Heathrow Airport
Airspace Noise and ATM Performance

Annual Report 2021

Heathrow

Contents

1. Executive Summary

This report, produced by Heathrow's Airspace Noise and ATM Performance Team (ANATMT), contains detailed data on a range of key issues relating to noise management, performance metrics and airspace projects which the team is responsible for delivering.

The report covers the calendar year of 2021 which was significantly impacted by the Covid-19 pandemic. Owing to the reduction in air traffic seen throughout the year, 2021 does not represent a true reflection of Heathrow's performance and cannot be meaningfully compared to previous years.

Night flight data is managed and reported separately following the summer and winter seasons and was also significantly impacted by the Covid-19 pandemic.

Further detailed information on Heathrow's noise strategy, abatement procedures, targets and mitigation schemes can be found on our dedicated noise website along with all our public reporting. Additional material on air quality including monitoring and reporting is available on our separate dedicated air quality website.

www.heathrow.com/noise

www.heathrowairwatch.org.uk

2. How Is This Data Gathered?

2.1 Airspace Noise and ATM Performance Team (ANATMT)

The Airspace Noise and ATM Performance Team (ANATMT) has three key areas of responsibility with respect to noise and aircraft track keeping performance. The team carries out daily, weekly, and monthly monitoring, reporting and root cause analysis of specific issues to ensure compliance with statutory requirements, and it enables Heathrow to continually assess the operational and environmental performance of its airspace and airfield operations.

Monitoring

To enable Heathrow to effectively monitor operational performance, the airport teams use internal airport-wide systems, together with the following assets:

2.2 Airport Noise and Operations Management System (ANOMS)

ANOMS is the Noise and Track Keeping system (NTK) used at Heathrow, which acts as a central data source for other IT software applications mentioned in this report. ANOMS receives radar data directly from NATS Air Traffic Control (ATC) which provides information about the height of

an aircraft, the track it has flown, its ground speed at any particular point, and the flight's call-sign to identify individual aircraft.

The call-sign is cross-referenced with air traffic logs that provide data such as the aircraft operator, aircraft type and its destination or origin. Additionally, the system automatically receives data from a series of permanent noise monitors located around the airport. The locations of the permanent monitors and the applicable noise limits, which apply to departing aircraft only, are prescribed by the UK Department for Transport (DfT). Any noise events recorded at the monitors are then matched to aircraft track details. The primary purpose of ANOMS is to monitor airline performance against regulatory key performance indicators. It measures aircraft against the following metrics:

- Adherence to departure NPR (Noise Preferential Route) corridors;
- Adherence to the minimum 4% climb gradient requirement;
- Adherence to limits set by Government on noise for departing aircraft;
- Adherence to reaching 1,000 feet in altitude by 6.5km from the start of the aircraft's take-off roll (minimum height on departure requirement);
- Compliance with Heathrow's day and night arrival Instrument Landing System (ILS) Joining Point procedures;
- Continuous Descent Approaches (CDA) on arrival; and
- Use of Night Jet Movements.

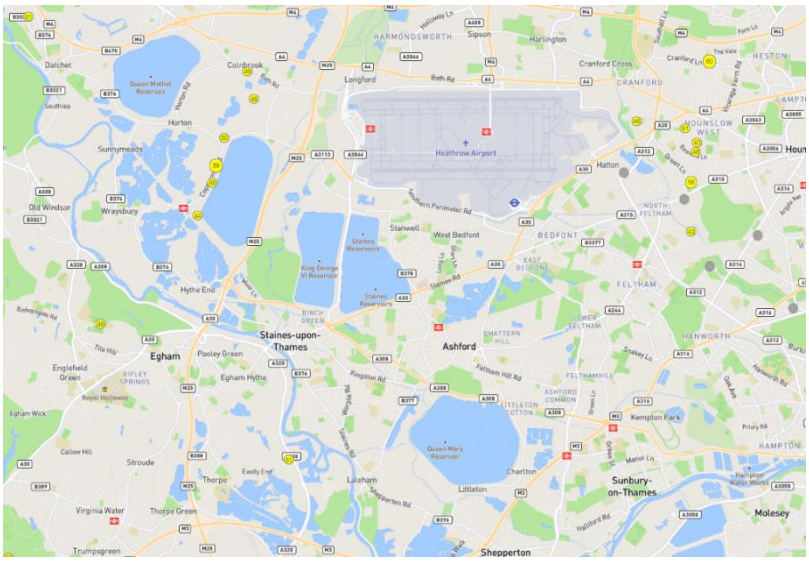
Details of these requirements are set out by the Government in the UK Aeronautical Information Publication

2.3 WebTrak

WebTrak is an online application that allows residents living near Heathrow to visualise how aircraft overfly their area. It has been in operation at Heathrow since 2008 and, following community feedback, has continued to be updated. For instance, users can now view flight tracks within the previous 12 months, view past and current weather conditions (rainfall) and overlay the Noise Preferential Route (NPR) corridors.

If a user has been disturbed by Heathrow's operations, they can identify specific aircraft which may have caused this, and they can complain to Heathrow via WebTrak using the Complaint form provided. WebTrak can be accessed at: https://webtrak.emsbk.com/lhr4

WebTrak is further supported by the deployment of noise monitors around the airport. All monitors that have been deployed and are in use can be viewed in the application, including data for recorded noise levels.



2.4 WebTrak My Neighbourhood

WebTrak My Neighbourhood displays general information on where aircraft fly in relation to a post code. The application allows the user to understand how often particular arrival and departure flight paths are used at Heathrow on a monthly, quarterly or yearly basis. Users can also view detailed information such as histograms that display how the distribution of traffic changes over hours of the day. WebTrak My Neighbourhood can be accessed at: https://myneighbourhood.emsbk.com/lhr14/

2.5 xPlane

xPlane allows residents to access flight data specific to their location and carry out their own analysis of flights over a selected area. Results include the numbers, heights, position, size and types of aircraft, and the routes and runways used. Users can also see a breakdown of westerly and easterly operations at Heathrow for the period selected, so they can understand the direction of aircraft over the selected location. xPlane can be accessed at: http://xplane.emsbk.com/xplane/

3. General Operations

3.1 Direction of Operation

For safety and operational performance reasons, aircraft typically take off and land into the wind. To create lift and become airborne, an aircraft's wing relies on the speed of the air moving over it (airspeed).

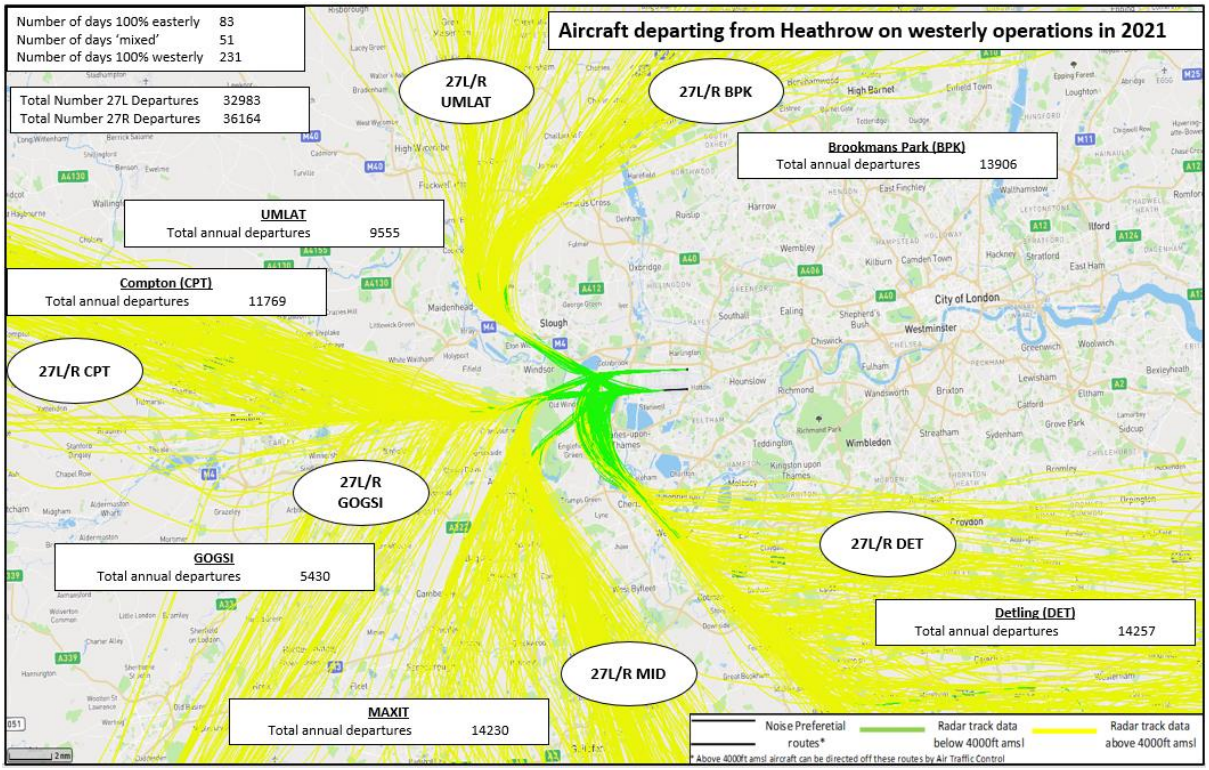
In the UK, the prevailing weather conditions generally see the wind coming mostly from the southwest. This means that the majority of aircraft (on average 70% a year) make their approach to land in a westerly direction over London, and they also take off towards the west.

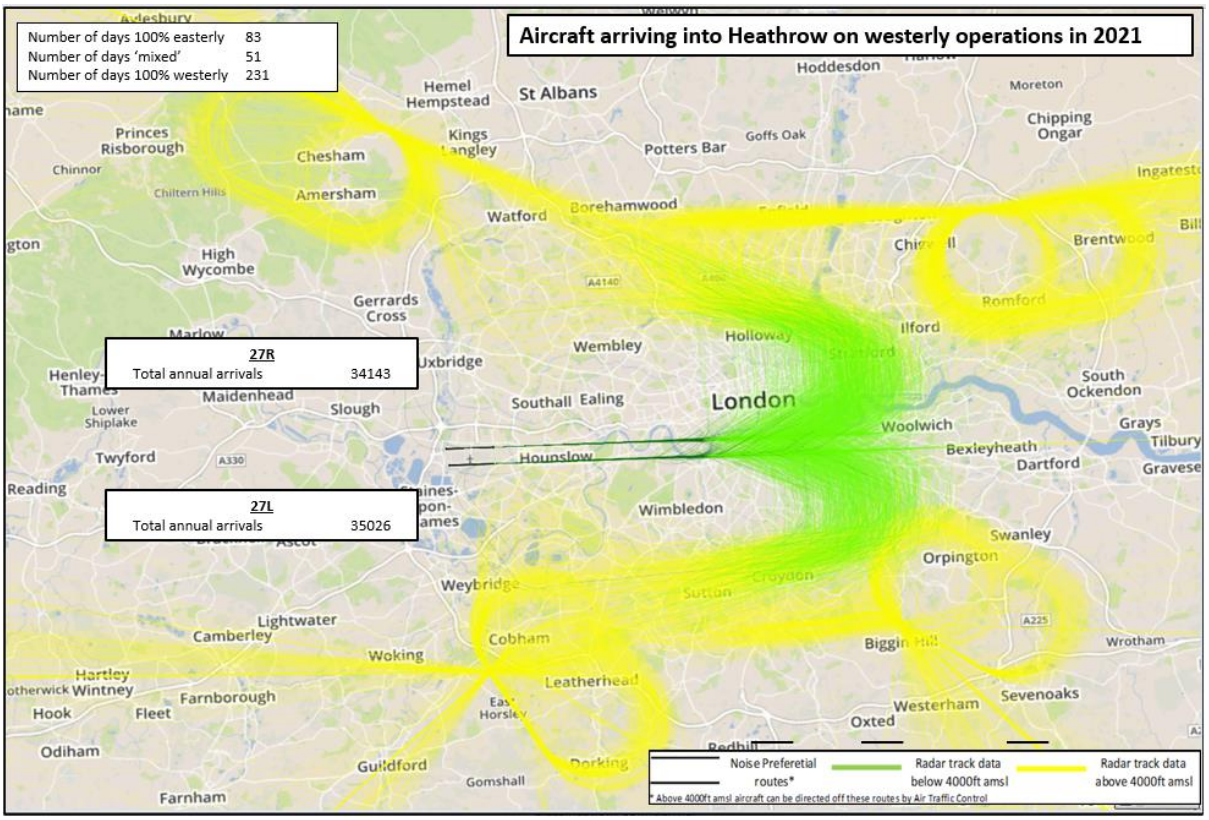
This is known as westerly operations. Wind speed and direction are considered both at surface level and at 3,000 feet, as although the wind may be calm on the ground, wind conditions aloft may be different where aircraft are being sequenced to commence their approach.

When the wind blows from the east (and is over five knots in strength), the direction of operation is changed, and aircraft instead approach to land towards the east over Berkshire and take off in an easterly direction towards London. This is known as easterly operations and occurs on average for 30% of the year.

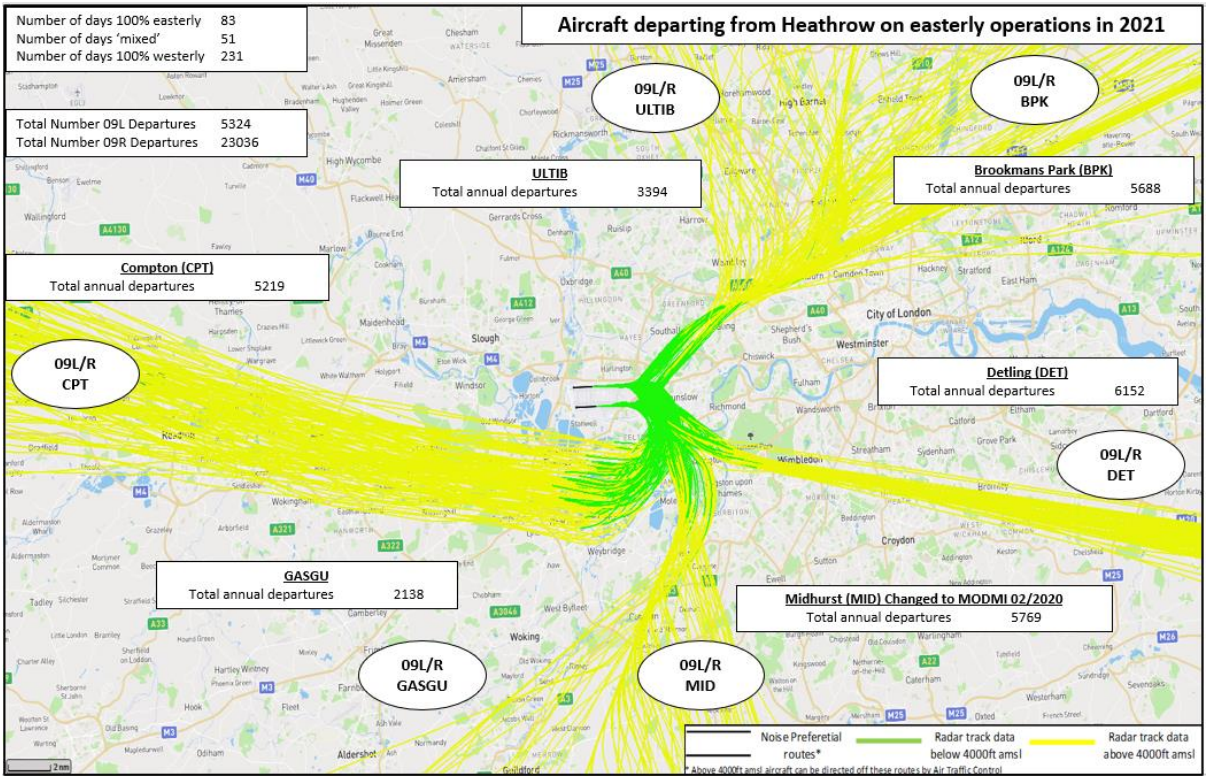
Heathrow recorded a 71/29 percentage split in favour of westerly/easterly operations for 2021, which follows historical averages. The maps on the following two pages show departure and arrival route usage and traffic statistics for 2021.

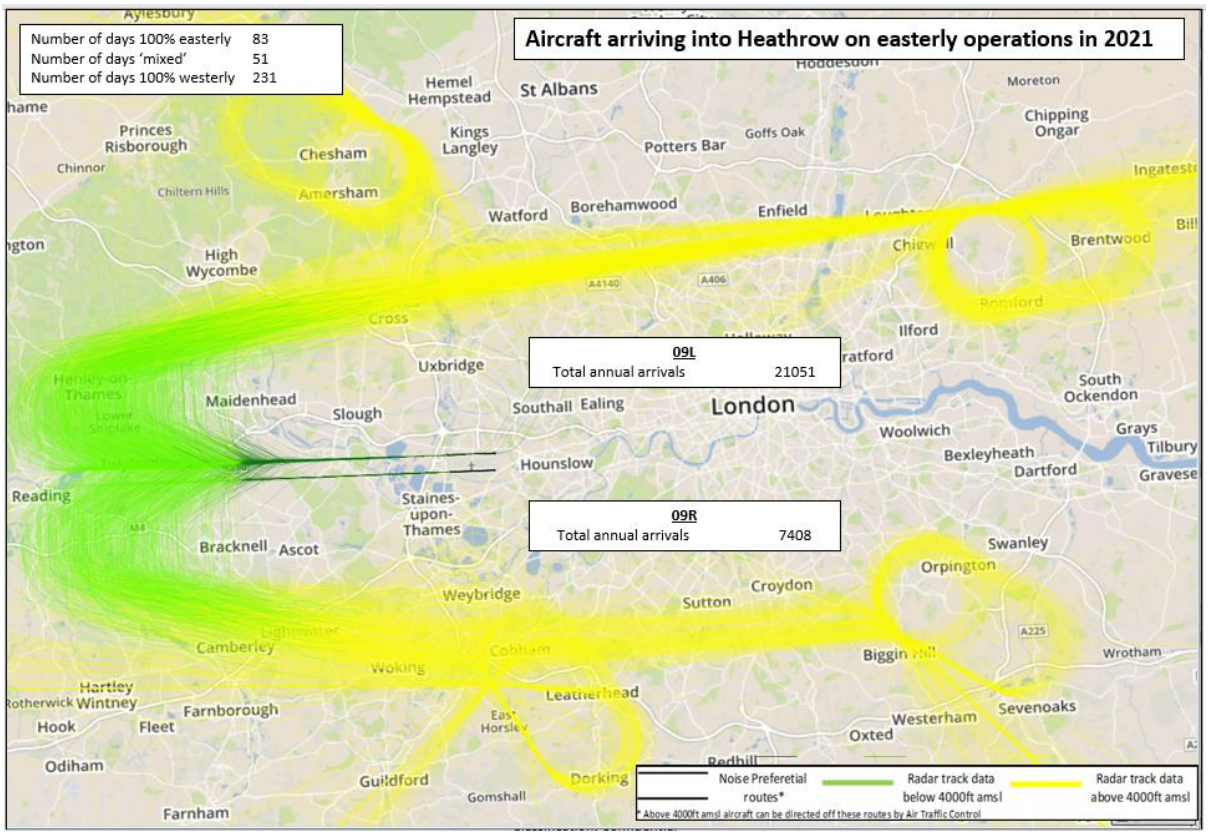
Westerly Operations – Departures and Arrivals





Easterly Operations – Departures and Arrivals





3.2 Westerly Preference

During the day, a 'westerly preference' is operated at Heathrow. Westerly preference is Government policy and means that even during periods of light easterly winds (up to 5 knots at the surface), aircraft will usually continue to operate in a westerly direction.

Westerly preference was introduced in the 1960s to reduce the number of aircraft taking off in an easterly direction over London, the most heavily populated side of the airport. This was at a time when departures were considered to be more disruptive to local communities than arrivals.

Following consultation in 2001, the DfT decided that westerly preference should be removed at night to provide a more equitable distribution of aircraft noise.

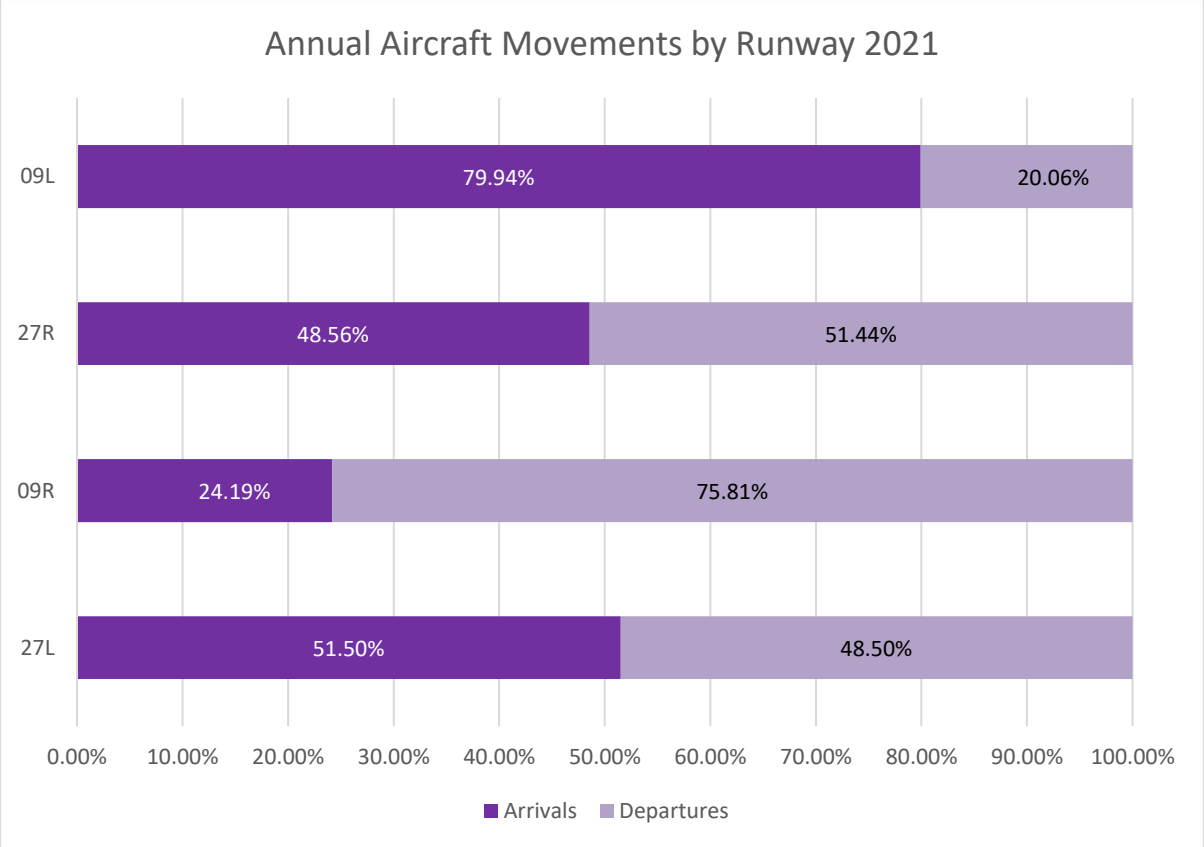
Modern technology means aircraft have become quieter and climb more quickly, and therefore questions have been raised as to whether westerly preference is still relevant today. In Heathrow's submission to the Airports Commission in May 2013, it proposed the ending of westerly preference, and the Commission supported a 'no preference' policy in its Interim Report.

Because westerly preference remains current Government policy, ending it would be subject to Government approval and public consultation.

3.3 Annual Movements by Runway and Aircraft Type Changes

Heathrow has a 480,000 annual movement cap which applies to the number of Air Transport Movements (ATMs), which refer to scheduled passenger traffic and cargo.

The total number of ATMs in 2021 was 190,032, down from 200,952 in 2020 and 475,874 in 2019. This reflects the impact of the Covid-19 pandemic and Government restrictions on travel.



Due to the reduced number of ATMs, Heathrow switched to Single Runway Operations (SRO) from 06:00 on 6th April 2020 and this continued until July 2021. This meant that arrivals and departures were operated from a single runway – normally one runway is used for arrivals and the other for departures. During periods of SRO, Heathrow took the decision to carry out runway maintenance works. Moving to SRO increased the number of departures from 09L from 126 in 2019 to 2,733 in 2020 and 5,282 in 2021. More information on Heathrow's runway utilisation can be found in Section 4.4.

The impacts of the pandemic have led to a change in aircraft fleet mix as airlines retired some of their older types earlier than planned. For example, British Airways retired their entire 747-400 fleet in October 2020. Airlines also grounded a majority of their A380 aircraft in favour of smaller types including the 777, 787 and A350. Towards the end of 2021, airlines began phasing their A380s back in to service

3.4 Night Flights

There is no ban on night flights at Heathrow, but since the 1960s the Government has placed restrictions on them. Heathrow has some of the tightest restrictions of any hub airport in Europe.

Night flight restrictions

Restrictions on night flights have been in place at Heathrow since 1962 and the structure of the current night flying restrictions at Heathrow has been in place since October 2017. The night flight restrictions are part of Government defined noise measures under the Civil Aviation Act 1982.

Overview of restrictions

- There are two time periods: 23:00–07:00 and 23:30–06:00, both have restrictions for different types of aircraft.
- The more restrictive period (23:30–06:00) is known as the Night Quota Period (NQP) and has limits on the number of movements which are set by the DfT. The limits are set on a seasonal basis in summer and winter.
- Heathrow is currently limited to 5,800 night flights a year within the NQP: 3,250 in the summer season and 2,550 in the winter season.

Typically, around 80% of night flights at Heathrow are between 04:30-06:00, with on average around 16 aircraft scheduled to arrive each day between these hours.

Heathrow has a voluntary ban in place that prevents flights from landing before 04:30. There is also a night quota limit, which caps the amount of noise the airport can make at night.

The remaining 20% of night flights are those that were scheduled to arrive or depart during normal operational hours but have been delayed. These flights may have suffered delays for several reasons including technical issues, weather, and medical delays. These so-called "late runners" are subject to strict number limits and approvals before they are allowed to operate in the night period. In some circumstances, late running flights may not be subject to restrictions. More details can be found under 'Dispensations' in Appendix B.

Why does Heathrow have night flights?

Night flights are an important part of operations at airports around the world. The time differences in an inter-connected global transport system mean that it is difficult to avoid night flights.

The relationship between flight times and clock times means that early morning arrivals at Heathrow are particularly suited to serving flights from much of China, Southeast Asia and South Asia. The early arrival permits a full day's business to be undertaken in the UK and maximises the timing opportunities for those making onward flight connections from London. By feeding other flights, these transfer passengers play an important role in maintaining the range and frequency of destinations served by Heathrow, and in maintaining connectivity with key destinations.

Government's approach to night flights

The Government consults on its night flight regime for Heathrow every five years. One of its stated objectives is to limit or reduce the number of people significantly affected by aircraft noise at night, for example by encouraging the use of quieter aircraft, while maintaining the existing benefits of night flights.

Quota Count (QC)

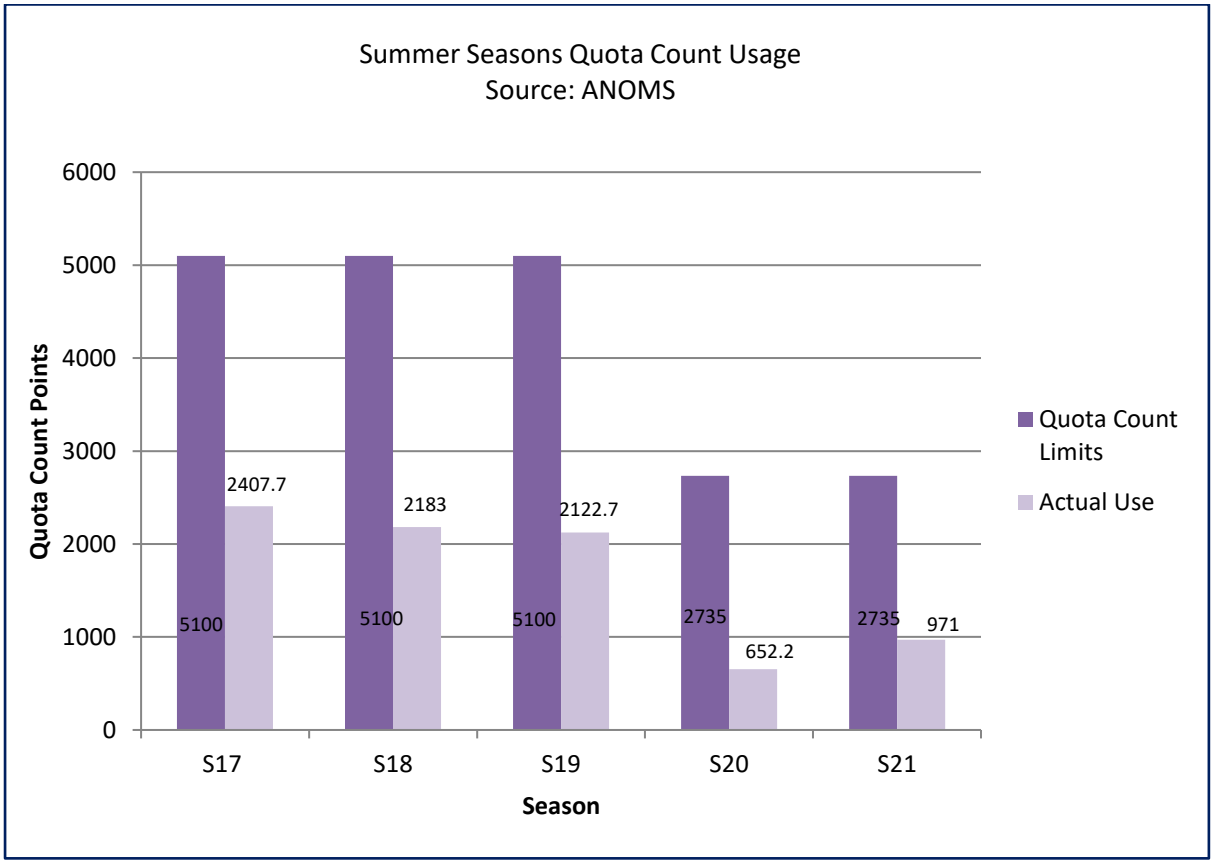
As well as the limits set on the number of movements during the night period, aircraft are classified into nine bands according to the amount of noise they make when taking off and landing. The noisier the aircraft, the higher the band it is placed in. These bands are called Quota Counts (QC). Every aircraft is given a QC number between 0 and 16 for both arrival and departure.

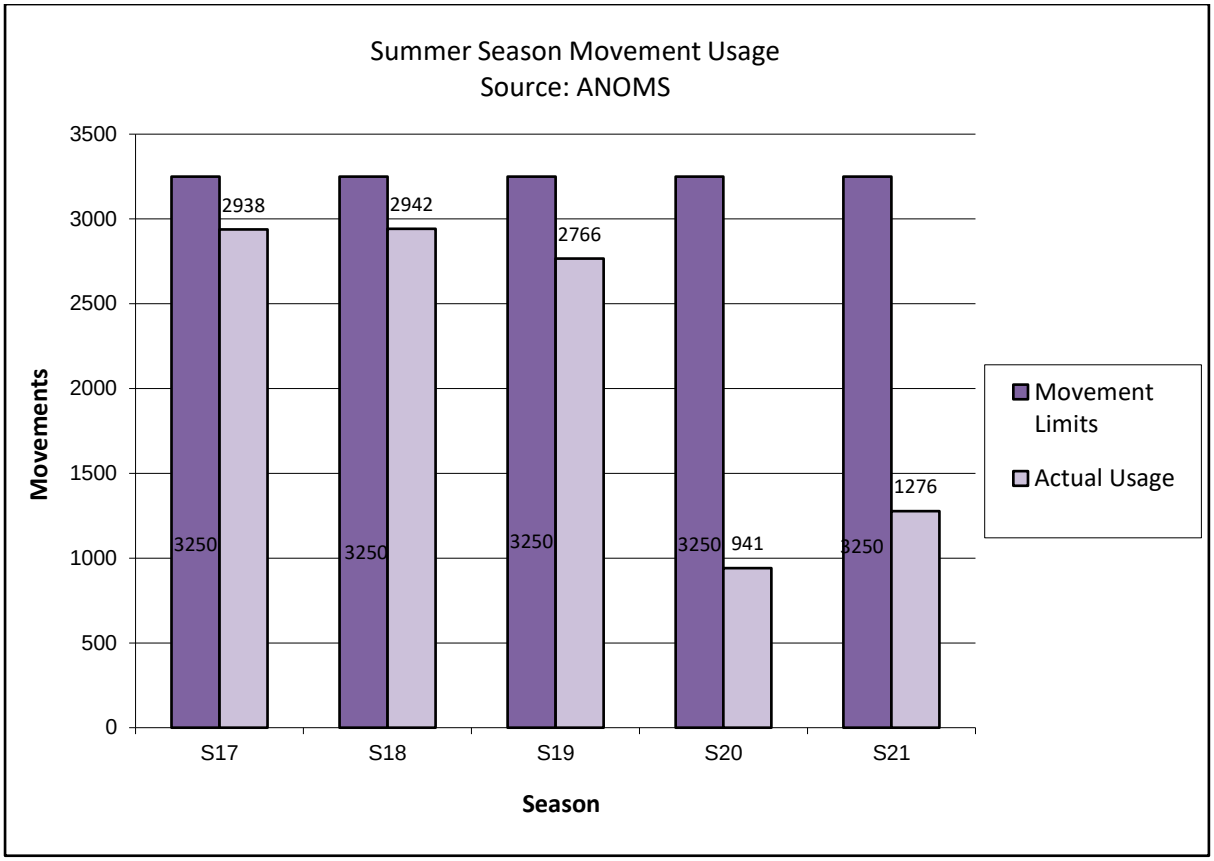
Under the QC system, each aircraft type, including different versions of the same model, is assigned a QC value according to its noise performance (separately for arrival and departure) as determined by the ICAO noise certification process. For example, a Boeing 737-800 is classified as QC/0.5 on arrival and as QC/0.5 or QC/1 on departure (depending on its maximum certificated

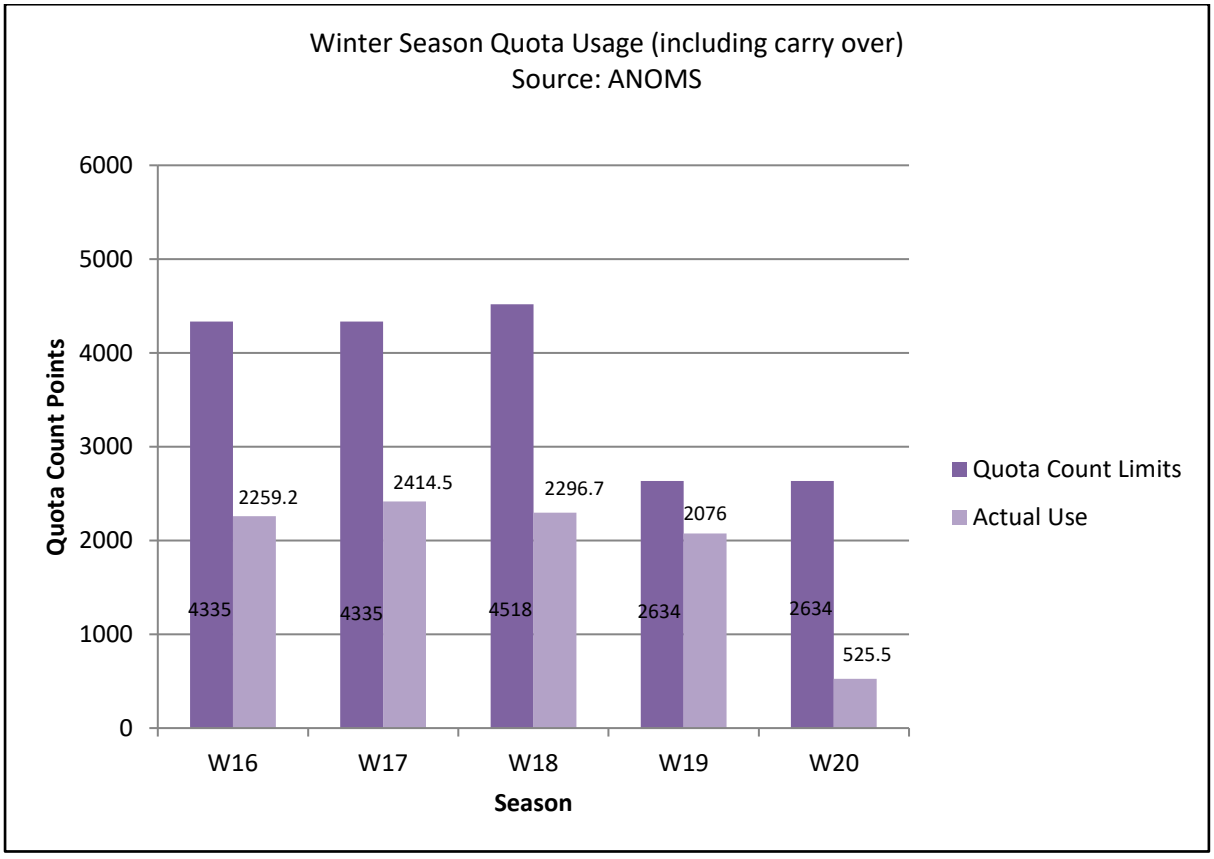
take-off weight), whereas a much larger and older Boeing 747-200 will vary between QC/2 and QC/8 on arrival, and between QC/4 and QC/16 on departure, depending on engine type and maximum certificated take-off weight (MTOW).

The number of points for each aircraft is added up and must be within the limit for that season. The regime includes a reduction of the QC limit for Heathrow from 4,080 to 2,415 for the winter season and from 5,100 to 2,735 for the summer season. This came into effect from the summer season of 2019.

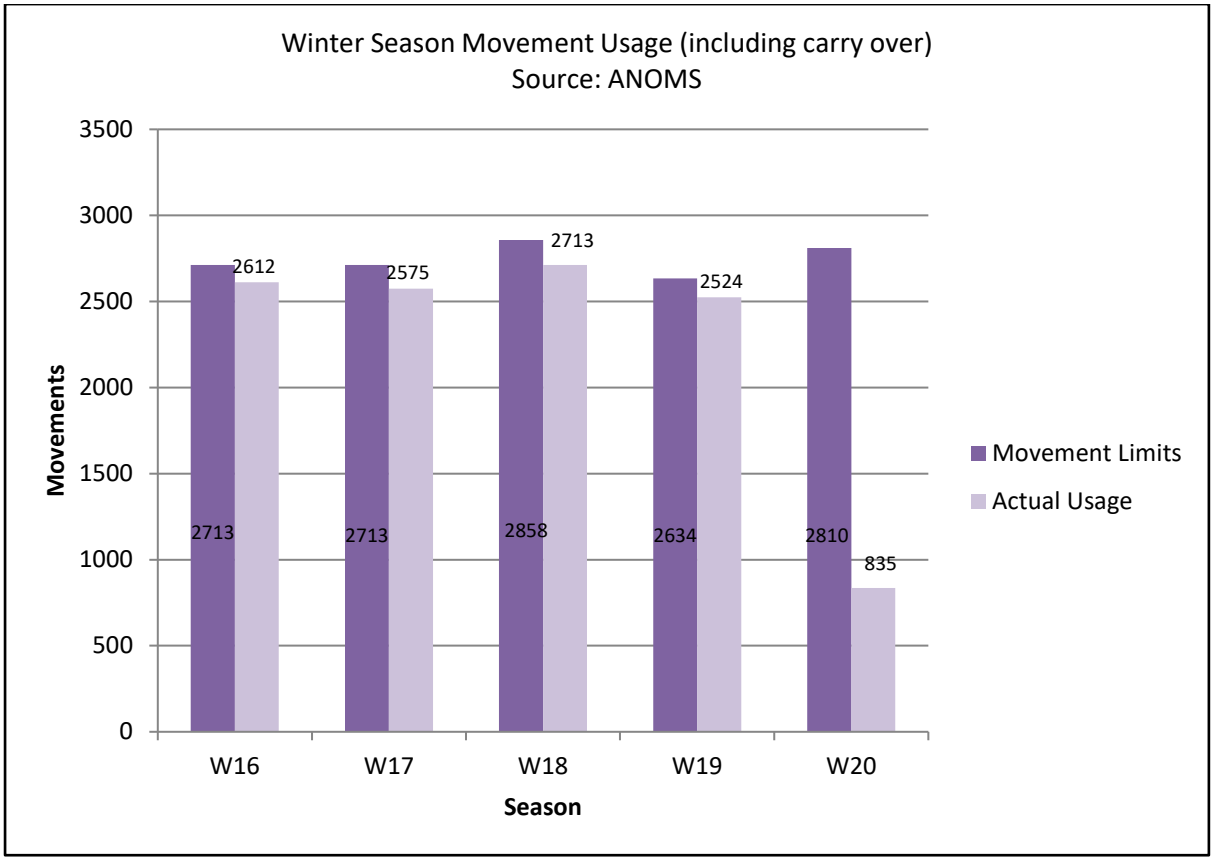
By far the largest contribution to night flights is from arrivals, which tend to be in the early morning. Typically, there also tend to be more night flights during the summer season than the winter. However, as can be seen from the graphs below, movement and Quota Count usage continue to be lower than the permitted limit, particularly in 2020/21 due to the Covid-19 pandemic and Government restrictions on travel.




Summer Season Movement Usage
Source: ANOMS
Movements
3500
3000
2500
2000
1500
1000
500
0
2938
2942
2766
941
1276
3250
3250
3250
3250
3250
S17
S18
S19
S20
S21
Season
Movement Limits
Actual Usage


Winter Season Quota Usage (including carry over)
Source: ANOMS
Quota Count Points
6000
5000
4000
3000
2000
1000
0
2259.2
2414.5
2296.7
2076
525.5
4335
4335
4518
2634
2634
W16
W17
W18
W19
W20
Season
Quota Count Limits
Actual Use

Heathrow



End of season flexibility

Up to 10% of the current season's movement limit may be carried over to the next season if unused. At Heathrow, there is often a carry-over from the summer to the winter season, but rarely from the winter to the summer season. The winter season graphs above include the carry-over from summer to winter.

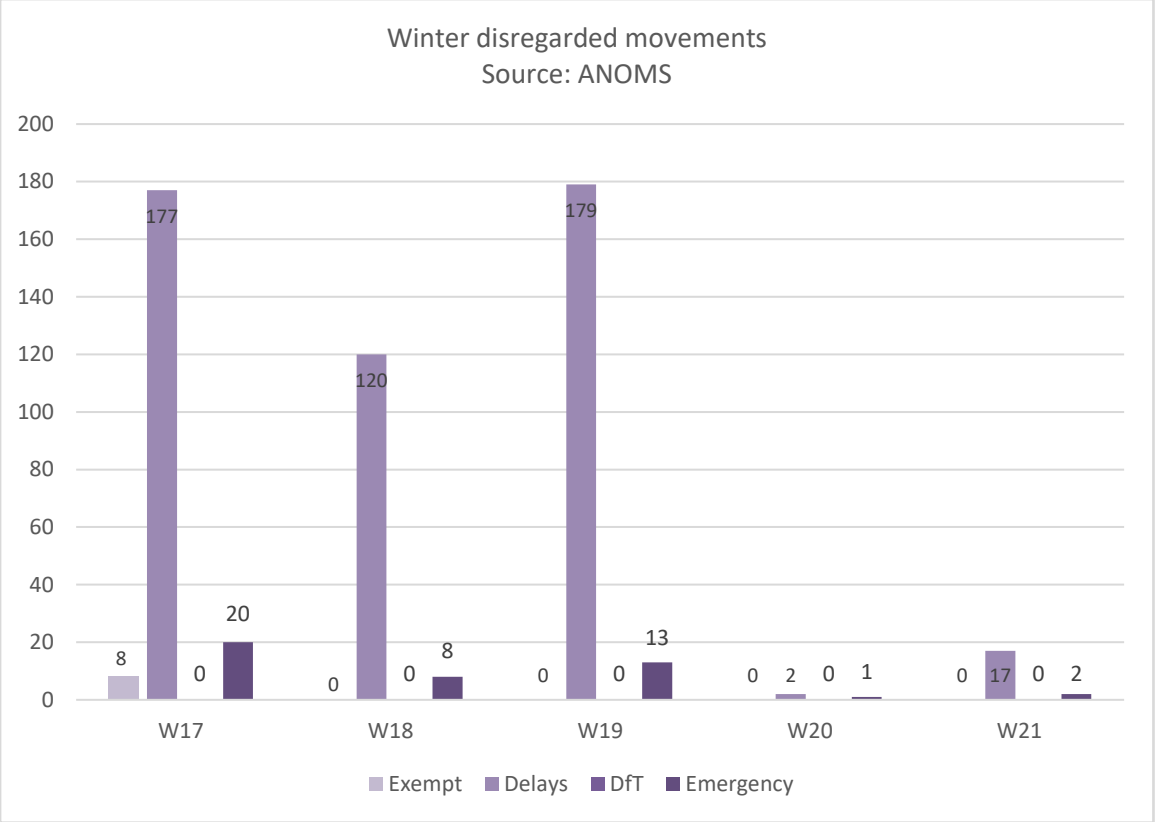
Overrun of movements

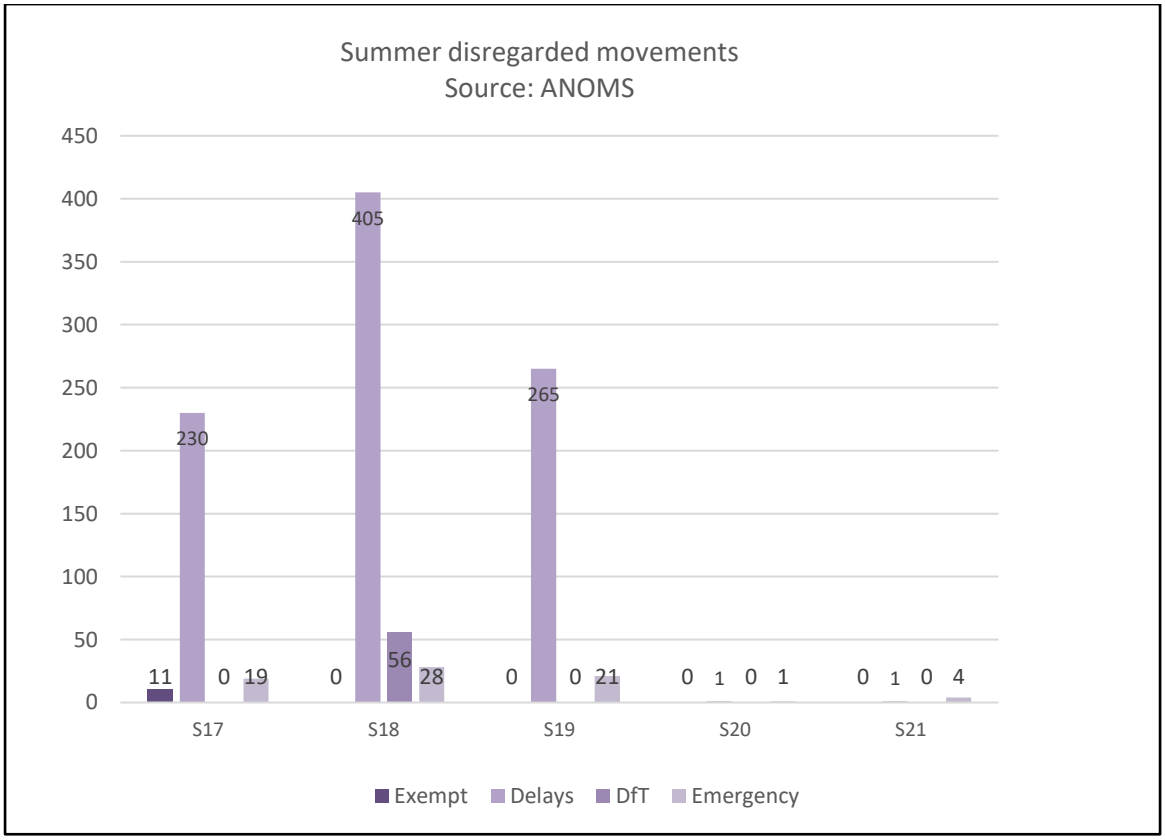
Up to 10% of the next season's movement limit may be anticipated in the event of an overrun. Any excess overrun is penalised in the following season at double the amount of the excess. The same arrangements apply to the noise quotas. In 2021 this was not required due to the low number of night flights in both the summer and winter seasons.

Dispensations

The Secretary of State for Transport has the power to state circumstances in which movements may be disregarded from the night restrictions. These are in exceptional circumstances only and disregarded movements include emergencies, delays which are likely to lead to serious congestion at the airport or serious hardship or suffering to passengers or animals, or which result from widespread and prolonged disruption of the air traffic network. Heathrow strictly monitors compliance with all current Government restrictions and reports regularly to the DfT. A full list of dispensation criteria can be found in Appendix B of this report.

The movements shown below were exempt from these restrictions, or dispensed either due to delays, emergencies, or by the DfT.


Winter disregarded movements
Source: ANOMS
200
180
160
140
120
100
80
60
40
20
0
8
177
0
20
0
120
0
8
0
179
0
13
0
2
0
1
0
17
0
2
W17
W18
W19
W20
W21
Exempt
Delays
DfT
Emergency


Summer disregarded movements
Source: ANOMS
450
400
350
300
250
200
150
100
50
0
11
230
0
19
0
405
56
28
0
265
0
21
0
1
0
1
0
1
0
4
S17
S18
S19
S20
S21
Exempt
Delays
DfT
Emergency

Non-dispensed late running flights

In 2021 there were 131 late running non-dispensed flights, up from 92 in 2020. The majority of those flights either experienced technical issues or were delayed due to weather or air crew Covid-19 testing requirements.

Heathrow also monitors the number of nights with no late running flights. In 2021 there were 270 nights with no late running aircraft compared to 281 in 2020.

3.5 Noise Action Plan (NAP)

Although the DfT has direct control over noise at Heathrow, Heathrow has its own detailed noise management strategy in the form of the Noise Action Plan (NAP). In March 2019, Heathrow published its latest NAP covering the period 2019-2023 after the approval of the Department for the Environment, Food and Rural Affairs (Defra). Our noise management framework has a structure similar to the ICAO Balanced Approach with an additional fifth pillar addressing community engagement. The framework covers the following areas:

- Quieter aircraft
- Quieter procedures
- Land-use planning and mitigation
- Operating restrictions and voluntary measures
- Working with local communities

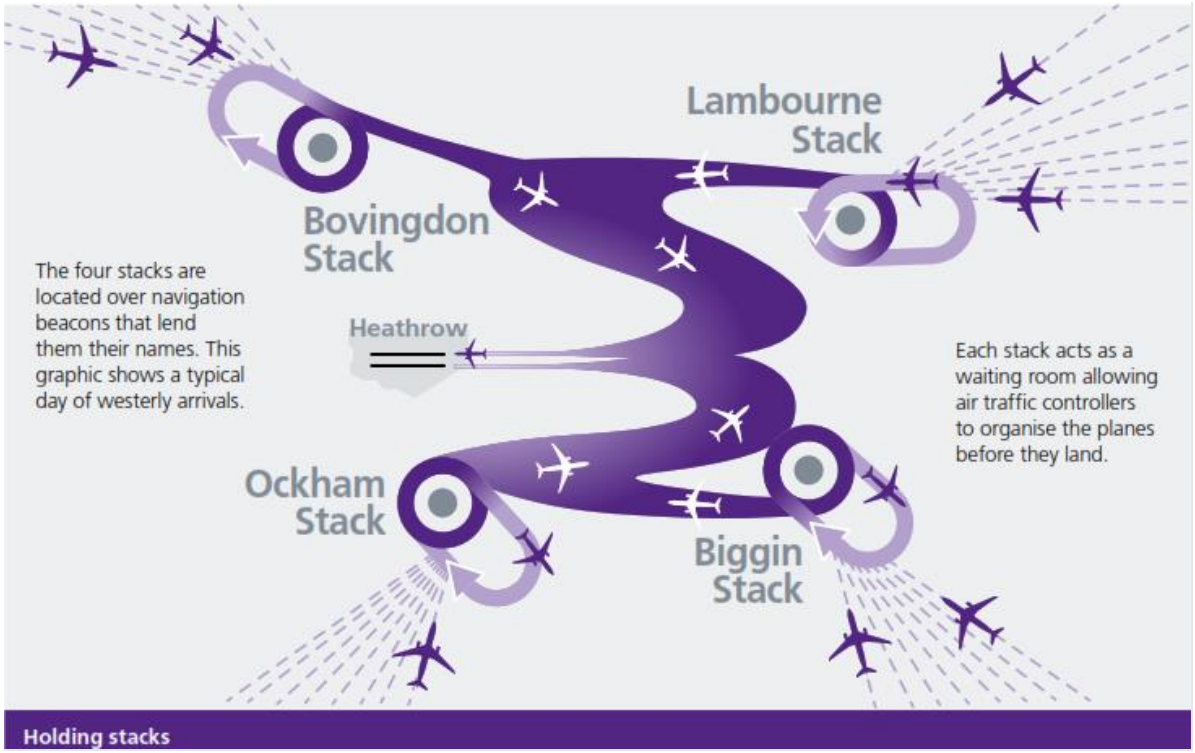
Progress against the NAP has been delayed due to the impacts of the Covid-19 pandemic on the aviation industry. Heathrow will continue to keep the NAP under review and will work with Defra on any potential changes.

4. Arrivals

4.1 Holding Stacks and Stacking

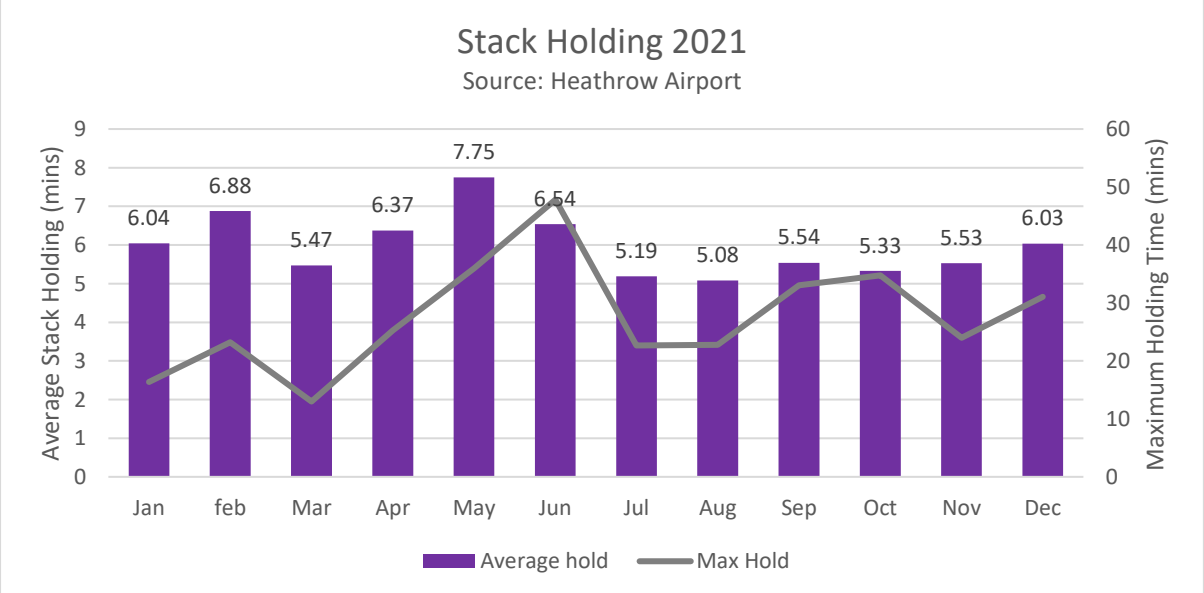
Because Heathrow is usually so busy, aircraft coming in to land are frequently held in holding stacks where they circle above 7,000 feet until there is space in the arrival queue to land at the airport.

Aircraft circle at different levels within the stacks until there is capacity for them to continue their approach to land at Heathrow. The levels are separated by 1,000 feet and the lowest level (the bottom of the stack) is around 7,000 feet. There are four holding stacks at Heathrow known as Bovingdon, Lambourne, Ockham and Biggin. The locations of the stacks have been the same since the 1960s.



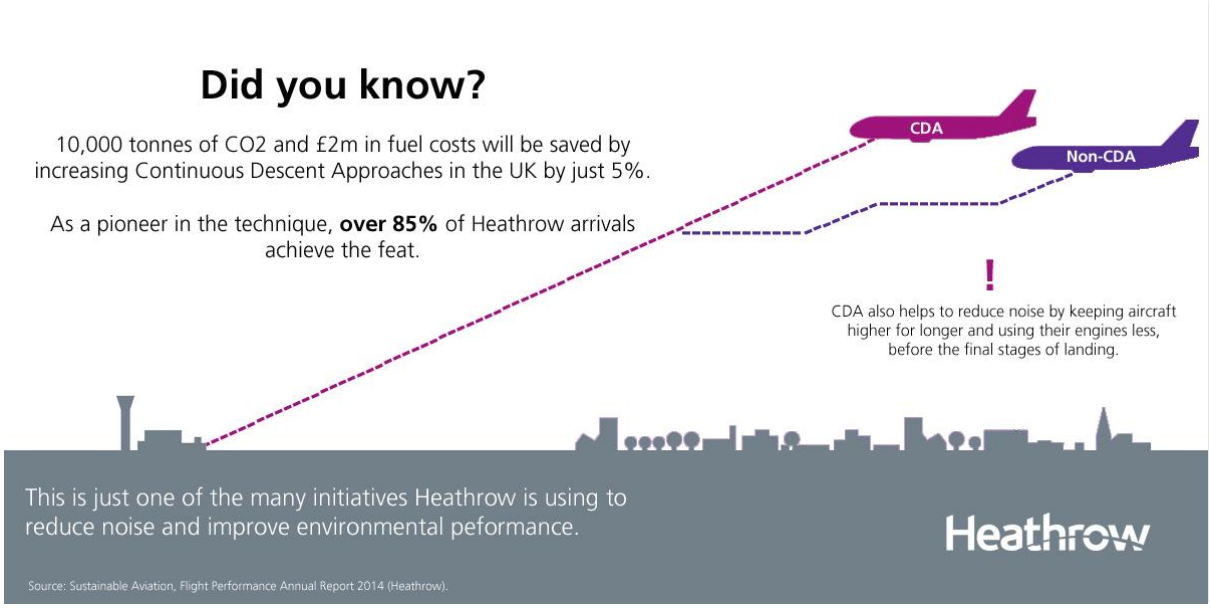
There are currently no precise flight paths for aircraft flying from the holding stacks to land. Air traffic controllers manually make decisions by allocating headings and altitudes for the aircraft to fly based on the positions of other aircraft. While the overall patterns that aircraft fly are similar to each other, the precise position of aircraft in the sky varies from flight-to-flight and day-to-day.

Not every aircraft is required to enter a holding stack on arrival, especially if there is no arrival delay. In 2021, an average of 17 aircraft held each day. Those aircraft that were required to hold in 2021 spent an average of 5.74 minutes in a stack, compared to 8.25 minutes in 2020.

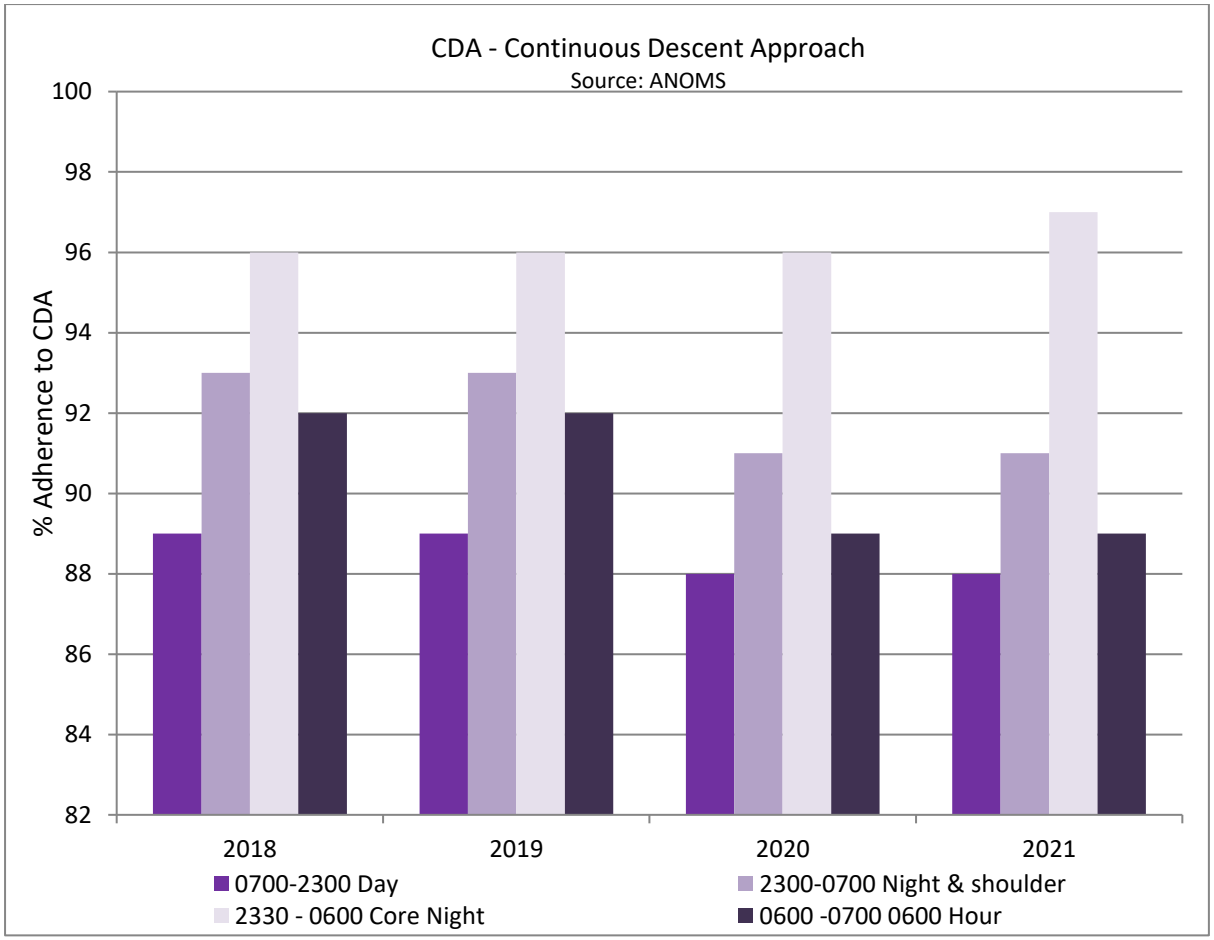


4.2 Continuous Descent Approaches (CDA)

Continuous Descent Approaches (CDA) have been used at Heathrow for many years. Once they have been directed out of the holding stack, CDA is a procedure by which aircraft maintain a steady angle of approach until they reach the final approach segment. The intention of CDA is to reduce arrival noise by keeping aircraft higher for longer. In addition, CDA reduces fuel burn and emissions, which leads to an overall environmental benefit.



The descent profile for Heathrow is deemed to be continuous provided that no segment of level flight longer than 2.5 nautical miles occurs below 6,000 feet above mean sea level (AMSL). A level segment can be defined as having less than a 50-foot variance over a distance of 2 nautical miles. This is measured by ANOMS.



The graph above shows that CDA performance in 2021 was consistent with 2020 across all reporting periods, with the exception of the Night Quota Period 23:30-06:00 which saw a slight improvement. Due to the Covid-19 pandemic Heathrow has seen a number of new airline operators in 2021, which may have contributed to the overall decline in CDA performance. The ANATMT will work with new operators to improve this key metric going forward.

4.3 Joining Point Adherence

The UK Government has specified minimum heights at which aircraft must be established on the final approach to Heathrow. The aim of this requirement is to keep aircraft higher for longer and avoid prolonged periods of level flight, therefore benefitting communities close to the airport.

- Westerly operations

  Between 06:00 and 23:30, aircraft are required to be established on the Instrument Landing System (ILS) for final approach not below 2,500 feet above mean sea level (AMSL). This equates to a distance of approximately 8 nautical miles from the runway, although it can vary due to changes in atmospheric pressure. Between 23:30 and 06:00 the altitude is raised to 3,000 feet AMSL together with an additional requirement to join the ILS no closer to the runway than 10 nautical miles.

- Easterly operations

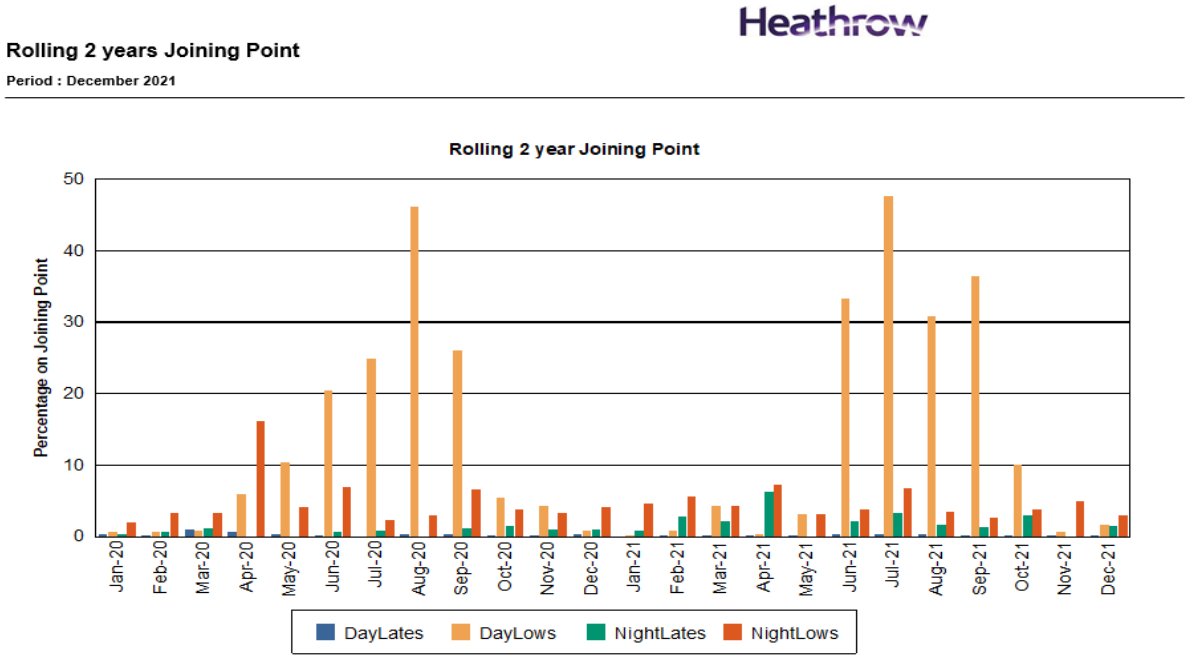
  Between 07:00 and 23:00, aircraft are required to be established on the ILS not below 2,500 feet AMSL. This equates to a distance of approximately 8 nautical miles. Between 23:00 and 07:00, the altitude is raised to 3,000 feet AMSL together with an additional requirement to join the Instrument Landing System (ILS) no closer to the runway than 10 nautical miles.

For compliance purposes, these requirements are broken down into the following metrics:

- Day Lows – aircraft joined below 2,500 feet
- Day Lates – aircraft joined within 8 nautical miles
- Night Lows – aircraft joined below 3,000 feet
- Night Lates – aircraft joined within 10 nautical miles

The graph below shows compliance for all four joining point metrics in 2020 and 2021. The graph also shows peaks recorded during the summer months, particularly during the day (Day Lows). This is due to the way in which barometric pressure changes affect the altitude data displayed on air traffic radar. They do not reflect an actual increase in the number of aircraft which are low when joining the ILS. These flights, whilst not technically low, are included in the data in the interests of transparency.

The joining point figures all remain within a range that is typical for Heathrow.



4.4 Runway Alternation and Arrivals out of Alternation

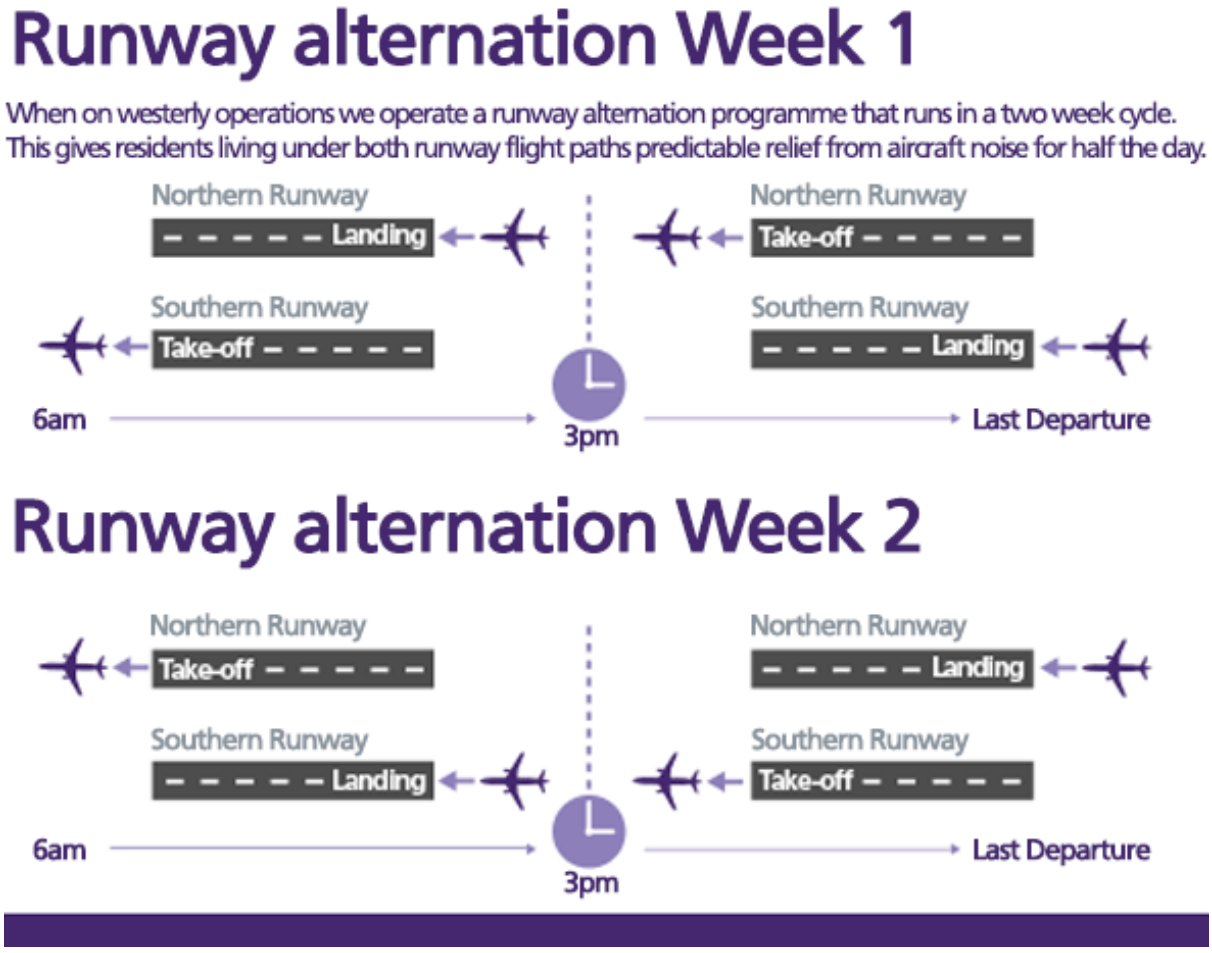
During the day, and when on westerly operations, Heathrow uses a procedure known as runway alternation. This is to provide local communities living under the final approach into the airport with periods of relief from aircraft noise. Local residents place great importance on the alternation system at Heathrow and every effort is made to adhere to it.

The alternation pattern means that for part of the day one runway is used for landings and the other for take-offs, then halfway through the day at 15:00, the runways are switched over.

On easterly operations, Heathrow does not alternate the runways at 15:00 because of the legacy of the 'Cranford Agreement' which prevented use of the northern runway for departures during the day. Although the Cranford Agreement has now ended, Heathrow needs to undertake works to the airport's infrastructure before runway alternation on easterly operations will be possible during full operations and this will also require a formal airspace change, both of which require endorsements under regulatory approvals processes.

Daytime runway alternation

Daytime runway alternation operates on a two-week cycle.



In the morning one runway is used for take-offs and the other for landings. At 15:00 (roughly halfway through Heathrow's working day), the runway is swapped over. The airport continues this pattern of runway use for the rest of the week, and the following week it is switched.

Night-time runway alternation

Since there are very few aircraft that take-off or land at night between 23:30 and 06:00, there is more scope for runway alternation – whether Heathrow is on easterly or westerly operations. Landings can be switched between the northern and southern runways and, if the weather allows it, aircraft can land from the east or the west.

Those four options allow Heathrow to operate night-time runway alternation on a four-weekly cycle:

- Week 1: Aircraft fly in from the west to land on the northern runway
- Week 2: Aircraft fly in from the east to land on the northern runway
- Week 3: Aircraft fly in from the west to land on the southern runway
- Week 4: Aircraft fly in from the east to land on the southern runway

Using both runways for arrivals

Heathrow makes every effort to adhere to the published runway alternation schedule. However, when delays build up in the arrival holding stacks, both runways can be used for arrivals for a temporary period.

This is called Tactically Enhanced Arrivals Mode (TEAM) and it is permitted after 07:00 on westerly operations when there is a predicted delay approaching 20 minutes per flight. Under these circumstances a maximum of six aircraft an hour can land on the runway designated for departures. A similar, but not identical, practice applies to easterly operations.

These rules have been in place since the alternation system was introduced in the 1970s.

Although not described as TEAM, the hour between 06:00-07:00 is the busiest time of the day at Heathrow for arrivals, therefore both runways are permitted to be used for landings during that time. This can occur when there is a minimum delay for arrivals forecast between 5 – 10 minutes. There are no restrictions on the number of arriving flights that can land on the departures runway and because delay is common at this time, the use of both runways is normally a daily occurrence in this hour. This is the case for both westerly and easterly operations.

Heathrow reports on the daily number of TEAM arrivals, as well as those between 06:00-07:00 as part of the operational data on its website.

There are other occasions when unforeseen circumstances mean that arriving aircraft need to land on the departure runway. For example, this can occur if an aircraft landing on the designated runway develops a problem which prevents it vacating the runway in time for the next aircraft to land. Subsequent aircraft will then need to use the other runway until the aircraft on the designated runway is able to vacate safely.

De-alternation

Routine maintenance of runways, taxiways or associated equipment is often scheduled to coincide with the pattern of runway alternation. However, there will be occasions when it is not possible to stick to the published runway alternation schedule. For example, this may be to facilitate maintenance or works of a longer duration (e.g. runway resurfacing) or work of an unforeseen, urgent nature.

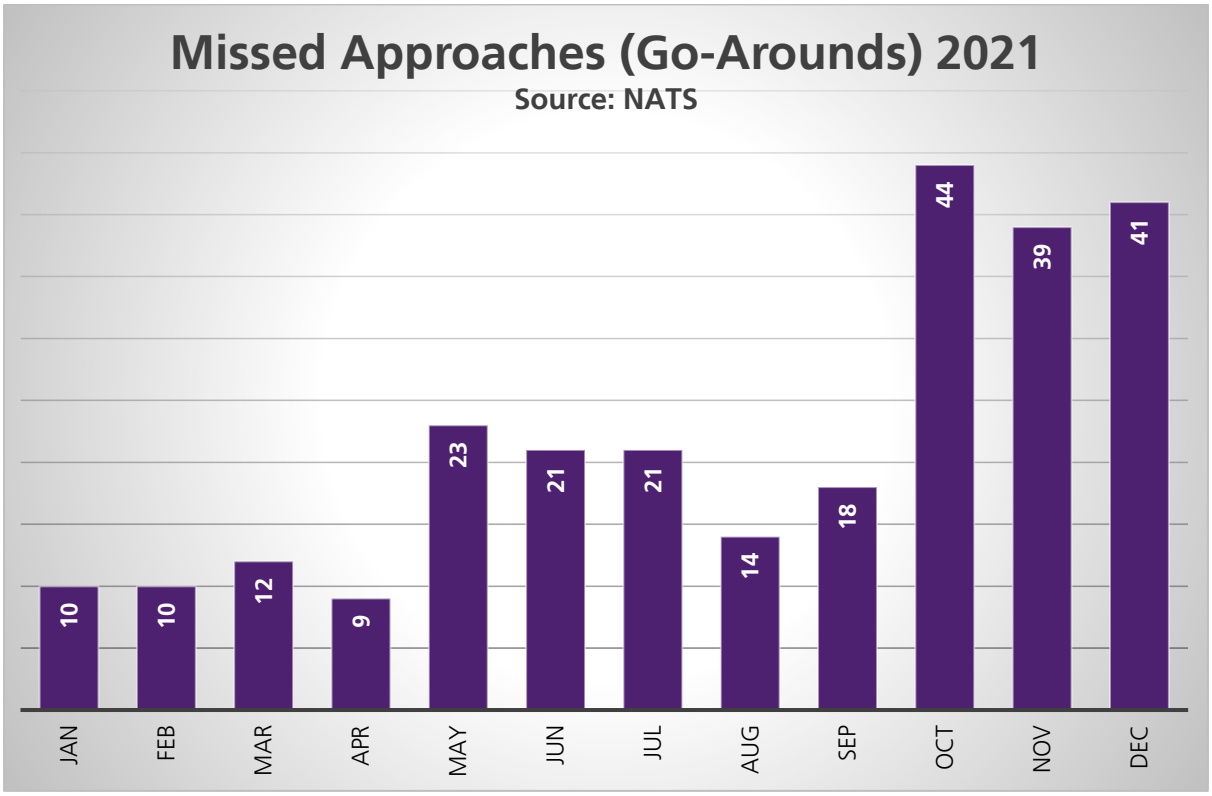
Weather can also impact alternation. For example, strong south-westerly winds can blow across the buildings in Heathrow's maintenance area, and this adversely affects the approach for aircraft landing on the northern runway on westerly operations. When this occurs, landings are switched to arrive on the southern runway. NATS may also decide to switch the use of runways for safety reasons, for example if visibility on one runway is temporarily impaired by fog or a nearby off-airport fire.

4.5 Missed Approaches (Go-Arounds)

Occasionally it is necessary for the pilot of an aircraft to abort a landing. There is an established procedure to follow when this occurs, known as a 'go-around'. This is where the pilot aborts the landing and then re-joins the landing pattern. A go-around is a well-practiced and safe procedure which pilots and air traffic controllers are trained and prepared for.

Although there are many reasons for a go-around, the most common is that the aircraft that has landed ahead is slow to fully vacate the runway and so it is not yet clear for another aircraft to land. Strong winds and adverse weather are other common causes.

In 2021, there were 262 go-arounds and in 2020 there were 394. The decrease in go-arounds reflects the lower traffic levels as a result of the Covid-19 pandemic and associated Government restrictions on travel.



5. Departures

5.1 Standard Instrument Departures (SIDs)

Aircraft departing from Heathrow follow pre-defined routes known as Standard Instrument Departures (SIDs). The choice of SID used is decided by the airline and is predominately dictated by the destination of the aircraft.

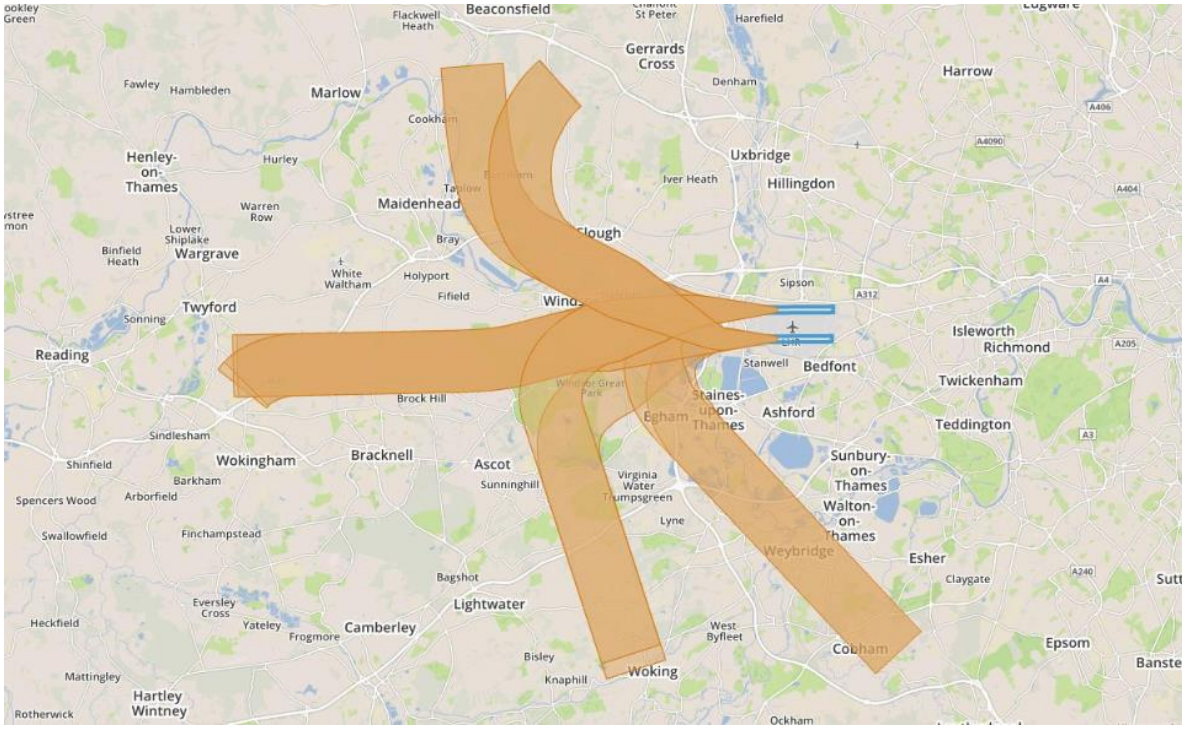
A SID includes a lateral profile and a minimum rate of climb. SIDs are designed to avoid obstacles (e.g. tall buildings, radio masts, high terrain) and they are deconflicted from routes to and from other airports, which means that they do not always follow the most direct route to the planned destination. SIDs are also based upon the historic positioning of ground-based navigational aids, upon which they mostly still rely.

5.2 Noise Preferential Routes (NPRs)

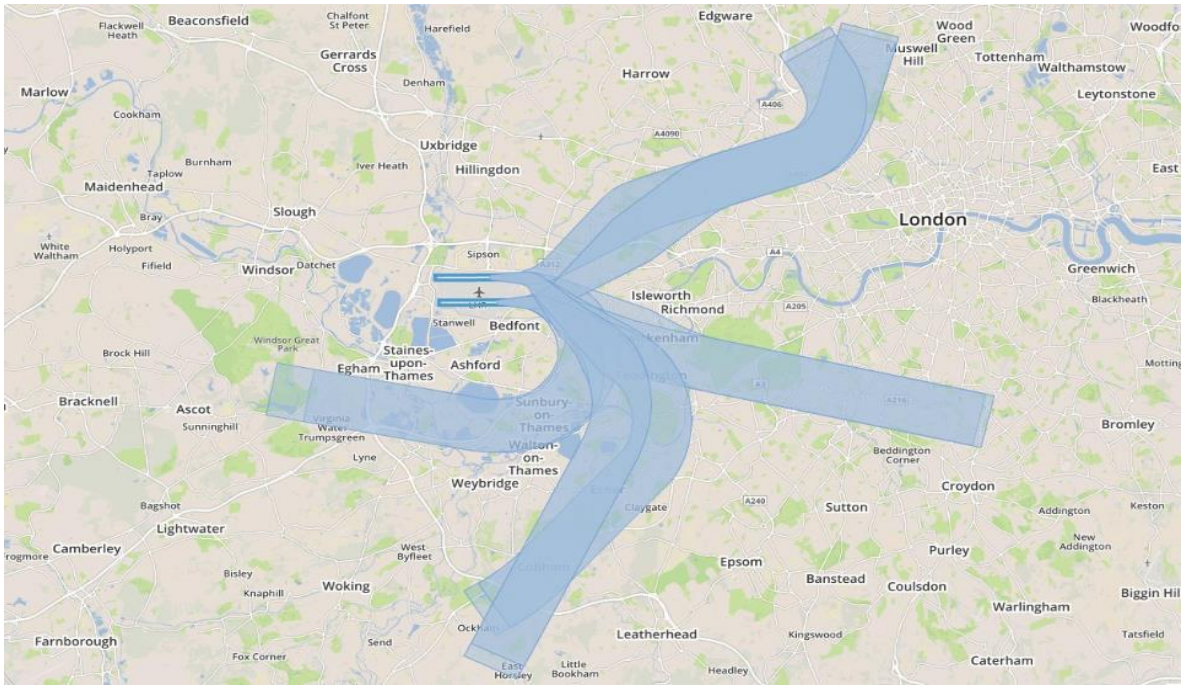
On either side of the SID is a 1.5km corridor known as the Noise Preferential Route (NPR). Aircraft do not have to follow the centreline of the SID precisely, but they are required to stay within the 3km wide NPR corridor up to 4,000 feet, unless they are directed out of the corridor by an air traffic controller for safety or operational reasons.

Once aircraft reach 4,000 feet, air traffic controllers can then direct them from the SID onto a more direct heading towards their destination, and this new heading may not be within the NPR.

Maps showing the NPR corridors for westerly and easterly operations are shown on the following page.



Westerly Operations NPRs



Easterly Operations NPRs

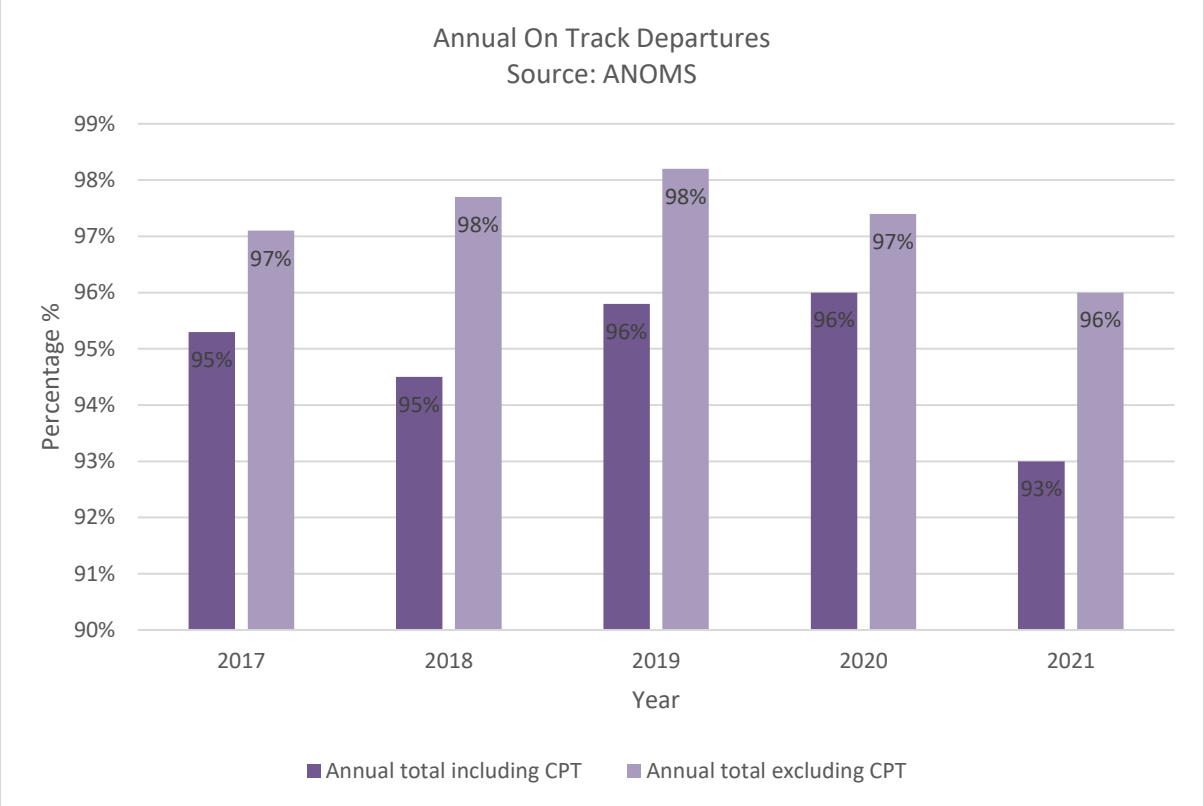
5.3 Track Keeping

Track keeping refers to how well aircraft remain within the NPR up to 4,000 feet (track adherence). Heathrow's Noise and Track Keeping system, ANOMS, is used to detect any aircraft which deviate from an NPR.

Track keeping on Heathrow's departure routes is very high overall. The exception is the easterly Compton route. Track keeping compliance is much lower on this route and has been for many years, for reasons explained below.

Information regarding track keeping deviations (poor track adherence) is sent to the relevant airline and statistics showing track keeping performance are shared regularly. Data shows good levels of adherence, and this has remained broadly consistent across recent years.

Track keeping deviations can occur for a variety of reasons. They may be necessary for weather avoidance or strong winds, and the speed and weight of the aircraft are also significant factors. For example, modern, faster aircraft have a wider radius of turn than older, slower aircraft. The decrease in overall track keeping compliance is due to an increase in 09L departures (an increase in easterly operations overall, particularly when Single Runway Operations were in effect) and an increase in Compton 09R departures, both of which have known track keeping issues. These are being addressed through Heathrow's formal Airspace Change Proposal (ACP) in support of the Government's Airspace Modernisation Strategy. More information on this ACP can be accessed at heathrow.com/airspacemodernisation.



5.4 The Compton Easterly Departure Route

As shown above, track keeping compliance for the Compton easterly departure route is much lower than Heathrow's other departure routes. Over time, as the number of flights using Heathrow has increased, the route has become challenging to manage because of its proximity to the Ockham holding stack to the south of the airport.

This requires NATS air traffic controllers to maintain safe operations by manually directing aircraft on this route to separate them from the stream of arrivals making their way from the holding stack to the airport.

5.5 09L Departures during SRO

Heathrow operated on Single Runway Operations (SRO) for long periods of time in 2021. Due to the low number of ATMs, Heathrow was able to alternate which runway was used for SRO on a weekly basis in order to provide respite to the local community. This increased the number of departing aircraft operating from 09L.

There were 5,282 09L departures in 2021, compared with 2,732 departures from 09L in 2020.

Historical monthly and annual route usage and track keeping figures for each departure route on westerly and easterly operations can be found here.

5.6 Noise Infringements Day/Night

Heathrow has historically assessed aircraft noise in two different ways: annual aircraft noise contours and departure noise limits. Noise contour reports are available in the Noise and Airspace section of Heathrow's website.

Aircraft departing from Heathrow are subject to individual noise limits set by the DfT. The current limits were introduced early in 2001. There are three limits in place: one each for the day, shoulder and night-time periods.

The limits are (all times local):

- Day (07:00 – 23:00 hours) 94dBA L_{max}
- Shoulder (23:00 – 23:30, 06:00 – 07:00 hours) 89dBA L_{max}
- Night (23:30 – 06:00 hours) 87dBA L_{max}

L_{max}, or Maximum Sound Level, is a noise level descriptor representing the highest sound level measured during a single noise event (such as an aircraft passing by), in which the level changes value as time progresses.

Heathrow has 12 permanent noise monitors which are used to monitor adherence to these departure noise limits. The limits assume that the noise monitors are exactly 6.5km from the start of the point from which the aircraft commences its take-off roll on the runway and at the same elevation as the airfield. In practice, this is rarely possible and so adjustments are made to the limits to take account of any variances in the monitor's position.

Furthermore, each monitor has an additional calibration allowance of 0.7dBA added to the limit to provide a margin of error for the microphone. An aircraft is deemed to have infringed the noise limits if it is measured to exceed the limit at any one of the permanent monitors.

In addition, if the aircraft was required to take off with a tailwind (measured by airfield anemometers and wind vanes according to a set formula), an amount of up to 2dBA of the noise recorded at the noise monitor is disregarded. The amount to be disregarded is:

- 0.4dB for a tailwind of up to 1 knot
- 0.8dB for a tailwind exceeding 1 knot but not exceeding 2 knots
- 1.2dB for a tailwind exceeding 2 knots but not exceeding 3 knots
- 1.6dB for a tailwind exceeding 3 knots but not exceeding 4 knots
- 2.0dB for a tailwind exceeding 4 knots

In the event that an airline infringes one of the limits, they are charged a noise supplement, with all proceeds going to the Heathrow Community Trust (HCT) which funds community projects in areas affected by the airport's operations.

Details concerning the allocation of funds can be found at www.heathrowcommunitytrust.org

Noise fines are charged based upon the table below:

	Time period	Decibel limit	Fine per decibel (£)
Day	7am-11pm	94	500
Shoulder	11pm-11:30pm and 6am-7am	89	1,500
Night	11:30pm-6am	87	4,000

A higher number of infringements are usually observed at night which is reflective of both the lower limit at night and the number of large, heavy, long-haul aircraft which tend to depart later in the day to fit schedules around the world or are disrupted from their planned schedule of operation (a spike in infringements may be seen during poor weather conditions, snow, and other periods of widespread delay).

In 2021 there were 3 noise infringements, 2 at night and 1 during the day, further details can be found here.

5.7 4% Climb Gradient

Aircraft departing from Heathrow are required to maintain a 4% minimum climb gradient between 1,000 feet and 4,000 feet. This is a requirement under Heathrow's noise abatement procedures and is monitored using ANOMS. The ANATMT works with airlines to monitor and improve performance where required. In 2021, compliance was 99.9%.

Appendix A – Glossary

ANOMS Airport Noise and Operations Management System

ANATMT Airspace, Noise and ATM Performance Team

ATC Air Traffic Control

ATM Air Transport Movement

CAA Civil Aviation Authority

CDA Continuous Descent Approach

dBA A-weighted decibel

DfT Department for Transport

HCT Heathrow Community Trust

ICAO International Civil Aviation Organization

ILS Instrument Landing System

L_{max} Maximum Sound Level

NAP Noise Action Plan

NATS Heathrow's ATC service provider, formerly known as National Air Traffic Services

NQP Night Quota Period

NPR Noise Preferential Route

NTK Noise and Track Keeping System

QC Quota Count

SID Standard Instrument Departure

Appendix B – DfT Night Flight Dispensation Reasons

Emergencies

- Medical
- Diversion
- Low Visibility
- Risk to Life

Serious Airfield and Terminal Congestion

- Hardship to Passengers
- Long Delays
- Terminal Overcrowded and Facilities Strained
- Insufficient Hotel Accommodation
- Hardship to Animals
- Single Runway Operations

Widespread and Prolonged ATC Delays

- ATC Flow Restrictions
- Thunderstorms, Strong Winds
- Snow and Ice
- ATC Strike or Computer Problems

DfT Dispensation

- Heads of State
- Royal Families (including foreign)
- Senior Ministers on Official Business
- Relief Flights
- Civil Aircraft Affected by Hostilities
- Military Flights on Compassionate Grounds