-£3,850	-£2,810
		Total	**-£5,070**	**-£479**	**-£2,493**	**+£1,112**	**-£8,042**	**-£6,930**
6	**23:00 NQP**	LHR	£0	£0	£0	£0	£0	£0
		LGW	-£300	£0	-£83	+£88	-£383	-£295
		STN	-£2,200	-£430	-£770	+£883	-£3,400	-£2,517
		Total	**-£2,500**	**-£430**	**-£853**	**+£971**	**-£3,783**	**-£2,812**
7	**No Restrictions**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
8a	**10% QC increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
8b	**30% QC increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
8c	**50% QC increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
9a	**10% Movement increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
9b	**30% Movement increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
9c	**50% Movement increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
10a	**10% QC & Movement increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
10b	**30% QC & Movement increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**
10c	**50% QC & Movement increase**	LHR	+£0	+£0	+£0	£0	+£0	+£0
		LGW	+£0	+£0	+£0	£0	+£0	+£0
		STN	+£707	+£1	+£181	-£273	+£889	+£616
		Total	**+£707**	**+£1**	**+£181**	**-£273**	**+£889**	**+£616**

6.36 Table 6.3 shows the same information but with passenger welfare limited to UK passengers only.

Table 6.3: Socio-Economic Welfare Impacts by Scenario – UK Passengers Only (10 Year NPV, £m, 2023 prices, 2023 Discounting Base Year)

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
1	**No Night Flights**	LHR	-£671	-£21	-£1,318	-£15	-£2,010	-£2,025
		LGW	-£2,420	-£3	-£943	£841	-£3,367	-£2,526
		STN	-£3,277	-£1,285	-£1,916	£2,035	-£6,477	-£4,442
		Total	**-£6,368**	**-£1,308**	**-£4,177**	**£2,861**	**-£11,854**	**-£8,993**
2a	**10% QC Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
		STN	-£1,013	-£298	-£442	£516	-£1,753	-£1,236
		Total	**-£1,013**	**-£298**	**-£442**	**£516**	**-£1,753**	**-£1,236**
2b	**30% QC Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,402	-£431	-£646	£740	-£2,479	-£1,739
		Total	**-£1,402**	**-£431**	**-£646**	**£740**	**-£2,479**	**-£1,739**
2c	**50% QC Reduction**	LHR	-£123	-£4	-£357	-£3	-£484	-£488
		LGW	-£197	£0	-£60	£81	-£257	-£176
		STN	-£2,311	-£438	-£1,201	£1,410	-£3,951	-£2,541
		Total	**-£2,632**	**-£443**	**-£1,618**	**£1,488**	**-£4,692**	**-£3,204**
3a	**10% Movement Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,013	-£298	-£442	£516	-£1,753	-£1,236
		Total	**-£1,013**	**-£298**	**-£442**	**£516**	**-£1,753**	**-£1,236**
3b	**30% Movement Reduction**	LHR	-£111	-£4	-£277	-£2	-£391	-£393
		LGW	-£75	£0	-£21	£23	-£96	-£73
		STN	-£1,402	-£431	-£646	£740	-£2,479	-£1,739
		Total	**-£1,588**	**-£435**	**-£944**	**£761**	**-£2,966**	**-£2,206**
3c	**50% Movement Reduction**	LHR	-£238	-£7	-£575	-£5	-£819	-£824
		LGW	-£509	£0	-£177	£202	-£686	-£484
		STN	-£1,967	-£435	-£991	£1,156	-£3,393	-£2,237
		Total	**-£2,714**	**-£442**	**-£1,743**	**£1,353**	**-£4,898**	**-£3,545**
4a	**10% QC & Movement Reduction**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	-£1,013	-£298	-£442	£516	-£1,753	-£1,236
		Total	**-£1,013**	**-£298**	**-£442**	**£516**	**-£1,753**	**-£1,236**
4b	**30% QC & Movement Reduction**	LHR	-£111	-£4	-£277	-£2	-£391	-£393
		LGW	-£75	£0	-£21	£23	-£96	-£73
		STN	-£1,402	-£431	-£646	£740	-£2,479	-£1,739
		Total	**-£1,588**	**-£435**	**-£944**	**£761**	**-£2,966**	**-£2,206**
4c	**50% QC & Movement Reduction**	LHR	-£238	-£7	-£575	-£5	-£819	-£824
		LGW	-£509	£0	-£177	£202	-£686	-£484
		STN	-£2,311	-£438	-£1,201	£1,410	-£3,951	-£2,541
		Total	**-£3,058**	**-£445**	**-£1,953**	**£1,607**	**-£5,456**	**-£3,849**
5	**06:30 NQP**	LHR	-£1,100	-£49	-£1,500	-£11	-£2,649	-£2,660
		LGW	-£214	£0	-£73	£83	-£287	-£203
		STN	-£1,783	-£430	-£920	£1,040	-£3,133	-£2,093

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
		Total	**-£3,096**	**-£479**	**-£2,493**	**£1,112**	**-£6,068**	**-£4,956**
6	**23:00 NQP**	LHR	£0	£0	£0	£0	£0	£0
		LGW	-£237	£0	-£83	£88	-£320	-£232
		STN	-£1,569	-£430	-£770	£883	-£2,769	-£1,886
		Total	**-£1,806**	**-£430**	**-£853**	**£971**	**-£3,089**	**-£2,118**
7	**No Restrictions**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
8a	**10% QC increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
8b	**30% QC increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
8c	**50% QC increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
9a	**10% Movement increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
9b	**30% Movement increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
9c	**50% Movement increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
10a	**10% QC & Movement increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
10b	**30% QC & Movement increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0

No.	Scenario Name	Airport	Passenger Welfare	Cargo User	Producer Surplus	Government Revenue	NPV exc. Government Revenue	NPV inc. Government Revenue
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**
10c	**50% QC & Movement increase**	LHR	£0	£0	£0	£0	£0	£0
		LGW	£0	£0	£0	£0	£0	£0
		STN	£504	£1	£181	-£273	£686	£413
		Total	**£504**	**£1**	**£181**	**-£273**	**£686**	**£413**

Overall Welfare Structure

6.37 Across all restrictive scenarios, the total welfare impact is negative, with a clear escalation in magnitude as constraints tighten. For example, Scenario 1 (No Night Flights) results in:

- Passenger welfare loss of £9.1 billion (£6.4 billion UK passengers only);
- Cargo welfare loss of £1.3 billion;
- Producer losses of £4.2 billion;
- Partially offset by £2.9 billion in government gains;
- Resulting in a net welfare loss of £11.7 billion (£9.0 billion UK passengers only).

6.38 This pattern is repeated across scenarios, with:

- Passenger welfare forming the largest component;
- Producer impacts contributing materially; and
- Government revenue providing only a partial offset.

Passenger Welfare – Dominant Driver

6.39 Passenger welfare is consistently the **largest component of total impact**, accounting for the majority of losses in all restrictive scenarios.

6.40 The results show a clear progression:

- Minimal impact in low-level constraint scenarios (e.g. 2a, 3a);
- Moderate impacts emerging in mid-range scenarios (e.g. 2c, 3b);
- Significant impacts under more severe restrictions (e.g. 3c, 5, 1).

6.41 For example, passenger welfare loss increases from:

- £1.4 billion (£0.7 billion UK passengers only) at Heathrow under Scenario 1 to
- £2.3 billion (£1.1 billion UK passengers only) under Scenario 5 (06:30 NQP), reflecting the sensitivity of early arrivals to changes in timing.

6.42 This demonstrates that:

- **Timing shifts**, rather than outright loss of passengers, are a major driver of welfare loss;
- Early-morning and late-evening windows carry disproportionate value.

Cargo Impacts – High Sensitivity, Lower Absolute Value

6.43 Cargo impacts are relatively small in absolute monetary terms but show clear and consistent patterns:

- Cargo impacts increase steadily with the severity of restrictions;
- They are particularly concentrated at Heathrow and Stansted;
- Even modest tonnage losses translate into measurable welfare effects.

6.44 For example, Scenario 3c results in cargo losses of:

- 57,000 tonnes at Heathrow and
- 4,000 tonnes at Stansted, contributing to overall welfare losses.

6.45 These results reflect:

- The high value of time associated with freight;
- The importance of overnight logistics cycles;
- Limited ability to substitute away from night operations.

Producer Impacts – Structural Effects

6.46 Producer impacts are consistently negative under restrictive scenarios and follow a similar pattern to passenger welfare.

6.47 Key observations include:

- Large producer losses in high-impact scenarios (e.g. **£4.0 billion total under Scenario 1**);
- Strong concentration at Stansted and Heathrow;
- Close alignment with passenger and cargo impacts.

6.48 These impacts reflect:

- Reduced aircraft utilisation;
- Loss of high-value rotations;
- Disruption to network efficiency.

6.49 Importantly, these are **not marginal effects**. They reflect structural changes in how airlines are able to operate their fleets and schedules. The broader potential impacts of this are significant, with airline costs rising impacts all passengers across the network.

Government Revenue – Partial Offset

6.50 Government impacts are generally positive in restrictive scenarios, providing a partial offset to welfare losses. For example, Scenario 1 generates **£2.9 billion in government gains**, largely offsetting part of the user and producer losses.

6.51 However:

- These gains are not sufficient to offset total welfare losses;
- They reflect redistribution rather than net economic benefit.

Interpretation of Socio-Economic Welfare Results

6.52 The detailed results reinforce several key conclusions:

- Non-linearity of impacts: impacts increase **more than proportionally** as constraints tighten, reflecting the loss of structurally important time windows;
- Importance of timing over volume: the economic value of night flights is driven by **when flights occur**, not simply how many operate;
- Freight as a critical component: freight impacts are smaller in absolute terms but play a **disproportionate role in total welfare**, particularly at Stansted.
- System constraints limit upside: The modest gains observed under relaxation scenarios are driven not by lack of demand, but by **lack of capacity to accommodate additional activity**, particularly at Heathrow and Gatwick.

Wider Economic Impacts

6.53 The wider economic impacts presented in Table 6.4 provide an indication of how changes to night flying may influence economic performance beyond the direct user and producer effects captured within the core welfare analysis.

6.54 As set out in the methodology, these impacts are estimated using two complementary approaches:

6.55 A **connectivity-productivity approach**, which links changes in air connectivity to productivity and economic output; and

6.56 A **regional catalytic approach**, which captures the role of aviation activity in supporting employment, supply chains and wider regional economic performance.

6.57 These approaches reflect different transmission mechanisms and therefore generate a **range of potential impacts**, rather than a single point estimate. Consistent with best practice, these impacts are presented separately from core welfare results and are not aggregated, in order to avoid double counting.

Table 6.4: Wider Economic Impacts by Scenario (10 Year Present Value, £m, 2023 prices, 2023 Discounting Base Year)

No.	Scenario Name	Airport	Connectivity Productivity Approach	Regional Catalytic Approach
1	No Night Flights	LHR	-£2,534	-£5,017
		LGW	-£8,267	-£12,715
		STN	-£15,723	-£22,326
		Total	-£26,525	-£40,058
2a	10% QC Reduction	LHR	£0	£0
		LGW	£0	£0
		STN	-£3,919	-£5,566
		Total	-£3,919	-£5,566
2b	30% QC Reduction	LHR	£0	£0
		LGW	£0	£0
		STN	-£5,609	-£7,966

No.	Scenario Name	Airport	Connectivity Productivity Approach	Regional Catalytic Approach
		Total	-£5,609	-£7,966
2c	50% QC Reduction	LHR	-£711	-£1,412
		LGW	-£985	-£1,518
		STN	-£10,301	-£14,640
		Total	-£11,997	-£17,569
3a	10% Movement Reduction	LHR	£0	£0
		LGW	£0	£0
		STN	-£3,919	-£5,566
		Total	-£3,919	-£5,566
3b	30% Movement Reduction	LHR	-£539	-£1,071
		LGW	-£356	-£548
		STN	-£5,609	-£7,966
		Total	-£6,504	-£9,585
3c	50% Movement Reduction	LHR	-£1,105	-£2,202
		LGW	-£1,939	-£2,987
		STN	-£8,504	-£12,085
		Total	-£11,549	-£17,274
4a	10% QC & Movement Reduction	LHR	£0	£0
		LGW	£0	£0
		STN	-£3,919	-£5,566
		Total	-£3,919	-£5,566
4b	30% QC & Movement Reduction	LHR	-£539	-£1,071
		LGW	-£356	-£548
		STN	-£5,609	-£7,966
		Total	-£6,504	-£9,585
4c	50% QC & Movement Reduction	LHR	-£1,105	-£2,202
		LGW	-£1,939	-£2,987
		STN	-£10,301	-£14,640
		Total	-£13,345	-£19,829
5	06:30 NQP	LHR	-£2,602	-£5,377
		LGW	-£1,001	-£1,541
		STN	-£7,755	-£11,018
		Total	-£11,358	-£17,937
6	23:00 NQP	LHR	£0	£0
		LGW	-£1,036	-£1,595
		STN	-£6,635	-£9,425
		Total	-£7,670	-£11,020
7	No Restrictions	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688

No.	Scenario Name	Airport	Connectivity Productivity Approach	Regional Catalytic Approach
8a	10% QC increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
8b	30% QC increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
8c	50% QC increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
9a	10% Movement increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
9b	30% Movement increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
9c	50% Movement increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
10a	10% QC & Movement increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
10b	30% QC & Movement increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688
10c	50% QC & Movement increase	LHR	£0	£0
		LGW	£0	£0
		STN	+£1,889	+£2,688
		Total	+£1,889	+£2,688

Overall Scale and Pattern of Impacts

6.58 The results show that wider economic impacts are:

- **material in scale**, particularly under more restrictive scenarios;
- **consistently aligned in direction** with the core welfare results; and

- **subject to a degree of uncertainty**, reflected in the range between the two approaches and, more generally, the greater uncertainty around estimating wider economic impacts generally.

6.59 Under the most restrictive scenario (Scenario 1 – No Night Flights), total wider economic impacts are estimated at between **-£26.5 billion and -£40.1 billion** over the appraisal period.

6.60 This is significantly larger than the corresponding welfare loss of £11.7 billion, reflecting the fact that wider impacts capture structural effects on productivity, connectivity and economic activity that extend beyond direct market transactions.

6.61 However, this difference should not be interpreted as additional net benefit or cost. Rather, it reflects the different analytical lenses being applied, with wider impacts capturing second-order effects that overlap with, but are not fully represented within, welfare metrics.

Asymmetry and Non-Linearity

6.62 As with the core welfare results, the wider impacts exhibit a clear asymmetry:

- **Tightening the night flight regime leads to large negative impacts**, increasing rapidly as constraints become more binding;
- **Relaxation the night flight regime produces relatively modest positive impacts**, typically concentrated at Stansted and limited in overall scale.

6.63 For example:

- Scenario 3c (50% movement reduction) results in wider impacts of between **-£11.5 billion and -£17.3 billion**;
- Scenario 7 (No Restrictions) produces a positive impact of only **£1.9 billion to £2.7 billion**, entirely driven by Stansted.

6.64 This reflects the same underlying dynamics observed in the welfare results:

- high-value activity is concentrated in specific time windows; and
- once lost, this activity cannot be fully recreated elsewhere in the system.

Airport-Level Effects

6.65 The distribution of wider impacts across airports closely mirrors the structural roles identified earlier in the report.

6.66 **Stansted consistently accounts for the largest share of wider impacts**, reflecting:

- the large impact on its passenger network;
- its role as a centre for express freight and logistics;
- the importance of overnight operations to integrator networks; and
- the limited flexibility of these systems to adjust to timing constraints.

6.67 **Heathrow also shows substantial impacts**, particularly in scenarios affecting early-morning arrivals:

- reflecting its role in global connectivity and hub operations;
- and the dependence of productivity effects on long-haul market access.

6.68 **Gatwick exhibits smaller but still material impacts**, consistent with:

- its more point-to-point structure; and
- its ability to accommodate activity within the daytime schedule, particularly with additional capacity.

6.69 This reinforces the conclusion that wider economic impacts are driven not simply by volumes of activity, but by the **functional role of each airport within the wider system**.

Relationship to Socio-Economic Welfare

6.70 While the wider impacts are larger in absolute terms than the welfare results, the relationship between the two is consistent and reinforcing.

6.71 In particular:

- Scenarios that generate the largest welfare losses (e.g. Scenario 1, Scenario 5, Scenario 3c) also generate the largest wider economic impacts;
- Scenarios with minimal welfare effects (e.g. small QC reductions) show correspondingly limited wider impacts; and
- The asymmetry between restriction and relaxation is evident in both sets of results.

6.72 This alignment provides confidence that the model is capturing a coherent picture of economic effects, with both approaches pointing to the same underlying conclusion: **night flying supports economically significant activity that is difficult to replicate outside the night period.**

Interpretation and Caveats

6.73 The wider impacts should be interpreted as **indicative rather than definitive estimates**, reflecting both methodological uncertainty and the complexity of the underlying relationships.

6.74 In particular:

- The connectivity-productivity approach captures long-run relationships that may not fully reflect short-term adjustment dynamics;
- The regional catalytic approach reflects broader economic associations that are not always strictly causal; and
- There is an inherent overlap between welfare and wider impacts, particularly where changes in connectivity influence user behaviour.

6.75 For these reasons:

- the results are presented as ranges rather than point estimates; and
- they are reported separately from core welfare impacts, consistent with appraisal guidance.

Overall Interpretation

6.76 Taken together, the wider economic impacts reinforce the central findings of the analysis.

6.77 They show that:

- the economic importance of night flying extends beyond direct user and producer benefits;
- impacts are concentrated in structurally important parts of the aviation system, particularly freight and long-haul connectivity; and
- restrictions that affect these areas can have **disproportionate effects on productivity and economic performance**.

6.78 At the same time, the results confirm that:

- the scope for generating additional wider benefits through relaxation is limited; and
- these constraints are driven by broader capacity and operational factors within the aviation system.

Conclusions

6.79 The results presented in this section provide a consistent and coherent picture of the economic role of night flying across the three designated airports. . The results are broadly consistent with the findings of the Literature Review. A clear pattern emerges across the scenarios: more restrictive scenarios lead to reductions in passenger volumes and cargo throughput, accompanied by material losses in both socio-economic welfare and wider economic impacts. Conversely, scenarios involving relaxation of the existing night flight regime generate positive effects, but these are generally more modest in scale and concentrated at specific airports. This reflects the literature review finding that night flying is economically important

6.80 Across all scenarios, the analysis demonstrates that night flying supports activity that is **highly concentrated, time-sensitive and structurally embedded within the aviation system**. As a result, changes to the night flight regime do not have uniform effects, but instead impact those parts of the schedule that are most difficult to replicate elsewhere.

6.81 A clear asymmetry is evident throughout the results. **Tightening the night flight regime leads to material and, in some cases, substantial economic losses**, increasing non-linearly as constraints become more binding. By contrast, **relaxation of the night flight regime generates only modest gains**, reflecting the extent to which the system is already operating close to its effective capacity, particularly at Heathrow and Gatwick.

6.82 These outcomes are driven by three core factors:

- The concentration of economic value in specific time windows, particularly early-morning arrivals and overnight freight operations;
- The structural dependence of key user groups and business models on these periods; and
- The presence of wider capacity constraints, which limit the ability of the system to adjust through retiming or expansion.

6.83 The results also highlight the importance of considering both **core socio-economic welfare impacts and wider economic effects**. While the latter are subject to greater uncertainty, they reinforce the central conclusion that changes to night flying can have implications beyond direct market outcomes, particularly through effects on connectivity, productivity and logistics networks.

6.84 Finally, the analysis confirms that impacts vary significantly across airports. Heathrow is most sensitive to changes affecting connectivity and long-haul arrivals, Gatwick shows more limited impacts reflecting its greater operational flexibility, and Stansted emerges as the most sensitive overall, driven by its role in low-cost operations and express freight.

6.85 Taken together, these findings underline the importance of assessing night flying not simply in terms of the volume of activity affected, but in terms of its **functional role within the wider aviation system**.

7. Appendix A: Description of the Model and its Architecture

Purpose of the Model

7.1 The modelling framework has been developed to estimate the potential socio-economic impacts of changes to the night flight regime at Heathrow, Gatwick and Stansted Airports. It is intended to assess how changes in the availability of night operations may affect aircraft movements, passenger volumes, cargo activity, airline and airport operations, user welfare, producer impacts, government revenue and wider economic performance.

7.2 The model has been developed specifically for the assessment of night flying policy. It is therefore designed to reflect the particular operational and economic characteristics of overnight and early-morning aviation activity, including the role of early long-haul arrivals, aircraft utilisation, freight logistics, transfer connectivity and the ability or otherwise of airlines to retime operations into adjacent periods.

7.3 The model is not a simple movement-counting tool. It does not assume that a change in the night flight regime removes or adds a fixed number of flights and then applies an average value to each flight. Instead, it constructs a baseline schedule, applies the relevant policy scenario, estimates likely airline responses and then translates the resulting changes in activity and service quality into economic impacts.

7.4 The outputs should therefore be interpreted as structured scenario estimates rather than precise predictions of individual airline decisions. The model is designed to provide a transparent and internally consistent basis for comparing policy scenarios.

Overall Model Architecture

7.5 The model operates through a sequence of linked analytical stages.

7.6 First, a baseline schedule is constructed. This represents the counterfactual position against which policy scenarios are assessed. The baseline draws on observed 2024 airport schedules, DfT aviation forecasts, airport capacity assumptions, movement patterns, passenger and cargo data, and wider operational assumptions. The purpose of the baseline is to represent the level and structure of activity that would be expected in the absence of the policy change being tested.

7.7 Second, the model applies the relevant policy scenario. Scenarios may involve changes to movement limits, quota count restrictions, control periods or the degree of permitted night activity. The model then identifies where the baseline schedule would breach the scenario constraints, or where additional headroom would exist.

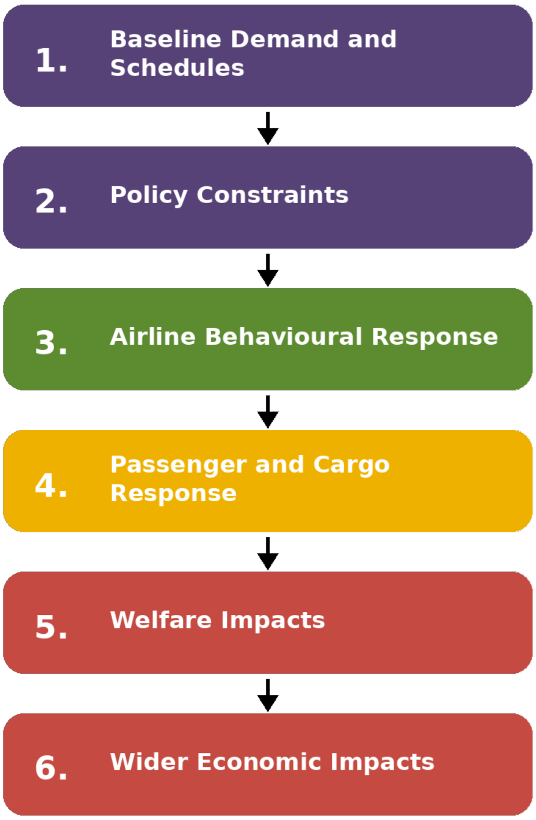
7.8 Third, the model simulates airline and airport responses. Airlines are assumed to respond in a commercially rational way, seeking to preserve higher-value and less flexible operations where possible. The model therefore applies a hierarchy of possible responses, including aircraft substitution, retiming, diversion, cancellation and, where capacity permits, add-back of previously constrained activity.

7.9 Fourth, the model estimates the impact of these operational changes on passengers, cargo users, airlines, airports and government. This includes changes in passenger volumes, cargo tonnage, timing, connectivity, airport choice, service reliability, airline revenues and costs, and Air Passenger Duty receipts.

7.10 Finally, wider economic impacts are assessed separately. These are intended to capture broader productivity and catalytic effects associated with changes in aviation connectivity and accessibility. They are reported separately from the core welfare results and are not added mechanically to the main socio-economic welfare estimates.

7.11 In simplified terms, the modelling flow is shown in Figure 7.1.

Figure 7.1: Simplified Modelling Flow



Baseline Schedule and Counterfactual

7.12 The baseline is a central part of the modelling framework. It represents the counterfactual schedule against which all policy scenarios are compared. This is important because many changes in airport activity over time would occur regardless of any change to the night flight regime. These include underlying demand growth, wider airport capacity constraints, infrastructure changes, fleet evolution and changes in passenger and cargo markets.

7.13 The baseline schedule is developed from observed airport operating patterns and forecast movement growth. Rather than applying growth only as a top-down percentage increase, the model creates a synthetic schedule that retains movement-level characteristics such as airport, airline type, route type, timing, aircraft type, passenger load, cargo relevance and operational grouping.

7.14 This approach is important because the economic value of night flying depends heavily on when flights operate and what role they perform. For example, an early-morning long-haul arrival at Heathrow may support onward passenger connections and bellyhold freight movements, while a late-night return at

Gatwick or Stansted may be important for aircraft utilisation. Similarly, an overnight freight movement at Stansted may form part of a time-critical express logistics chain.

7.15 The baseline therefore aims to preserve the operational structure of airport activity while reconciling movements to forecast demand and capacity assumptions. This gives the model a realistic counterfactual against which to test policy change.

Policy Scenarios and Operational Constraints

7.16 Each policy scenario is represented as a change in the constraints applying to airport operations. These constraints may include movement caps, quota count limits, control period definitions, restrictions on particular time windows, or changes in the extent to which night or shoulder-period operations can be used.

7.17 The model compares the baseline schedule with the policy constraint in each scenario. Where the baseline schedule exceeds the permitted level of activity, the model identifies the scale and nature of the required adjustment. Where a relaxation creates additional capacity headroom, the model tests whether additional demand can be accommodated within the broader operational and forecast assumptions.

7.18 This distinction is important. Relaxing a night flight restriction does not automatically generate additional activity or economic value. Additional benefit arises only where there is underlying demand to be accommodated and where wider capacity, fleet, scheduling and airport constraints allow that demand to be served. This is particularly relevant at Heathrow and Gatwick, where broader capacity constraints influence the extent to which additional night flexibility can be productively used. At Gatwick, planned additional capacity associated with the Northern Runway also affects the extent to which forecast growth can be accommodated outside the night period.

7.19 The model therefore treats the night flight regime as one part of a wider aviation capacity and scheduling system, rather than as an isolated constraint.

Airline Behavioural Response

7.20 A core feature of the modelling framework is the treatment of airline behaviour. The model assumes that airlines respond to restrictions in a commercially rational way. This means that they seek to preserve higher-value, less flexible and operationally important activity wherever possible, while lower-value or more flexible activity is affected first.

7.21 The model therefore does not assume that all flights are equally likely to be cancelled, retimed or diverted. Instead, it differentiates movements according to their commercial and operational importance. This includes consideration of:

- the estimated value of the movement or operational grouping to the airline;
- the role of the flight within a wider aircraft rotation;
- whether the service supports transfer connectivity;
- whether the service carries significant cargo;
- the feasibility of retiming into adjacent periods;
- the feasibility of diversion to an alternative airport; and
- the airline business model.

7.22 The model applies a hierarchy of behavioural responses. Where quota count restrictions are binding, some operators may be able to respond through aircraft substitution, using newer-generation aircraft with lower quota count values. This is represented in a simplified way and is not intended to be a detailed fleet planning model.

7.23 Where flights cannot remain in the restricted period, the model first tests whether they can be retimed into an adjacent feasible period. Retiming is not assumed to be costless: it may reduce passenger convenience, weaken transfer connectivity, affect cargo service windows or reduce commercial attractiveness.

7.24 Where retiming is not feasible or commercially viable, the model may test diversion to another airport. Diversion may preserve some activity, but it is assumed to impose additional costs and inconvenience on passengers, cargo users and airlines. Where neither retiming nor diversion is feasible, the model treats the movement as cancelled or otherwise lost from the modelled system.

7.25 This behavioural hierarchy is important because it helps explain the non-linear nature of the results. Modest restrictions may be absorbed through retiming or operational adjustment. More severe restrictions eventually affect activity that is more valuable and less flexible, leading to larger economic impacts.

Movement Value, Revenues and Costs

7.26 The model estimates the commercial value of flights and operational groupings in order to help determine which activities are most likely to be preserved under constraint.

7.27 Passenger revenues are estimated using airline yield relationships derived from fare data. These relationships identify how yield per revenue passenger kilometre varies by route distance and airline business model. The model also includes allowances for ancillary revenues and other charges, such as baggage, seat selection, fuel surcharges and airport-related charges, where relevant. For some airline groups, evidence on time-of-day yield differences has also been used to adjust revenue assumptions.

7.28 Passenger composition is estimated using airport data and CAA Passenger Survey evidence, including the split between origin-and-destination passengers, transfer passengers, business passengers and leisure passengers.

7.29 Freight revenues are estimated separately by cargo type. Bellyhold freight assumptions are based on airline evidence, publicly quoted freight rates and industry benchmarks. General cargo and express freight rates are informed by airline accounts, stakeholder discussions, integrator evidence and published shipping rates.

7.30 Operating costs are estimated using aircraft-type block-hour operating cost evidence, drawing primarily on US DOT Form 41 Schedule Airline Cost data, supplemented by analysis of airline report and accounts to identify typical operating margins by airline type. The model does not estimate individual cost components separately, such as fuel, crew, maintenance or ownership, because the available evidence is not sufficiently consistent across all airlines and aircraft types. Instead, a simplified total operating cost is applied to each flight or operational unit.

7.31 The resulting movement value is therefore based on the broad relationship:

Movement value = estimated revenue – estimated operating cost – relevant adjustment penalties.

7.32 This value is used both to inform airline behavioural response and to support producer surplus calculations.

Passenger Behaviour and Welfare

7.33 Passenger impacts are assessed through changes in service availability, timing, airport choice and connectivity. The model differentiates between business passengers, leisure passengers, transfer passengers and origin-and-destination passengers, reflecting their differing sensitivity to time, reliability, fare and airport access.

7.34 The model uses DfT value of time assumptions expressed in 2023 prices. Business passengers are assigned a higher value of time than leisure passengers, reflecting standard transport appraisal practice. Schedule delay penalties are applied where passengers are moved away from their preferred travel time, and a schedule delay multiplier is used to reflect the wider inconvenience associated with travelling at a materially less attractive time.

7.35 The model also includes missed-connection effects, particularly relevant at Heathrow where early-morning long-haul arrivals support onward domestic, European and long-haul connectivity. Where retiming causes passengers to miss a preferred connection wave, the model applies an effective delay penalty reflecting the time to the next available connection opportunity and the associated inconvenience.

7.36 Diversion impacts are represented through airport-specific penalties expressed in equivalent minutes of additional generalised cost. These reflect increased surface access time, weaker connectivity, reduced airport preference and disruption to established travel patterns.

7.37 Passenger attrition assumptions are also applied. These reflect the fact that some passengers may continue travelling after retiming or diversion, some may switch airport or airline, and some demand may be lost entirely. Attrition rates are higher where disruption requires airport diversion rather than retiming at the same airport.

7.38 Core passenger assumptions are set out in table 7.1.

Table 7.1: Core Passenger Behaviour Assumptions

Assumption area	Core assumption
Business passenger value of time	£34.17 per hour
Leisure passenger value of time	£9.51 per hour
Schedule delay multiplier	3.0
All-passenger fare elasticity	-0.9
Passenger retime attrition	4% at Heathrow; 5% at Gatwick and Stansted
Passenger diversion attrition	16% at Heathrow; 17% at Gatwick and Stansted
Missed connection penalty	810 minutes equivalent delay (including delay multiplier)

7.39 The passenger welfare calculation follows standard transport appraisal principles, including the use of generalised cost changes and rule-of-half treatment where relevant.

Freight Behaviour and Cargo User Impacts

7.40 Freight is treated separately from passengers because the economic significance of timing is different. For passengers, the main impacts are typically schedule delay, reliability, airport access and connectivity. For freight, the key issue is often whether a shipment can meet a particular logistics service window.

7.41 The model distinguishes between bellyhold freight, general cargo and integrator or express freight. This distinction is important because express freight and integrator operations are highly dependent on overnight sortation, next-day delivery commitments and downstream distribution windows. A delay of one or two hours may therefore have a larger economic impact than the elapsed time alone would suggest.

7.42 Freight values of time are differentiated by cargo type, as set out in table 7.2.

Table 7.2: Air Cargo Values of Time

Cargo type	Value of time
Bellyhold freight	£20 per tonne-hour
General cargo	£40 per tonne-hour
Integrator / express freight	£100 per tonne-hour

7.43 The higher value applied to integrator and express freight reflects the importance of reliability, next-day delivery commitments and logistics-chain integrity. These values are informed by stakeholder evidence, logistics industry evidence and the literature review.

7.44 The model also applies cargo diversion penalties, reflecting additional trucking time, reduced logistics efficiency, operational disruption and reduced attractiveness of alternative airports. For integrator freight, a diversion attrition assumption of 15% is applied. This reflects the view that while a substantial proportion of freight activity may be retained through trucking or operational adjustment, some traffic is likely to be lost where overnight service integrity is materially degraded.

7.45 Cargo demand responses are also differentiated using generalised cost elasticities, as set out in table 7.3.

Table 7.3: Freight Generalised Cost Elasticities

Cargo type	Generalised cost elasticity
Integrator / express freight	-0.25
General cargo	-0.45
Bellyhold freight	-0.60

7.46 The lower elasticity applied to integrator freight reflects the relatively limited substitutability of time-definite logistics services.

Producer Surplus, Government Revenue and Welfare

7.47 The model estimates impacts on passengers, cargo users, producers and government.

7.48 Producer impacts primarily reflect changes in airline and airport revenues and costs. A cancelled flight results in lost revenue but may also avoid operating cost. A retimed flight may retain most revenue but incur schedule-related penalties, attrition or additional operating cost. A diverted flight may retain part of its market but incur additional costs and reduced commercial value.

7.49 Government revenue impacts are mainly driven by changes in Air Passenger Duty receipts associated with changes in passenger volumes. These are reported separately because fiscal effects have a different interpretation from direct user or producer welfare effects.

7.50 The model reports socio-economic welfare impacts as the combination of passenger user impacts, cargo user impacts, producer surplus and government revenue. Results can be presented with and without government revenue, depending on the reporting requirement.

7.51 Representative-day impacts are annualised using airport-specific scaling factors and then discounted over the appraisal period to produce present value and net present value outputs.

Wider Economic Impacts

7.52 The model also estimates wider economic impacts separately from the core welfare results. These wider impacts are intended to capture broader productivity and catalytic effects associated with changes in aviation connectivity and accessibility.

7.53 Two approaches are applied.

7.54 The first is a national connectivity-productivity approach. This draws on the literature review and supporting econometric evidence linking aviation connectivity to productivity. The model applies a central elasticity of 0.05, meaning that a 1% change in economically meaningful aviation connectivity is associated with an approximately 0.05% change in national productivity. This calibration is aligned with Oxford Economics evidence, which is particularly relevant because its connectivity metric incorporates both business passenger connectivity and air freight.

7.55 The second is a regional catalytic approach. This estimates the relationship between aviation accessibility and regional productivity using separate passenger and freight accessibility measures. The passenger approach uses an economically weighted connectivity index incorporating direct and indirect routings, frequency, seat capacity, journey time, airline compatibility and destination economic importance. The freight approach uses a separate freight accessibility framework reflecting logistics connectivity and infrastructure access.

7.56 The regional passenger approach applies an elasticity of approximately 0.09, meaning that a 1% increase in effective passenger connectivity is associated with an approximately 0.09% increase in regional productivity. The regional freight approach applies an elasticity of approximately 0.05, meaning that a 1% increase in effective freight accessibility is associated with an approximately 0.05% increase in regional productivity.

7.57 Wider economic impacts are reported separately from the core welfare results. They are not added mechanically to passenger welfare, cargo welfare, producer surplus or government revenue. This separation is important because wider impact relationships are more uncertain and may overlap conceptually with some mechanisms captured in the welfare analysis.

Evidence Base and Calibration

7.58 The model has been calibrated using a hierarchy of evidence sources. These include:

- observed airport and schedule data;
- DfT aviation forecasts;
- airport operational information;
- CAA Passenger Survey data;
- stakeholder engagement with airports, airlines and freight operators;
- fare data and airline financial accounts;
- logistics and freight pricing evidence;
- DfT appraisal values and guidance;
- literature review findings; and
- analytical judgement where direct empirical evidence is unavailable.

7.59 The model therefore combines empirical data, observed schedule structures, stakeholder evidence and economic appraisal principles. This is important because many behavioural responses to hypothetical future policy scenarios cannot be observed directly. The assumptions are therefore evidence-informed rather than mechanically estimated from a single historic dataset.

7.60 The model has also been designed to support sensitivity testing. Key assumptions that can materially affect the results include retiming flexibility, diversion feasibility, passenger attrition, cargo values of time, cargo service penalties, airline revenue retention, producer cost assumptions and wider economic elasticities.

Data Quality and Calibration

7.61 The model has been developed using a detailed and diverse evidence base. This includes airport operational data, DfT aviation forecasts, CAA Passenger Survey evidence, CAA Statistics, ACL Coordination Reports, airport, airline and freight stakeholder evidence, fare data, airline financial information, published logistics data, the literature review and analytical judgement. Some of the evidence used is publicly available, while other evidence has been provided by stakeholders on a confidential basis.

7.62 However, it is important to recognise the practical limitations of aviation data at the level of individual flights. While movement-level schedule data provides a strong basis for understanding timing, airport, aircraft type, airline and broad route characteristics, it does not always provide a complete picture of the economic role of each flight. For example, information on passenger journey purpose, nationality, final origin and destination, transfer behaviour, cargo composition and freight urgency is not consistently available at flight level.

7.63 The model therefore uses a process of evidence triangulation. Where flight-level data is incomplete, it draws on wider evidence sources to infer the likely characteristics and economic role of movements. For example, CAA Passenger Survey evidence is used to inform passenger mix, airport and airline evidence is used to inform operational behaviour, fare and yield data is used to estimate passenger revenues, and stakeholder evidence is used to calibrate freight sensitivity and airline response assumptions.

7.64 This approach is appropriate for strategic policy appraisal, but it means that the model should not be interpreted as a precise prediction of the outcome for each individual flight. Rather, it is a structured scenario model that uses the best available evidence to represent the likely direction, scale and distribution of impacts across airports, time periods, airline types and user groups.

7.65 The breadth of the evidence base provides confidence in the overall patterns and relative results produced by the model. Nevertheless, some uncertainty remains, particularly in relation to the detailed composition of passengers and freight on individual services and the precise behavioural response of airlines and users under hypothetical policy scenarios. These uncertainties are reflected in the interpretation of the model outputs and reinforce the importance of treating the results as evidence-based estimates of potential impacts, rather than exact forecasts of future market behaviour.

Interpretation and Limitations

7.66 The model provides a structured and transparent framework for assessing the socio-economic effects of changes to night flight policy. However, the results should be interpreted with appropriate caution, particularly given the data and behavioural uncertainties described above.

7.67 First, the model is a synthetic schedule model rather than a full operational simulation. It represents realistic airport and airline operating patterns but does not predict individual airline decisions at tail-number level.

7.68 Second, airline behaviour is inherently uncertain. Actual responses would depend on commercial strategy, fleet availability, slot holdings, network design, bilateral rights, cargo contracts and wider market conditions.

7.69 Third, freight valuation is subject to greater uncertainty than passenger valuation, because cargo data and freight time sensitivity are less standardised than passenger appraisal values.

7.70 Fourth, wider economic impacts are more uncertain than direct welfare impacts and may overlap conceptually with some mechanisms captured in the welfare analysis. They are therefore reported separately and should be interpreted as indicative estimates of the potential scale and direction of wider productivity effects, not as precise forecasts of GDP change.

7.71 Finally, the model assesses the socio-economic impacts of night flying policy. It does not provide a complete assessment of all policy impacts, particularly environmental and noise impacts, which are considered through separate evidence streams. The model outputs should therefore be viewed as one part of the wider evidence base for night flight policy appraisal.

Contact York Aviation at:
Atlas House
Old Hall Street
Macclesfield
Cheshire
SK10 2DT
United Kingdom
Telephone No: 01625 614051
Fax No. 01625 426159
yal@yorkaviation.co.uk
www.yorkaviation.co.uk

York Aviation