



***AIRSPACE MODERNISATION
AIRSPACE CHANGE PROPOSAL
(ACP-2021-056)***

STEP 2A OPTIONS DEVELOPMENT





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Annex 1 – Design Principle Evaluation – PBN Departures

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Annex 4 – Comprehensive List of Options Focus Group Reports/Material

Step 2A Appendix A – Comprehensive List of Options – Presentation

Step 2A Appendix B – Comprehensive List of Options – Community Correspondence

Step 2A Appendix C – Comprehensive List of Options – Industry Correspondence

Step 2A Appendix D – Comprehensive List of Options – Workshop Notes

Step 2A Appendix E – Comprehensive List of Options – Stakeholder Feedback Forms

Step 2A Appendix F – Stage 2 Forum Updates

All airspace design options in this document are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, Design Principles, appraisals and stakeholder engagement and consultation.



1. INTRODUCTION

1.1. Purpose of this document

- 1.1.1 Heathrow is undertaking an Airspace Change Proposal to modernise its airspace to make use of modern navigation technology to improve environmental performance, reduce delays and manage traffic in ways that mitigate, where possible, the impact on local communities.
- 1.1.2 CAP1616 Airspace Change Guidance details the seven-stage regulatory process for changing the design of airspace over the UK, including flight paths and procedures. Heathrow is currently in Stage 2 of the process which comprises 2 steps: Step 2A and Step 2B. This document describes Heathrow's Step 2A activities and explains how Heathrow has developed airspace change options, engaged with stakeholders, and then evaluated the options against the Design Principles developed during Stage 1.
- 1.1.3 This document forms part of the suite of submission documentation Heathrow has produced for the CAA's Stage 2 Gateway of the CAP1616 process and is intended to be read alongside those documents. Heathrow's Stage 2 submission documentation includes:
- **Step 2A Options Development (this document):**
 - Development of the Comprehensive List of Options (CLOO)
 - Design Principle Evaluation (DPE)
 - Step 2A Engagement on the CLOO
 - *Step 2A Appendices A-F*, which contain evidence of all CLOO engagement activities
 - **Step 2B Initial Options Appraisal:**
 - Approach to the Initial Options Appraisal (IOA)
 - The IOA
 - Shortlisting of options
 - *Step 2B Appendices A-C*, which contain the IOA for all options
 - **Stakeholder Engagement Summary Document:**
 - Heathrow's stakeholder engagement throughout Stage 2
 - *Stakeholder Engagement Appendix A*, which contains a correspondence log listing all engagement activities and associated stakeholder correspondence.
 - *Stakeholder Engagement Appendices B-F*, which contain evidence of all Stage 2 engagement activities (except CLOO related)
- 1.1.4 A glossary of all terms is provided in Section 7.



1.1 The UK's Airspace Modernisation Strategy

- 1.1.1 In December 2018, the Civil Aviation Authority (CAA) published its finalised Airspace Modernisation Strategy (AMS), which describes the objectives in UK governmental and international policy for airspace to be modernised and sets out the work that industry and other entities are required to carry out to deliver that modernisation.
- 1.1.2 The AMS was recently reviewed by the CAA and an updated version was published in January 2023. It has been split into three parts, Part 1 - Strategic objectives and enablers, Part 2 - Delivery elements and Part 3 – Deployment (still under development).
- 1.1.3 The structure of the UK's airspace has remained the same for decades, despite an increase in demand from its users. Modernisation is critical to ensure that this invisible piece of the UK's national infrastructure is fit for purpose for the future. The AMS sets out the shared vision of the CAA and the Department for Transport (DfT) for modernising airspace, which is to deliver quicker, quieter, and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace. It describes the ways, means, and ends of modernising airspace through initiatives that will modernise the design, technology and operations of airspace.
- 1.1.4 One of the most important initiatives from the AMS is the FASI (Future Airspace Strategy Implementation) programme. This programme is being progressed by NATS En-Route Limited (NERL) and 22 airports in the UK, including Heathrow.
- 1.1.5 The FASI programme encompasses the requirement to fundamentally redesign the national airspace system at lower altitudes and in the terminal airspace, which serves commercial air transport across the busiest regions of the UK, making the most of the capabilities of modern aircraft and satellite-based technology. The airspace design projects are sponsored by 22 airports, who are responsible for arrival and departure routes below 7,000 feet, and by NERL (NATS En-Route Ltd) who is responsible for the airspace structures and route network above 7,000 feet.
- 1.1.6 To achieve this initiative, the Airspace Change Organising Group (ACOG) was established in 2019 to develop a Masterplan to coordinate the modernisation programme. There is more information on ACOG and the Masterplan in section 0 of this document.
- 1.1.7 The introduction of Performance Based Navigation (PBN) is key to achieving the aims of airspace modernisation. PBN improves the accuracy of where aircraft fly and allows users to move away from airspace design based on 'conventional' navigation and the location of ground-based beacons, to an airspace design based on modern satellite navigation technology. This allows for more flexible positioning of routes and enables aircraft to fly them more accurately.

1.2 The Airspace Change Process

- 1.2.1 In December 2017, the CAA reformed the airspace change process and introduced CAP1616 Airspace Change Guidance detailing the regulatory process for changing the design of airspace over the UK, including flight paths and procedures.
- 1.2.2 Proposals for changes to airspace design are brought forward by an airspace change sponsor, usually an airport or a provider of air navigation services (such as NERL). The



CAA is responsible for deciding whether to approve Airspace Change Proposals (ACPs), and the Secretary of State for Transport has the ability to call in proposals that meet certain criteria. CAP1616 sets out a seven-stage process which provides a framework for making and determining ACPs, and it places great importance on engaging and consulting with a wide range of stakeholders, including potentially affected communities. Figure 1 (taken from CAP1616) gives an overview of the airspace change process.

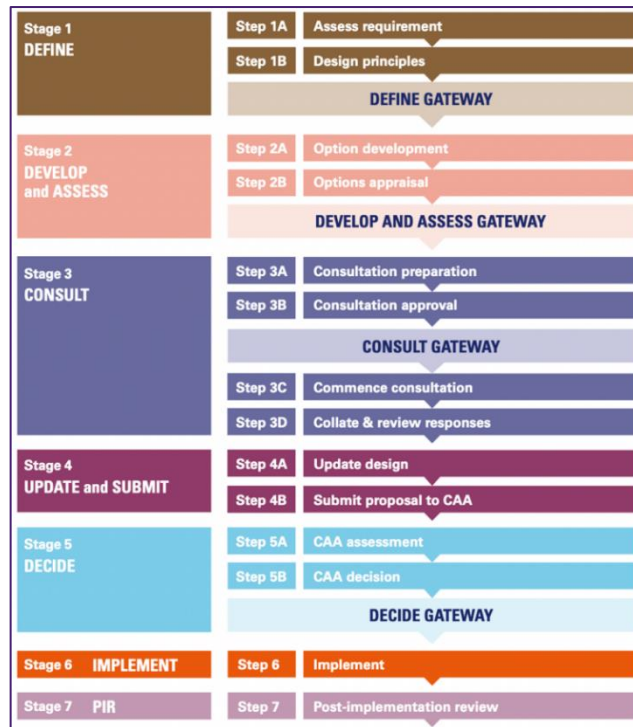


Figure 1: Seven stages of the CAP1616 Process

1.3 Heathrow’s Airspace Modernisation ACP

- 1.3.1 To introduce airspace modernisation, Heathrow is required to follow the CAP1616 process as outlined above.
- 1.3.2 Table 1 below summarises the CAP1616 stages already undertaken for this ACP, providing links to submission documents for those previous stages. All information submitted to the CAA for this ACP is available on the [CAA’s Airspace Change Portal](#).



| Airspace Change Stage | Summary | Link to Documents |
|----------------------------------|--|--|
| Stage1 Step 1A | <p>In July 2021, Heathrow submitted a Statement of Need (SoN) to the CAA.</p> | <p>Statement of Need</p> |
| | <p>On 19 August 2021, Heathrow had an assessment meeting with the CAA, as part of Step 1A of the CAP1616 process. The purpose of the assessment meeting is for the change sponsor to present and discuss its SoN and to enable the CAA to consider whether the proposal falls within the scope of the formal airspace change process.</p> | <p>Assessment Meeting Presentation</p> <p>Assessment Meeting Minutes</p> |
| Stage 1 Step 1B | <p>At Step 1B, Heathrow carried out engagement with stakeholder representatives to develop a set of Design Principles for this airspace change.</p> <p>The aim of the Design Principles is to provide high-level criteria that the proposed airspace design options ‘must’ or ‘should’ meet. They also provide a means of analysing the impact of different design options and a framework for choosing between or prioritising options.</p> | <p>Step 1B – Design Principle Submission Document</p> |
| Stage 2 Step 2A | <p>At Step 2A, Heathrow developed options for the airspace change, and evaluated how those options responded to the Design Principles.</p> <p>Heathrow developed a comprehensive list of options which address the Statement of Need and align with the Design Principles set at Stage 1.</p> <p>Those options were shared with stakeholder representatives who were previously engaged with at Stage 1. Feedback from this engagement was then used to refine and/or generate further options.</p> <p>The final part of Step 2A was to qualitatively and, where possible, quantitatively assess the options against the Design Principles to produce a Design Principle Evaluation.</p> | <p>This Document</p> |

Table 1: Summary of CAP1616 work to date



1.4 Design Principles

- 1.4.1 The Design Principles were set following engagement with stakeholders. Heathrow decided not to prioritise the final Design Principles individually, but instead has grouped them into clusters of equal importance within two brackets: “our new airspace design must”, and “our airspace design should also”.
- 1.4.2 The ‘must’ Design Principles are core requirements of the airspace design, related to policy, regulation, or Heathrow’s business requirements. They all have equal priority with each other since the final airspace design will need to deliver against each of these.
- 1.4.3 The ‘should also’ Design Principles all have equal priority with each other, and Heathrow will aim to deliver against all these principles, where possible.
- 1.4.4 The Design Principles in Table 2 below are numbered, however this is not to indicate a priority order, but for ease of reference.

| | Design Principle | | |
|------------------------------|---|----|--|
| Our new airspace design must | Be safe | 1 | |
| | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | 2 | |
| | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | 3 | |
| | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | 4 | |
| | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | 5 | |
| And should also | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | 6 | |
| | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | 7 | |
| | Contribute to minimising the negative impacts of night flights | 8 | |
| | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | 9 | |
| | Keep the total number of people who experience noise from the future airspace design to a minimum | 10 | |
| | Enable the efficiency of other airspace users' operations | 11 | |
| | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | 12 | |

Table 2: Heathrow's Design Principles for Airspace Modernisation

- 1.4.5 Heathrow passed the Stage 1 Gateway in March 2022.

1.5 CAP1616 Step 2A Requirements

- 1.5.1 Stage 2 of the CAP1616 process is split into two steps, Step 2A – Options Development and Step 2B – Options Appraisal. This document describes all work undertaken at Step 2A.
- 1.5.2 Paragraph 125 of CAP1616 sets out that, “Step 2A requires the change sponsor to develop a first comprehensive list of options – to the extent that a list is possible – that address the Statement of Need and that align with the Design Principles from Stage 1. The change sponsor preliminarily tests these with the same stakeholders it engaged with in Step 1B to



ensure that they are satisfied that the design options are aligned with the Design Principles and that the change sponsor has properly understood and accounted for stakeholder concerns specifically related to the design options. The change sponsor then produces a design principle evaluation that sets out how its design options have responded to the design principles.”

1.5.3 Figure 2 from Page 45 of CAP1616 summarises this process.

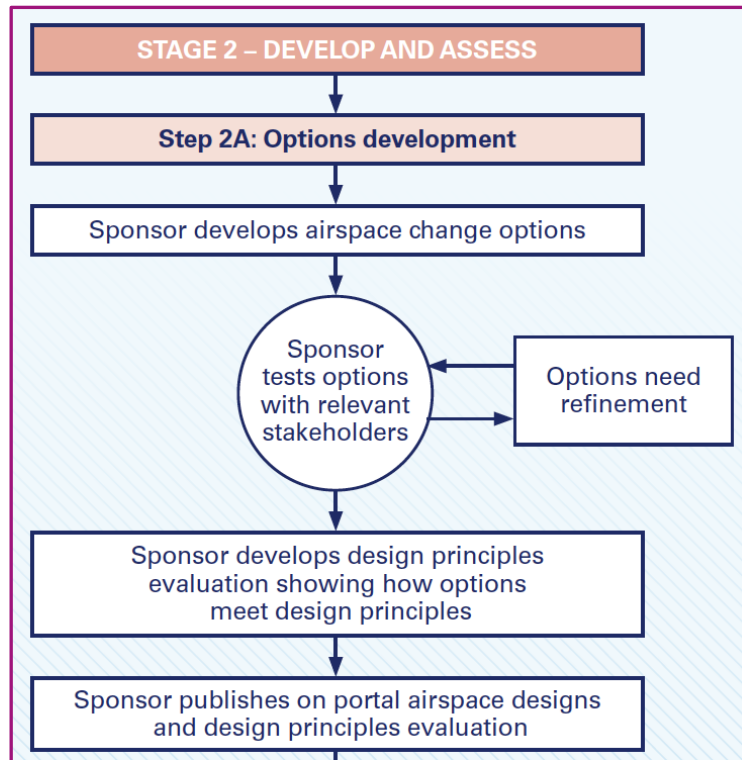


Figure 2: Step 2A of CAP1616

1.5.4 Paragraph 128 of CAP1616 makes clear that, as part of the Stage 2 Develop & Assess Gateway, the CAA will not assess the appropriateness of any of the individual options or approve the airspace change. They will instead provide an assessment that Heathrow has (in its view):

- identified all the possible options;
- evaluated the design options against the Design Principles in a fair and consistent manner;
- ensured, as far as possible, that stakeholders are satisfied that the design options are aligned with the Design Principles and that Heathrow has set out how decisions taken relate to stakeholder feedback, and
- evaluated that the design options are compliant with the required technical criteria.

1.6 The UK Airspace Change Masterplan

1.6.1 Due to the number, complexity and overlapping scope of the individual ACPs needed to deliver the FASI Programme, as co-sponsors of the AMS, the DfT and CAA commissioned



ACOG to create a single coordinated implementation plan – the Masterplan – for the UK’s interdependent Airspace Change Proposals.

- 1.6.2 Airspace modernisation is a long and complex process. Larger ACPs with many interdependencies can take several years longer to develop than smaller ones which have fewer interactions. As a result, ACOG is developing the Masterplan through a series of iterations. The iterative approach recognises that different information and levels of detail will be available at different times. ACOG may have an insufficient level of detail about some ACPs to make firm conclusions and need to make assumptions that are refined in later iterations.
- 1.6.3 This method means that the Masterplan remains flexible and responsive to accommodate the evolving context for airspace modernisation, such as changes arising from the AMS review, CAP1616 updates, new policy direction or unanticipated events.
- 1.6.4 ACOG envisages a minimum of four iterations of the Masterplan. These iterations broadly align with the gateways of the CAP1616 process. Each iteration must be accepted separately into the AMS, except for Iteration 1, which was a high-level plan that has already been assessed and published¹.
- 1.6.5 The purpose of Iteration 2 is to provide a system-wide scope of the constituent ACPs and identify the potential interdependencies between the proposals. The assessment of interdependencies between ACPs remains at a high level in Iteration 2, because most of the sponsors were yet to produce a comprehensive list of airspace design options at the time of its creation. Iteration 2 of the Masterplan² was accepted by the CAA in January 2022. The CAA’s decisions on Airspace Change Proposals will need to ensure there is alignment with the Masterplan.
- 1.6.6 The timeline and sequencing of the Masterplan ACPs is complex. It is not considered feasible for all the ACPs in the Programme to be developed and deployed at the same time. The Masterplan therefore takes a modular approach to deployment and requires coordination and strong programme management discipline to mitigate the risks of design conflicts, technical misalignments, and a lack of transparency for external stakeholders. To help with this, the Masterplan has placed each of the ACPs into a regional cluster and Iteration 2 places Heathrow in the cluster referred to as the London Terminal Manoeuvring Area (LTMA).
- 1.6.7 The LTMA is one of the busiest and most complex airspace structures in the world and extends across much of South-East England. The LTMA cluster of airports also includes Biggin Hill, RAF Northolt, Bournemouth, Southampton, Gatwick, Southend, Stansted, London City, Luton, and Manston. Since the publication of the Masterplan Iteration 2, Farnborough Airport has joined the programme and will also be part of the LTMA regional cluster.
- 1.6.8 Large scale ACPs are usually difficult to develop and deploy due to the complexity of the existing airspace design, the intensity of the current operation and its potential impacts on communities, the environment, and other airspace users. The Masterplan ACPs bring additional deployment challenges associated with airspace design interdependencies and

¹ [Airspace Masterplan Iteration One](#) – Southern UK (CAA CAP1884, February 2021)

² [Masterplan Iteration 2](#)



the widespread introduction of PBN routes, which will replace well-established Air Traffic Control (ATC) procedures based on controller vectoring with the comparatively new concept of systemisation.

- 1.6.9 Iteration 2 advises that the LTMA regional cluster will require a minimum of three separate deployment windows to implement the full set of proposed changes (within the LTMA) because of the size, complexity, and extensive interdependencies of the constituent ACPs. The make-up of these three separate deployments is yet to be determined.

Heathrow's Potential Interdependencies identified within Iteration 2

- 1.6.10 The Masterplan identifies the interdependencies between the constituent ACPs based on analysis of “the broad sections of airspace where a flight path could conceivably be positioned within the scope of each proposal”. Based on this broad assessment, the Masterplan identifies that Heathrow has likely dependencies below 7,000 feet with flight paths to and/or from Gatwick, Luton, Stansted, London City, Biggin Hill, RAF Northolt and Southampton airports.
- 1.6.11 Since the publication of Masterplan Iteration 2, Farnborough Airport has commenced an ACP and has been accepted into future iterations of the Masterplan. We expect there to be interdependencies between Heathrow and Farnborough design options.



2. EXISTING RUNWAY AND AIRSPACE ARRANGEMENTS

2.1 Runways and Local Geography

2.1.1 Heathrow is the main international airport serving London, situated 14 miles west of the capital. With two parallel east-west runways, Heathrow falls entirely within the administrative boundary of the London Borough of Hillingdon. It is adjacent to or in the vicinity of the local authority areas of Buckinghamshire, Slough, Windsor & Maidenhead, Spelthorne, Hounslow, Richmond upon Thames, and Ealing as shown in Figure 3.

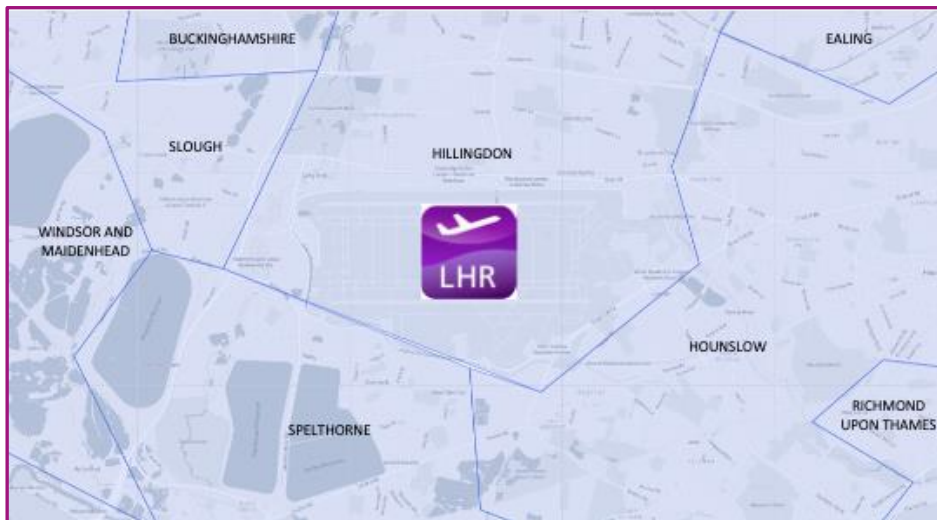


Figure 3: Location of Heathrow

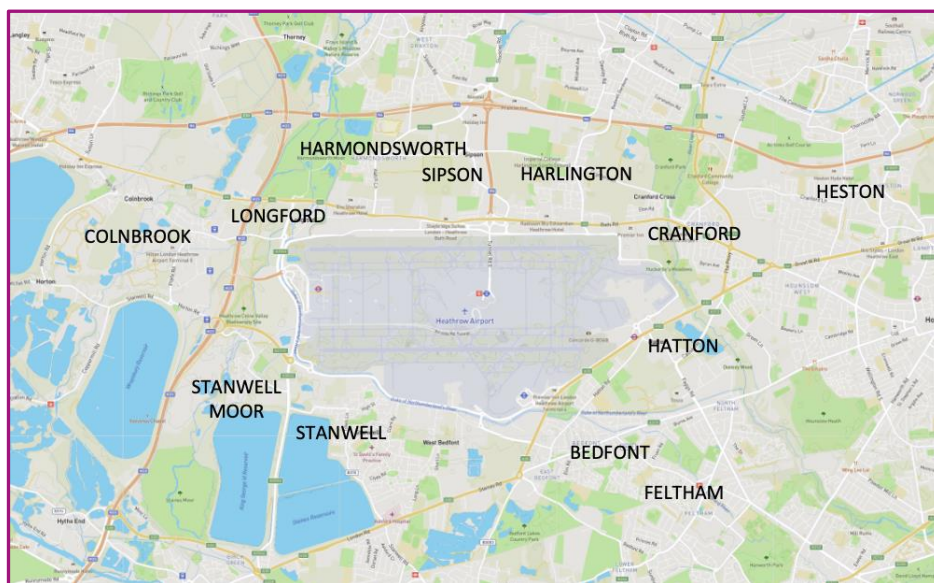


Figure 4: Local Geography

2.1.2 Runways are given a numerical designation based on their compass bearing as shown in Figure 5. The position of the runways at Heathrow means that when it is on westerly



operations the runways are designated as Runway 27L (the southern runway) and Runway 27R (northern). '27' refers to the compass heading when lined up on the runway for either departure or landing (i.e. 270 degrees magnetic), whilst the L (Left) and R (Right) refers to the lateral position of the runways as pilots would see them as they make an approach.

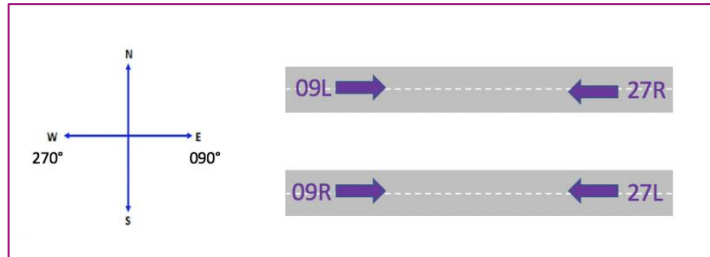


Figure 5: Heathrow's naming convention

- 2.1.3 This is reversed when considering the runways from the opposite direction when on easterly operations, where they align to a compass heading of 090 degrees magnetic. In this instance the runways are referred to as Runway 09L (northern) and Runway 09R (southern).
- 2.1.4 To the north-west of the airport are the Chilterns and North Wessex Downs Areas of Outstanding Natural Beauty (AONB) and to the south and south-east lie Surrey Hills, Kent Downs, and High Weald AONBs, as shown in Figure 6.

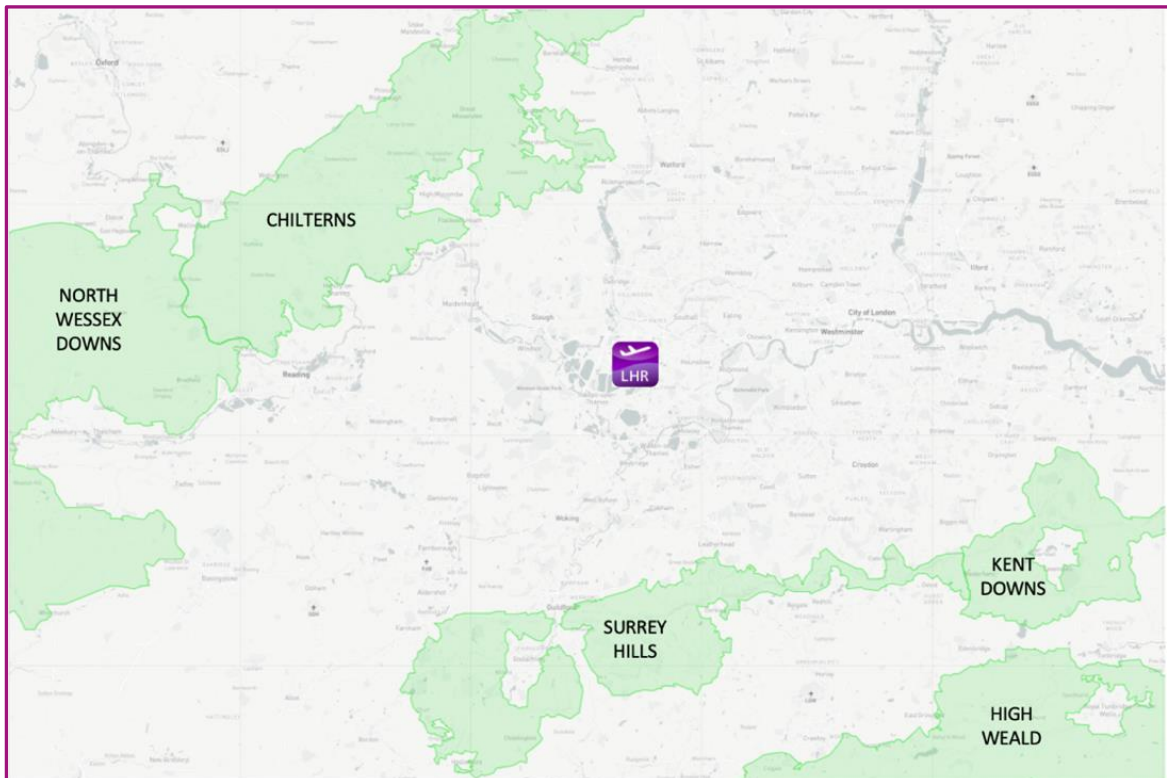


Figure 6: AONBs

- 2.1.5 London's Royal Parks are situated to the east of Heathrow, and Windsor Great Park to the west as shown in Figure 7.

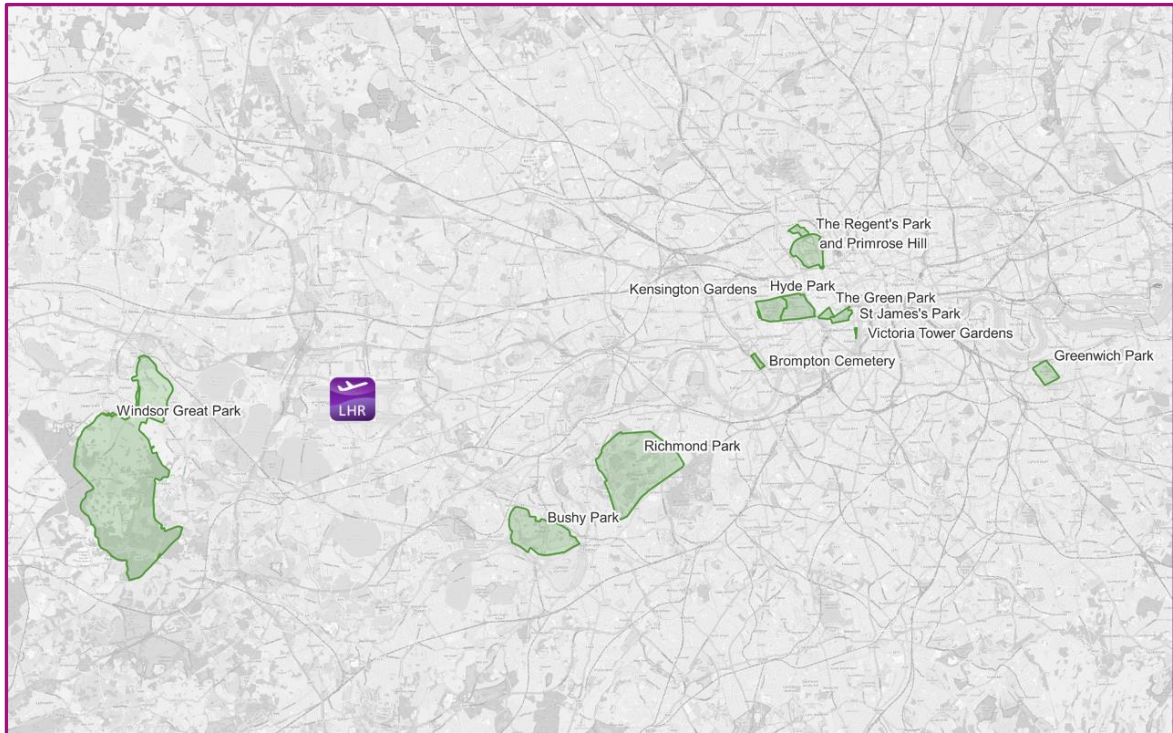


Figure 7: Royal Parks and Windsor Great Park

- 2.1.6 The direction planes arrive and depart at Heathrow depends on the direction of the wind. For safety and performance reasons aircraft typically take off and land into the wind. This is because an aircraft's wing relies on the speed of the air moving over it (airspeed) to generate lift, and aircraft taking off or landing into a headwind require less runway distance compared with a tail wind.
- 2.1.7 The UK's prevailing wind is from a south westerly direction, meaning the Airport is on westerly (runways 27L and 27R) for most of the time. Over the last 20 years, (2003-2022), westerly operations have occurred on average approximately 72% of the time, meaning the arrivals and departures to the east (runways 09L and 09R) were in operation around 28% of the time³.
- 2.1.8 The split between westerly and easterly operations varies year to year, with generally a higher proportion of westerly operations occurring in the summer months⁴.

Westerly Preference

- 2.1.9 When winds are light (below 5 knots), aircraft can potentially take off or land safely in either direction. Rules are set by Government to determine what to do in these circumstances. These rules are called "westerly preference" and they determine which direction the runways are configured to use when the winds are light and there is a choice. At Heathrow, winds are light on average 20% of the time.
- 2.1.10 Westerly preference has been in operation at London Heathrow since 1962 as a noise mitigation measure. The preference enables westerly operations (i.e. arriving aircraft to

³ Based on data published by Heathrow [here](#)

⁴ Based on Table 1 of ERCD Report 2001 [here](#)



approach Heathrow from the east over London, and take-offs to the west over Berkshire) to continue when there is a light, easterly tailwind wind of up to 5kts, providing that the runways are dry and any cross-wind does not exceed 12kts. This was introduced in 1962 to reduce the number of aircraft taking off in an easterly direction over London, the most heavily populated side of the airport. This was when departures were considered to be more disruptive to local communities than arrivals. The operation of westerly preference has formed an established part of the airspace arrangements that apply at Heathrow.

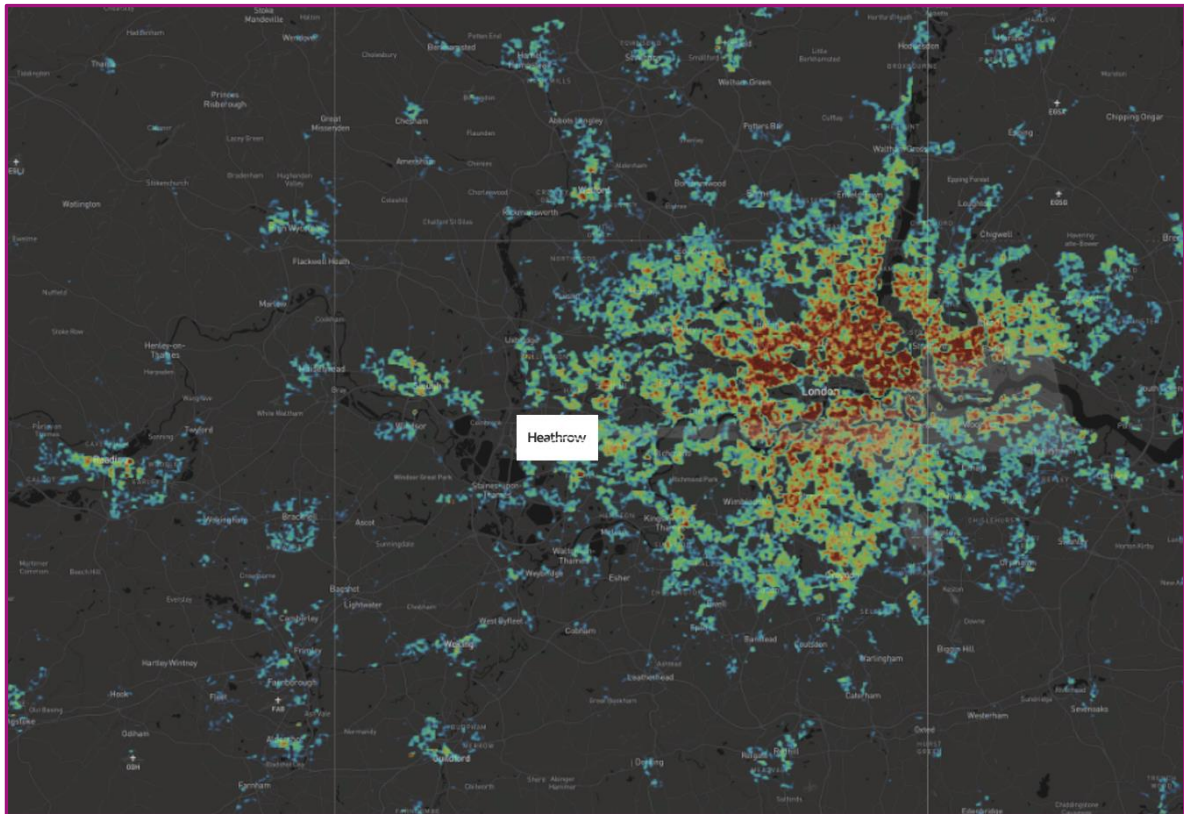


Figure 8: Population Density in London & surrounds

- 2.1.11 Following consultation in 2001, the Government decided that the westerly preference should be removed at night and particularly during the early morning period (0430-0600) when there are more arrivals than departures. This means that instead of westerly preference at night, Heathrow rotates between westerly and easterly operations to provide a fairer distribution of aircraft noise to the east and west of the airport. This is still dependent on the wind, which means Heathrow can only do this when the wind direction allows or is below 5 knots. The way in which Heathrow alternates its runways is described in more detail in Section 2.6.

2.2 Controlled Airspace Arrangements

- 2.2.1 Figure 9 shows the Class D London Control Zone airspace (known as “the London CTR”), bordered in pink with Heathrow at its centre. It also shows the London City CTR and airport to the east, and RAF Northolt approximately 4.5 nautical miles (nm) to the north of Heathrow. Helicopter routes are shown as blue dashed lines. The vertical extent of the CTR is from the surface to an altitude of 2,500 feet.

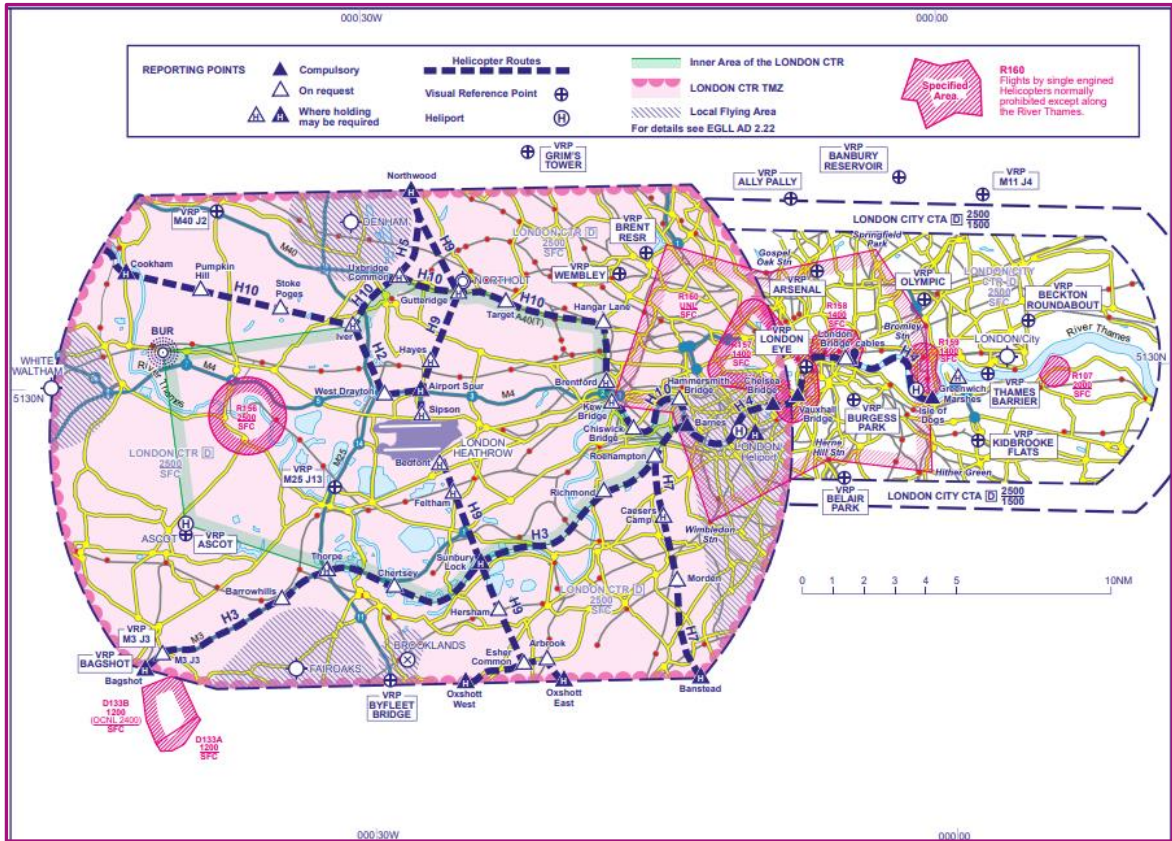


Figure 9: London CTR

2.2.2 Figure 10 illustrates the positioning of the London CTR within the context of RAF Northolt and Luton airports to the north, Stansted airport to the northeast, London City and Southend airports to the east, Biggin Hill to the southeast, Gatwick airport to the south and Farnborough airport to the southwest. The lateral boundaries of Controlled Airspace (CAS) are depicted in green, with varying vertical dimensions.



Figure 10: Adjacent Airports & CAS

- 2.2.3 Figure 11 illustrates the Inner Area (shown in green) of the London CTR (shaded pink). Within this area, helicopters landing or departing close to Heathrow are required to obtain Prior Permission (PPR) 60 minutes before their flight. With the exception of high priority aircraft, i.e. Flight Priority Category A or B (as defined in CAP493 Section 1 Chapter 4 such as emergencies and normal police operational flights), flights wishing to land or depart from within the Inner Area may be subject to holding delay on the ground or outside of the Inner Area, commensurate with the current respective inbound or outbound Heathrow delays.
- 2.2.4 Figure 11 also illustrates the Local Flying Areas (LFAs), which are the volumes of airspace (dashed circles) surrounding four airfields and the London Heliport which are contained within the London CTR:
- Denham airfield up to 1,200 feet above mean sea level (AMSL);
 - White Waltham airfield up to 1,500 feet AMSL;
 - Fair Oaks airfield up to 1,500 feet AMSL;
 - Brooklands Museum up to 1,500 feet AMSL, and
 - the London (Battersea) Heliport up to 1,300 feet AMSL.
- 2.2.5 Aircraft within these LFAs operate under specific rules but without a clearance and under separation provision from ATC at London Terminal Control (LTC).

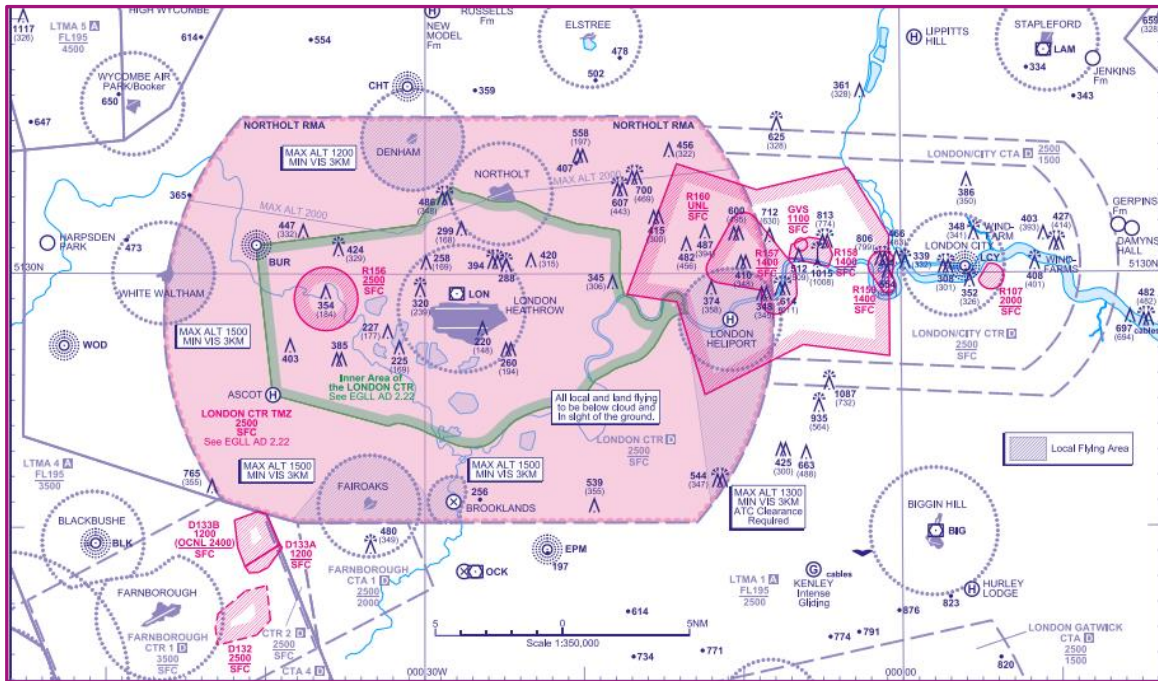


Figure 11: Inner Area & LFA

2.3 Departures from Heathrow

- 2.3.1 On average there are around 650 departures from Heathrow each day. The first scheduled departure is at 0600 and the last scheduled departure is at 2240, with a cargo departure at 2250. These are the scheduled times of departure, which can vary from actual times of departure depending on operational performance throughout the day.
- 2.3.2 Aircraft taking off from Heathrow follow pre-defined routes, known as Standard Instrument Departures routes (SIDs).

Heathrow's Departure Routes

- 2.3.3 There are six SIDs in use from each of Heathrow's runways⁵. They follow a very similar route from Runways 09L and 09R and Runways 27L and 27R, the only difference being the first few miles from the runway end before the route aligns with the corresponding SID from the adjacent runway. Figure 12 illustrates Heathrow's SID centrelines.

⁵ There are currently 7 published SIDs from each runway, however the Mayfield SID is no longer used and it will be withdrawn from the Aeronautical Information Publication (AIP) in due course under a separate ACP.

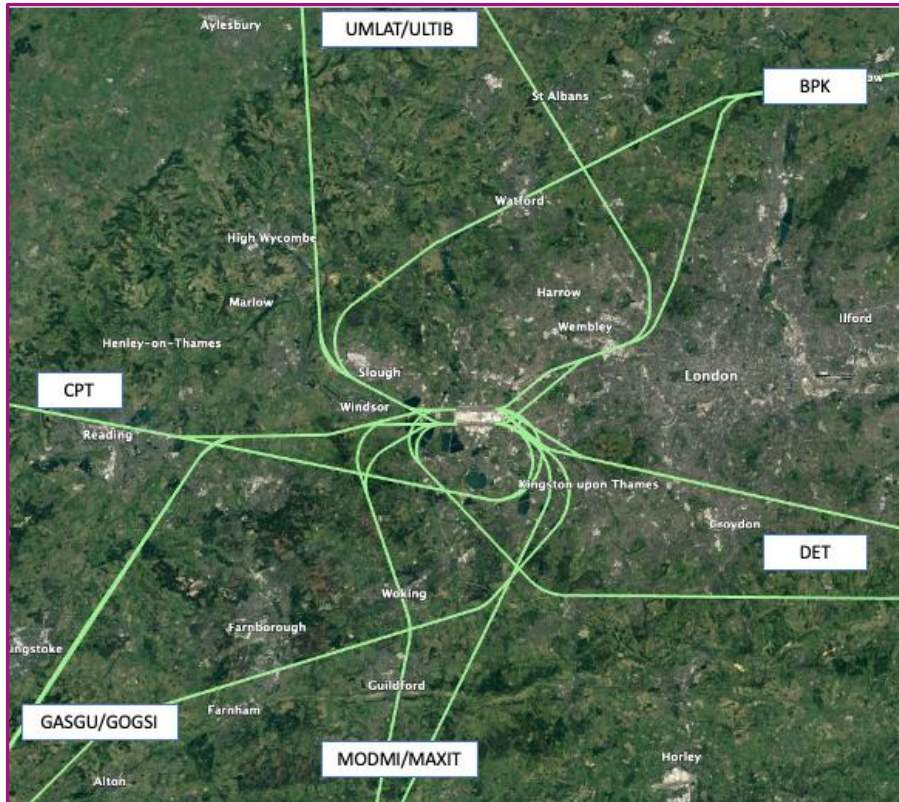


Figure 12: Heathrow's SID centrelines

- 2.3.4 The choice of which of the six departure routes aircraft take is a decision for airlines. It is dictated primarily by the destination of the flight but there are several other factors that influence this choice, including international situations, weather conditions and the availability of the route.
- 2.3.5 The primary purpose of a SID is to ensure aircraft departing the runway remain clear of obstacles (e.g. tall buildings, radio masts, terrain) until they safely reach the en-route network. SIDs can also be used to ensure aircraft are kept within the confines of Controlled Airspace, and they ensure safe separation from aircraft arriving at Heathrow and aircraft following other routes to/from adjacent aerodromes. The latter is particularly important in the London airspace.

Departure Route usage

| Annual Departure Movements by SID (%) | SID | 2019 | | 2020 | | 2021 | | 2022 | |
|---------------------------------------|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | Easterly | Westerly | Easterly | Westerly | Easterly | Westerly | Easterly | Westerly |
| | BPK | 22 | 23 | 25 | 23 | 20 | 20 | 15 | 16 |
| | DET | 25 | 25 | 24 | 23 | 22 | 21 | 27 | 26 |
| | MID ⁶ /MAXIT/ MODMI | 16 | 16 | 16 | 18 | 20 | 21 | 19 | 18 |

⁶ The Midhurst SID changed to MAXIT/MODMI on 27 February 2020



| | | | | | | | | | |
|--|-------------|----|----|----|----|----|----|----|----|
| | GOGSI/GASGU | 7 | 6 | 7 | 7 | 8 | 8 | 8 | 9 |
| | CPT | 15 | 13 | 18 | 14 | 18 | 17 | 17 | 16 |
| | UMLAT/ULTIB | 15 | 17 | 11 | 14 | 12 | 14 | 13 | 16 |

Table 3: Breakdown of SID usage % (2019-2022)

Noise Preferential Routes

- 2.3.6 Because all aircraft perform differently and may be affected by weather conditions which can cause them to drift left or right, there will be some variation as to where different aircraft will fly relative to the centreline of the SID.
- 2.3.7 For this reason, when the SIDs were designed in the 1960s by the DfT, the Government set corridors known as Noise Preferential Routes (NPRs) which extend 1.5 kilometres (km) either side of the SID route centreline. Over time as aircraft performance and navigation technology has developed, the position of aircraft over the ground has become more consistent on departure routes. However, there are still some small variations between aircraft types and due to the navigation data coding supplied to airlines for aircraft flight management systems.
- 2.3.8 Aircraft don't have to follow the centreline of the SID precisely, but they have to remain within the NPR corridor up to 4,000 feet. Under Government rules⁷, once aircraft reach this altitude, ATC can direct planes off the departure route towards a more direct heading to their destination, or to facilitate a better continuous climb above 6,000 feet. This is known as vectoring, and it is a common feature of today's operation as aircraft performance has outstripped the legacy airspace design which was predicated on slower climbing aircraft.

⁷ Rules set under Section 78(1) of the Civil Aviation Act 1982 and detailed in the UK AIP



Figure 13: Heathrow's easterly NPRs

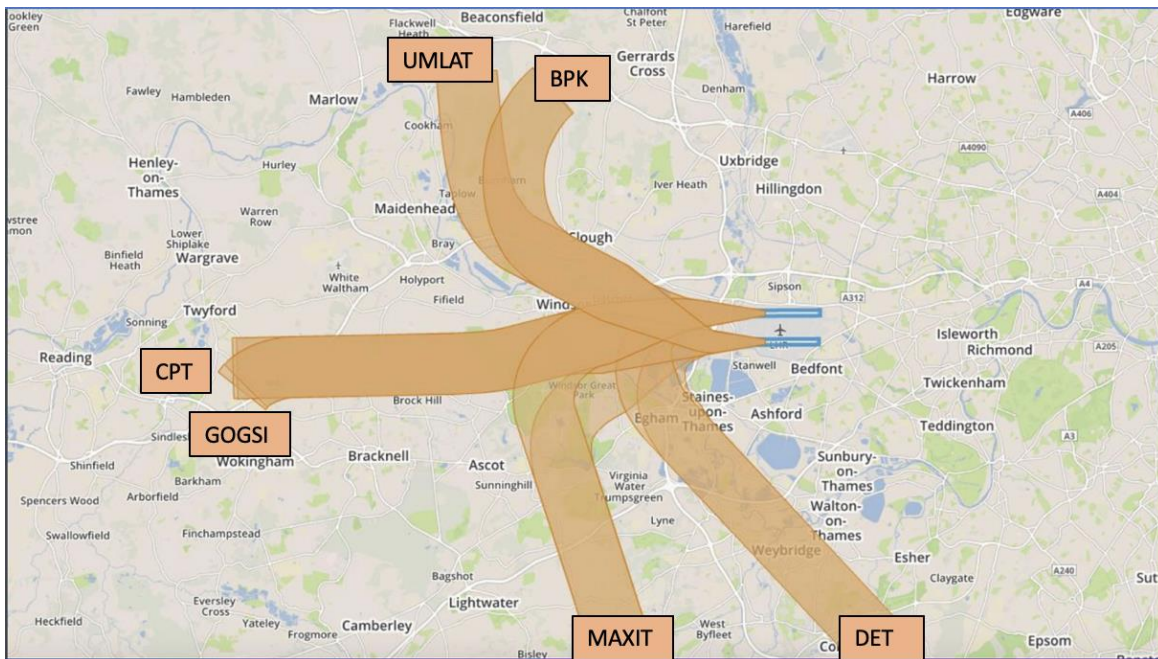


Figure 14: Heathrow's westerly NPRs

NPR Performance

- 2.3.9 Track keeping refers to how well aircraft stay within the NPR up to 4,000 feet. Heathrow's Noise and Track Keeping (NTK) system is used to detect any aircraft which deviates from a Noise Preferred Route.
- 2.3.10 Track keeping on Heathrow's departure routes is very high overall, with about 98% of all departures staying within the NPRs. The exception is the easterly Compton route – a



departure route which is used during periods of easterly operations for aircraft departing to the west. Track keeping compliance is much lower on this route and it has been for many years. The reasons for this are explained below.

| | SID | 2021 | 2022 |
|--|-------|------|------|
| Westerly NPR Performance % (on-track departures) | BPK | 99.4 | 99.3 |
| | CPT | 99.1 | 99.5 |
| | DET | 94 | 95.6 |
| | MAXIT | 98.1 | 98.1 |
| | GOGSI | 99.5 | 99.3 |
| | UMLAT | 99.3 | 99.1 |

| | | | |
|--|-------|------|------|
| Easterly NPR Performance % (on-track departures) | BPK | 99.2 | 99.3 |
| | ULTIB | 98.8 | 98.6 |
| | CPT | 40.8 | 37 |
| | DET | 99.5 | 99.6 |
| | MODMI | 90.1 | 98.9 |
| | GASGU | 88.6 | 99 |

Table 4: NPR Performance % 2021-2022

2.4 Easterly Compton SID

- 2.4.1 The current Compton (CPT) SIDs from Runways 09L and 09R have not been regularly used for over 30 years. As the number of flights using Heathrow increased, the route became increasingly challenging to manage because of its proximity to the Ockham holding stack and the associated Heathrow arrival flow from the south of the airport.
- 2.4.2 Instead of allowing aircraft to fly the published SID, air traffic controllers have been required to manually direct aircraft on this route, to safely separate them from the stream of arrivals making their way from the southerly holding stacks towards the airport.
- 2.4.3 In 2009, this manual intervention by ATC was standardised and it is now standard practice.
- 2.4.4 However, it does result in poor Noise Preferential Route (NPR) compliance on this particular route compared to Heathrow’s other departure routes, as shown in Table 4. Traffic departing on this route is mainly used for flights heading towards the west, to Ireland and over the Atlantic.
- 2.4.5 As part of this ACP, Heathrow intends to design new Compton SIDs from Runways 09L and 09R so aircraft can operate without the need for routine controller intervention below 4,000 feet in the same manner as the other Heathrow SIDs. This will enable greater track keeping within the NPR on this departure route.



Noise Abatement

Airport

2.4.6 The DfT sets rules⁸ regarding the height of aircraft on departure from Heathrow. The rules state that:

- after take-off, aircraft must reach 1,000 feet within 6.5km from ‘start of roll’;
- after passing this point, the aircraft shall maintain a minimum climb gradient of not less than 4% to an altitude of not less than 4,000 feet, and
- Aircraft must stay within the NPR to 4,000 feet.

2.4.7 Climb rates on departure will vary, because aircraft climb at different rates depending on factors such as the type of aircraft, headwind, and weather conditions, or how fully laden they are. For example, bigger aircraft such as Airbus A380s will climb more slowly compared with smaller aircraft such as an A319 or A320, and therefore they may be lower than a smaller aircraft would be in the same position on the departure route.

2.4.8 Occasionally planes are directed to take a different route by ATC, which means leaving the NPR below 4,000 feet. This could be for reasons such as thunderstorms, other severe weather conditions, or proximity to other aircraft (such as a police helicopter or air ambulance) that may be flying within or near to the departure route.

2.4.9 Table 5 below shows the percentage of all Heathrow departures that adhere to the requirement to maintain a 4% minimum climb gradient between 1,000 feet and 4,000 feet.

| | 2019 | 2020 | 2021 | 2022 |
|--------------------------------|-------|-------|-------|-------|
| Adherence to 4% climb gradient | 99.8% | 99.9% | 99.9% | 99.8% |

Table 5: Percentage adherence to minimum 4% climb from 1000ft to 4,000ft.

Airlines

2.4.10 In addition to meeting the airport’s noise abatement requirements set out above, airlines must adhere to a Noise Abatement Departure Procedure (NADP). Developed by the International Civil Aviation Organization (ICAO), the use of an NADP for the take-off climb ensures that the necessary safety of flight operations is maintained while minimising exposure to noise on the ground. At or above 800 feet, the aircraft’s engine power may be reduced in order to preserve the service life of the engine and to reduce noise. At or above this 800-foot threshold, an aircraft may then accelerate from its take-off speed. Once an aircraft starts to accelerate over the ground, the vertical (climb) speed reduces. The engines are therefore used to either prioritise altitude gain or speed gain, but not both at the same time.

2.4.11 The balance between how the engines are used to either gain altitude or speed, and at what altitude it is acceptable to reduce engine power and accelerate, are set out in each airline’s Standard Operating Procedures (SOPs). These procedures are regulated by ICAO and vary across airlines. The ICAO guidance recommends that an airline does not adopt more than

⁸ Rules set under Section 78(1) of the Civil Aviation Act 1982 and detailed in the UK AIP



two procedures for any given aircraft type, to ensure that adoption of multiple procedures does not lead to confusion for the flight crew and thus a potential impact on flight safety. The decision on which of these procedures is used is the responsibility of the airline.

- 2.4.12 ICAO guidance provides two examples that were originally intended to provide distinct differences in noise exposure for communities that are either close to, or further away from, an airport: NADP 1 and NADP 2. ICAO notes that NADP 1 is intended to provide noise reduction for noise-sensitive areas in close proximity to the departure end of the runway. NADP 2 is intended to provide noise reduction for noise-sensitive areas more distant from the runway end.
- 2.4.13 The difference between the height profiles for the two procedures is illustrated below for the Airbus A380 (when configured for a 3,000 nautical mile trip length, using reduced take-off thrust)⁹.

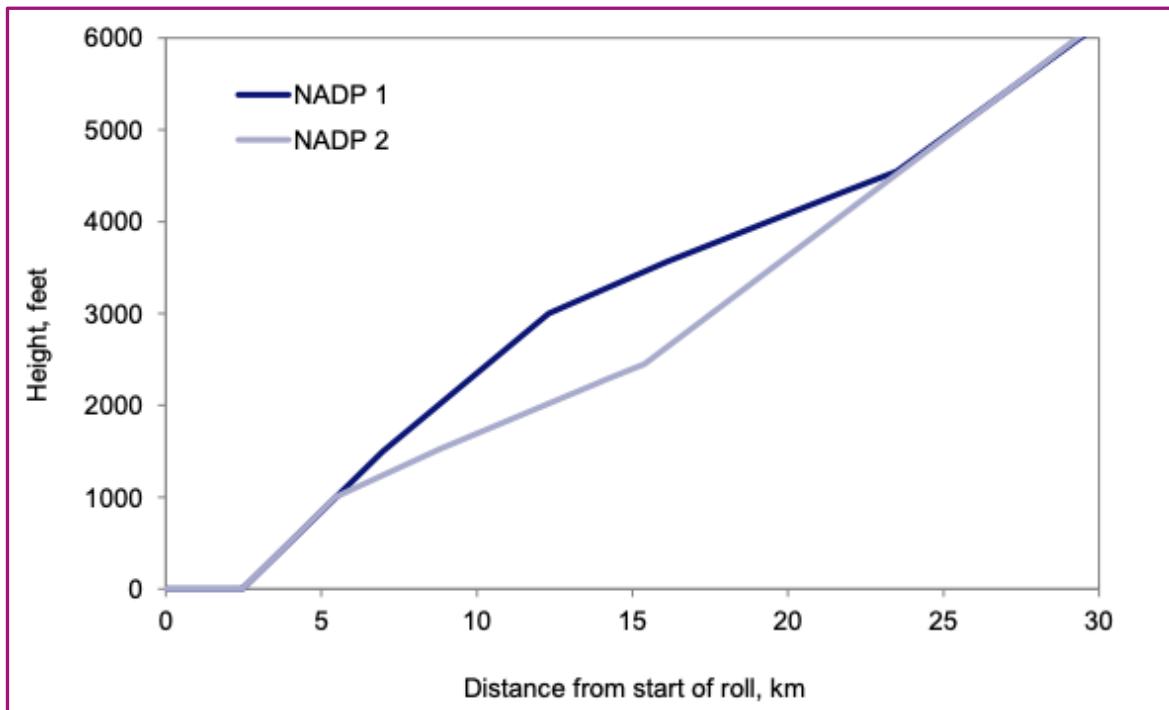


Figure 15: Comparison of NADP 1 & NADP 2 height profiles for the A380 aircraft type

- 2.4.14 Whilst NADP 1 and NADP 2 are the two core departure procedures described by ICAO, there are many more subtle variations. Airlines will tend to develop and adopt noise abatement departure procedures within these two core procedures. In doing so they must seek to balance noise with emissions and engine wear considerations. In general, airlines only operate two departure procedures: a ‘normal’ departure; and one for noise abatement¹⁰.
- 2.4.15 These procedures are usually developed and adopted so to be compatible with their dominant base of operation, and then used across all their operations for safety reasons.

⁹ CAP1691a Departure Noise Mitigation: Summary Report

¹⁰ ICAO Circular 317 Effects of PANS-OPS Noise Abatement Procedures on Noise and Gaseous Emissions



Continuous Climb Operations (CCO) performance

- 2.4.16 Continuous Climb Operations (CCO) is an aircraft operating technique enabled by airspace design, procedure design and facilitation by ATC, enabling the execution of a flight profile optimised to the performance of the aircraft. The optimum vertical profile takes the form of a continuously climbing path which delivers environmental and economic benefits – reduced fuel burn, emissions, and noise – without any adverse effect on safety.
- 2.4.17 CCO allows departing aircraft to climb continuously, to the greatest extent possible. Aircraft applying CCO use optimum climb engine thrust settings and climb speeds until reaching their cruising levels. Employment of this technique reduces intermediate level-offs (segments of level flight during the climb phase), and results in time being spent at more fuel-efficient, higher cruising levels, hence significantly reducing fuel burn, fuel costs, and emissions.

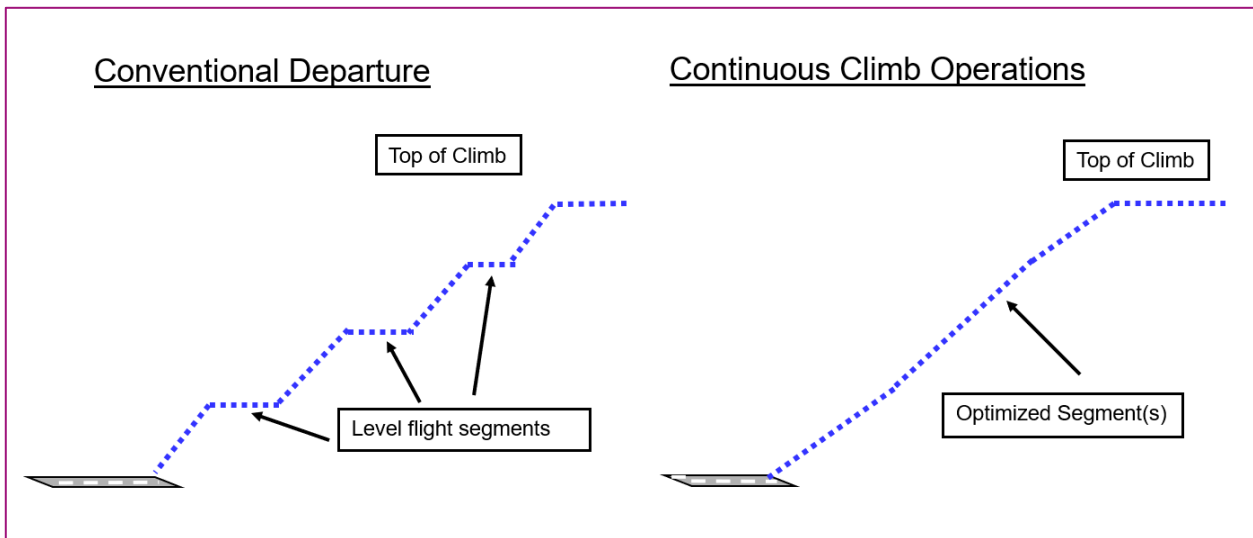


Figure 16: Conventional departure vs. Continuous Climb Operations

- 2.4.18 Heathrow’s SIDs are designed for a standard climb procedure that level off at 6,000 feet, because most routes are constrained by the position of the airport’s holding stacks and the arrival sequence. However, routine manual ATC tactical intervention results in many aircraft climbing continuously through 6,000 feet.
- 2.4.19 Unlike Continuous Descent Operations (CDO), there is no industry definition for how to measure CCO. Table 6 below shows CCO performance for Heathrow’s departures in 2019 between the runway and FL100 (equivalent to 10,000 feet under standard air pressure), where Heathrow deems that aircraft were performing CCO if they are achieving a rate of climb of at least 375 feet per minute.

| | CCO to FL100 | | | | | |
|------------|--------------|--------------|-----|-----|--------------|-----|
| | DET | MODMI /MAXIT | SAM | CPT | ULTIB /UMLAT | BPK |
| Easterlies | 37% | 43% | 30% | 68% | 24% | 26% |
| Westerlies | 29% | 83% | 83% | 76% | 47% | 38% |

Table 6: Heathrow CCO performance per SID



2.5 Arrivals into Heathrow

Holding Stacks and Arrival Vectoring Patterns

- 2.5.1 As Heathrow is so busy, aircraft arriving are frequently held in holding stacks. Aircraft usually come into a holding stack where they fly in an oval pattern to wait for a landing slot. The stacks enable ATC to maintain an optimum landing sequence, thus minimising delays to arriving aircraft and their passengers during the busiest times of the day.
- 2.5.2 There are four holding stacks at Heathrow, known as Bovingdon (BNN), Lambourne (LAM), Ockham (OCK) and Biggin (BIG). The stacks take their names from the ground-based VOR radio navigation aids that were established in those geographic locations, which define a reference point for aircraft to follow over the ground in the stack's holding pattern. The locations of the stacks have been the same since the 1960s, see Figure 17 below.



Figure 17: Heathrow's four holding stacks

- 2.5.3 Aircraft circle at different levels within the stacks until there is an available gap in the arrival sequence for them to land at Heathrow. The levels are separated by 1,000 feet, and the lowest level (i.e. the bottom of the stack) is around 7,000 feet with upper levels reaching up to approximately 18,000 feet. Once they are instructed to leave holding stack, aircraft then



follow a set of instructions issued by ATC¹¹. These instructions direct the aircraft onto the final approach path and safely onto one of Heathrow's four runway ends. This manual intervention by ATC is known as 'vectoring'.

- 2.5.4 Generally, aircraft are vectored in a direction parallel to the runway in the opposite direction for landing, then turned onto a 'base leg' and finally, are given a closing heading onto the final approach path. These arrivals do not follow prescribed routes, but instead follow a vectoring pattern determined by air traffic controllers, which creates the broad swathes (6,000 feet and below) shown in Figure 18.

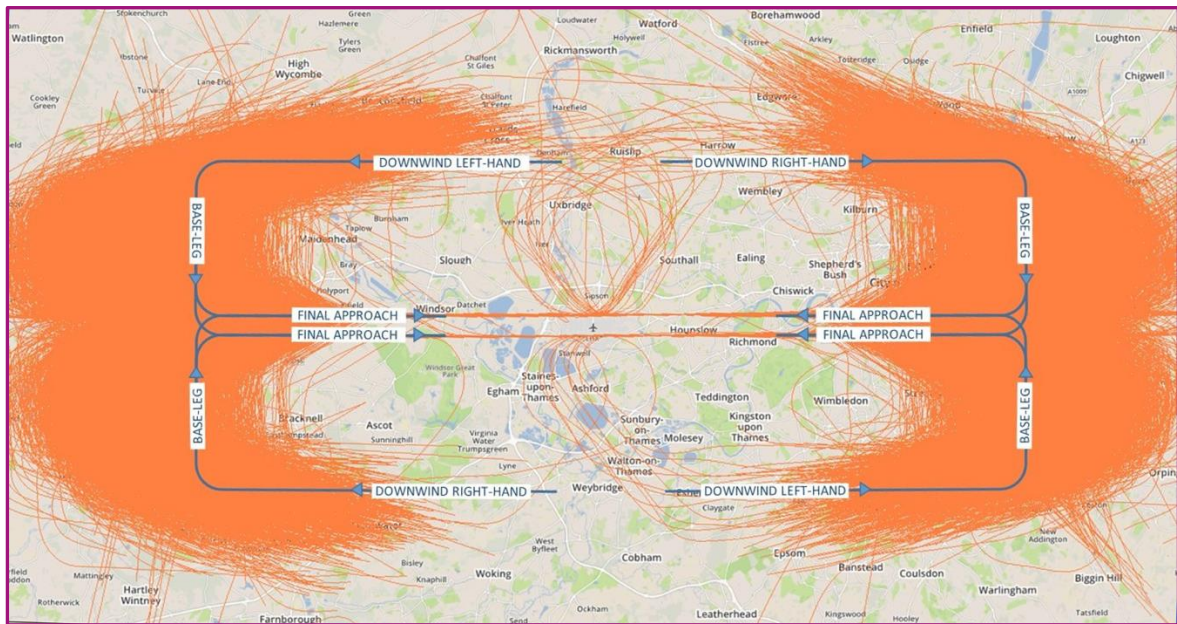


Figure 18: Arrival vectoring patterns and their naming conventions

- 2.5.5 When aircraft leave the holding stacks, they are normally at or above 7,000 feet above ground level. During the arrival sequencing they are instructed to descend to between 3,000 and 4,000 feet until they become established on the final approach path, before completing the final segment of the descent onto the runway to land.
- 2.5.6 The final approach path is a straight line extended from the runway. Once an aircraft is given a vector to intercept this path, the aircraft's navigation systems guide the flight crew to become established on the runway's Instrument Landing System (ILS) localiser, which ensures the aircraft is aligned correctly with the centreline of the runway.
- 2.5.7 The aircraft's systems then guide a descent that follows the glide path, which dictates the vertical descent profile. In combination, the localiser and glide path form the ILS which guides aircraft to land safely. The angle of the glide path for the final approach is set at 3.0°

¹¹ ATC instructs the pilot to fly a radar heading or 'vector'. The radar heading is given as a compass bearing e.g. an instruction to fly a heading of 090° will result in the aircraft turning towards the east. Headings are generally given in blocks of 5° therefore there are 72 possible vector instructions. ATC will also instruct the pilot to change levels, by giving clearances to descend to lower altitudes until the aircraft is established on the final approach path. There are no useable published routes between the stacks and final approach, therefore vectors are required for all aircraft arriving via the stacks.



and as a result, aircraft maintain a set height according to distance from the runway, as illustrated in Figure 19.

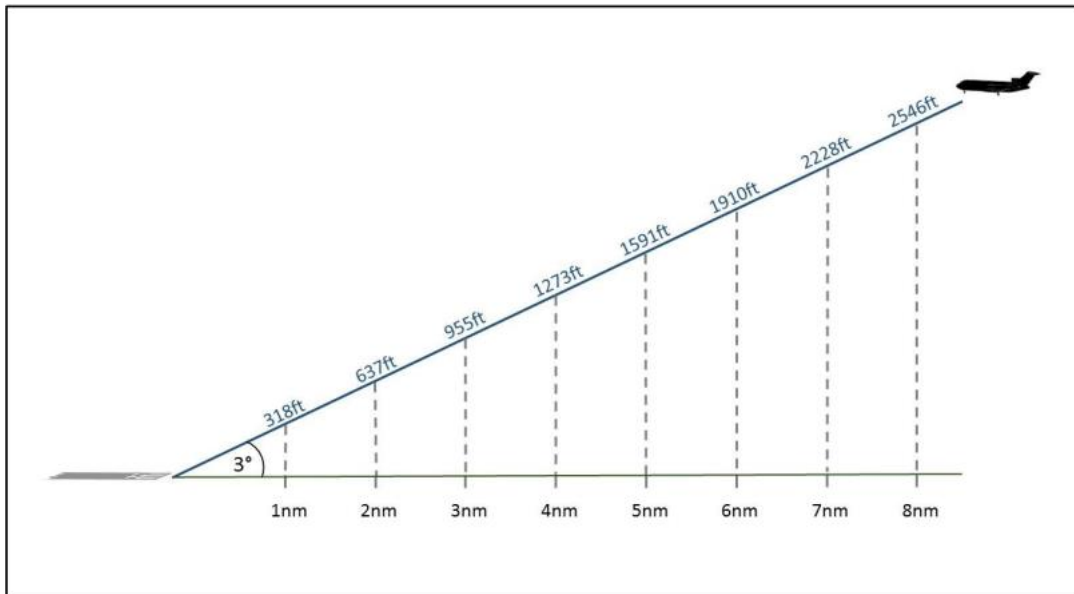


Figure 19: Aircraft height on a 3.0° approach

- 2.5.8 Heathrow's AIP (Aeronautical Information Publication) states that the minimum height at which aircraft can join the ILS during the day (between 0600 and 2300 local) is 2,500 feet, which corresponds to approximately 7.5 nautical miles from the runway threshold. At night (between 2300 and 0600) an aircraft must be no lower than 3,000 feet, which will be approximately 10 nautical miles from the runway.
- 2.5.9 Aircraft can join the final approach further out than the distances mentioned above. However, this will vary depending on how aircraft are tactically sequenced by ATC to achieve optimum landing runway throughput.

Instrument Approach Procedures

- 2.5.10 The section above describes the use of the ILS, as this is the most frequently used Instrument Approach Procedure (IAP), flown by approximately 98% of Heathrow's arrivals.
- 2.5.11 A small percentage of aircraft fly a PBN Approach (known as RNP APCH) which has a slightly steeper gradient of 3.2°. More information on these approaches is available [here](#).

2.6 Runway Usage

- 2.6.1 Heathrow's runways are typically operated in 'segregated mode' where arrivals and departures use different runways (e.g. the southern runway for departures and the northern runway for arrivals, or vice versa).
- 2.6.2 During the day when aircraft are landing and taking off to the west (westerly operations), Heathrow alternates the use of the two runways to provide local communities with noise



respites. The alternation pattern means that for the first part of the day one runway is used for landings and the other for take-offs, then at 1500¹² they switch over.

- 2.6.3 At the end of each week this arrangement is reversed, so the configuration used in the evening during the previous week is now used in the morning, and vice versa. This is so communities get respite from aircraft in the mornings in one week and in the evening in each alternate week.

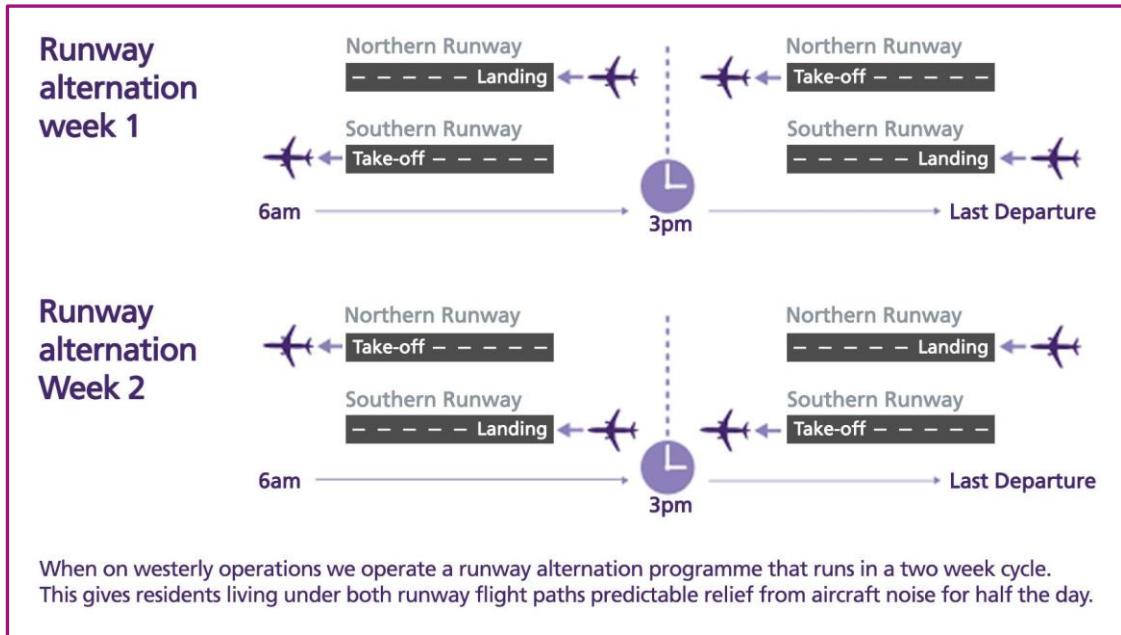


Figure 20: Westerly runway alternation

Easterly Alternation and The Cranford Agreement

- 2.6.4 The Cranford Agreement was established by the Government in 1952. Cranford is a village at the eastern end of the northern runway. The agreement prevented aircraft from taking off over the village except in exceptional circumstances and applied when Heathrow was on easterly operations.
- 2.6.5 In 2009 the Government announced that the Cranford Agreement should end following consultation with local residents. This decision was based on the desire to distribute noise more equitably around the airport, and to extend the benefits of runway alternation to communities under flight paths during periods of easterly winds. Although the Cranford Agreement has now ended, Heathrow needs to undertake ground works to the airport’s airfield infrastructure before runway alternation on easterly operations will be possible. This means that during easterly operations, most arriving aircraft still currently land on the northern runway, with most departures taking off from the southern runway.
- 2.6.6 Heathrow submitted a planning application to the London Borough of Hillingdon in 2013 to construct an additional taxiway at the western end of the northern runway to enable full runway alternation on easterly operations. Planning permission was granted on appeal by the Secretary of State on 2 February 2017. However, on the same day the Government

¹² All times in this document are local.



published the draft Airports National Policy Statement (ANPS) which supported the expansion of Heathrow.

- 2.6.7 The airfield design for an expanded airport required a repositioning of the taxiway works, so a new planning application was required which Heathrow intended to pursue through the planning process for expansion, known as a Development Consent Order.
- 2.6.8 Following the (now overturned) Court of Appeal judgement in relation to the Airports National Policy Statement on 27 February 2020, Heathrow's expansion plans were paused, and Heathrow began re-evaluating how to approach its airspace change programmes. The COVID-19 crisis began, and it had a significant impact on Heathrow, resulting in all projects being paused or stopped unless they were safety critical. The earlier planning permission for the airfield works required to enable full easterly alternation has now expired.
- 2.6.9 Runway alternation for easterly operations remains a key commitment by Heathrow to its local communities and forms part of the airport's plans for airspace modernisation. The airport has set a target to deliver easterly alternation by 2028 in its recently refreshed sustainability strategy, Heathrow 2.0¹³. The timescales to deliver on this commitment are subject to a new, separate planning application for the required ground infrastructure, and the time required to complete the associated works. To enable easterly alternation, Heathrow will need to submit a planning application to the London Borough of Hillingdon, which is in the early stages of preparation.
- 2.6.10 Approval of the application will enable the required ground works to upgrade the taxiway infrastructure. Heathrow plans to submit a scoping report this summer, the purpose of which is to provide a summary of technical and environmental information that Hillingdon would expect to see included as part of any planning application for the proposed ground works. This will be followed by submission of the full planning application in early 2024.
- 2.6.11 Heathrow's expectation is that easterly alternation will be operational within the time frame of this ACP.

Night-time runway alternation

- 2.6.12 Since very few aircraft take off or land at night, there is more scope for runway alternation whether Heathrow is on easterly or westerly operations. the airport can switch landings between the northern and southern runways and, if the weather allows it, bring in aircraft from the east or the west. That flexibility provides the ability 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, and
 - Week 4: Aircraft fly in from the east to land on the southern runway.

¹³ <https://www.heathrow.com/company/about-heathrow/heathrow-2-0-sustainability-strategy>



Step 2A Options Development

- 2.6.13 Since the wind direction and strength can disrupt this pattern, Heathrow always specifies a primary and a secondary (alternative) runway in the schedule. The secondary runway is not actually a different runway, but the primary runway approached from the opposite direction. Heathrow's published runway alternation schedule is available [here](#).

Use of both runways for arrivals

- 2.6.14 Heathrow makes every effort to adhere to the published landing runway alternation schedule. However, sometimes there may be a build-up of flights being held in the holding stacks. When this happens, the Government has set rules permitting ATC to land aircraft out of alternation, i.e. on the departure runway. In these circumstances, both runways will be used for arrivals for a temporary period. This is called Tactically Enhanced Arrivals Mode (TEAM) and is allowed after 0700 when severe inbound congestion occurs, or is anticipated to occur, involving predicted delays to arriving flights of 20 minutes or more.
- 2.6.15 Under these circumstances Heathrow can land up to six aircraft an hour on the runway designated for departures. These rules have been in place since the alternation system was introduced in the 1970s.
- 2.6.16 On easterly operations, a local ATC agreement exists which enables additional landings on the departure runway. This improves airfield efficiency and reduces overall taxi times with associated fuel and CO₂ benefits.
- 2.6.17 Heathrow is also able to use both runways for arrivals between 0600 and 0700 without being limited to a set number because this hour is the busiest time of day for arrivals into the airport. Landing traffic is permitted on the departure runway provided delay is, or is anticipated to be, greater than 10 minutes (0600–0629) or 5 minutes (0630–0700). This is often referred to as 'Early Morning TEAM'.
- 2.6.18 During use of Early Morning TEAM, aircraft are predominantly delivered to the runways in an alternating left/right sequence. A minimum of 2nm diagonal spacing is required between aircraft on adjacent final approach paths, however the consistent delivery of 2nm separation is highly workload-intensive for ATC and sometimes difficult to achieve. Therefore, a greater separation of 2.5–3nm is generally achieved resulting in approximately 6nm in trail spacing between arrivals to the same runway. This is illustrated in Figure 21.

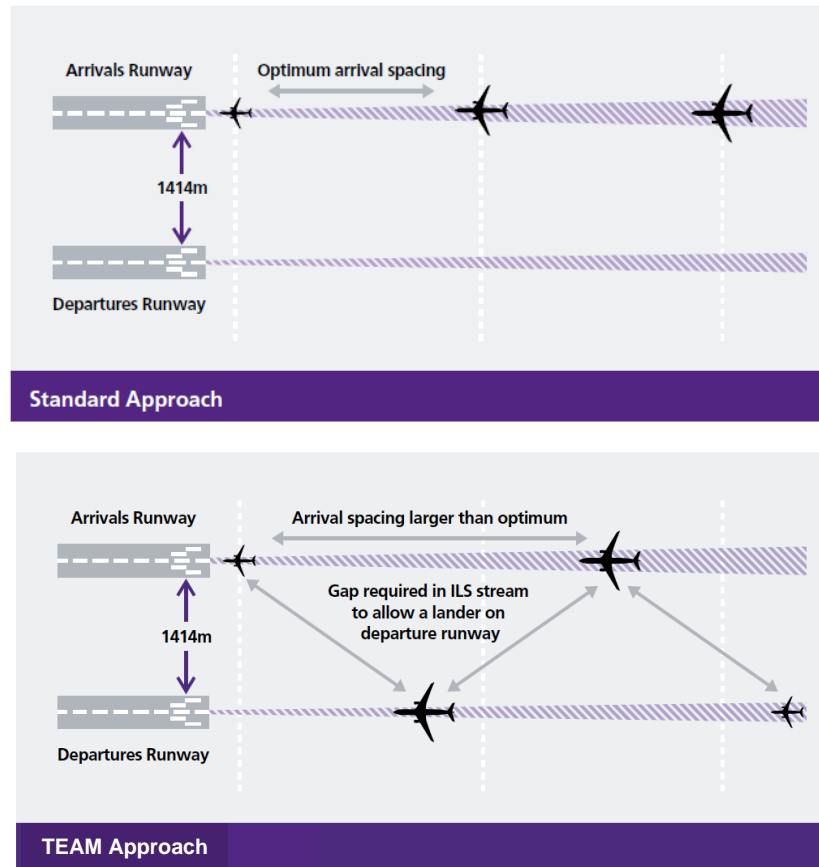


Figure 21: TEAM

- 2.6.19 There are other occasions when unforeseen circumstances mean that arriving aircraft need to land on the departure runway. For example, this might occur if an aircraft landing on the designated arrival 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 arrivals runway is able to vacate safely.

Continuous Descent Operations (CDO) performance

- 2.6.20 Continuous Descent Operations (CDO) (also known as Continuous Descent Approaches, CDA) have been used at Heathrow for many years. Once aircraft have been directed out of the holding stack, CDO involves aircraft maintaining a steady angle of approach until they reach the final approach path to the runway.
- 2.6.21 The intention of CDO is to reduce arrival noise by keeping aircraft higher for longer. In addition, CDO reduces fuel burn and emissions, which leads to an environmental benefit.
- 2.6.22 The specific CDO profile for Heathrow is deemed to be continuous, provided that no segment of level flight longer than 2.5nm occurs below 6,000 feet. A level segment can be defined as having less than 50ft variance over a distance of 2nm. This is measured through Heathrow’s Noise and Track Keeping system.



| | | 2019 | 2020 | 2021 | 2022 |
|------------------------------------|---------------|------|------|------|------|
| CDO performance % adherence to CDA | 0700-2300 Day | 89% | 88% | 88% | 90% |
| | 2300-0700 | 93% | 91% | 91% | 92% |
| | 2330-0600 | 96% | 96% | 97% | 97% |
| | 0600-0700 | 92% | 89% | 89% | 91% |

Table 7: Percentage adherence to CDO (2019-2022)

2.7 Measuring and Reporting Noise

- 2.7.1 For many communities, aircraft noise is a series of discrete noise events of no longer than one to two minutes duration, varying in noise level and frequency of occurrence, and spaced out over a part or all of a day, with daily, weekly and monthly variation. Consequently, measuring noise, describing its impacts, and describing change are inherently complex. Any attempt to define and measure noise and change has its limitations and cannot fully capture the spectrum of personal experiences of noise. Furthermore, there are many subjective factors such as perception, attitude, and visual impact – collectively these are sometimes labelled as 'non-acoustic factors'. Nevertheless, seeking to quantify noise with objective metrics is essential for any efforts to manage the noise challenge.
- 2.7.2 There are a range of metrics which are used to describe aircraft noise and to inform policy. The most common international measure of noise is the L_{Aeq} (often shortened to L_{eq}) which means 'equivalent continuous noise level.' Most policy is based on the L_{eq} metric because, based on current research, it has proven to have the best correlation with associated health outcomes such as annoyance and sleep disturbance.
- 2.7.3 In the UK, daytime aircraft noise is typically measured by calculating this average noise level in decibels (dB) over 16 hours (0700-2300) during the summer period¹⁴ to give a single daily figure. As these L_{Aeq} 16hr contours have been used in the UK for over 30 years, they allow historic trends to be monitored.
- 2.7.4 Noting that research on health impacts is usually based on L_{Aeq} metrics, we acknowledge that most people struggle to understand how the concept of 'average noise over a day' relates to their own individual experience. We have been working for a number of years, and most recently through the airport's Noise and Airspace Community Forum (NACF), and through our [Stage 2 engagement](#), to expand the use of supplementary and event-based metrics that better reflect individual experiences of noise. The outcomes of this work can be seen in the evolution of our annual Noise Action Plan contour reports, and our Initial Options Appraisal (IOA) which begins to report on some requested metrics in addition to those required by CAP1616. This includes presenting noise exposure data from a notional 45dB L_{den} and 40dB L_{night} along with changes in noise exposure of 1dB or more between each option and the current airspace arrangements. The IOA presents such metrics for both the airspace design options currently under consideration as well as for today's ('Do Nothing') scenarios.

¹⁴ 16 June and 15 September inclusive

**Noise Contours 2018-2021¹⁵**

- 2.7.5 Heathrow is required to generate and publish annual summer day and night L_{Aeq} noise contours and chooses to produce other metrics such as the L_{den} and L_{night} , on an annual basis, in support of its Noise Action Plan. The following images show Heathrow's annual day and night L_{Aeq} noise contours between 2018 and 2021.
- 2.7.6 It can be seen how as the number of Heathrow's movements dropped as a result of the COVID-19 pandemic in 2020 and 2021, the size and shape of the contours also changed accordingly and are therefore not considered a typical baseline scenario.

¹⁵ 2022 data is not available at the time of publishing this document.



L_{Aeq} (16hr day, actual modal split)

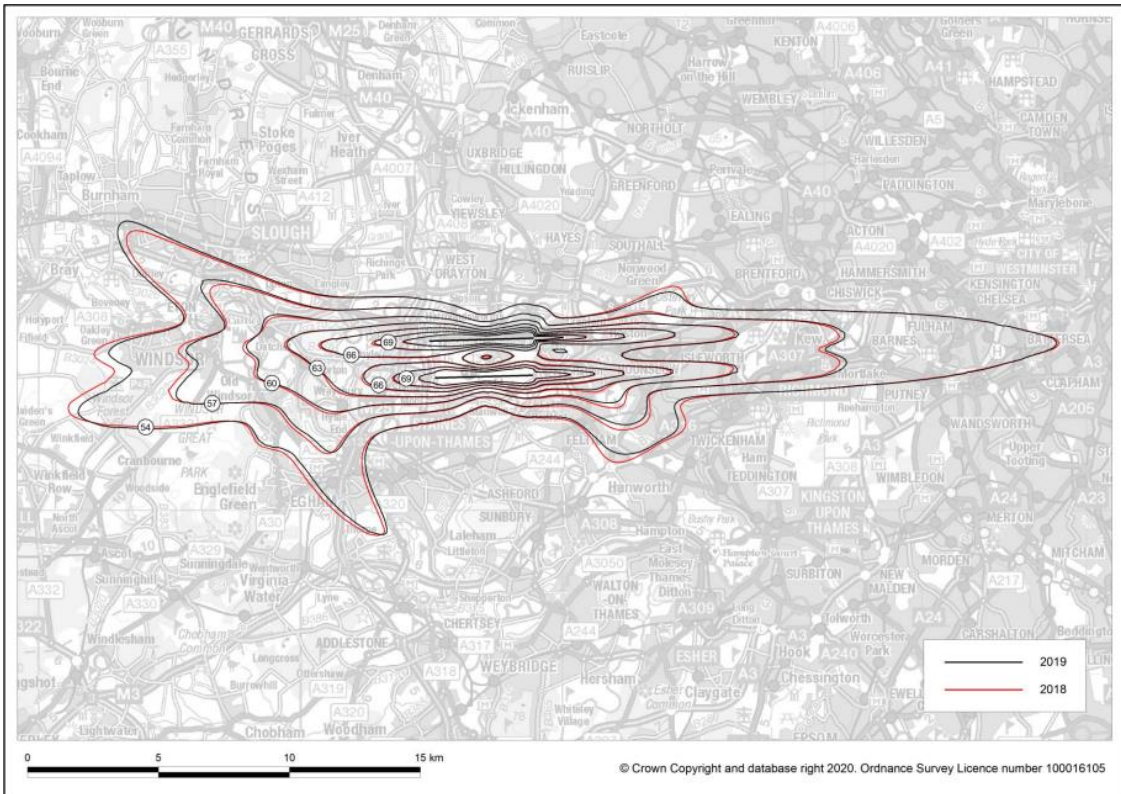


Figure 22: *L_{Aeq} (16hr day, actual modal split) 2018 & 2019*

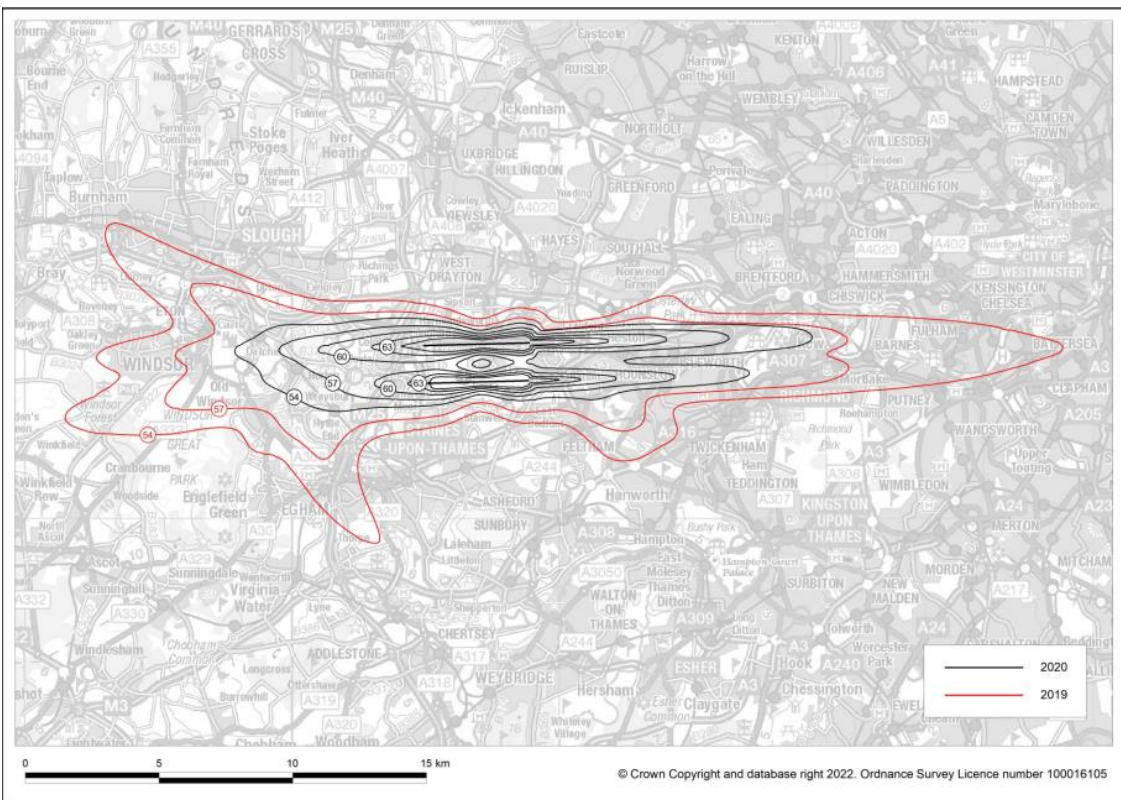


Figure 23: *L_{Aeq} (16hr day, actual modal split) 2019 & 2020*

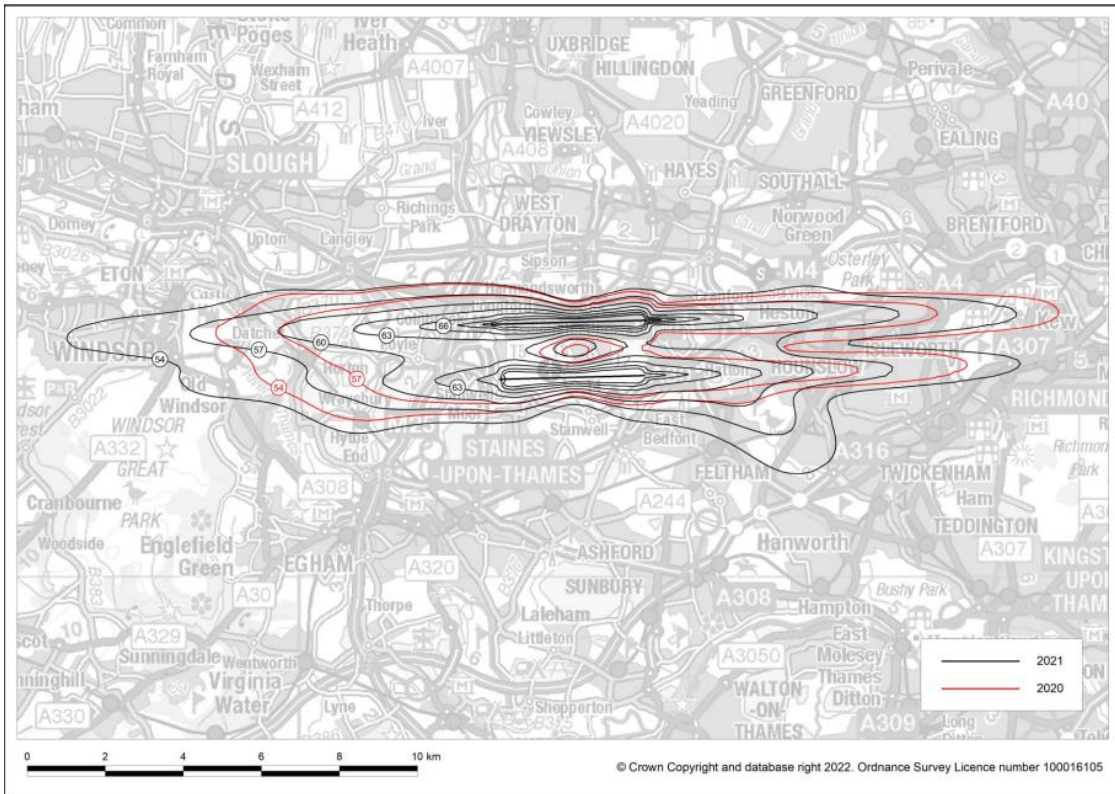


Figure 24: L_{Aeq} (16hr day, actual modal split) 2020 & 2021

| $L_{Aeq, 16h}$ (dB) | Households (given in thousands) | | |
|---------------------|---------------------------------|------|------|
| | 2019 | 2020 | 2021 |
| >54 | 193.4 | 42.7 | 65.1 |
| >57 | 79.1 | 17.8 | 26.5 |
| >60 | 34.6 | 5.1 | 7.8 |
| >63 | 12.7 | 1.1 | 1.5 |
| >66 | 3.3 | 0.2 | 0.2 |
| >69 | 0.8 | 0.0 | <0.1 |
| >72 | 0.0 | 0.0 | 0.0 |

Table 8: Summer day actual modal split L_{Aeq} , 16h contours household estimates 2019-2021¹⁶

¹⁶ 2022 data not available at time of publishing this document



L_{Aeq} (8hr night, actual modal split)

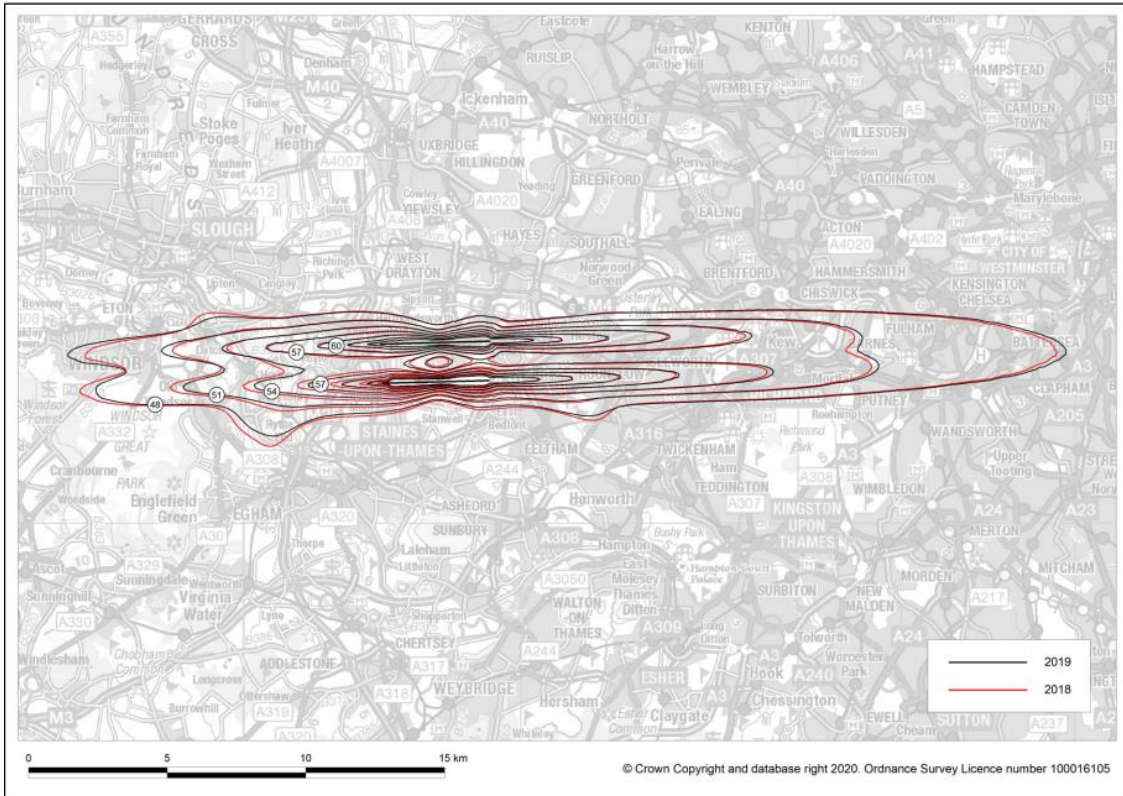


Figure 25: *L_{Aeq} (8hr night, actual modal split) 2018 & 2019*

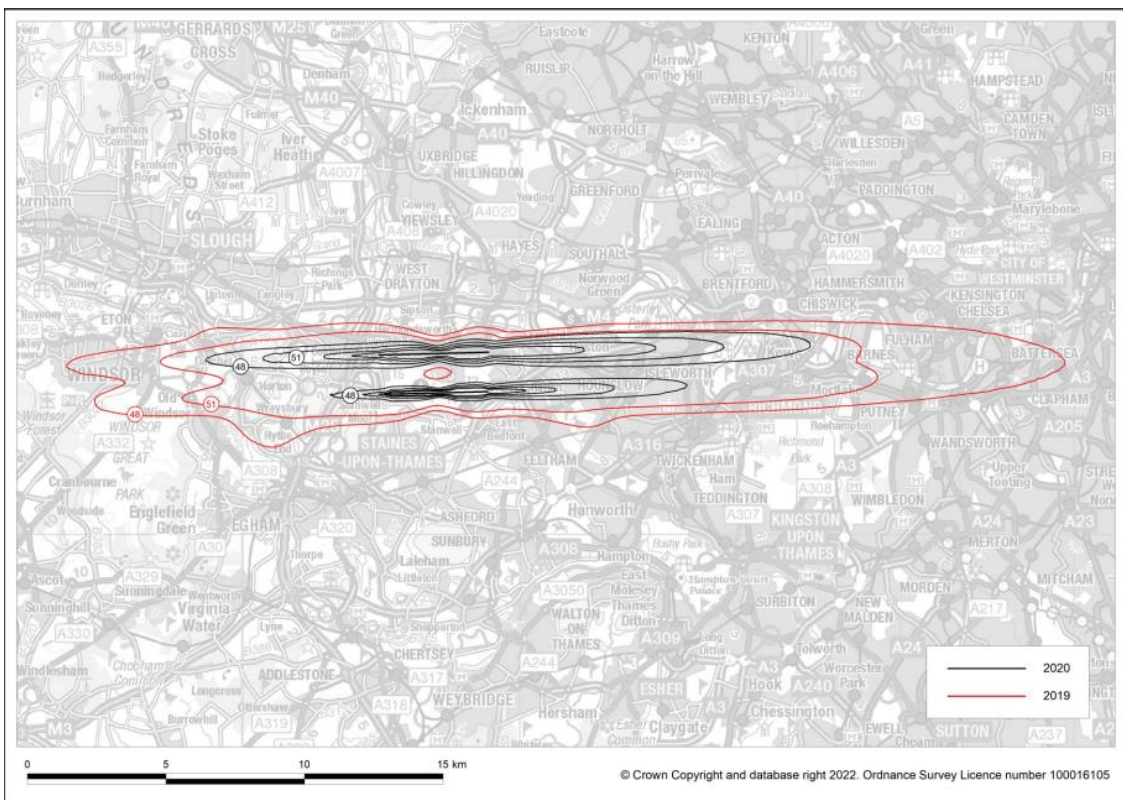


Figure 26: *Figure 25: L_{Aeq} (8hr night, actual modal split) 2019 & 2020*

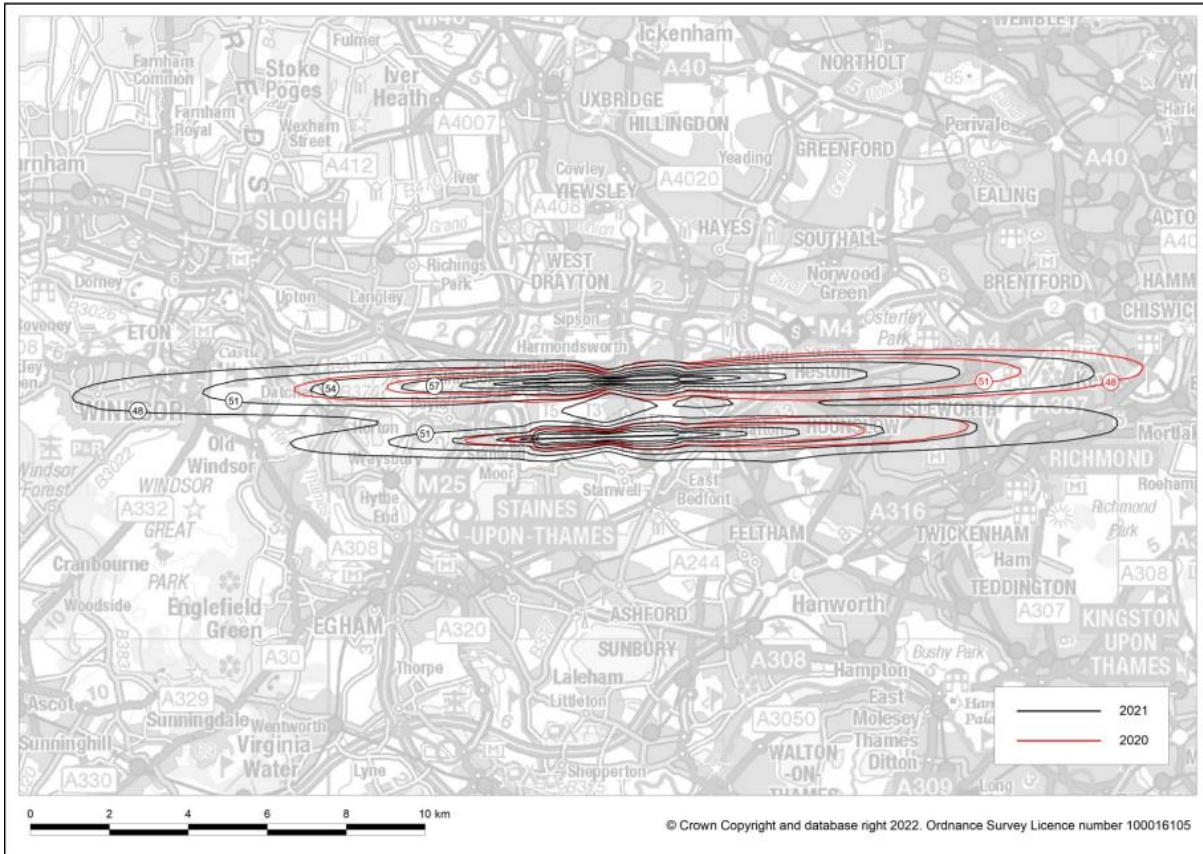


Figure 27: Figure 25: LAeq (8hr night, actual modal split) 2020 & 2021

| L _{AEQ, 8h} (dB) | Households (given in thousands) | | |
|---------------------------|---------------------------------|------|------|
| | 2019 | 2020 | 2021 |
| >48 | 172.4 | 33.3 | 54.7 |
| >51 | 75.2 | 15.8 | 19.2 |
| >54 | 33.9 | 5.6 | 7.4 |
| >57 | 15.2 | 1.5 | 1.0 |
| >60 | 5.1 | 0.4 | 0.2 |
| >63 | 0.8 | 0.0 | <0.1 |
| >66 | 0.2 | 0.0 | 0 |
| >69 | 0.0 | 0.0 | 0 |
| >72 | 0.0 | 0.0 | 0 |

Table 9: Summer night actual modal split L_{AEQ, 8h} contours household estimates 2019-2021¹⁷

2.8 Heathrow’s Movement Cap

2.8.1 Heathrow operates under an annual flight movement cap of 480,000 ATMs, which was imposed as a planning condition attached to the approval of the construction of Terminal 5. Any increase in this cap would need to go through a planning process, separate to the ACP process.

¹⁷ 2022 data not available at time of publishing this document



2.8.2 Table 10 below shows the total number of the annual flight movements, including scheduled passenger and cargo flights, charter passenger and cargo flights, and government charter flights counting towards the capping condition.

| Heathrow ATMs (Actuals) | | | | |
|-------------------------|---------|---------|---------|---------|
| 2018 | 2019 | 2020 | 2021 | 2022 |
| 457,600 | 475,800 | 201,000 | 190,000 | 376,800 |

Table 10: Heathrow ATMs 2018-2022



3. **DEVELOPMENT OF A COMPREHENSIVE LIST OF OPTIONS**

3.1 **Approach to Developing Options**

- 3.1.1 This section sets out Heathrow's Comprehensive List of Options (CLOO) at Step 2A of the Airspace Change Process.
- 3.1.2 At Stage 2, all options have been developed per single runway operation, but not as a complete system of westerly and easterly departures and arrivals to/from both runways combined in operation together.
- 3.1.3 This allows Heathrow to consider many more options for a final solution. These component parts are identified as PBN Departures, PBN Arrivals and Vectored Arrival options, for each runway.
- 3.1.4 In Stage 3, the generation of system options will require the assembly of component parts into systems.
- 3.1.5 For a description of the methodology used to develop these options please refer to our Step 2A engagement slides in *Step 2A Appendix A*. Please refer to section 4 of this document which describes stakeholder feedback on the options and the methodology used in their development.
- 3.1.6 The outcome of this methodology resulted in the creation of runway directional groupings for PBN Departures, PBN Arrivals, and Vectored Arrivals, with 181 options in total. These are split into:
- 40 groups of Performance Based Navigation (PBN) Departure options,
 - 93 PBN Arrival options and
 - 48 Vectored Arrival options.
- 3.1.7 These options included 12 Baseline 'Do Nothing'¹⁸ options (for PBN Departures, PBN Arrivals and Vectored Arrivals to/from each of Heathrow's four runways – Runways 27L, 27R, 09L and 09R).
- 3.1.8 In addition, Heathrow generated operational concepts to explore how the flight path options could be operated in a way that meets the Design Principles that relate to the operation of the routes more than the positioning of routes. These concepts included the provision of respite and minimising the negative impacts of night flights.
- 3.1.9 Together, with the proposed operational concepts, these option groupings addressed all the Design Principles set out at the start of the ACP.

¹⁸ CAP1616 Para E21 also refers to a Do Minimum. Please see document Step 2B – Options Appraisal for an explanation of why Heathrow does not consider that a 'Do Minimum' option is feasible or appropriate to define at this stage and a 'Do Nothing' scenario provides for a suitable, existing baseline against which to compare design options.



Step 2A Options Development

- 3.1.10 Each option has a short description of what it is trying to achieve and overflight cones for each route option based on the CAA's definition of overflight. Some of the options, especially some PBN Arrival options, could be considered "radical" owing to the significantly different traffic patterns that would arise should those options be progressed.
- 3.1.11 The route centrelines and therefore overflight cones are likely to move as options are refined and matured throughout the process. Refinement will be on the basis of:
- integration of Heathrow's other arrivals and departure routes,
 - integration with the wider airspace network below and above 7,000ft, including the location of Heathrow's holding stacks to be determined by NATS NERL,
 - taking into account stakeholder feedback from engagements,
 - increasing environmental and operational performance and,
 - in accordance with more detailed Instrument Flight Procedure (IFP¹⁹) design and validation in Stages 3 and 4 of the CAP1616 process.
- 3.1.12 This refinement could include merging elements of different options into a final design solution if that is considered to provide greater benefit having regard to applicable policy and guidance.

3.2 *PBN Departure Options*

- 3.2.1 The AMS and CAA Policy require that all new departure routes are designed to a PBN specification.
- 3.2.2 Each of Heathrow's PBN Departure options has a group of six SIDs from the runway which have been developed to meet the various design principles. Some are designed to meet a specific design principle and some are designed to meet a blend of design principles. Through the design of a list of wide-ranging flight path options Heathrow have ensured a comprehensive approach.
- 3.2.3 Tables 11-14 sets out all Heathrow departure options, including the "Do Nothing" options (i.e. current flight paths) from all runways with a brief description of what each option aims to achieve.
- 3.2.4 Each image contains overflight cones to 7000ft assuming continuous climb based on a linear 5.5% climb gradient (consistent with today's climb gradients). The existing Controlled Airspace boundaries are visible in light green with AONBs in a darker shade of green. The options can be viewed in more detail in *Step 2A Appendix A*.
- 3.2.5 The full list of Design Principles is at Table 2 of this document.

¹⁹ See Glossary of Terms for definition



| Departure Options from Runway 27L | | |
|-----------------------------------|-------|---|
| Option Name | Image | Description |
| 27L 'Do Nothing' | | <p>This represents the baseline 'Do Nothing' for 27L departures. The grey areas represent the areas overflowed at least once per day on average by 27L departures in 2019</p> |
| 27L Option A | | <p>This option was developed to address Design Principle 2, with noise the absolute priority to 7,000ft</p> |
| 27L Option B | | <p>This option was developed to address Design Principle 2 differently, by prioritising noise to 4,000ft but then giving more weight to CO2 from 4,000ft to 7,000ft</p> |



| | | |
|-------------------------|--|---|
| <p>27L Option C</p> | | <p>This option was developed to address Design Principle 4 by minimising the number of track miles flown</p> |
| <p>27L Option D</p> | | <p>This option was developed to address Design Principle 5 and maximise departure efficiency</p> |
| <p>27L Option E</p> | | <p>This option was developed to address Design Principle 9 “keep the number of people who experience an increase in noise from the future airspace design to a minimum”</p> |



| | | |
|-------------------------|--|---|
| <p>27L Option F</p> | | <p>This option was developed to address Design Principle 9 differently, minimising increases in noise by replicating today's nominal SID centrelines as far as possible</p> |
| <p>27L Option G</p> | | <p>This option was developed to address Design Principle 10 by minimising the number of people exposed to noise up to 7,000ft</p> |
| <p>27L Option H</p> | | <p>This option was developed to address a blend of Design Principles 2, 4, 9 & 10 with no prioritisation of any one principle</p> |

Table 11: Departure Options from Runway 27L



| Departure Options from Runway 27R | | |
|-----------------------------------|-------|---|
| Option Name | Image | Description |
| 27R 'Do Nothing' | | <p>This represents the baseline for 'Do Nothing' for 27R departures. The grey areas represent the areas overflowed at least once per day on average by 27R departures in 2019</p> |
| 27R Option A | | <p>This option was developed to address Design Principle 2, with noise the absolute priority to 7,000ft</p> |
| 27R Option B | | <p>This option was developed to address Design Principle 2 differently, by prioritising noise to 4,000ft but then giving more weight to CO2 from 4,000ft to 7,000ft</p> |



| | | |
|-------------------------|--|---|
| <p>27R Option C</p> | | <p>This option was developed to address Design Principle 4 by minimising the number of track miles flown</p> |
| <p>27R Option D</p> | | <p>This option was developed to address Design Principle 5 and maximise departure efficiency</p> |
| <p>27R Option E</p> | | <p>This option was developed to address Design Principle 9 “keep the number of people who experience an increase in noise from the future airspace design to a minimum”</p> |



| | | |
|-------------------------|--|---|
| <p>27R Option F</p> | | <p>This option was developed to address Design Principle 9 differently, minimising increases in noise by replicating today's nominal SID centrelines as far as possible</p> |
| <p>27R Option G</p> | | <p>This option was developed to address Design Principle 10 by minimising the number of people exposed to noise up to 7,000ft</p> |
| <p>27R Option H</p> | | <p>This option was developed to address a blend of Design Principles 2, 4, 9 & 10 with no prioritisation of any one principle</p> |

Table 12: Departure Options from Runway 27R



| Departure Options from Runway 09L | | |
|-----------------------------------|-------|--|
| Option Name | Image | Description |
| 09L 'Do Nothing' | | <p>This represents the baseline for 'Do Nothing' for 09L departures. The image represents the areas overflowed at least once per day on average by 09L departures in 2020 Single Runway Operations</p> |
| 09L Option A | | <p>This option was developed to address DP2 where noise was the absolute priority to 7000ft</p> |
| 09L Option B | | <p>This option was developed to address DP2 prioritising noise to 4000ft but then giving more weight to CO2 from 4000ft to 7000ft</p> |



| | | |
|-------------------------|--|---|
| <p>09L Option C</p> | | <p>This option was developed to address DP4 to minimise the number of track miles flown</p> |
| <p>09L Option D</p> | | <p>This option was developed with a very minor increase to the assumed climb gradient in order to avoid London City's airspace to address DP4 to minimise the number of track miles flown</p> |
| <p>09L Option E</p> | | <p>This option was developed to address DP5 and maximise departure rates</p> |



| | | |
|-------------------------|--|---|
| <p>09L Option F</p> | | <p>This option was developed to address Design Principle 9 “keep the number of people who experience an increase in noise from the future airspace design to a minimum”</p> |
| <p>09L Option G</p> | | <p>This option was developed to address a version of DP9 and minimise the number of people newly overflown by representing today’s nominal SID centrelines</p> |
| <p>09L Option H</p> | | <p>This option was developed to address DP10 and minimise the number of people exposed to noise up to 7,000ft.</p> |



| | | |
|-------------------------|--|---|
| <p>09L Option I</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10 with no prioritisation of any single principle.</p> |
| <p>09L Option J</p> | | <p>This option was developed to address stakeholder feedback from Step 2A engagement to develop an option which specifically avoids Richmond Park</p> |

Table 13: Departure Options from Runway 09L



| Departure Options from Runway 09R | | |
|-----------------------------------|-------|---|
| Option Name | Image | Description |
| 09R 'Do Nothing' | | This represents the baseline for 'Do Nothing' for 09R departures. The image represents the areas overflowed at least once per day on average by 09R departures in 2019. |
| 09R Option A | | This option was developed to address DP2 where noise was the absolute priority to 7000ft |
| 09R Option B | | This option was developed to address DP2 prioritising noise to 4000ft but then giving more weight to CO ₂ from 4000ft to 7000ft |



| | | |
|-------------------------|--|---|
| <p>09R Option C</p> | | <p>This option was developed to address DP4 to minimise the number of track miles flown</p> |
| <p>09R Option D</p> | | <p>This option was developed with a very minor increase to the assumed climb gradient in order to avoid London City's airspace to address DP4 to minimise the number of track miles flown</p> |
| <p>09R Option E</p> | | <p>This option was developed to address DP5 and maximise departure efficiency</p> |



| | | |
|-------------------------|--|---|
| <p>09R Option F</p> | | <p>This option was developed to address Design Principle 9 “keep the number of people who experience an increase in noise from the future airspace design to a minimum”</p> |
| <p>09R Option G</p> | | <p>This option was developed to address a version of DP9 and minimise the number of people newly overflown by representing today's nominal SID centrelines</p> |
| <p>09R Option H</p> | | <p>This option was developed to address DP10 and minimise the number of people exposed to noise up to 7,000ft.</p> |



| | | |
|-------------------------|--|---|
| <p>09R Option I</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10 with no prioritisation of any single principle.</p> |
| <p>09R Option J</p> | | <p>This option was developed to address stakeholder feedback from Step 2A engagement to develop an option which specifically avoids Richmond Park</p> |

Table 14: Departure Options from Runway 09R

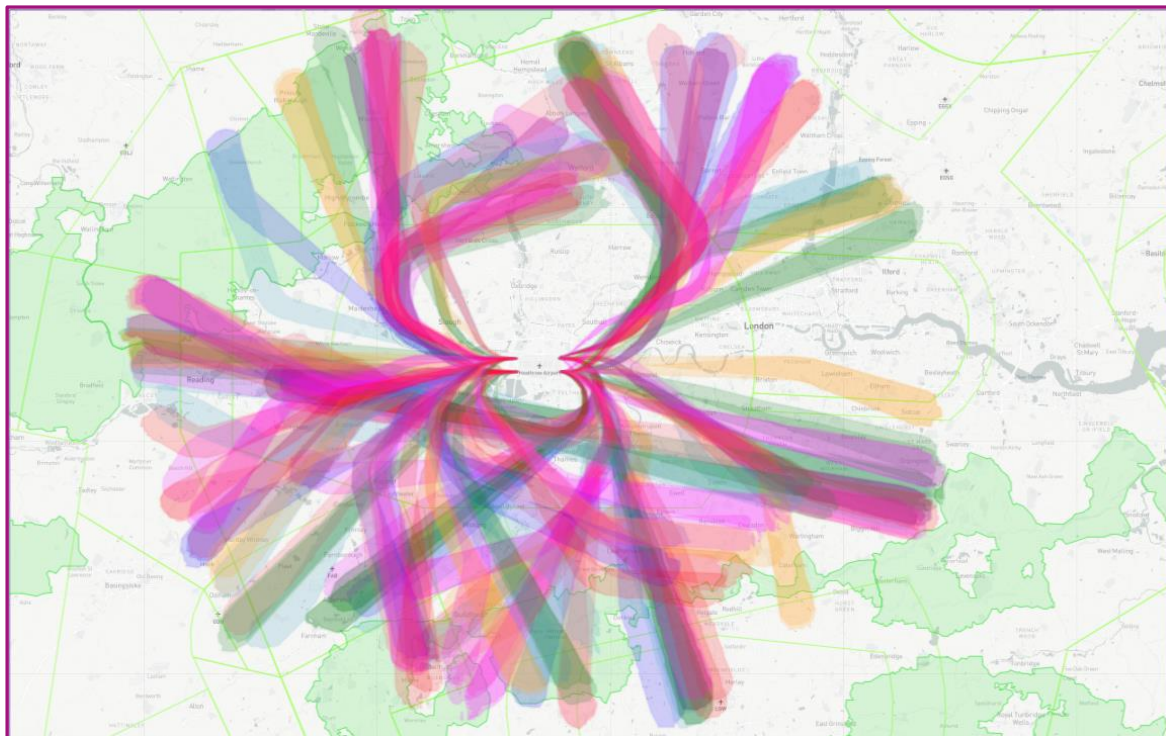


Figure 28: All PBN Departure options (excluding 'Do Nothing' options)



3.3 PBN Arrival Options

- 3.3.1 There are conventional published arrival routes from Heathrow's existing holding stacks to the final approach, but these are not used. This is because it would not be possible to systemically sequence and land the number of arrivals required at Heathrow were the arrivals to follow those routes alone. Instead, as covered in Section 2.5, ATC tactically positions aircraft from the four different stacks onto final approach.
- 3.3.2 At this stage in the project, Heathrow do not anticipate that Heathrow's arrivals will be able to be systemised onto final approach via sole reliance on a series of PBN tracks from multiple different locations, whilst maintaining peak landing rates. Therefore, an element of tactical vectoring will still be required in the future. The Vectored Arrival options will cover this.
- 3.3.3 However, the use of dedicated PBN Arrival routes during less busy periods, or for a subset of arrivals, may offer noise and environmental benefits. In particular, the 0430-0600 period sees a limited number of arrivals into Heathrow during a time with no departures. The airspace at this time potentially offers the flexibility to use PBN Arrival routes for Heathrow's arrivals. Dedicated arrival routes could be used in combination and/or rotation to deliver valuable respite to overflowed communities during this early morning period.
- 3.3.4 This is a working assumption at this stage and use of dedicated PBN Arrival routes during other times of the day will be investigated. However, during Stage 2 of the process Heathrow have used the 0430-0600 period to evaluate and appraise PBN Arrival options.
- 3.3.5 Tables 15-18 set out all Heathrow's PBN Arrival options to all runways with a brief description of what each option aims to achieve. Each image contains overflight cones from 7,000ft assuming continuous descent on a 3.0° (5.24%) descent gradient. To meet certain Design Principles some options resulted in PBN flight paths which join final approach much closer to the runways than today.
- 3.3.6 This is technically possible by utilising a high specification of PBN known as RNP-AR however many aircraft operating into Heathrow do not have this capability and/or regulatory authorisation, nor will some have in the future. Therefore, where options were created that required RNP-AR, additional options were also generated that would not require the functionality and join final approach further out.
- 3.3.7 The options also include the 'Do Nothing' options. The existing Controlled Airspace boundaries are visible in light green with AONBs in a darker shade of green. The options can be viewed in more detail in *Step 2A Appendix A*.



| PBN Arrival Options to Runway 27L | | |
|-----------------------------------|-------|---|
| Option Name | Image | Description ²⁰ |
| 27L 'Do Nothing' | | The baseline for 'Do Nothing' for 27L arrivals in the 0430-0600 period. The image represents the areas overflowed at least 1 time per day by 27L arrivals on average in 2019 0430-0600. |
| 27L Option A | | This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from waypoints BEDEK, TOBID, LOGAN & BEGTO. |
| 27L Option B | | This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the ALESO waypoint. |

²⁰ For the description of the elements of the DP the option was designed for, please refer to the PBN Departure tables



| | | |
|-----------------------------|--|---|
| <p>27L Option C</p> | | <p>This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from waypoints ALESO, BEDEK, TOBID, LOGAN & BEGTO.</p> |
| <p>27L Option D</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the BEDEK waypoint.</p> |
| <p>27L Option E</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the BEGTO waypoint.</p> |
| <p>27L Option F</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the BEGTO waypoint.</p> |



| | | |
|-----------------------------|--|--|
| <p>27L Option G</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the ALESO waypoint.</p> |
| <p>27L Option H</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the ALESO waypoint.</p> |
| <p>27L Option I</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the LOGAN waypoint.</p> |
| <p>27L Option J</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the LOGAN waypoint.</p> |



| | | |
|-----------------------------|--|---|
| <p>27L Option K</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the TOBID waypoint.</p> |
| <p>27L Option L</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the TOBID waypoint.</p> |
| <p>27L Option M</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the BEDEK waypoint.</p> |
| <p>27L Option N</p> | | <p>This option was developed to address DP9.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from waypoints ALESO, BEDEK, TOBID, LOGAN & BEGTO.</p> |
| <p>27L Option O</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from waypoints ALESO, BEDEK, TOBID, LOGAN & BEGTO.</p> |



| | | |
|-----------------------------|--|--|
| <p>27L Option P</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from waypoints ALESO, BEDEK, TOBID, LOGAN & BEGTO.</p> |
| <p>27L Option Q</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the BEGTO waypoint.</p> |
| <p>27L Option R</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the BEDEK & BEGTO waypoints.</p> |
| <p>27L Option S</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the ALESO waypoint.</p> |
| <p>27L Option T</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from ALESO & LOGAN waypoints.</p> |



| | | |
|-----------------------------|--|---|
| <p>27L Option U</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from TOBID & LOGAN waypoints.</p> |
| <p>27L Option V</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals capable of RNP-AR during the 0430-0600 period from the BEDEK waypoint.</p> |
| <p>27L Option W</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27L arrivals during the 0430-0600 period from the TOBID waypoint.</p> |

Table 15: PBN Arrival Options to Runway 27L



| PBN Arrival Options to Runway 27R | | |
|-----------------------------------|-------|---|
| Option Name | Image | Description ²¹ |
| 27R 'Do Nothing' | | This represents the baseline for 'Do Nothing' for 27R arrivals in the 0430-0600 period. The image represents the areas overflowed at least 1 time per day by 27R arrivals on average in 2019 0430-0600. |
| 27R Option A | | This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from TOBID & LOGAN waypoints. |
| 27R Option B | | This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from BEDEK & BEGTO waypoints. |

²¹ For the description of the elements of the DP the option was designed for, please ref to the PBN Departure tables



| | | |
|-------------------------|--|---|
| <p>27R Option C</p> | | <p>This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the ALESO waypoint.</p> |
| <p>27R Option D</p> | | <p>This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from ALESO & LOGAN waypoints.</p> |
| <p>27R Option E</p> | | <p>This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from BEDEK, TOBID & BEGTO waypoints.</p> |
| <p>27R Option F</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the BEDEK waypoint.</p> |



| | | |
|-------------------------|--|---|
| <p>27R Option G</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the BEGTO waypoint.</p> |
| <p>27R Option H</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from the BEGTO waypoint.</p> |
| <p>27R Option I</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the ALESO waypoint.</p> |
| <p>27R Option J</p> | | <p>This option was developed to address DP4. This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from the ALESO waypoint.</p> |



| | | |
|-------------------------|--|--|
| <p>27R Option K</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from the LOGAN waypoint.</p> |
| <p>27R Option L</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the LOGAN waypoint.</p> |
| <p>27R Option M</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from the TOBID waypoint.</p> |
| <p>27R Option N</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the TOBID waypoint.</p> |



| | | |
|-------------------------|--|---|
| <p>27R Option O</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from the BEDEK waypoint.</p> |
| <p>27R Option P</p> | | <p>This option was developed to address DP9.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |
| <p>27R Option Q</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |
| <p>27R Option R</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |



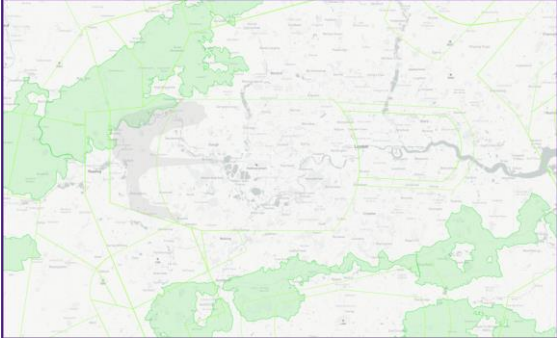
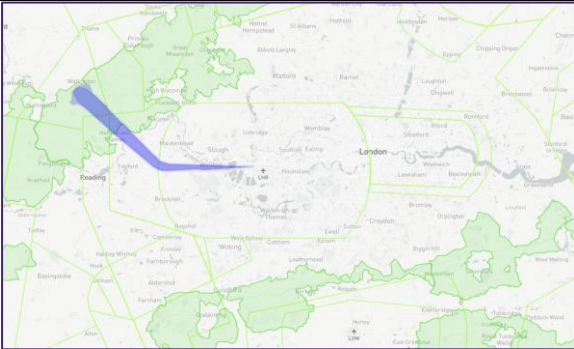
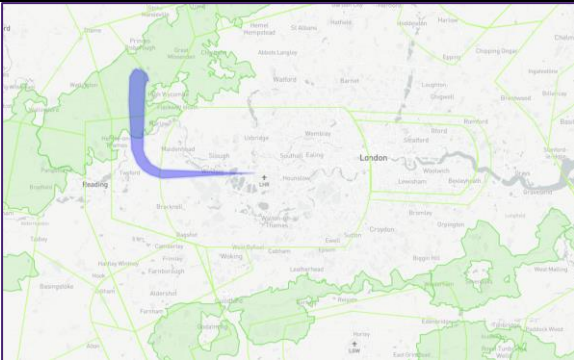
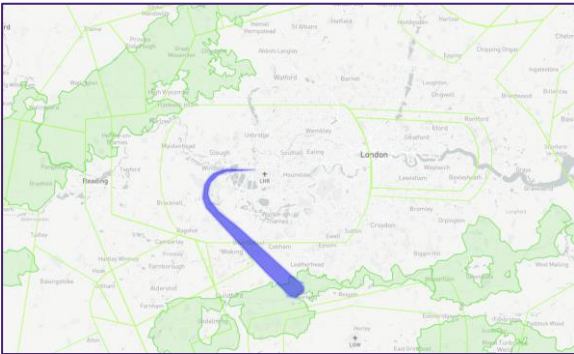
| | | |
|-------------------------|--|---|
| <p>27R Option S</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from BEDEK & TOBID waypoints.</p> |
| <p>27R Option T</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the BEGTO waypoint.</p> |
| <p>27R Option U</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from BEDEK, TOBID & BEGTO waypoints.</p> |
| <p>27R Option V</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from the ALESO waypoint.</p> |



| | | |
|-------------------------|--|--|
| <p>27R Option W</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals during the 0430-0600 period from ALESO & LOGAN waypoints.</p> |
| <p>27R Option X</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY27R arrivals capable of RNP-AR during the 0430-0600 period from the LOGAN waypoint.</p> |

Table 16: PBN Arrival Options to Runway 27R



| PBN Arrivals Options to Runway 09L | | |
|------------------------------------|---|--|
| Option Name | Image | Description ²² |
| 09L 'Do Nothing' |  | <p>This represents the baseline for 'Do Nothing' for 09L arrivals in the 0430-0600 period. The image represents the areas overflowed at least 1 time per day by 09L arrivals on average in 2019 0430-0600.</p> |
| 09L Option A |  | <p>This option was developed to address DP2.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from BEDEK, TOBID & BEGTO.</p> |
| 09L Option B |  | <p>This option was developed to address DP2.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from ALESO & LOGAN</p> |
| 09L Option C |  | <p>This option was developed to address DP2.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from ALESO, LOGAN & BEGTO.</p> |

²² For the description of the elements of the DP the option was designed for, please ref to the PBN Departure tables



| | | |
|-----------------------------|--|---|
| <p>09L Option D</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from BEDEK.</p> |
| <p>09L Option E</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from BEDEK.</p> |
| <p>09L Option F</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from BEGTO.</p> |
| <p>09L Option G</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from BEGTO.</p> |



| | | |
|-------------------------|--|---|
| <p>09L Option H</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from ALESO.</p> |
| <p>09L Option I</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from ALESO.</p> |
| <p>09L Option J</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from LOGAN.</p> |
| <p>09L Option K</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from LOGAN.</p> |



| | | |
|-----------------------------|--|---|
| <p>09L Option L</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from TOBID waypoint.</p> |
| <p>09L Option M</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from TOBID waypoint.</p> |
| <p>09L Option N</p> | | <p>This option was developed to address DP9.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |
| <p>09L Option O</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |



| | | |
|-----------------------------|--|---|
| <p>09L Option P</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |
| <p>09L Option Q</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from BEDEK & BEGTO waypoints.</p> |
| <p>09L Option R</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals capable of RNP-AR during the 0430-0600 period from ALESO waypoint.</p> |
| <p>09L Option S</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from LOGAN waypoint.</p> |



| | | |
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| <p>09L Option T</p> | | <p>This option was developed to address a blend of DPs 2, 4,9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from ALESO & LOGAN waypoints.</p> |
| <p>09L Option U</p> | | <p>This option was developed to address a blend of DPs 2, 4,9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09L arrivals during the 0430-0600 period from TOBID waypoint.</p> |

Table 17: PBN Arrival Options to Runway 09L



| PBN Arrival Options to Runway 09R | | |
|-----------------------------------|-------|---|
| Option Name | Image | Description ²³ |
| 09R 'Do Nothing' | | This represents the baseline for 'Do Nothing' for 09R arrivals in the 0430-0600 period. The image represents the areas overflowed at least 1 time per day by 09R arrivals on average in 2019 0430-0600. |
| 09R Option A | | This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from BEDEK, TOBID & BEGTO waypoints. |
| 09R Option B | | This option was developed to address DP2. This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from ALESO & LOGAN waypoints. |

²³ For the description of the elements of the DP the option was designed for, please ref to the PBN Departure tables



| | | |
|-----------------------------|--|--|
| <p>09R Option C</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from BEDEK waypoint.</p> |
| <p>09R Option D</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from BEDEK waypoint.</p> |
| <p>09R Option E</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from BEGTO waypoint.</p> |
| <p>09R Option F</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from BEGTO waypoint.</p> |



| | | |
|-------------------------|--|--|
| <p>09R Option G</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from ALESO waypoint.</p> |
| <p>09R Option H</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from ALESO waypoint.</p> |
| <p>09R Option I</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from LOGAN waypoint.</p> |
| <p>09R Option J</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from LOGAN waypoint.</p> |



| | | |
|-----------------------------|--|--|
| <p>09R Option K</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from TOBID waypoint.</p> |
| <p>09R Option L</p> | | <p>This option was developed to address DP4.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from TOBID waypoint.</p> |
| <p>09R Option M</p> | | <p>This option was developed to address DP9.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from ALESO, BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |
| <p>09R Option N</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from BEDEK, TOBID, LOGAN & BEGTO waypoints.</p> |



| | | |
|-----------------------------|--|--|
| <p>09R Option O</p> | | <p>This option was developed to address DP10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from ALESO waypoint.</p> |
| <p>09R Option P</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from BEDEK & BEGTO waypoints.</p> |
| <p>09R Option Q</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from ALESO waypoint.</p> |
| <p>09R Option R</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals capable of RNP-AR during the 0430-0600 period from LOGAN waypoint.</p> |



| | | |
|-----------------------------|--|--|
| <p>09R Option S</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from LOGAN waypoint.</p> |
| <p>09R Option T</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from ALESO waypoint.</p> |
| <p>09R Option U</p> | | <p>This option was developed to address a blend of DPs 2, 4, 9 & 10.</p> <p>This option assumes a single PBN Arrival track used for all RWY09R arrivals during the 0430-0600 period from TOBID waypoint.</p> |

Table 18: PBN Arrival Options to Runway 09R

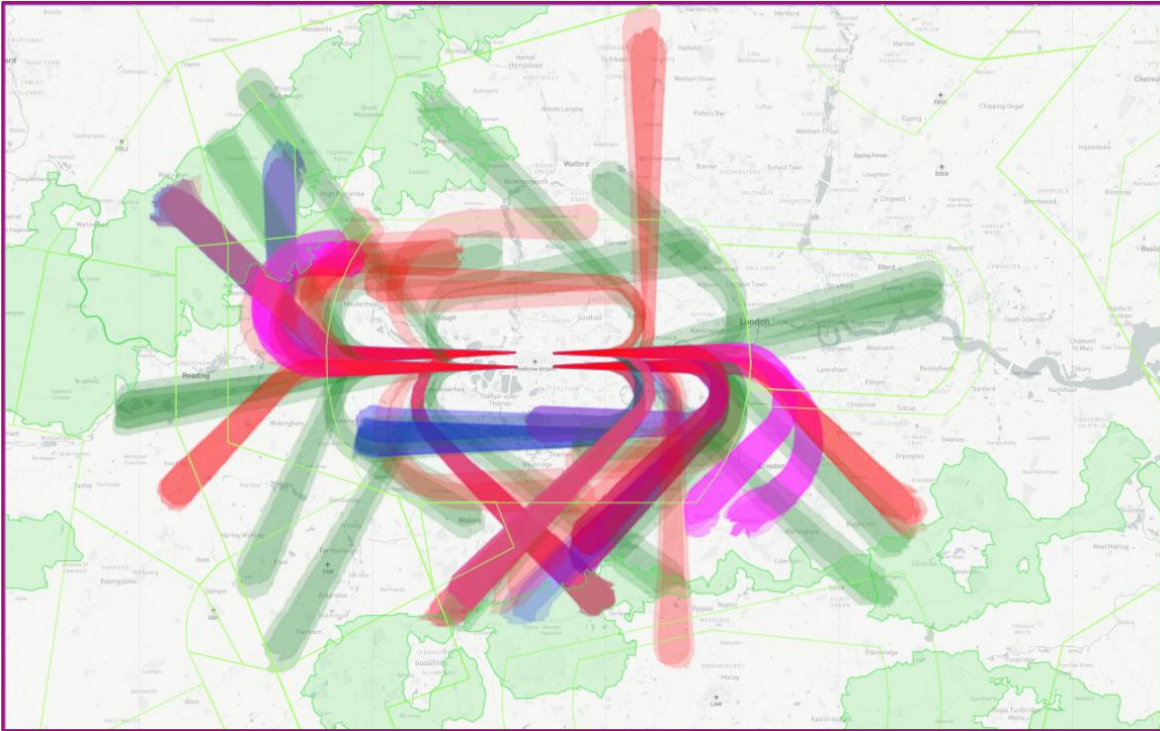



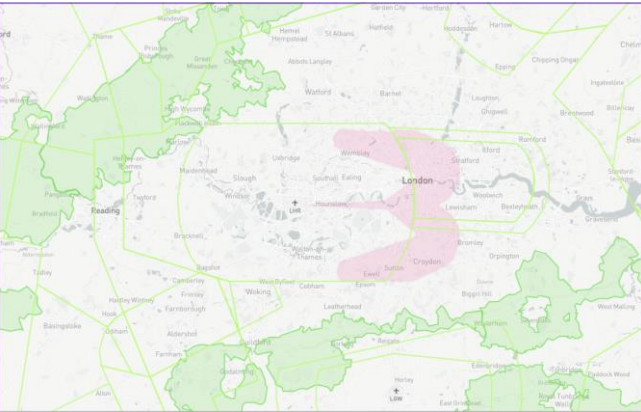
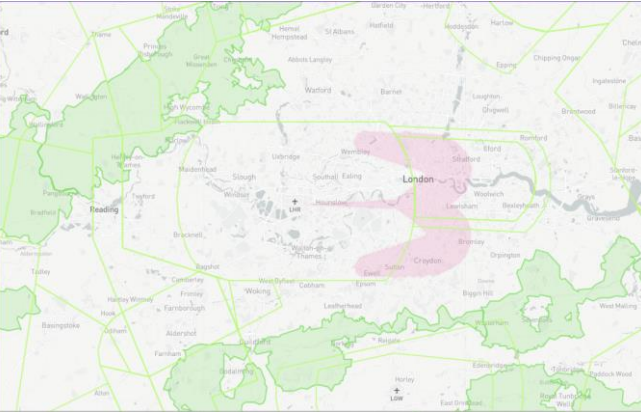
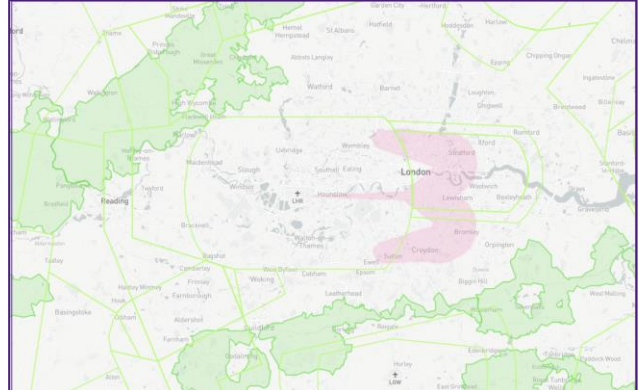
Figure 29: All PBN Arrival options (excluding 'Do Nothing' options)



3.4 Vectored Arrival Options

- 3.4.1 At this stage in the project, Heathrow do not anticipate that arrivals will be able to be systemised onto final approach via sole reliance on a series of PBN tracks from multiple different locations, whilst maintaining peak landing rates. Therefore, an element of tactical vectoring will still be required in the future.
- 3.4.2 Today, Heathrow Approach ATC has a volume of airspace within which arrivals are vectored between the four holding stacks and the runway. The existing vectoring area allows for aircraft to be positioning onto final approach anywhere between approximately 8nm from the runway and 20nm from the runway. The typical joining point is between 12nm and 15nm from the runway.
- 3.4.3 The result is a large arrival swathe with arrivals overflying a large number of people but with a relatively low level of frequency of overflight, compared to if the vectoring area was more constrained (smaller) or if there were fixed PBN Arrival routes. The variety in joining point means there is no predictable respite to most communities for arrivals, other than under final approach itself inside 8nm, through westerly runway alternation.
- 3.4.4 In order to service the required landing rate at Heathrow, a vectoring area will still be required. Heathrow therefore developed a variety of different options to understand the benefits and impacts of different final approach joining point locations.
- 3.4.5 Heathrow also considered the potential benefits, impacts and technical feasibility of ATC being constrained to a smaller vectoring area. If a smaller vectoring area is technically achievable and beneficial, there could be scope for varying the size, shape and/or location of the vectoring area during different periods to provide respite to some communities. The use of smaller vectoring area would however mean that, during periods of overflight, affected communities would be overflown at a greater frequency as the aircraft would be concentrated within a smaller vectoring area.
- 3.4.6 In addition, breaking down the vectoring area into different combinations could potentially help assembly and assessment of system options in Stage 3.
- 3.4.7 Heathrow generated multiple options for vectoring area to help explore the impact of arrivals joining final approach in 4nm 'bandings' or 'increments' from 8nm-12nm, 9nm-13nm all the way out to 18nm-22nm.
- 3.4.8 At this time, Heathrow have assumed that the banding will need to be the same to the north and south of final approach at any one time. i.e. if arrivals from the north are joining final approach between 8nm and 12nm, then arrivals from the south would also need to join between 8nm and 12nm. This does not mean that the final solution will be constrained in this way: the purpose at this stage is to explore feasibility, benefits and impacts.
- 3.4.9 Tables 19-22 set out all the Vectored Arrival options, including the 'Do Nothing' options, to all runways with a brief description of what each option aims to achieve. Each image contains overflight cones from 7,000ft assuming continuous descent on a 3.0° (5.24%) descent gradient. The existing Controlled Airspace boundaries are visible in light green with AONBs in a darker shade of green. The options can be viewed in more detail in *Step 2A Appendix A*.



| Vectored Arrival Options to Runway 27L | | |
|--|--|---|
| Option Name | Image | Description |
| 27L 'Do Nothing' |  | This represents the baseline for 'Do Nothing' for 27L arrivals. The image represents the areas overflow at least once per day on average by arrivals in 2019. |
| 27L Option A |  | This option has a vectored area with 27L final approach joining points between 8 and 12nm. |
| 27L Option B |  | This option has a vectored area with 27L final approach joining points between 9 and 13nm. |
| 27L Option C |  | This option has a vectored area with 27L final approach joining points between 10 and 14nm. |



| | | |
|-------------------------|--|---|
| <p>27L Option D</p> | | <p>This option has a vectoring area with 27L final approach joining points between 11 and 15nm.</p> |
| <p>27L Option E</p> | | <p>This option has a vectoring area with 27L final approach joining points between 12 and 16nm.</p> |
| <p>27L Option F</p> | | <p>This option has a vectoring area with 27L final approach joining points between 13 and 17nm.</p> |
| <p>27L Option G</p> | | <p>This option has a vectoring area with 27L final approach joining points between 14 and 18nm.</p> |



| | | |
|-------------------------|--|---|
| <p>27L Option H</p> | | <p>This option has a vectoring area with 27L final approach joining points between 15 and 19nm.</p> |
| <p>27L Option I</p> | | <p>This option has a vectoring area with 27L final approach joining points between 16 and 20nm.</p> |
| <p>27L Option J</p> | | <p>This option has a vectoring area with 27L final approach joining points between 17 and 21nm.</p> |
| <p>27L Option K</p> | | <p>This option has a vectoring area with 27L final approach joining points between 18 and 22nm.</p> |

Table 19: Vectored Arrival Options to Runway 27L



| Vectored Arrival Options to Runway 27R | | |
|--|-------|---|
| Option Name | Image | Description |
| 27R 'Do Nothing' | | This represents the baseline for 'Do Nothing' for 27R arrivals. The image represents the areas overflowed at least once per day on average by arrivals in 2019. |
| 27R Option A | | This option has a vectored area with 27R final approach joining points between 8 and 12nm. |
| 27R Option B | | This option has a vectored area with 27R final approach joining points between 9 and 13nm. |
| 27R Option C | | This option has a vectored area with 27R final approach joining points between 10 and 14nm. |



| | | |
|-------------------------|--|---|
| <p>27R Option D</p> | | <p>This option has a vectoring area with 27R final approach joining points between 11 and 15nm.</p> |
| <p>27R Option E</p> | | <p>This option has a vectoring area with 27R final approach joining points between 12 and 16nm.</p> |
| <p>27R Option F</p> | | <p>This option has a vectoring area with 27R final approach joining points between 13 and 17nm.</p> |
| <p>27R Option G</p> | | <p>This option has a vectoring area with 27R final approach joining points between 14 and 18nm.</p> |



| | | |
|-------------------------|--|---|
| <p>27R Option H</p> | | <p>This option has a vectoring area with 27R final approach joining points between 15 and 19nm.</p> |
| <p>27R Option I</p> | | <p>This option has a vectoring area with 27R final approach joining points between 16 and 20nm.</p> |
| <p>27R Option J</p> | | <p>This option has a vectoring area with 27R final approach joining points between 17 and 21nm.</p> |
| <p>27R Option K</p> | | <p>This option has a vectoring area with 27R final approach joining points between 18 and 22nm.</p> |

Table 20: Vectored Arrival Options to Runway 27R



| Vectored Arrival Options to Runway 09L | | |
|--|-------|---|
| Option Name | Image | Description |
| 09L 'Do Nothing' | | This represents the baseline for 'Do Nothing' for 09L arrivals. The image represents the areas overflowed at least once per day on average by arrivals in 2019. |
| 09L Option A | | This option has a vectored area with 09L final approach joining points between 8 and 12nm. |
| 09L Option B | | This option has a vectored area with 09L final approach joining points between 9 and 13nm. |
| 09L Option C | | This option has a vectored area with 09L final approach joining points between 10 and 14nm. |



| | | |
|-------------------------|--|---|
| <p>09L Option D</p> | | <p>This option has a vectoring area with 09L final approach joining points between 11 and 15nm.</p> |
| <p>09L Option E</p> | | <p>This option has a vectoring area with 09L final approach joining points between 12 and 16nm.</p> |
| <p>09L Option F</p> | | <p>This option has a vectoring area with 09L final approach joining points between 13 and 17nm.</p> |
| <p>09L Option G</p> | | <p>This option has a vectoring area with 09L final approach joining points between 14 and 18nm.</p> |



| | | |
|-------------------------|--|---|
| <p>09L Option H</p> | | <p>This option has a vectoring area with 09L final approach joining points between 15 and 19nm.</p> |
| <p>09L Option I</p> | | <p>This option has a vectoring area with 09L final approach joining points between 16 and 20nm.</p> |
| <p>09L Option J</p> | | <p>This option has a vectoring area with 09L final approach joining points between 17 and 21nm.</p> |
| <p>09L Option K</p> | | <p>This option has a vectoring area with 09L final approach joining points between 18 and 22nm.</p> |

Table 21: Vectored Arrival Options to Runway 09L



| Vectored Arrival Options to Runway 09R | | |
|--|-------|---|
| Option Name | Image | Description |
| 09R 'Do Nothing' | | This represents the baseline for 'Do Nothing' for 09R arrivals. The image represents the areas overflowed at least once per day on average by arrivals in 2019. |
| 09R Option A | | This option has a vectoring area with 09R final approach joining points between 8 and 12nm. |
| 09R Option B | | This option has a vectoring area with 09R final approach joining points between 9 and 13nm. |



| | | |
|-------------------------|--|---|
| <p>09R Option C</p> | | <p>This option has a vectoring area with 09R final approach joining points between 10 and 14nm.</p> |
| <p>09R Option D</p> | | <p>This option has a vectoring area with 09R final approach joining points between 11 and 15nm.</p> |
| <p>09R Option E</p> | | <p>This option has a vectoring area with 09R final approach joining points between 12 and 16nm.</p> |
| <p>09R Option F</p> | | <p>This option has a vectoring area with 09R final approach joining points between 13 and 17nm.</p> |



| | | |
|-------------------------|--|---|
| <p>09R Option G</p> | | <p>This option has a vectoring area with 09R final approach joining points between 14 and 18nm.</p> |
| <p>09R Option H</p> | | <p>This option has a vectoring area with 09R final approach joining points between 15 and 19nm.</p> |
| <p>09R Option I</p> | | <p>This option has a vectoring area with 09R final approach joining points between 16 and 20nm.</p> |
| <p>09R Option J</p> | | <p>This option has a vectoring area with 09R final approach joining points between 17 and 21nm.</p> |



| | | |
|-------------------------|--|--|
| <p>09R Option K</p> |  | <p>This option has a vectored area with 09R final approach joining points between 18 and 22nm.</p> |
|-------------------------|--|--|

Table 22: Vectored Arrival Options to Runway 09R

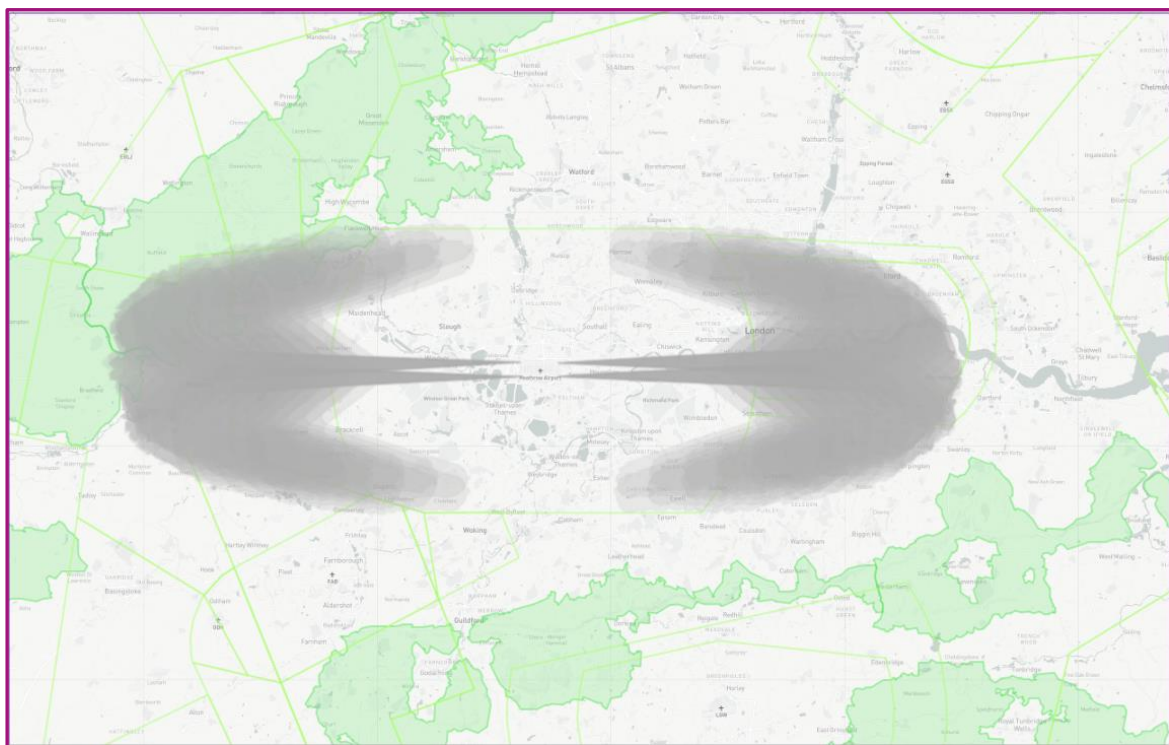


Figure 30: All Vectored Arrival options (excluding 'Do Nothing' options)



3.5 Operational Concepts

3.5.1 Some of Heathrow's design principles could not be addressed through the options developed (route placement) in Stage 2 but will be addressed at a later stage through how the routes are operated and/or their interdependencies with routes to/from adjacent airports and NATS network connectivity. These design principles were:

- Design Principle 3: Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise
- Design Principle 6: Provide predictable and meaningful respite to those affected by noise from Heathrow's movements
- Design Principle 7: Seek to avoid overflying the same communities with multiple routes including those to/from other airports
- Design Principle 8: Contribute to minimising the negative impacts of night flights
- Design Principle 11: Enable the efficiency of other airspace users' operations
- Design Principle 12: Minimise the impact to all stakeholders from future changes to Heathrow's airspace

3.5.2 In order to demonstrate how these principles could be potentially addressed, Heathrow developed some operational concepts. Heathrow shared these in the Stage 2A engagement and asked for feedback. These concepts were:

- Investigation of whether mandating a specific NADP could be beneficial on some options
- Enabling the deconfliction of arrival and departure flight paths to enable continuous climb and continuous descent operations
- Investigation of noise relief via dispersion. Dispersion of flight paths within an allocated route would not give the predictable break in noise required for "respite", but it could offer "relief" from noise for some overflown communities
- Departure routes from adjacent runways following different tracks for longer to increase the number of people who benefit from runway alternation
- Different flight paths for a departure or arrival route at different times to offer respite to overflown communities ("respite routes")
- A variable vectoring area which could see different final approach joining points being used during different periods of the day or on different days
- Use of PBN arrival flight paths for early morning (pre 6am) arrivals. Flight paths could be alternated to ensure the same communities are not overflown each morning
- Use of bespoke departure routes for occasional late running departures at night. These routes could vary on a rotation pattern to ensure the same community is not always affected



- Use of 'extra' departure routes during or after periods of disruption (such as periods of bad weather) to minimise the number of aircraft needing to depart after 23:00.



4. STAKEHOLDER ENGAGEMENT

4.1 CAP1616 Requirements

- 4.1.1 CAP1616 Step 2A requires sponsors to undertake stakeholder engagement following the development of the Comprehensive List of Options (CLOO).
- 4.1.2 Paragraph 125 of CAP1616 states that the purpose of the engagement on the CLOO is to preliminarily test the options with the same stakeholders that were engaged with during Stage 1 of the process, to ensure, “that they are satisfied that the design options are aligned with the Design Principles and that the change sponsor has properly understood and accounted for stakeholder concerns specifically related to the design options”²⁴.
- 4.1.3 CAP1616 is explicit in stating that change sponsors must test the options with stakeholders and then produce a Design Principle Evaluation. In accordance with this requirement, Heathrow carried out stakeholder engagement on the CLOO in October 2022.
- 4.1.4 Heathrow also engaged with stakeholders at a number of additional points during Stage 2, as it was felt that stakeholders would benefit from a greater level of engagement on the process the airspace team was undertaking for this ACP. Heathrow also recognised that its approach to the appraisal of options and presentation of results could be informed by stakeholder representatives.
- 4.1.5 Details of all additional engagement undertaken during Stage 2 can be found in the separate document: ‘Stage 2 Stakeholder Engagement Summary’.

4.2 Identification of Stakeholders

- 4.2.1 Heathrow invited all stakeholders who were invited to engage at Stage 1 to Step 2A workshops, regardless of whether they responded at that stage. This included:
- Council for the Independent Scrutiny of Heathrow Airport (CISHA)
 - Community group representatives
 - Local authority representatives, including Heathrow Strategic Planning Group (HSPG)
 - NERL and other FASI airport sponsors
 - Public bodies, such as NATMAC
 - Environmental group representatives
 - Airlines and airline representative groups; and
 - The General Aviation community
- 4.2.2 Heathrow is aware that some stakeholders might only choose to engage at later stages of the ACP, or that there might have been personnel changes within stakeholder

²⁴ CAP1616, page 39, para 125



organisations. If a stakeholder representing an organisation consistently fails to respond to engagement invitations, then Heathrow always sought and will always seek to identify another individual from that organisation.

- 4.2.3 The only stakeholder group removed from the stakeholder list completely was Aircraft Noise Three Villages, as the group has disbanded since Stage 1.

4.3 Engagement Methods

Non-Industry stakeholders

Community Groups

- 4.3.1 Heathrow hosted a series of workshops in November 2022 with all community, local authority and environmental group stakeholders that were invited to attend these workshops and who had been engaged at Stage 1.
- 4.3.2 The following community group stakeholders were invited to attend workshops:
- Council for the Independent Scrutiny of Heathrow Airport (CISHA²⁵)
 - Heathrow Local Community Forum (LCF²⁶)
 - Heathrow Noise and Airspace Community Forum (NACF²⁷)
 - Other community group representative stakeholders
- 4.3.3 CISHA is Heathrow's Airport Consultative Committee as required by Section 35 of the Civil Aviation Act 1982, responsible for ensuring independent oversight of the way Heathrow engages with its key stakeholders.
- 4.3.4 The LCF and NACF are two of CISHA's six established stakeholder forums which meet regularly throughout the year. CISHA meets quarterly to consider issues raised by its forums and includes representatives from other stakeholders such as local authorities, airlines, the business community, and airport user groups.
- 4.3.5 The LCF is comprised of nominated representatives of community groups around Heathrow. The forum meets every two months with an independent chair to facilitate a positive dialogue between Heathrow and its neighbouring communities, to help build relationships and trust. The aim of the forum is to improve Heathrow's understanding of key concerns of communities living around the airport and to work together to minimise or mitigate its local impacts.

²⁵ Previously known (during Stage 1) as Heathrow Community Engagement Board (HCEB)

²⁶ Previously known (during Stage 1) as Heathrow Local Focus Forum (LFF)

²⁷ Previously known (during Stage 1) as Heathrow Community Noise Forum (HCNF)



| List of LCF Members | |
|------------------------------------|--|
| Colnbrook Residents Association | Colnbrook with Poyle Parish Council |
| Cranford Residents Association | Harmondsworth and Sipson Residents Association (HASRA) |
| Heston Residents Association | Hillingdon Council |
| Iver Parish Council | Longford Residents Association |
| Pavillion Association | Richings Park Resident Association |
| Spelthorne Council | Stanwell Moor Residents Association |
| Stanwell Preservation Action Group | Stanwell Village Hall |

Table 23: List of LCF members

- 4.3.6 The NACF was established in 2022 to continue the work of the previous Heathrow Community Noise Forum (HCNF), which was established in 2015 in response to local concerns around potential future changes to airspace.
- 4.3.7 The purpose of the NACF is to bring together representatives from Heathrow, industry, Government and regulators, local authorities and community groups in the area around Heathrow. The forum meets every two months, facilitated by an independent chair, to allow members to discuss issues related to noise, airspace and runway operations at Heathrow. This provides an environment for members to listen to the key concerns of communities living around the airport and the opportunity to ask questions.



| List of NACF Members | |
|--|--|
| Bracknell Forest Council | Buckinghamshire Council |
| Elmbridge Borough Council | London Borough of Ealing |
| London Borough of Hammersmith and Fulham | London Borough of Hounslow |
| London Borough of Lewisham | London Borough of Richmond upon Thames |
| Royal Borough of Windsor and Maidenhead | Runnymede Borough Council |
| Slough Borough Council | Spelthorne Borough Council |
| Surrey County Council | Surrey Heath Borough Council |
| Wokingham Borough Council | Richings Park Residents Association |
| Iver Village Residents Association | Molesey Residents Association |
| Ealing Aircraft Noise Action Group (EANAG) | Harmondsworth and Sipson Residents Association (HASRA) |
| Forest Hill Society | Richmond Heathrow Campaign |
| Teddington Action Group (TAG) | Plane Hell Action |
| Englefield Green Action Group (EGAG) | Stanwell Moor Residents Association |
| The Windlesham Society | Heathrow Association for the Control of Aircraft Noise (HACAN) |
| Local Authorities Aircraft Noise Council (LAANC) | Civil Aviation Authority (CAA) |
| The Council for the Independent Scrutiny of Heathrow (CISHA) | Department for Transport (DfT) |
| British Airways (BA) | |

Table 24: List of NACF members

4.3.8 All the groups and residents who are part of ‘Other Community Groups’ are stakeholders who either contacted Heathrow directly requesting to be included in future engagement activities or were recommended to Heathrow via a known stakeholder community group during Stage 2.

| List of Other Community Stakeholder Groups | |
|--|---|
| Cleveland Square Residents Association | Westbourne Park Road East Resident’s Association (WPRERA) |
| The Royal Parks | Wimbledon and Putney Commons Conservators and Friends |
| Local Resident Walton-on-Thames, Surrey | Friends of the Great Barn Harmondsworth |
| Paddington Residents Active Concern on Transport (PRACT) | Clean Air Bayswater |
| Communities Against Gatwick Noise Emissions (CAGNE) | Lower Sunbury Residents Association (LOSRA) |
| Luton and District Association for the Control of Aircraft Noise | The Holly Lodge Centre |
| Old Oak and Park Royal Development Corporation | |

Table 25: List of other community stakeholder groups, added since Stage 1

4.3.9 All these stakeholders in Table 25 were invited to the CLOO workshops, except for Holly Lodge Centre and LOSRA, who requested involvement after the workshops had concluded.



4.3.10 Copies of emails sent to community stakeholders are available at *Step 2A Appendix B*.

Local Authorities/Councils

4.3.11 Local authorities and councils were invited to attend the engagement workshops. As at Stage 1, there are 77 local authorities and 9 county councils within Heathrow’s potentially affected area. In the first instance, the CEO from each local authority or council was invited to attend a workshop and, if notified, the Heathrow stakeholder list was expanded to include the relevant airspace point of contact within each organisation.

| List of Local Authorities | | |
|--------------------------------|----------------------|----------------------|
| Barking & Dagenham | Guildford | Richmond upon Thames |
| Barnet | Hackney | Runnymede |
| Basingstoke & Deane | Hammersmith & Fulham | Rushmoor |
| Bexley | Haringey | Sevenoaks |
| Bracknell Forest | Harlow | Slough |
| Brent | Harrow | South Oxfordshire |
| Brentwood | Hart | Southwark |
| Bromley | Havering | Spelthorne |
| Broxbourne | Hertsmere | St Albans |
| Buckinghamshire County Council | Hillingdon | Surrey Heath |
| Camden | Horsham | Sutton |
| Central Bedfordshire | Hounslow | Tandridge |
| Chichester | Islington | Three Rivers |
| City of London | Kensington & Chelsea | Thurrock |
| Crawley | Kingston upon Thames | Tower Hamlets |
| Croydon | Lambeth | Waltham Forest |
| Dacorum | Lewisham | Wandsworth |
| Dartford | Luton | Watford |
| Ealing | Merton | Waverley |
| East Hampshire | Mid Sussex | Welwyn Hatfield |
| East Hertfordshire | Mole Valley | West Berkshire |
| Elmbridge | Newham | Westminster |
| Enfield | North Hertfordshire | Windsor & Maidenhead |
| Epping Forest | Reading | Woking |
| Epsom and Ewell | Redbridge | Wokingham |
| Greenwich | Reigate & Banstead | |

Table 26: List of Local Authority Stakeholders



| List of County Councils | |
|---------------------------------|----------------------------|
| Essex County Council | Hampshire County Council |
| Hertfordshire County Council | Oxfordshire County Council |
| East Sussex County Council | Milton Keynes Council |
| Northamptonshire County Council | Kent County Council |
| Surrey County Council | |

Table 27: List of County Council stakeholders

- 4.3.12 Old Oak and Park Royal Development Corporation was a newly identified and engaged group at Stage 2, suggested by the London Borough of Hammersmith and Fulham, as it covers a significant part of the borough where new major housing schemes are planned.
- 4.3.13 Included in this stakeholder category is the Heathrow Strategic Planning Group. The HSPG represents many of the local authorities and public agencies responsible for planning the land use, transport, environment, economic development, and sustainable development of the sub-region surrounding Heathrow.
- 4.3.14 The Chair of the HSPG was invited to the workshops and acts as the assigned point of contact to extend invitations and associated engagement material to the wider group.

| List of HSPG Members | |
|--|--|
| Buckinghamshire Council | Runnymede Borough Council |
| Colne Valley Park Community Interest Company | Slough Borough Council |
| Elmbridge Borough Council | Surrey County Council |
| Enterprise M3 Local Enterprise Planning | Spelthorne Borough Council |
| London Borough of Ealing | Thames Valley Berkshire Local Enterprise Partnership |
| London Borough of Hounslow | Buckinghamshire Thames Valley Local Enterprise Partnership |
| London Borough of Windsor & Maidenhead | |

Table 28: List of HSPG members

- 4.3.15 Copies of the emails sent to local authority and council stakeholders are available at *Step 2A Appendix B*.

Environmental Groups/Organisations

- 4.3.16 Heathrow invited the same environmental organisations groups who had been engaged during Stage 1 to the CLOO workshops.



| List of Environmental Groups and AONBs | |
|--|--------------------------|
| Natural England | Friends of the Earth |
| National Trust | CPRE |
| Environment Agency | CPRE Berkshire |
| CPRE Bedfordshire | CPRE Kent |
| CPRE Buckinghamshire | CPRE Oxfordshire |
| CPRE London | The Chiltern Society |
| CPRE Surrey | Friends of Richmond Park |
| Kew Gardens | Chilterns AONB |
| South Downs AONB | Surrey Hills AONB |
| Kent Downs AONB | North Wessex Downs AONB |
| High Weald AONB | English Heritage |

Table 29: List of Environmental Organisations/Groups & AONBs

- 4.3.17 Copies of the emails sent to the environmental organisations and groups are available at *Step 2A Appendix B*.

Industry Stakeholders

Airlines

- 4.3.18 Heathrow held seven online industry workshops, which took place in November 2022. Key airline representatives were invited to attend the workshops.
- 4.3.19 Heathrow also asked the Chair of Heathrow's Airline Operating Committee to identify any additional airlines who would be interested in engaging at Stage 2. A copy of this email is available at *Step 2A Appendix C*.
- 4.3.20 From this activity Heathrow received responses from WestJet, Aer Lingus, Flybe and Cathay Pacific, who were all subsequently invited to attend the Stage 2 workshops. A copy of the emails is available at *Step 2A Appendix C*.
- 4.3.21 In January 2023, the CAA announced that Flybe had gone into administration and made the decision to cease trading. Therefore, Flybe was invited to the Comprehensive List of Options engagement workshops in November 2022 but was not engaged any further and has now been removed from the stakeholder list.



| List of Airlines Invited to Stage 2 Workshops | |
|---|------------------------|
| Aer Lingus | American Airlines |
| British Airways | Cathay Pacific Airways |
| Delta Air Lines | Etihad |
| Flybe | KLM |
| Lufthansa Group (Swiss) | United Airlines |
| Virgin Atlantic Airways | WestJet |

Table 30: List of Airline representatives invited to Stage 2 workshops

4.3.22 Copies of the emails sent to the airlines are available at *Step 2A Appendix C*.

Flight Operations Performance and Safety Committee (FLOPSC)

- 4.3.23 FLOPSC is made up of a wide range of stakeholders, including multiple additional airlines. The member list changes frequently, particularly due to the Covid-19 pandemic disruption.
- 4.3.24 When an airline representative leaves an airline without providing an alternative contact, the organisation is removed. This occurred for Qatar Airways, KLM, Germanwings (renamed Eurowings in 2015) and Qantas, who were engaged at Stage 1.
- 4.3.25 Jetblue, Wideroe, WestJet and Sky Express have started operating at Heathrow since the pandemic. Heathrow engages with new entrant airlines to make them aware of the noise abatement procedures they need to follow when operating from Heathrow, and to invite them to join FLOPSC.
- 4.3.26 The committee meets quarterly to discuss Heathrow's airside operational and safety performance, and a member of the Airspace Team was invited to attend a meeting and provide a short update on our progress with the ACP. A copy of the information presented is available at *Step 2A Appendix F*.
- 4.3.27 This group was further engaged on the Comprehensive List of Options via email correspondence following the workshops.



| List of FLOPSC Members | |
|---|------------------------------------|
| Air Canada | United Airlines |
| American Airlines | Emirates |
| Austrian Airlines | Delta Air Lines |
| British Air Line Pilots Association (BALPA) | UK Flight Safety Committee (UKFSC) |
| British Airways | Virgin Atlantic Airways |
| Department for Transport (DfT) | Aer Lingus |
| Flybe | NATS |
| Heathrow | Lufthansa (DLH) |
| Jetblue | Civil Aviation Authority (CAA) |
| Met Office | Wideroe |
| SAS | WestJet |
| Sky Express | Airport Coordination Ltd (ACL) |
| Swiss | |

Table 31: List of FLOPSC members

4.3.28 Copies of the emails sent to FLOPSC members are available at *Step 2A Appendix C*.

Airfield Operational Efficiency (AOE)

4.3.29 The AOE forum is attended by a smaller group of external organisations. The forum is part of Heathrow’s capital engagement process, where the focus is Air Traffic Management and airspace projects. It meets monthly.

4.3.30 The facilitator of the AOE was invited to attend the CLOO workshops and to extend the invitation and engagement material to the wider group.

4.3.31 An IATA point of contact requested inclusion in the Stage 2 engagement activities following an update at a meeting on 3 November 2022, and was subsequently invited to the workshops.

4.3.32 This group was further engaged on the CLOO via email correspondence following the workshops.

| List of AOE Members | |
|--|-------------------------|
| Heathrow Airline Operators Committee | NATS |
| British Airways | Virgin Atlantic Airways |
| American Airlines | United Airlines |
| International Air Transport Association (IATA) | |

Table 32: List of AOE members

4.3.33 Copies of the emails sent to the AOE members are available at *Step 2A Appendix C*.



Adjacent FASI Airports and Airfields

- 4.3.34 Heathrow engaged with the adjacent FASI airports, who were also engaged at Stage 1. These stakeholders were invited to attend the industry workshops.
- 4.3.35 In addition, Heathrow added Southampton Airport, Blackbushe Airport and Elstree Aerodrome to the stakeholder list.
- 4.3.36 Southampton Airport was added due to the potential overlapping area of common interest in the region of 7,000 feet. Blackbushe Airport was added as some aircraft traffic is routed through the Farnborough ACP region, and therefore they have an indirect interest in the Heathrow ACP. Elstree Aerodrome was added due to its location in relation to Heathrow, for which there are existing Letters of Agreement on airspace arrangements.

| List of Airports and Airfields | |
|--------------------------------|-------------------------|
| Luton | RAF Northolt |
| Stansted | London City |
| Gatwick | Farnborough |
| Biggin Hill | Southampton |
| Southend | Denham Aerodrome |
| Fairoaks Airport | White Waltham Aerodrome |
| Wycombe Air Park | Elstree Aerodrome |
| Blackbushe Airport | |

Table 33: List of Airports and Airfields

- 4.3.37 Copies of the emails sent to the airports and airfields are available at *Step 2A Appendix C*.

National Air Traffic Management Committee (NATMAC)

- 4.3.38 NATMAC is an advisory board sponsored by the CAA’s Safety and Airspace Regulation Group (SARG). The committee is consulted for advice and views on airspace matters. NATMAC assists SARG in the development of airspace policies, configurations, and procedures to ensure that due attention is given to the requirements of both civil and military users of UK airspace.
- 4.3.39 NATMAC is regularly engaged on ACPs and is familiar with the CAP1616 process, so Heathrow engaged with these organisations via email, rather than at workshops.
- 4.3.40 However, representatives from Airlines UK, BALPA, NATS and the Ministry of Defence (MoD) were invited to attend the CLOO workshops given these organisations are most likely to be impacted by Heathrow’s ACP.



| List of NATMAC Members | |
|---|---|
| Airlines UK | Airspace4All |
| Airport Operators Association (AOA) | Airfield Operators Group (AOG) |
| Aircraft Owners & Pilots Association (AOPA) | Airspace Change Organising Group (ACOG) |
| Association of Remotely Piloted Aircraft Systems UK (ARPAS-UK) | Aviation Environment Federation (AEF) |
| British Airways (BA) | BAE Systems |
| British Airline Pilots Association (BALPA) | British Balloon & Airship Club (BBAC) |
| British Business & General Aviation Association (BBGA) | British Gliding Association (BGA) |
| British Helicopter Association (BHA) | British Hang Gliding & Paragliding Association (BHPA) |
| British Microlight Aircraft Association (BMAA) | British Model Flying Association (BMFA) |
| British Skydiving | Drone Major |
| General Aviation Alliance (GAA) | Guild of Air Traffic Control Officers (GATCO) |
| Honourable Company of Air Pilots (HCAP) | Helicopter Club of Great Britain (HCGB) |
| Heavy Airlines | Iprosurv |
| Isle of Man CAA | Light Aircraft Association (LAA) |
| Low Fare Airlines | Military Aviation Authority (MAA) |
| Ministry of Defence – Defence Airspace & Air Traffic Management (MoD DAATM) | NATS |
| Navy Command HQ | PPL/IR (Europe) |
| UK Airprox Board (UKAB) | UK Flight Safety Committee (UKFSC) |
| United States Air Force Europe (3 rd Air Force-Directorate of Flying (USAFE 3 rd AF-DOF)) | |

Table 34: List of NATMAC members

4.3.41 Copies of the emails sent to the NATMAC members are available at *Step 2A Appendix C*.

Other Industry Stakeholders

4.3.42 Several individuals on the industry stakeholder list had changed roles, so new representatives were added to the list.

4.3.43 A representative from the Future Aviation Industry Working Group on Airspace Integration (FAIWG-AI) was added to the stakeholder list at Stage 2 and invited to attend workshops.



4.3.44 This group was set up in February 2022 and works alongside the DfT, the CAA and Connect Places Catapult, aiming to bring together stakeholders to provide input and insight to Government strategy and policy for integrating new aerial vehicle types in UK airspace.

| List of Other Industry Stakeholders | |
|---|----------------------|
| NATS – NERL | NERL Swanwick (LAMP) |
| Future Aviation Industry Working Group on Airspace Integration (FAIWG-AI) | |

Table 35: List of other industry stakeholders

4.3.45 Copies of the emails sent to the other industry stakeholders are available at *Step 2A Appendix C*.

4.4 Stakeholder Engagement Workshops on the CLOO

4.4.1 The workshops were held in November 2022.

4.4.2 All community, local authority and environmental representatives in Tables 23-29 were invited to attend workshops. There was a combination of online and in-person workshops for non-industry stakeholders to engage with Heathrow in a manner that was convenient to them.

4.4.3 An independent facilitator was used to chair the Stage 2 non-industry workshops. The independent facilitator produced a single meeting note for all six workshops, reflecting the discussions that took place. This document is available at *Step 2A Appendix D*.

4.4.4 Airlines and airports were invited to attend a separate set of online industry workshops. Heathrow produced a single meeting note for all seven workshops, reflecting the discussions that took place. This document is available at *Step 2A Appendix D*. Industry stakeholders not invited to the workshops were engaged via email. Copies of the email sent to the industry stakeholders are at *Step 2A Appendix C*.

4.4.5 Table 36 shows the dates of the workshops. A number is shown in brackets if more than one representative from that organisation attended.

| Stakeholder Group | Organisations (approx. number of members) | Workshop(s) | Date |
|---|---|---|--------------------|
| Community and Environmental Representatives | NACF (46) LCF (19) CISHA (4) Local authorities and county councils (131) Environmental Groups & AONBS (33) HSPG, AOE, DfT, CAA | 6 workshops (4 in-person and 2 online workshops, including 1 evening online workshop) | 1- 9 November 2022 |
| Airlines and Other Airport Representatives | Selected Airlines & NATS (NERL) Other FASI airports and local airfields | 7 online workshops: 4 x airlines, 3 x NERL/ FASI airports | 3-15 November 2022 |

Table 36: Stakeholder organisations invited to Stage 2 workshops

4.4.6 Table 37 shows the attendees at each of the non-industry workshops.



| Workshop 1: 0930-1200 Tue 1 Nov In-person | Workshop 2: 1400-1630 Tue 1 Nov In-person | Workshop 3: 1430-1630 Tue 8 Nov Online | Workshop4: 1830-2030 Tue 8 Nov Online | Workshop 5: 0930-1200 Wed 9 Nov In-person | Workshop 6: 1400-1630 Wed 9 Nov In-person |
|--|--|--|--|--|---|
| The Royal Parks (2) | Molesey Residents Association | NATS Heathrow | Council for the Independent Scrutiny of Heathrow (CISHA) | Local Resident Walton-on-Thames, Surrey (2) | Communities Against Gatwick Noise Emissions (CAGNE) |
| Local Community Forum (LCF), Independent Chair | Richings Park Residents Association | Spelthorne Council | Heathrow Strategic Planning Group (HSPG) | Colbrook Residents Association | Pavilion Association (2) |
| Friends of Richmond Park (3) | Englefield Green Action Group (EGAG) | Elmbridge Borough Council | Paddington Residents Active Concern on Transport (PRACT) | Surrey Heath Borough Council | Teddington Action Group (TAG) (2) |
| London Borough of Ealing | | Haringey Council | Buckinghamshire Council | Bracknell Forest Council | Plane Hell Action |
| Royal Borough of Windsor and Maidenhead Council (RBWM) | | Mole Valley District Council | Greenwich London Borough Council | Buckinghamshire Council | Englefield Green Action Group (EGAG) |
| | | Watford Borough Council | Hertfordshire County Council | Friends of Richmond Park | Harmondsworth & Sipson Residents Association (HASRA) |
| | | Iver Village Residents Association | Kingston upon Thames Council | NACF, Independent Chair | Clean Air Bayswater (2) |
| | | Forest Hill Society | Reigate and Banstead Borough Council | | Westbourne Park Road East Resident's Association (WPRERA) |
| | | Richmond Heathrow Campaign | Southwark Council | | |
| | | The Windlesham Society | Surrey County Council | | |
| | | Heathrow Association for the Control of Aircraft Noise (HACAN) | Richmond Heathrow Campaign | | |
| | | Local Authorities Aircraft Noise Council (LAANC) | The Windlesham Society | | |
| | | National Trust | The Chiltern Society | | |
| | | CPRE Oxfordshire | Chilterns Conservation Board | | |



| | | | | | |
|--|--|-----------------------|------------------------------|--|--|
| | | Milton Keynes Council | NACF, Independent Chair | | |
| | | | Central Bedfordshire Council | | |

Table 37: List of non-industry workshop attendees

4.4.7 Table 38 shows the attendees at each of the industry workshops.

| Workshop 1: Thu 3 Nov 0900-1200 | Workshop 2: Thu 3 Nov 1500-1800 | Workshop 3: Fri 4 Nov 0900-1200 | Workshop 4: Mon 7 Nov 0900-1200 | Workshop 5: Mon 7 Nov 1500-1800 | Workshop 6: Thu 10 Nov 0900-1200 | Workshop 7: Tue 15 Nov 1400- 1630 |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--|---|
| Etihad | Delta Air Lines (3) | NATS – NERL | British Airways (3) | American Airlines (2) | Stansted Airport (2) | Ministry of Defence – Defence Airspace & Air Traffic Management (MoD DAATM) |
| KLM | WestJet | Stansted Airport (4) | Lufthansa Group (Swiss) | United Airlines (2) | NATS – NERL | Luton Airport (3) |
| IATA | | London City Airport (3) | Virgin Atlantic Airways | | | Biggin Hill Airport (3) |
| Flybe (3) | | RAF Northolt (2) | Cathay Pacific Airways(2) | | | Gatwick Airport (2) |
| | | Southampton Airport (3) | | | | Farnborough Airport (3) |
| | | Southend Airport | | | | ACOG |
| | | | | | | Blackbushe Airport |
| | | | | | | Future Aviation Industry Working Group on Airspace Integration (FAIWG-AI) |

Table 38: List of industry workshop attendees

4.5 CLOO Engagement Focus Groups

4.5.1 In January 2023 Heathrow conducted two resident focus groups and three school focus groups in areas local to the airport. School focus groups involved students aged 16 to 18. This is consistent with our Stage 1 approach to engagement.



| Focus Group | Date | Location | No. of Attendees |
|----------------------------|-----------------|--------------------------|--------------------|
| West Thames College | 9 January 2023 | Isleworth | 24 students |
| Resident Group – Bracknell | 10 January 2023 | Hilton Hotel, Bracknell | 9/10 participants |
| Uxbridge College | 11 January 2023 | Uxbridge | 13 students |
| Resident Group – Surbiton | 11 January 2023 | Glenmore House, Surbiton | 10/10 participants |
| UTC Heathrow | 12 January 2023 | Northwood | 12 students |

Table 39: Resident & School Focus Group details

- 4.5.2 For the resident focus groups, Heathrow used an independent facilitator to chair the session, to ensure that the participants felt as comfortable as possible providing their opinions on the material.
- 4.5.3 Copies of the information presented to the focus groups and further details are available at Annex 4.

4.6 Stakeholder Engagement Material

- 4.6.1 During the workshops, Heathrow provided a presentation to talk through the approach taken to developing the CLOO and offered stakeholders the opportunity to ask questions. This can be found in *Step 2A Appendix A*.
- 4.6.2 Following the workshops, all stakeholders, whether they had attended a workshop or not, were emailed the slide pack presented at the workshops, including Heathrow's approach to developing the CLOO for:
- PBN Departure options;
 - PBN Arrival options;
 - Vectored Arrival options; and
 - Future Operational Concepts.
- 4.6.3 Stakeholders were also emailed a technical appendix with maps showing the full set of options by design principle, and a link to a Feedback Form.
- 4.6.4 To ensure meaningful stakeholder engagement could take place, Heathrow made material as non-technical and accessible as possible, including providing background information for stakeholders who may be new to Heathrow's ACP. Heathrow also provided a glossary and a Frequently Asked Questions (FAQ) document.
- 4.6.5 To ensure stakeholders were aware of the indicative nature of Heathrow's flight path options at this stage in the process, each map in the slide pack had a disclaimer stating that the options are subject to change throughout the ACP process.
- 4.6.6 Heathrow focused on sharing some examples of how options were created for the PBN Departure options and PBN Arrival options for some of the Design Principles, with information on all options provided after the workshop for stakeholders to review in their own time.



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- 4.6.7 As well as the CLOO, Heathrow also provided information on future concepts that are being considered to meet some of the Design Principles. Heathrow asked stakeholders for feedback on the following:
- Heathrow's approach to delivering respite;
 - Heathrow's approach to night flights, and
 - Heathrow's approach to noise efficient operations.
- 4.6.8 Engagement material for the residents and school focus groups was simplified and included more background information, as these stakeholders were unlikely to have prior knowledge of the project. Heathrow engaged with residents in similar areas and schools during Stage 1 of this ACP, however it was not always possible to engage the same individuals at Stage 2.
- 4.6.9 For the school groups, Heathrow explained the operational use of the runways and included more prompts to enable them to effectively contribute to the discussion. The slide pack was used to focus the conversation on the high-level approach to developing the CLOO, and invited participants to provide their views on the conceptual work for delivering respite and minimising the potential impact of night flights. The engagement material was not shared with participants following the session, as comments and contributions were recorded during the meetings. A copy of the report from the focus groups is available at Annex 4.

4.7 Summary of CLOO Feedback and Heathrow Responses

- 4.7.1 Following the completion of the workshops, the engagement material and information outlined in paragraph 4.6.2 was distributed to all stakeholders, regardless of their attendance at a workshop.
- 4.7.2 Stakeholders were given a four-week period to provide feedback on the slide pack and the supplementary material. Stakeholders were also able to ask clarification questions via Heathrow's dedicated airspace email address.
- 4.7.3 The feedback form contained the following questions:
- Thinking about the information that Heathrow has provided and/or presented to you, do you agree or disagree with the following statement about Heathrow's development of flight path options? "I am satisfied that Heathrow has taken into account the Design Principles when developing the Comprehensive List of Flight Path Options".
 - Answer options: I strongly agree, I agree, I am unsure, I disagree, or I strongly disagree
 - Do you have any feedback on Heathrow's potential concepts for delivering respite?
 - Do you have any feedback on Heathrow's potential approach to night flights?
 - Do you have any feedback on Heathrow's proposed approach to noise efficient operations?
 - Do you have any feedback on Heathrow's overall approach to developing flight path options?



- 4.7.4 A copy of the feedback form is available at *Step 2A Appendix E*.
- 4.7.5 Heathrow received 65 submissions of feedback from non-industry and industry stakeholder groups. This includes four organisations, HSPG, CAGNE (Communities Against Gatwick Noise Emissions), Gatwick Airport and the London Borough of Waltham Forest, who submitted their feedback via email, rather than through the feedback form.
- 4.7.6 The breakdown of feedback responses received from industry and non-industry groups is illustrated in Figure 31.

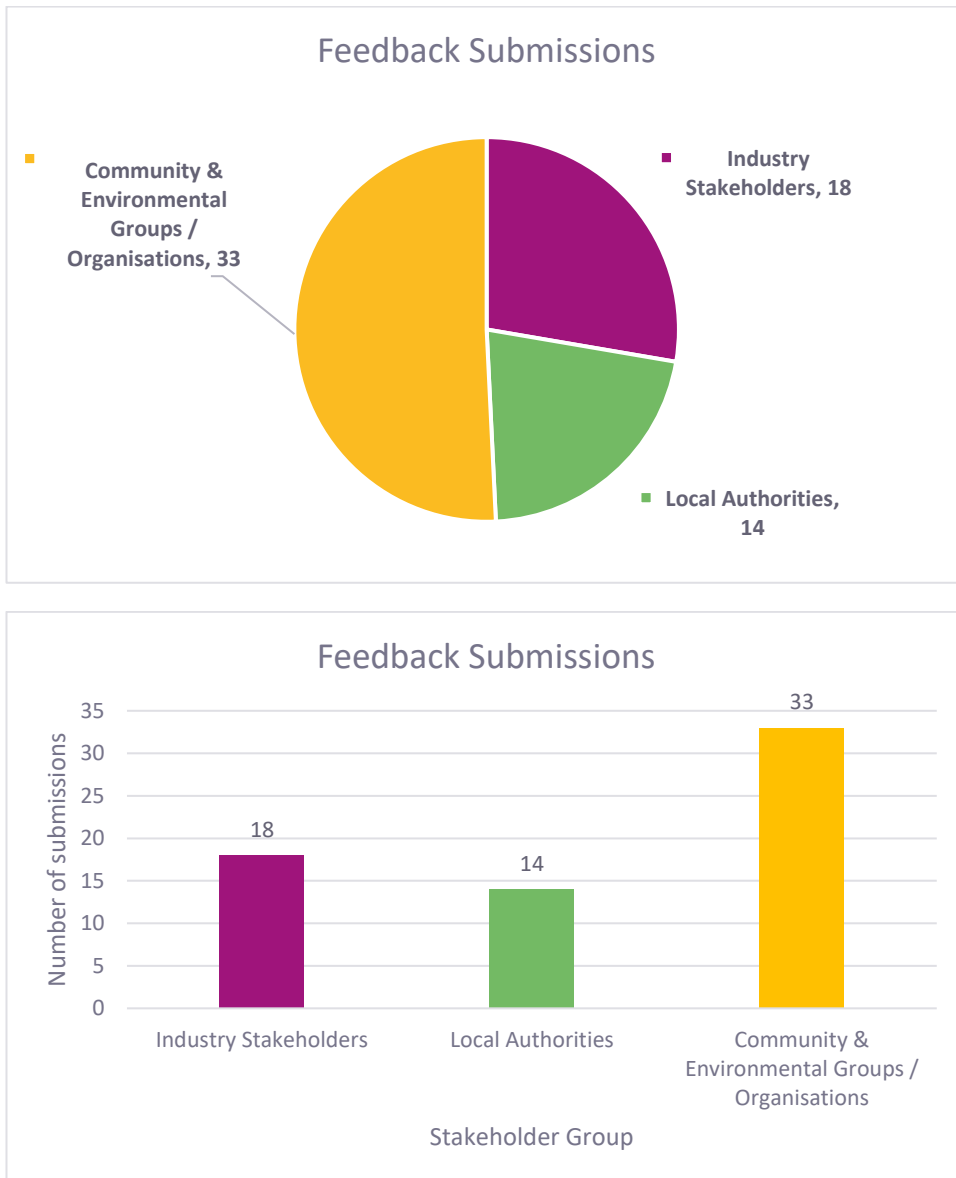


Figure 31: Community & Industry Stakeholder feedback submissions

- 4.7.7 The breakdown of responses to the key question, “I am satisfied that Heathrow has taken into account the Design Principles when developing the Comprehensive List of Flight Path Options” is at Figure 32. The chart also states if a stakeholder did not answer the key question.

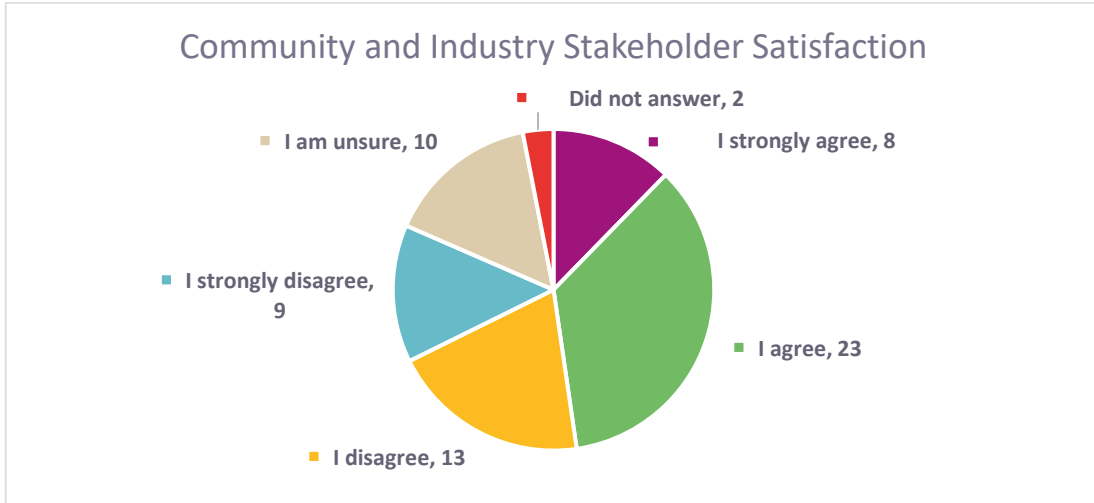


Figure 32: Community & Industry key questions responses

- 4.7.8 The following tables (40-47) summarise the feedback Heathrow received from stakeholders specifically on the CLOO.
- 4.7.9 Feedback from stakeholders related to the questions regarding the concepts have not been included in these tables, but a summary of the feedback received on the concepts is included in this document at Table 48.
- 4.7.10 Heathrow has summarised the key points made by stakeholders regarding the CLOO and provided a formal response to them in the tables below. Full copies of the feedback forms provided by stakeholders are available in *Step 2A Appendix E*.

Summary of Non-industry CLOO feedback – Community Groups, Local Councils & Environmental Organisations/Groups

- 4.7.11 From the 33 community and environmental groups/organisations who responded, 6 were AONBs and environmental group representatives, and 27 were community groups.
- 4.7.12 The breakdown of responses to the key question from the community group and environmental group organisations is shown in Figure 33. Note that responses from the NACF are shown separately (in Figure 34) since the greatest number of responses came from representatives within this community group.



Figure 33: Community (excluding NACF) & Environmental Groups/Organisation key question responses

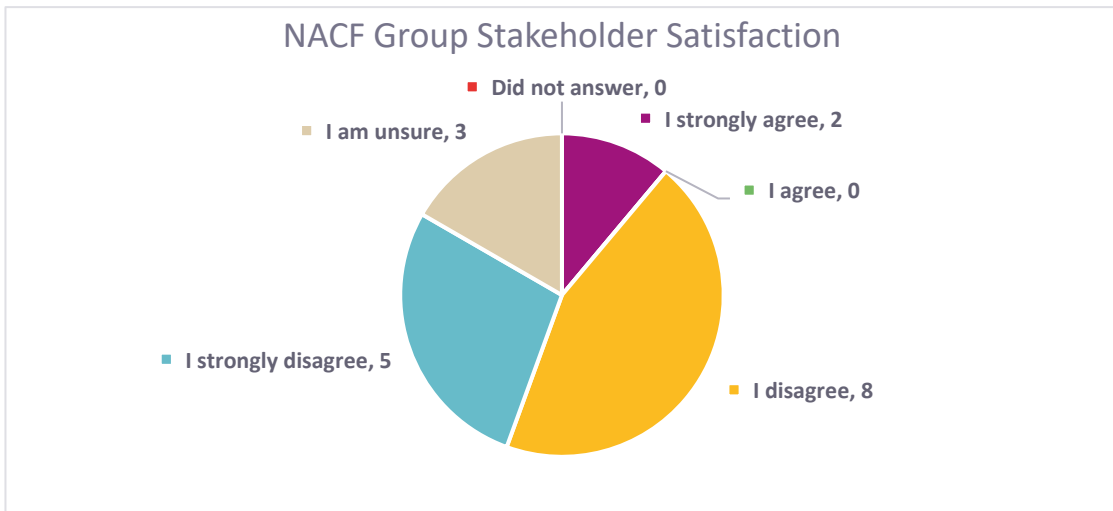


Figure 34: NACF members key questions responses

4.7.13 The breakdown of responses to the key question from the 14 local authority representatives is shown in Figure 35.



Figure 35: Local authority key question responses

- 4.7.14 In the tables (40-47) below, Heathrow has summarised the key points from the stakeholder feedback on the CLOO and on the overall approach to developing flight path options.
- 4.7.15 The intention is to provide interested readers with a high-level overview, but the longer responses have been logged, considered, and repeatedly referred to by the airspace team. The full feedback forms can be found in *Step 2A Appendix E*.
- 4.7.16 The summary points in the tables below have been numbered by Heathrow, so that the Heathrow response can be matched to the summary of the point raised by the stakeholders.



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LCF members

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--------------------------|--|--|
| Pavilion Association | 1) Heathrow is only interested in the 'bottom line', not its neighbours. | Heathrow is part of a UK wide programme of Airspace Modernisation, which has been set by the Department for Transport and the CAA and is made up of 22 airports in the UK and NATS. Heathrow's intention is to improve the daily lives of our neighbours and colleagues by investing in our communities, through funding and other initiatives. Please see Heathrow Sustainability 2.0 Strategy for more information especially with regards to our Giving Back Programme . |
| Pavilion Association | 2) All information was clear and consistent. | Noted and thank you. |

Table 40: Summary of LCF members CLOO feedback

NACF members

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|------------------------------------|--|--|
| Buckinghamshire Council | 1) No information provided as to how the data sets were created, validated or used. 2) Should have been more time to explain the stages in detail. 3) Communities were not asked for their input into the creation of the options and comments on the previous stage were ignored. | 1 & 2) We have to balance the amount of detail we can provide in sessions to maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The metrics used were shared with stakeholders, including via more detailed 'methods and metrics' workshops. 3) Community input to the creation of the initial Comprehensive List of Options (CLOO) comes through the development of the Design Principles in Stage 1. We then shared and tested those options, together with our methodology used to generate them, with stakeholders. We have considered feedback and will continue to use the feedback throughout the ACP. As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis are undertaken and the associated metrics are shared widely through public consultation in Stage 3. |
| Ealing Aircraft Noise Action Group | 1) The potential departure routes shown cover every community around Heathrow. | 1) At this stage of the process, we are creating options which align with our Design Principles to create a comprehensive, and therefore, long list, of options. This number of options will be narrowed down as the project develops. |
| Englefield Green Action Group | 1) Requested clarity on the weighting of Design Principles. | 1) No weighting is being applied to the Design Principles, beyond the 'must' and 'should' criteria. |



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| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|-------------------------------|--|--|
| | 2) Further information will need to show details in non-technical form so impacts can be understood. | 2) As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis are performed and the associated metrics are shared widely through public consultation in Stage 3. One of the challenges will be how to articulate these details in a non-technical form and we will ensure we have accessible information on the proposals at public consultation. |
| Englefield Green Action Group | 1) Requested the GIS data used to generate the CLOO. 2) Would like more detail on how the options have been developed & detail must be shared equally between stakeholders. 3) CLOO ignores 3 DPs. 4) Endorses response provided by TAG & MRA & Elmbridge. | 1) We have carefully considered this request but decided that the options which aren't mature enough for detailed maps which could be misleading to the public. We will share detailed maps once we are at a much smaller number of mature, system designs in the Stage 3 public consultation. 2) We have to balance the amount of detail we can provide in sessions maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The metrics used were shared with stakeholders, and the airspace email address was shared so that stakeholders can request clarification or additional 1:1 engagement. 3) We explained in our engagement material which DPs could not be designed for at this stage as they relate to the operation of routes rather than just the route placement itself. 4) Noted. |
| Forest Hill Society | 1) Concerns over interactions with London City and if engagement is being done with other airports. 2) Welcome the opportunity to contribute. | 1) Heathrow holds frequent meetings with surrounding airports to share updates on our developing airspace design options and identify where amendments might be required to enable each airport to operate efficiently. Heathrow is also supporting ACOG's work to coordinate ACPs. 2) Thank you. |
| HACAN | 1) Difficult to assess whether DPs have been met due to rough indication of flight path options. 2) More detail required on how principles will be balanced. 3) Respite terms should be better defined 4) Supports alternation of flight paths and maximum spread of flight paths | 1) The level of detail on options is suitable for this stage, given we are not requesting feedback on specific geographical pros and cons of options. More detailed maps will be provided as we shortlist, develop and refine options at Stage 3. 2) We will engage further on our Design Principle Evaluation 3&4) Respite concepts are being explored and more detail will be shared later in Stage 2. Heathrow has also commissioned respite research and the findings of this will be shared. |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|---|---|--|
| | 5) Request for modelling to WHO guidance levels 6) More noise modelling is required, not just the A320. | 5) The primary metrics used to assess noise impacts are set within CAP1616 and by UK Government Policy. However, Heathrow intends to use secondary metrics to help illustrated the impacts of options at Step 2B and WHO guidance will be considered. 6) Noise modelling in the IOA will consider a full range of aircraft types. |
| Iver Village Residents Association | 1) Very impressive & scientific presentation. | Noted and thank you. |
| Local Authorities' Aircraft Noise Council (LAANC) | 1) Concerns that noise is not being treated with sufficient attention 2) 'Do Nothing' option should have been presented at this stage 3) Seems to be more attention on managing noise for departures rather than arrivals 4) More aircraft types should be modelled 5) More metrics should be used, such as SEL contours for 60-65dB 6) Request clarification on future departures from runway 09L | 1&2) Our options have been developed based on our Design Principles, in which noise is a key feature of 7 of them. Our CLOO slide pack has now been updated with the Do-Nothing option. 3) We are considering respite concepts for both departures and arrivals, however we have more flexibility with the positioning of departure routes given arrivals need to join final approach a few miles away from the runway. 4&5) More detail will be provided as we shortlist, develop and refine options. As we do this, we will consider a much wider range of aircraft types and a range of different metrics. The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. 6) Heathrow has committed to introducing runway alternation for easterly operations. The timescales to deliver this will be subject to a separate planning application for infrastructure changes needed on the airfield. |
| London Borough of Ealing | 1) Would like more information on the input parameters, assumptions & constraints used for the notional flight paths. 2) Would like information on how notional flight paths are combined to develop multiple routes. 3) Request clarification on the limits attached to some of the DPs, in particular the number of people who would experience an increase in noise. 4) Lack of clarity on what the trade-off is between noise & CO2. | 1) CAP1616 does not provide detailed guidance on how to create the CLOO at Step 2A. Heathrow chose to use a data-led approach, but the appraisal of options to understand impacts and benefits does not take place until the IOA in Step 2B. 2) We have to balance the amount of detail we can provide in sessions to maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The metrics used were shared with stakeholders, and the airspace email address was shared so that stakeholders can request clarification or additional 1:1 engagement. 3) Our approach to using design principles to evaluate the options will be shared once we have undertaken the Design Principle Evaluation. |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--|---|---|
| | | 4) At the time of this engagement the DPE or IOA had not been performed and therefore no decisions on trade-offs had been made. |
| London Borough of Lewisham | <ol style="list-style-type: none"> 1) More detail required. 2) Heathrow and London City should work closely together on their airspace designs | <p>1) We have to balance the amount of detail we can provide in sessions to maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The metrics used were shared with stakeholders, and the airspace email address was shared so that stakeholders can request clarification or additional 1:1 engagement. The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B.</p> <p>2) Heathrow holds frequent meetings with surrounding airports, including London City, to share updates on our developing airspace design options and identify where amendments might be required to enable each airport to operate efficiently.</p> |
| Royal Borough of Richmond Upon Thames | <ol style="list-style-type: none"> 1) Concerns that noise is not being treated with sufficient attention 2) 'Do Nothing' option should have been presented at this stage 3) Seems to be more attention on managing noise for departures rather than arrivals 4) More aircraft types should be modelled 5) More metrics should be used, such as SEL contours for 60-65dB 6) Request clarification on future departures from runway 09L | <p>1&2) Our options have been developed based on our Design Principles, in which noise is a key feature of 7 of them. Our CLOO slide pack has now been updated with the Do-Nothing option.</p> <p>3) We are considering respite concepts for both departures and arrivals, however we have more flexibility with the positioning of departure routes given arrivals need to join final approach a few miles away from the runway.</p> <p>4&5) More detail will be provided as we shortlist, develop and refine options. As we do this, we will consider a much wider range of aircraft types and a range of different metrics. The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B.</p> <p>6) Heathrow has committed to introducing runway alternation for easterly operations. The timescales to deliver this will be subject to a separate planning application for infrastructure changes needed on the airfield.</p> |
| Molesey Residents Association (MRA) & appointed by Elmbridge Council (Elmbridge) | <ol style="list-style-type: none"> 1) Would like to see more data on how notional routes were created and what population data sets were used. 2) Not clear on the methods/data used to produce the options to meet DP5, DP9 or DP10. | 1-3) We have to balance the amount of detail we can provide in sessions to maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The metrics used were shared with stakeholders, including via some more detailed 'methods and metrics' workshops, and the airspace email address was shared so that stakeholders could request clarification or additional 1:1 engagement. |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|---|--|--|
| | <ul style="list-style-type: none"> 3) No explanation of the weighting methods applied. 4) Need to consider the impact of new routes and concentration of traffic due to PBN 5) Current route options do not account for a mix of aircraft types/volumes of traffic on routes or heights of aircraft. 6) Limited metrics used, for example reservations about use of 70dB SEL 7) Heavier emphasis on departures to the south. 8) Clarity on why 3° was modelled. 9) Need to be able to understand the proposed approach to combining route options & overlaying departures and arrivals. 10) Options are missing the noise change impacts on communities. | <p>No weighting has been applied to the development of options. Each option was developed using metrics appropriate to that DP as explained in our engagement material.</p> <p>4) Heathrow understands that communities have concerns about route concentration and is exploring respite concepts that will help to mitigate this.</p> <p>5-6) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. This will include consideration of a much wider range of aircraft types. At the time of this engagement the DPE or IOA had not been performed and therefore no decisions on trade-offs had been made. Weighting of criteria will be in line with Government Policy.</p> <p>7) There are more departure routes to the south than the north, this is in line with what happens today. The data driven approach led to more routes being designed from the south, particularly on westerlies, due to the lower population density here and avoiding the dense population of London.</p> <p>8) A 3° descent gradient was assumed as this is the standard descent gradient for arrivals. Whilst a 3.2° PBN approach is currently available at Heathrow, the majority of arrivals require to use the Instrument Landing System which is set at a 3° gradient.</p> <p>9) Combinations of options will take place in Stage 3 to generate System Options of easterly and westerly arrival and departure flight paths.</p> <p>10) Metrics associated with noise increases will be generated in the IOA which had not taken place at this stage of engagement.</p> |
| <p>Plane Hell Action (Southeast London)</p> | <ul style="list-style-type: none"> 1) ANG has not been accounted for. 2) Heathrow has not accounted for London City. | <p>1) Air Navigation Guidance 2017 is policy and as such, Heathrow must consider it when assessing options. For the creation of the CLOO, options developed for DP2 account for the altitude-based priorities in ANG17. All options will be assessed against ANG17 as part of the Design Principle Evaluation.</p> <p>2) Heathrow holds frequent meetings with surrounding airports, including London City, to share updates on our developing airspace design options and identify where amendments might be required to enable each airport to operate efficiently.</p> |
| <p>Richmond Heathrow Campaign</p> | <ul style="list-style-type: none"> 1) Supports the response submitted by TAG & MRA & Elmbridge | <p>1) Noted.</p> |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--------------------------------------|--|--|
| | <p>2) Noise minimisation should be the main criteria for aircraft between 4000-7000ft.</p> | <p>2) Our airspace design will need to be consistent with ANG17 which states in the airspace at or above 4,000 feet to below 7,000 feet, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the government’s overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO₂ emissions.</p> |
| <p>Teddington Action Group (TAG)</p> | <ol style="list-style-type: none"> 1) CLOO shows radical concepts. 2) Options refer to numbers of people, not adverse effects as required by ANG. 3) Tools used to generate the CLOO are not adequately explained and CLOO is incomplete and indicative of a pre-judged approach. 4) Heathrow needs additional CLOOs that address DPs 6, 7 & 9 and a ‘do-nothing’ option. 5) Heathrow are ignoring the change effect. 6) Communities should not be overflow for more than a third of the time 7) Designing arrivals & departures separately means that many of the CLOO options are not possible and should be ruled out. | <ol style="list-style-type: none"> 1) The CLOO is intended to be comprehensive and therefore includes a range of different options for assessment. 2) The references to “number of people” in DP9 and DP10 were suggested by stakeholders during workshops we held to develop the principles for this airspace change. Some stakeholders (including TAG) requested that adherence to ANG was also explicitly referenced in the design principles, so we added this to DP2. Our ACP will need to consider adverse effects, in line with ANG, and this will be part of our work at Stage 3. 3) We have to balance the amount of detail we can provide in sessions to maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The methodology and metrics used to generate options were shared with stakeholders, including via more detailed ‘methods and metrics’ workshops. 4 & 5) DP6 and DP7 relate to the provision of respite and avoiding overflying communities with multiple routes. We will be able to incorporate these at Stage 3 when we have system options. DP9 relates to noise changes and can only be assessed when we have system options and know how areas might be affected by the combination of arrivals and departures together, for easterly and westerly operations. A ‘do nothing’ option was added to our CLOO. 6) Heathrow will continue to alternate runways when on westerly operations and is looking to introduce runway alternation for easterly operations as well. We also set out a number of different concepts for offering further respite to overflow communities. 7) Designing single mode options allowed Heathrow to consider far more options than would have been possible if we had started with system options. Options will be compiled into system options at the beginning of Stage 3, informed by data on the potential benefits and impacts of those options in single mode. |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|---|--|---|
| <p>The Windlesham Society</p> | <ol style="list-style-type: none"> 1) Option for DP2 is based on a simplistic approach of numbers overflown. 2) WHO guidance should be factored in. 3) Not enough consideration for DP7. 4) Concern that noise increases are not being considered for those already overflown 5) Design options are similar to those considered under IPA proposal and the impacts of those would not meet DP2, 3, 9 or 10. | <p>1) Options for DP2 were generated using a combination of SEL and overflight metrics, not just ‘numbers overflown’.</p> <p>2) The primary metrics used to assess noise impacts are set within CAP1616 and by UK Government Policy. However, Heathrow intends to use secondary metrics to help illustrate the impacts of options at Step 2B, and WHO guidance will also be considered.</p> <p>3) DP7 is one of the principles we explained could not be designed for at this stage given we need a system option (arrivals and departures together, for easterly and westerly operations) and we need a better understanding of surrounding airports’ designs to ensure that communities are not overflown by multiple routes. An initial assessment of DP7 will be included in the DPE.</p> <p>4) DP9 is to keep the number of people who experience an increase in noise to a minimum. When developing the options, we looked at areas that were not already overflown 20 times per day or more. However, at later stages of appraisal we will assess noise increases for all communities, including those who are already overflown.</p> <p>5) Options such as PBN Arrivals to a shorter final approach have been generated to help meet certain DPs and to ensure Heathrow considered a comprehensive range of options. Not all options will meet all DPs.</p> |
| <p>Windsor & Maidenhead Borough Council</p> | <ol style="list-style-type: none"> 1) Heathrow needs to explain how they will prioritise the aims of the AMS strategy. 2) Options for dispersal need to be explained. 3) Options for DP2, 9 & 10 would likely increase the number of people significantly affected by concentrated routes and is contrary to ANG. 4) Heathrow should choose the option that best meets ANG. | <p>1) Heathrow has developed design principles that include meeting the aims of the Airspace Modernisation Strategy (AMS). CAP1616 accepts that some principles may conflict and that there will be trade-offs in the selection of design options. Therefore, it was not necessary to prioritise during the development of the CLOO. Heathrow will apply policy when making any decisions between differing options and will be transparent with stakeholders on any prioritisation applied.</p> <p>2) A study into the feasibility of dispersing aircraft to offer respite from noise in a PBN environment is underway. The technical feasibility of this approach will be considered before Heathrow consider the operational feasibility and benefits of such an approach to delivering respite.</p> <p>3) We cannot say at this stage whether any particular option would increase the number of people significantly affected by noise. This will start to emerge in our IOA at Step 2B.</p> |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--------------------------|---------------------------------|---|
| | | 4) Airspace Modernisation is Government policy and Heathrow will need to demonstrate that the chosen airspace design is consistent with current Government policy, including ANG17. |

Table 41: Summary of NACF members' CLOO feedback

Local Authorities/Councils (excl. NACF members)

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--|---|--|
| Bracknell Forest Council | 1) Future rounds of consultation must be inclusive and accessible for all. | 1) At Stage 3, we are required to hold a full public consultation on our options which will be inclusive and accessible to meet the CAP1616 requirements and the Gunning principles |
| Elmbridge Borough Council (Environmental Health & Licensing) | 1) Information provided was useful. 2) Promoting quieter planes and penalising noisier, less efficient aircraft should occur. | 1&2) Noted. |
| London Borough of Hounslow | 1) Would like the studies that Heathrow will use to refine the options to be published. 2) Stated a number of metrics that should be considered. | 1) Heathrow's decisions on shortlisting and refining of options will be published on the CAA's airspace change portal at each gateway. 2) We will generate additional metrics in addition to those required by CAP1616 at Step 2B. Suggestions of suitable metrics from stakeholders will all be considered. |
| Heathrow Strategic Planning Group (HSPG) | 1) Unsure of the impacts of the options. 2) Queries over the prioritisation of the Design Principles. | 1) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis are performed and the associated metrics are shared more widely through public consultation in Stage 3. 2) No weighting is being applied to the Design Principles, beyond the 'must' and 'should' criteria. Heathrow will need to apply policy when choosing between options at later stages and will need to be transparent in the decisions taken and the rationale for them. |



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| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--|---|--|
| London Borough of Southwark | <ol style="list-style-type: none"> 1) Very little specifics provided, e.g. how different principles will be balanced. 2) Impossible to judge the impact at this stage. | <p>1&2) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. This will include consideration of a much wider range of aircraft types. At the time of this engagement the DPE or IOA had not been performed and therefore no decisions on trade-offs had been made. Weighting of criteria will be in line with Government Policy</p> |
| London Borough of Waltham Forest | <ol style="list-style-type: none"> 1) Requested clarity on method for meeting DP7. 2) Need to consider London City flight paths. | <ol style="list-style-type: none"> 1) Consideration of overflight of the same communities by multiple routes including those to/from other airports will be considered in more detail in Stage 3 when we have system options for Heathrow and for surrounding airports. However, we have provided an indication of whether each of our options overflies the same areas as routes to/from other airports in our DPE in Annexes 1, 2 & 3. 2) Heathrow holds frequent meetings with surrounding airports, including London City, to share updates on our developing airspace design options and identify where amendments might be required to enable each airport to operate efficiently. |
| Mole Valley District Council | <ol style="list-style-type: none"> 1) Options shown are confusing, a further breakdown would have been helpful. 2) Ensure that technical options are fully explained at the next stage, with pros/cons. | <ol style="list-style-type: none"> 1) We have to balance the amount of detail we can provide in sessions to maintain audience focus and participation. Our aim is to be transparent whilst balancing the varying interest across multiple stakeholders. The airspace email address was shared so that stakeholders could request clarification or additional 1:1 engagement. 2) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis are performed and the associated metrics are shared more widely through public consultation in Stage 3. |
| Newham Council | <ol style="list-style-type: none"> 1) Wants to focus on the interactions with London City Airport. | <ol style="list-style-type: none"> 1) Heathrow holds frequent meetings with surrounding airports, including London City, to share updates on our developing airspace design options and identify where amendments might be required to enable each airport to operate efficiently. |
| Royal Borough of Kingston & London Borough of Sutton | <ol style="list-style-type: none"> 1) Opposed to any proposal which increase noise or pollution. 2) Need to see draft, detailed navigation plans and respite arrangements to give a considered view. | <ol style="list-style-type: none"> 1) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis is performed and the associated metrics are shared more widely through public consultation in Stage 3. 2) Application of respite will be considered in more detail in Stage 3 when we have system options. |



Step 2A Options Development

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|-----------------------------------|---|--|
| Runnymede Borough Council | <ol style="list-style-type: none"> 1) In favour of dispersal. 2) Presentation did not address that PBN enables increased capacity. 3) Difficult to provide meaningful feedback due to numbers involved. 4) Compound effects will be ultimately the criteria which will be required. | <ol style="list-style-type: none"> 1) Noted. 2) Slide 5 of our engagement material sets out that one of the objectives of the AMS is to ensure there is capacity to meet future demand. In addition, DP5 is to enable Heathrow to make the most operationally efficient and resilient use of its existing two runways. 3&4) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis is performed and the associated metrics are shared more widely through public consultation in Stage 3. |
| Sevenoaks District Council | <ol style="list-style-type: none"> 1) Encouraging to see that DP10 has been clearly highlighted in the departure approach options. 2) Overall approach seems pragmatic; however, the information is high level. 3) Welcomes the opportunity to comment once more detailed information is available. | <ol style="list-style-type: none"> 1) Noted. 2) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. As we go through the CAP1616 process and shortlist, develop and refine options, greater levels of analysis is performed and the associated metrics are shared more widely through public consultation in Stage 3. 3) Noted. |
| St Albans City & District Council | <ol style="list-style-type: none"> 1) Nothing addresses the issue of the indirect impact of Heathrow aircraft on airspace used by Luton Airport. 2) Believe that 8 DPs have not been accounted for in the options (DPs, 3 & 6-12) 3) Queried use of 5.5% gradient is unnecessarily low and whether NATS way points should be considered fixed. | <ol style="list-style-type: none"> 1) Heathrow holds frequent meetings with surrounding airports to share updates on our developing airspace design options and identify where amendments might be required to enable each airport to operate efficiently and is supporting ACOG's work to coordinate the LTMA ACPs. Our DPE starts to understand the extent to which our options will interact with Luton's options. 2) Some of our Design Principles could not be addressed through the options developed (route placement) in Stage 2 but will be addressed at a later stage through how the routes are operated and/or their interdependencies with routes to/from adjacent airports and NATS network connectivity. These Design Principles were 3,6,7,8, 11 and 12 and this was explained in our engagement material. Concepts for how these DPs could be addressed were included in the engagement material and feedback requested. 3) The 5.5% climb gradient was an assumption used when considering our notional tracks and this is not necessarily a proposed minimum climb gradient going forwards. Our appraisals from Step 2B onwards will assess actual climb profiles from Heathrow, not a assume a blanket 5.5% gradient. NATS' waypoints are not |



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| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
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| | | fixed however NATS expects them to be representative of the continued core traffic flows within the SE on the UK with a modernised airspace. |
| Waverley Borough Council | <ol style="list-style-type: none"> 1) Pleased to see the inclusion of DP4. 2) Need to see the options against a baseline comparator to better understand the impacts. | <ol style="list-style-type: none"> 1) Noted. 2) The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. |

Table 42: Summary of Local Authority/Council CLOO feedback

Environmental Groups/Organisations

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
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| Chiltern Society | <ol style="list-style-type: none"> 1) Request explanation of the weighting process applied to the blended DP option. 2) Have the 'must' DPs been given more weighting than the 'should'? 3) Thorough approach. 4) Concerns about the split in terms of design responsibilities between airport design and NATS and seeks assurance that mechanisms for regular and close communication between the relevant parties is already in place. | <ol style="list-style-type: none"> 1) The blended DP options are based on a weighted average of all the metrics we have considered. Since different stakeholders would apply different weightings to different metrics, we have applied all possible weighting combinations to identify the highest performing tracks against the full set of data. 2) No weighting has been applied to the development of options. Each option was developed using metrics appropriate to that DP as explained in our engagement material. 3) Thank you & noted. 4) In addition to the formal CAP1616 stakeholder engagement with industry stakeholders on the CLOO, Heathrow has also taken part in several technical working groups and bilateral workshops with ACOG, adjacent FASI sponsors (NATS NERL, RAF Northolt, Luton, Stansted, London City, Biggin Hill, Farnborough and Gatwick). |
| CPRE Oxfordshire | <ol style="list-style-type: none"> 1) Avoiding population might seem rational but incurs more issues away from centres of habitation. | <ol style="list-style-type: none"> 1) Noted. |



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| | <ul style="list-style-type: none"> 2) Moving flight paths to the countryside rather than over dense populations is the wrong way round. | <p>2) Heathrow will be required to use Government Policy, such as Air Navigation Guidance 2017, in addition to stakeholder feedback to support/justify its decisions.</p> |
| Kent Downs AONB | <ul style="list-style-type: none"> 1) Consideration of minimizing overflying of AONBs is welcomed. | <p>1) Noted.</p> |
| The Chilterns Conservation Board | <ul style="list-style-type: none"> 1) Request explanation of the weighting process applied to the blended DP option. 2) Have the 'must' DPs been given more weighting than the 'should'? 3) Thorough approach. 4) Concerns about the split between airport design and NATS. | <p>The feedback provided by the Chilterns Conservation Board raised the same points as were submitted by the Chiltern Society, therefore please see the response to Chiltern Society above.</p> |
| The Friends of Richmond Park | <ul style="list-style-type: none"> 1) Ignores the instructions in CAP1616 to apply the same approach as that for AONBs to other areas as identified through community engagement. 2) Uses (resident) 'population' rather than 'people' (and thus ignores the impact on people in urban parks; Richmond Park has 5.5 million visitors a year). 3) Not taken account of feedback from stakeholders in the Methods and Metrics workshop. 4) Flaws in its metrics for DP2, 4 and 9. 5) Fails to include the mandated 'Do Nothing' option. 6) Has a disproportionate number of arrival options over the southern quadrants; and 7) Uses only two, close-in convergence points, rather than a range. 8) Provided suggestions on what should take place in Step 2B. | <p>1) Richmond Park has been identified as an area for specific consideration, via engagement with Friends of Richmond Park. Consistent with CAP1616, Heathrow will consider Richmond Park within tranquillity assessments to be undertaken as part of this ACP. Heathrow's assessment of Richmond Park at Stage 2 (DPE and IOA) will adopt the same metrics as those being used to assess AONBs at this stage.</p> <p>2) The use of population data is more practical and more reliable since it is difficult to accurately forecast the movement of 'people' between places of work, home and leisure. The use of population counts is referred to in CAP1616 B54 and CAA confirmed they would expect appraisals to be based on resident population data</p> <p>3) The metrics discussed at the "M&M workshop" were for use in the DPE, not in the development of the CLOO.</p> <p>4) CAP1616 does not provide detailed guidance on how to create the CLOO at Step 2A. Heathrow chose to use a data-led approach, but the appraisal of options to understand impacts and benefits does not take place until the IOA in Step 2B.</p> <p>5) The 'Do Nothing' option was not shared in the engagement material, but is included in the CLOO and will be assessed as a standalone option in the DPE.</p> <p>6) The prevalence of more PBN Arrival options from the south, particularly on westerlies is due to the lower population density and the noise-led Design Principles meant that the majority of routes were positioned to avoid the dense population of London.</p> <p>7) When creating the CLOO arrivals options, we considered joining points for vectored arrivals that were no closer than 8 nautical miles (nm) from Heathrow (as</p> |



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| | | per ILS requirements) out to as far as 22nm from Heathrow. For PBN arrivals we considered tracks that joined final approach between 3-18nm. 8) Suggestions for Step 2B are noted and Heathrow will continue to engage throughout Stage 2. |
| The National Trust | <ol style="list-style-type: none"> 1) Does not have the technical expertise to evaluate the studies which are being undertaken, 2) Looks forward to the opportunity to review the short-listed options in due course. | 1&2) Noted. |

Table 43: Summary of Environmental Groups/Organisations CLOO feedback

Additional Community/Environmental Organisations

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|-------------------------------------|---|---|
| Clean Air Bayswater | <ol style="list-style-type: none"> 1) Based on flawed Design Principles. 2) Concerns regarding the data/tools and assumptions used to create the CLOO. 3) Would like to see WHO levels used. 4) The airspace modernisation programme should be presented for consultation. 5) Options should include flight paths which ban flights over central London. | <p>1) Heathrow's Design Principles were established and approved in Stage 1 of the process.</p> <p>2&3) The primary metrics used to assess noise impacts are set within CAP1616 and by UK Government Policy. However, Heathrow intends to use secondary metrics to help illustrated the impacts of options at Step 2B and WHO recommendations will be considered.</p> <p>4) The CAA consulted prior to their latest publication of the AMS.</p> <p>5) A ban of flights over central London is not possible for the continued operation of Heathrow.</p> |
| CAGNE | <ol style="list-style-type: none"> 1) CCO/CDO is aspirational and not mandatory for airlines, so benefits may not be achieved. | <p>1) Many of the objectives of the AMS are aspirational not mandatory and this is because there are so many competing factors. The generation of multiple different options allows Heathrow and its stakeholders to explore those competing parameters and understand the various trade-offs. Heathrow are committed to developing an airspace design that enables improved CCO/CDO compared to the Do-Nothing scenario.</p> |
| Local Resident 1 (Walton on Thames) | <ol style="list-style-type: none"> 1) Options are weighted in favour of DPs 2, 4, 5, 9 & 10. 2) Request clarity on the weighting of DPs. | 1&2) No weighting is being applied to the Design Principles, beyond the 'must' and 'should' criteria. |



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| | <p>3) More metrics should be used, such as WHO guidelines.</p> | <p>3) The primary metrics used to assess noise impacts are set within CAP1616 and by UK Government Policy. However, Heathrow intends to use secondary metrics to help illustrate the impacts of options at Step 2B and WHO recommendations will be considered.</p> |
| <p>Local Resident 2 (Walton on Thames)</p> | <p>1) Options are weighted in favour of DPs 2, 4, 5, 9 & 10. 2) Request clarity on the weighting of DPs. 3) Effective noise monitoring needs to take place to provide an accurate baseline. 4) More aircraft than the A320 should be modelled. 5) Relocating Heathrow should be considered.</p> | <p>1&2) No weighting is being applied to the Design Principles, beyond the 'must' and 'should' criteria. 3) The primary metrics used to assess noise impacts are set within CAP1616 and by UK Government Policy. However, Heathrow intends to use secondary metrics to help illustrate the impacts of options at Step 2B and WHO recommendations will be considered. 4) More detail will be provided as we shortlist, develop and refine options. As we do this, the level of analysis will increase, for example to consider a much wider range of aircraft types. The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B. 5) Noted.</p> |
| <p>Luton & District Association for the Control of Aircraft Noise (LADACAN)</p> | <p>1) Assessments need to be more widespread, with different types of aircraft and noise metrics. 2) Concerns over the assumptions used to create the CLOO.</p> | <p>1&2) More detail will be provided as we shortlist, develop and refine options. As we do this, the level of analysis will increase, for example to consider a much wider range of aircraft types. The modelling of options to understand impacts and benefits does not take place until the IOA in Step 2B.</p> |
| <p>The Royal Parks, The Old Police House, Hyde Park London</p> | <p>1) Would like to see consideration for Richmond and Bushy Parks in the options. 2) Visitors to parks should be accounted for. 3) A comprehensive Environmental Impact Assessment should take place and be made public.</p> | <p>1) We do have options that do not overfly Bushy Park however we did not have any easterly SID options that avoided Richmond Park in their entirety. 2 additional options have been developed to avoid Richmond Park and these were subsequently shared with stakeholders in March 2023. 2) We used available population data to create these options. Data on peoples' movements to work/school/leisure facilities would be needed to develop options that take account of visitors. CAA confirmed they expect appraisals to be based on resident population data. 3) In accordance with CAP1616, a detailed Environmental Appraisal will take place in Stage 3 as part of the Full Options Appraisal of the system options.</p> |
| <p>Westbourne Park Road East Residents</p> | <p>1) Based on flawed Design Principles. 2) Concerns regarding the data/tools and assumptions used to create the CLOO.</p> | <p>The feedback provided by the WPERA raised the same points as the response from Clean Air Bayswater, therefore, please see the response to Clean Air Bayswater above.</p> |



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| Association (WPERA) | 3) Would like to see WHO levels used. 4) The airspace modernization programme should be presented for consultation. 5) Options should include flight paths which ban flights over central London. | |
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Table 44: Summary of additional community/environmental organisations' CLOO feedback



Summary of Industry CLOO feedback

- 4.7.17 From the 18 industry representatives/organisations who responded, 8 were representatives from FASI airports, 6 were airline representatives and the remaining 4 were from NATS and other stakeholder groups.
- 4.7.18 The breakdown of responses to the key question from the industry stakeholders is at Figure 36.



Figure 36: Industry stakeholders key question responses

- 4.7.19 The tables below (45-47) provide a summary of key points from the industry stakeholder feedback on the CLOO and Heathrow’s overall approach only, alongside the Heathrow response.
- 4.7.20 A summary of the feedback received on the potential concepts Heathrow presented is shown in Table 48.



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Airports & Airfields

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|-------------------------------------|---|---|
| Biggin Hill Airport | 1) Heathrow have not taken account for a westerly arrival/departure route to/from Biggin Hill Airport. | 1) Consideration of other airports routes were not taken into account in the generation of the CLOO however consideration will be given in the in the DPE and subsequent appraisals as the wider LTMA design matures. |
| Farnborough Airport | 1) Clear & concise presentation. 2) Excellent visuals. | 1&2) Noted |
| Gatwick Airport | 1) Agreed that the options have been developed taking into account the DPs. 2) Question the approach of using a 5.5% climb gradient, has this constrained potential options? 3) Would outcomes & options have varied if a more ambitious climb profile was applied. 4) When do Heathrow plan to integrate arrivals and departures? | 1) Noted. 2) The 5.5% was only an assumption used for the process of generating design options to provide a standard and proportionate method of analysis at an early stage. This is not necessarily a proposed climb gradient for Heathrow's future SIDs. 3) If a higher gradient had been used then options generated may have been slightly different although then we would have been challenged as to why we hadn't used a lower gradient. To keep this part of the design process proportionate we had to make some assumptions. 5.5% was chosen because it is the average climb gradient seen today across all SIDs. 4) Creation of system options (arrivals and Departures) will take place in Stage 3 ahead of FOA. |
| London City Airport Ltd | N/A | N/A |
| London Luton Airport Operations Ltd | 1) Not all DPs have been considered in much detail, such as DPs 7 & 11. 2) Would be helpful to have routes of airports who have passed Stage 2 on the maps. | 1) Some of our Design Principles could not be addressed through the options developed (route placement) in Stage 2 but will be addressed at a later stage through how the routes are operated and/or their interdependencies with routes to/from adjacent airports and NATS network connectivity. These Design Principles were 3,6,7,8, 11 and 12 and this was explained in our engagement material. Concepts for how these DPs could be addressed were included in the engagement material and feedback requested. 2) We felt that adding other airports' options would have cluttered the images and detracted from our articulation of how the options were created. Consideration of Luton's options against Heathrow's options will form part of the DPE and subsequent appraisals. |
| London Southend Airport | N/A | N/A |



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| <p>MAG Stansted Airport</p> | <ol style="list-style-type: none"> 1) Broadly agrees with the process followed. 2) Feel more clarity on which options are to be carried forward would be useful. 3) Departure routes have been designed at an angle of climb lower than from other airports within the LTMA. 4) For arrivals, would like to see clarification which design standard is being applied to the options in which aircraft establish by 3nm. | <ol style="list-style-type: none"> 1) Noted. 2) At Step 2A engagement, all options presented are carried forward to the DPE. 3) Departure routes have not been 'designed' with any set gradient however a minimum climb gradient of 5.5% was assumed for the generation of certain metrics e.g. Overflight cones in the DPE. Heathrow will need to cater for a lower climb gradient than many other airports owing to the long haul fleet operating from the airport. 4) PBN Arrival options that line up with final approach at c.3nm assume RNP-AR capability. |
| <p>RAF Northolt</p> | <ol style="list-style-type: none"> 1) Requesting clarity on the how the concept DPs will be addressed. 2) Pleased to see consideration has been given to RAF Northolt operations. | <ol style="list-style-type: none"> 1) Some of our Design Principles could not be addressed through the options developed (route placement) in Stage 2 but will be addressed at a later stage through how the routes are operated and/or their interdependencies with routes to/from adjacent airports and NATS network connectivity. These Design Principles were 3,6,7,8, 11 and 12 and this was explained in our engagement material. Concepts for how these DPs could be addressed were included in the engagement material and feedback requested. 2) Noted. |

Table 45: Summary of Airports/Airfields' CLOO feedback

Airlines

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--------------------------|---|--|
| <p>American Airlines</p> | <ol style="list-style-type: none"> 1) Correctly considering the options. 2) Noise is challenging to mitigate. 3) Hopes for a design which can do as much for communities as possible but provide the most efficient/cost neutral option for the operators. | <p>Noted.</p> |
| <p>British Airways</p> | <ol style="list-style-type: none"> 1) For departures, DP2 should only develop options where noise is considered up to 4000ft with minimal track miles from that point. 2) For DP10, future housing developments need to be considered. | <ol style="list-style-type: none"> 1) Heathrow will be required to use Government Policy in addition to stakeholder feedback to support/justify its decisions. 2) Consideration for local plans is required as part of the CAP1616 process. 3) Noted. |



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| | 3) For arrival, vectoring will still be required for throughput and will provide dispersion/respite. | |
| Delta Airlines | 1) Appreciates the opportunity to provide feedback. 2) Looking forward to Stage 3. 3) Approach seems comprehensive. | Noted. |
| Lufthansa Group | 1) Thank you for sharing the information | Noted. |
| United Airlines | 1) Thank you for sharing the information | Noted. |
| WestJet Airlines | 1) Thank you for sharing the information | Noted. |

Table 46: Summary of Airlines' CLOO feedback

NATMAC members

| Stakeholder Organisation | Summary of Stakeholder Feedback | Heathrow Response |
|--------------------------------|---|---|
| BALPA | 1) How would options differ if other airports were not given some areas of airspace? 2) Due to the number of flights at Heathrow, prioritisation needs to be considered. 3) Will 09L be used equally for departures as 09R? | 1) If no consideration at all had been given to Northolt or London City's operation, many of our options generated would have been not technically viable and then subsequently discounted in the DPE. 2) Noted. 3) Heathrow's current aspiration for this ACP is that easterly alternation will be operational by the time the new airspace design is implemented and therefore this ACP includes the design of easterly departure and arrival routes from/to the northern runway. |
| British Helicopter Association | 1) Thank you for sharing the information | Noted. |
| Ministry of Defence (MOD) | 1) Thank you for sharing the information | Noted. |
| NATS (NERL) | 1) Information was clear and well presented. | Noted. |



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| | <ul style="list-style-type: none">2) No certainty regarding how many aircraft will be vectors vs PBN routes.3) Concerns regarding 'red routes' due north & south for runway 27 & how they would connect to an arrival structure & why are there no equivalent routes for runway 09. | |
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Table 47: Summary of NATMAC members CLOO feedback

***Feedback on Operational Concepts***

- 4.7.21 Heathrow also asked stakeholders for their feedback on potential concepts Heathrow shared regarding Design Principles on respite, night flights and noise efficient operations.
- 4.7.22 Heathrow has summarised the feedback received by stakeholder groups in Table 48 below. No Heathrow response has been added at this stage, as this feedback will be considered, and the issues raised will be taken forward and assessed during Stage 3 of the CAP1616 process.



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| Stakeholder Group | Respite Concepts | Night Flight Concepts | Noise Efficient Operational Practices |
|---------------------------------|--|--|---|
| Community Groups – LCF Members | Respite is very important, and people are entitled to it. | Night-flights should be kept to a minimum. | Any noise efficient operation should be considered and applied if possible. |
| Community Groups – NACF members | <ul style="list-style-type: none"> • Need more information on the definition of respite & how it will be used. • No definition of respite or relief. • Impacts of change to communities needs to be considered. • Respite is critical with the introduction of PBN. • Respite should be predictable and meaningful. • Noise benefits should be applied to those most affected and disbenefits to those least affected. • Need to work with other airports. • The impact of the joining points needs to be assessed. • Respite/Runway alternation should be part of the future design. • Route alternation will be helpful if routes are sufficiently separated and utilised sensibly. • Aim should be to achieve maximum dispersion. • Impact of change should be considered. • Communities should not be overflowed for more than one third of the time. | <ul style="list-style-type: none"> • Opposed to night flights between 2300-0700. • Late running should not be routinely permitted. • Alteration of flight paths would be welcomed. • Support the use of extra departure routes to minimise aircraft departing after 2300. • PBN is not acceptable pre-0600. • Airlines who infringe late departures need to be policed and penalised properly. • Extra departure routes could increase staffing and operational difficulties and Heathrow will want to use them in normal operating hours. • Oppose the use of PBN for any night-time or early morning arrivals. • Night flights should be banned between 2300-0600. • Support alternation of flight paths and maximise spread minimise impacts on any specific locations. | <ul style="list-style-type: none"> • Communities not directly overflowed need to be accounted for. • No new initiatives. • Should commit to NADP1 for departures. • Noise efficient practices should be adopted. • Use of quieter aircraft & CCO need to be considered. • Need to know how the noise efficient practices will be modelled. • All aircraft should operate a continuous climb. • Would like to see collaboration with other airports so all can achieve CCO//CDO. • Impacts should be spread between communities. • WHO guidance levels should be used. |



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| | <ul style="list-style-type: none"> • Routes from each runway should be well separated. • Respite for arrivals is important. • Not enough airspace to create meaningful respite. • Arrivals and departures should not overlap. • Respite should not be diminished from current levels. | | |
| Environmental Groups/ Organisations | <ul style="list-style-type: none"> • Would like to see routes explored that avoids to the greater extent AONBs during the day but overflies more at night. • Green spaces should be preserved. | | <ul style="list-style-type: none"> • Support designs that allow for CCO/CDO. |
| Industry - Airlines | <ul style="list-style-type: none"> • Respite adds complexity. • Good concept, providing impact on track miles is minimal. • Crews need advance notice of RWY/route alternation. • Fuel requirements can differ significantly. • FMS capability needs to be considered. | <ul style="list-style-type: none"> • CCO/CDO are the preferred noise abatement principles. • Spreading the noise could give communities a reprieve, but potentially impacts fuel burn & emissions. • Crews need advance notice of RWY/route alternation. • Fuel requirements can differ significantly. • All 3 concepts are workable from an operational point. • Multiple procedures can lead to confusion/errors. | <ul style="list-style-type: none"> • Noise mitigation must not come at the expense of flight safety. • Changes to NADPs/Steeper climbs will increase CO₂ emissions and will not reduce noise but move it around. • CCO shouldn't disbenefit arrival procedures. • CDO – desirable but balanced with throughput/ capacity. • Steeper approaches can be challenging. • Steeper climbs must work in concert with the lowest performing aircraft. • Landing gear deployment should be coordinated with operators. |
| Industry - Airports | <ul style="list-style-type: none"> • Concerns that multiple respite routes could lead to more airspace requirements or a more complex design. | <ul style="list-style-type: none"> • Extra routes increase the airspace needed and increase complexity into the network. | <ul style="list-style-type: none"> • The ability for aircraft performance to be utilised in design should not be missed. |



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| | <ul style="list-style-type: none"> Concerns that more airspace requirements would negatively impact adjacent airports and increase the complexity of the network. Relief via waypoints/design standards should not adversely impact adjacent airports. Relief via dispersion has the potential to have cumulative impacts for communities overflowed by more than one airport. Respite via runway and route alternation could impact other LTMA designs. | <ul style="list-style-type: none"> Extra departure routes after disruption could result in preference to Heathrow over other airports. | <ul style="list-style-type: none"> Should be aiming for CCO/CDO, but this should be balanced against the impacts this could have on neighbouring airports. Supportive of investigating all the alternative operational practices suggested. |
| <p>Industry - Other</p> | <ul style="list-style-type: none"> Any route & its respite alternative must join the network at the same point. May offer a degree of resilience. | <ul style="list-style-type: none"> Consistent route connectivity to the network is generally less critical during night-time operations. | <ul style="list-style-type: none"> Intersection take-offs could be considered. |
| <p>Local Stakeholders (Additional)</p> | <ul style="list-style-type: none"> Respite difficult to address until flight paths are more clearly defined. Requires definition and clarification. Concentration is not necessarily better than dispersion. Objective should be to maintain or reduce the number of ATMs. Support full, rather than partial respite. Trade-offs between intensity of potential impacts vs number of people to some extent affected. Respite needs to be predictable and meaningful. | <ul style="list-style-type: none"> Ban night flights between 2300-0600. Ban night flights between 2300-0700. WHO recommended noise levels should be adopted. Do not want to see any negative impact on Richmond & Bushy Parks. Number of night flights should be reduced. Welcome alternative routes/tracks and regime for the NQP. | <ul style="list-style-type: none"> Needs investigation on which strategy is most effective in providing relief for departures and arrivals. Need open and transparent research into the noise effects of different options. Would like to see these utilised to ensure no adverse impacts to Richmond & Bushy Parks. Every improvement combines and accumulates to reduce the noise and annoyance. Will be trade-offs between CO₂ efficiency and noise efficient operations, which may mean that benefits from noise efficient operations are limited. Introduction of IPA would cause harm through loss of respite. |



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| <p>Local Authorities</p> | <ul style="list-style-type: none"> • Respite will be difficult to deliver due to number of flights. • Early morning and night-time arrivals/departures should be avoided. • Runway alternation should be utilised for respite, but this may affect new communities and lead to more airspace requirement which could impact other airports flight paths. • Respite should include spreading flights. • Respite patterns must be agreed with community engagement. • Respite should be predictable and meaningful. | <ul style="list-style-type: none"> • Minimise impact on communities with night flights. • Should only occur in exceptional & defined circumstances and over open spaces. • Full night-time ban should be implemented (2300-0700). • Alternation & spread of flight paths supported. • Concerns about impacts on new communities. • Need an assessment of the impacts of neighbouring airports flights. • Westerly operations are the preferred choice, using the northerly runway. • Support tightening of restrictions on aircraft types – quietest types only. • Support a night-flight ban of 2230-0600. • More concerned over the number of night-flights. • Welcome use of alternate routes and IPA should be explored. | <ul style="list-style-type: none"> • Concerns that steeper climbs mean more thrust & an increase in noise. • Noise efficient operations should be secondary to ensuring quieter aircraft can use the airport. • Support the use of noise efficient operation practices. • Need evidence on the effectiveness of the practices. • Need an assessment of the impacts of neighbouring airports flights. • Support CCO/CDO and late deployment of landing gear. |
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Table 48: Summary of stakeholder feedback on concepts

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4.8 Outcomes of Stakeholder Engagement

- 4.8.1 The comprehensive nature of Heathrow's options resulted in only two suggestions for potential changes or additions to the options in the CLOO.
- 4.8.2 The Friends of Richmond Park and The Royal Parks' stakeholder representatives suggested that there should be an easterly departure option which does not overfly Richmond Park, owing to its tranquil characteristics. Heathrow therefore designed a new option based on a departure route created for a blend of Design Principles, 2, 4, 9 and 10 and then adjusted it to avoid overflying Richmond Park. This is Option J for Runways 09L and 09R in Section 3, Table 13 and Table 14 of this document.
- 4.8.3 Heathrow also considered options which do not overfly Bushy Park or Windsor Great Park. However, an option already exists which does not overfly Bushy Park and it was identified that Heathrow would not be able to avoid Great Windsor Park without significant impacts to airport throughput.
- 4.8.4 Some stakeholders suggested that the CLOO should include a 'Do Nothing' option for each runway, as none were shared in the Technical Appendix (*Step 2A Appendix A*).
- 4.8.5 Heathrow clarified in the additional stakeholder engagement which took place in March 2023 that the CLOO does include a 'Do Nothing' option, as required by CAP1616. A copy of this presentation is available at *Stakeholder Engagement Appendix C*, including a technical appendix to the slides with the 'Do Nothing' images. Heathrow explained that the 'Do Nothing' option is assessed in its own right in the Design Principle Evaluation and the Initial Options Appraisal, and if discounted at Stage 2, will continue as a baseline comparator for further options appraisal in Stage 3.
- 4.8.6 Whilst the considerable amount of feedback did not result in many changes to the options themselves (other than stated above), the engagement has deepened Heathrow's understanding of what is important to stakeholders especially with regards to:
- the importance of respite to communities to mitigate the effects of concentration;
 - the impact of night flights on communities;
 - the need to articulate the level of change that may be experienced by communities and therefore the importance of appropriate tools, visualisations and metrics at consultation;
 - a suggestion to explore options that avoid tranquil areas during the day but overfly them at night, and
 - concern from industry over the level of complexity that could be introduced to provide noise mitigation measures, whilst at the same time being supportive of the need.

4.9 Technical Engagement Summary

- 4.9.1 In addition to the formal CAP1616 stakeholder engagement with industry stakeholders on the CLOO, Heathrow has also taken part in several technical working groups and bilateral workshops with ACOG, adjacent FASI sponsors (NATS NERL, RAF Northolt, Luton,

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Stansted, London City, Biggin Hill, Farnborough and Gatwick) and six of the main airline operators.

4.9.2 The dates of meetings which have taken place during Stage 2 of this ACP are provided in Table 49.

| Meeting | Date(s) |
|-----------------------|--|
| ACOG | 3 March 2022 28 April 2022 3 May 2022 26 May 2022 14 July 2022 9 Aug 2022 22 September 2022 27 October 2022 31 October 2022 10 November 2022 19 January 2023 26 January 2023 10 March 2023 23 March 2023 10 May 2023 |
| NATS NERL | 7 April 2022 27 April 2022 28 June 2022 9 Sept 2022 24 November 2022 7 December 2022 14 December 2022 9 January 2023 20 January 2023 8 March 2023 |
| London Gatwick | 3 May 2022 22 August 2022 9 February 2023 |
| RAF Northolt | 20 April 2022 |
| Luton | 28 April 2022 |
| Stansted | 16 May 2022 |
| London City | 13 May 2022 |
| Farnborough | 02 March 2023 |
| Biggin Hill | 26 April 2022 15 November 2022 |
| British Airways & IAG | 3 May 2022 10 February 2023 |
| Lufthansa Group | 13 May 2022 |

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| | |
|--------------------------|----------------------------|
| United Airlines | 26 May 2022 |
| American Airlines | 10 May 2022 |
| Delta Air Lines | 17 May 2022 |
| Virgin Atlantic Airways | 6 May 2022 |
| NATS NERL & RAF Northolt | 25 May 2022 21 Feb 2023 |

Table 49: List of Technical Meetings which have taken place during Stage 2 of this ACP

4.9.3 These technical working groups, programme coordination and bilateral meetings provide a mechanism for the sharing of appropriate information which Heathrow can use to inform ACOG and sponsors within the LTMA, when discussing elements such as timelines, risks, strategies, and Masterplan integration.

4.10 CAA Airspace Classification Review Consultation

4.10.1 In December 2019 the CAA launched a consultation to ask respondents to identify areas of controlled airspace where the classification could be amended to better reflect the needs of all airspace users on an equitable basis.

4.10.2 The key points raised by GA stakeholders to CAA with regards to controlled airspace in the vicinity of Heathrow were:

- the London CTR is longer and wider than most other airports;
- the London CTR no longer needs to protect a cross Runway 05/23 operation at Heathrow;
- the London CTR and Farnborough airspace create choke points for transiting GA aircraft, and
- there are high volumes of GA activity around the London CTR, especially around Fair Oaks and White Waltham airfields.

4.10.3 In relation to the adjacent LTMA airspace boundaries, the following points were raised:

- requests to increase the base levels of LTMA 3 to aid safer gliding operations above Wycombe Air Park;
- only a narrow corridor of Class G airspace exists between Heathrow and Gatwick further constrained by the Biggin Hill ATZ and the low base of LTMA 1, and
- Many areas around Heathrow airspace are considered underutilised up to 4,000 feet (LTMA 3, LTMA 1 & LTMA 11).

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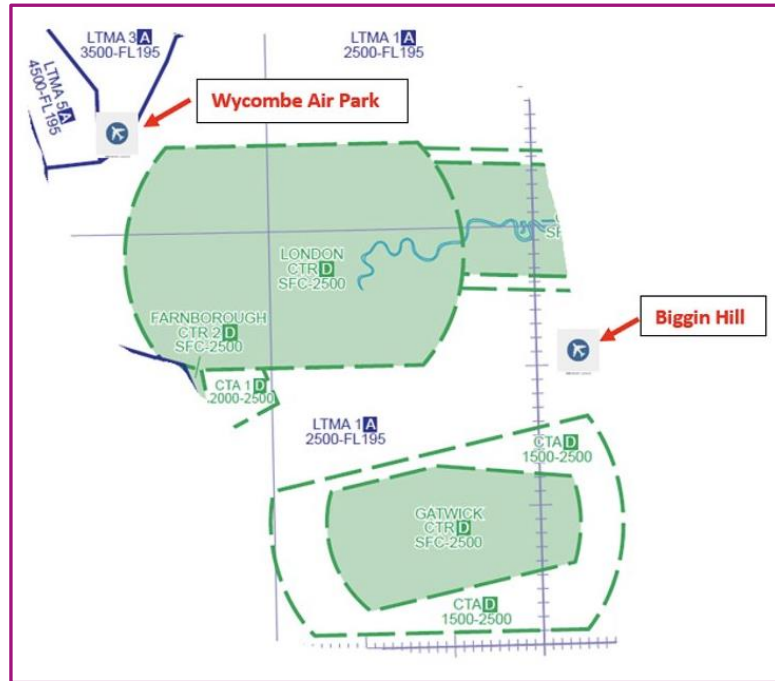


Figure 37: Map of London CTR & Gatwick CTR

- 4.10.4 Heathrow will consider the findings of this consultation as our ACP develops and Controlled Airspace volumes are generated in Stages 3 and 4. The CAA will look for evidence of this within the ACP's final submission.

5. DESIGN PRINCIPLE EVALUATION

5.1 Evaluating Options against Design Principles

- 5.1.1 The Design Principle Evaluation (DPE) involves taking all of the options developed and qualitatively evaluating them against the Design Principles to set out how the design options have responded to the Design Principles
- 5.1.2 At Step 1B, Heathrow developed a set of Design Principles (Table 2) having regard to feedback from stakeholder engagement. The aim of the Design Principles is to provide high-level criteria that the proposed airspace design options must or should meet. They also provide a means of analysing the impact of different design options and a framework for choosing between or prioritising options.
- 5.1.3 For the DPE, CAP1616 requires sponsors to qualitatively evaluate each option in a fair and consistent manner against the Design Principles, and to identify whether each option has 'met', 'partially met' or 'not met' each of the Design Principles.
- 5.1.4 As part of this evaluation, sponsors must set out the criteria used to determine whether an option doesn't meet, partially meets or does meet each Design Principle. Whilst CAP1616 assumes a qualitative evaluation at this stage, we have used data to inform the evaluation where possible. In order to enable the 'Do Nothing' options to be evaluated against the Design Principles in a way that was consistent with the way the other options were evaluated, we analysed the baseline in a way that could generate a comparable dataset.
- 5.1.5 The criteria used to determine whether an option doesn't meet, partially meets or does meet a design principle varies slightly between PBN Departure, PBN Arrival and Vectored Arrival options. The full criteria applied to each of the evaluations can be found in Annexes 1, 2 and 3 accordingly.
- 5.1.6 A summary of the Design Principle Evaluation (DPE) is provided in this chapter. The full Design Principle Evaluation is shown in Annexes 1, 2 and 3. Page 208 of CAP1616 provides a proforma that 'should' be used for DPE activity. However, given the large number of options and criteria to the evaluations, this has been presented in a tabular format to allow more direct comparison of the options. The proforma presented in CAP1616 does not allow for effective comparison of such a large number of options.
- 5.1.7 Due to the large amount of information presented in the DPE, it will be necessary Annexes 1,2 and 3 at a high magnification. Instructions on how best to read the documents are at the start of the Annexes.
- 5.1.8 Technical language and references are used in parts of the evaluation. Wherever possible, we have endeavoured to explain these technicalities within the earlier sections of this document and within the assessment methodology itself, however we would recommend reviewing the glossary pages within this document.

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5.2 *Evaluating Options against the Airspace Modernisation Strategy*

- 5.2.1 The CAA has requested evidence that the DPE includes an assessment of how the different Design Options respond to the relevant AMS objectives:
- 5.2.2 “Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA’s published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.”
- 5.2.3 There are four objectives of the Airspace Modernisation Strategy (AMS), as detailed in CAP1711, and Heathrow’s Design Principles encompass these objectives. Table 23 sets out which parts of our DPE assess each of the four AMS objectives.

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| AMS objective | Heathrow's Design Principles which evaluated this objective |
|--|---|
| <p>Safety: Maintaining and, where possible, improving the UK's high levels of aviation safety has priority over all other 'ends' to be achieved by airspace modernisation.</p> | <p>(DP1) Our new airspace design must be safe.</p> |
| <p>Integration of diverse users: Airspace modernisation should wherever possible satisfy the requirements of operators and owners of all classes of aircraft, including the accommodation of existing users (such as commercial, General Aviation, military, taking into account interests of national security) and new or rapidly developing users (such as remotely piloted aircraft systems, advanced air mobility, spacecraft, high-altitude platform systems).</p> | <p>(DP11) Our new airspace design should enable the efficiency of other airspace users' operations.</p> |
| <p>Simplification, reducing complexity and improving efficiency: Consistent with the safe operation of aircraft, airspace modernisation should wherever possible secure the most efficient use of airspace and the expeditious flow of traffic*, accommodating new demand and improving system resilience to the benefit of airspace users, thus improving choice and value for money for consumers.</p> | <p>(DP5) Our new airspace design should enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities.</p> |
| <p>Environmental sustainability: Environmental sustainability will be an overarching principle applied through all airspace modernisation activities. Modernisation should deliver the Government's key environmental objectives with respect to air navigation as set out in the Government's Air Navigation Guidance and, in doing so, will take account of the interests of all stakeholders affected by the use of airspace.</p> | <p>(DP2) Our new airspace design must remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits.</p> <p>(DP3) Our new airspace design must use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise.</p> <p>(DP4) Our new airspace design must reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities.</p> |

Table 50: AMS objectives mapped against Heathrow's Design Principles

5.3 Evaluation of Design Principles with multiple criteria

5.3.1 Within the DPE, Heathrow has chosen to break some Design Principles into multiple criteria in order to fairly and transparently evaluate different aspects of the Design Principle (DP).

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5.3.2 For example, the assessment of DP2 'Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits has been broken down into the following components which when combined, contribute to an overall DP2 evaluation:

- The AMS Objectives
 - Safety
 - Integration of diverse users
 - Simplification, reducing complexity and improving efficiency
 - Environmental sustainability
- Noise
 - Evaluation of overflight and certain noise impacts below 4000ft
 - Evaluation of overflight and certain noise impacts between 4000ft and 7000ft
 - Track mileage
- Tranquillity
 - AONBs and National Parks
 - All Historic Parks and Gardens and Public Parks
 - Richmond Park
- Ecology and/or Biodiversity
 - Special Protection Areas, Special Areas of Conservation, and Sites of Special Scientific Interest
- Air Quality

5.3.3 However, the CAA requires that sponsors provide an overall evaluation for the Design Principle in its entirety²⁸.

5.3.4 In order to assess an option's overall performance against a Design Principle, the following methodology has been applied to all Design Principles that have been broken down into components²⁹.

²⁸ See CAA [feedback to Glasgow Stage 2](#).

²⁹ Boxes are shaded in grey if Heathrow is unable to assess the criteria at this stage of the ACP.

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| Overall “Met” | Overall “Partly Met” | Overall “Not Met” |
|--|---|--|
| All components of the Design Principle are ‘Met’ | All components of the Design Principle are ‘Partially Met’ or any mixture of ‘Met’ and ‘Not Met’ | All components of the Design Principle are ‘Not Met’ |

Table 51: Met/Partially Met/Not Met criteria

- 5.3.5 Special case (Not Met): Using the methodology outlined above, in the context of the AMS the ‘Do Nothing’ baseline options would be considered as partially met however a ‘Do Nothing’ option would not result in any Airspace Modernisation for Heathrow and therefore would fundamentally not meet the AMS. The ‘Do Nothing’ options were therefore categorised as ‘not met’ for the AMS Design Principle.
- 5.3.6 A summary of how the options have responded to the Design Principles is shown in the ‘Design Principle Evaluation Summary Table’ section below. Annexes 1, 2 and 3 contain the detailed breakdown of the performance against each of the criteria together with the criteria applied to determine whether an option doesn’t meet, partially meets or does meet a design principle.



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5.4 DPE Results: Summary Tables

PBN Departure Options from Runway 27L

| Option Name | | | "Do Nothing" | Option A | Option B | Option C | Option D | Option E | Option F | Option G | Option H |
|--|---|-------------------------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Design Principle | | Design Principle Number | | | | | | | | | |
| Our new airspace design must | Be safe | Overall DP1 | Green | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Overall AMS Objectives | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | | Overall DP2 | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Overall DP3 | Red | Green | Green | Green | Green | Green | Green | Green | Green |
| | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Overall DP4 | Red | Red | Yellow | Green | Green | Red | Yellow | Red | Red |
| | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Overall DP5 | Yellow | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Yellow | Yellow |
| And should also | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Overall DP6 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey |
| | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Overall DP7 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Contribute to minimising the negative impacts of night flights | Overall DP8 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey |
| | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Overall DP9 | Grey | Yellow | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Yellow |
| | Keep the total number of people who experience noise from the future airspace design to a minimum | Overall DP10 | Grey | Green | Green | Yellow | Yellow | Green | Yellow | Green | Green |
| | Enable the efficiency of other airspace users' operations | Overall DP11 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| Minimise the impact to all stakeholders from future changes to Heathrow's airspace | Overall DP 12 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | |



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PBN Departure Options from Runway 27R

| Option Name | | | "Do Nothing" | Option A | Option B | Option C | Option D | Option E | Option F | Option G | Option H |
|-------------------------------------|---|-------------------------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Design Principles | | Design Principle Number | | | | | | | | | |
| Our new airspace design must | Be safe | Overall DP1 | Green | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Overall AMS Objectives | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | | Overall DP2 | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Overall DP3 | Red | Green | Green | Green | Green | Green | Green | Green | Green |
| | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Overall DP4 | Red | Red | Yellow | Green | Yellow | Yellow | Yellow | Red | Yellow |
| | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Overall DP5 | Yellow | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Yellow | Yellow |
| And should also | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Overall DP6 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey |
| | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Overall DP7 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Contribute to minimising the negative impacts of night flights | Overall DP8 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey |
| | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Overall DP9 | Grey | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Keep the total number of people who experience noise from the future airspace design to a minimum | Overall DP10 | Grey | Green | Yellow | Yellow | Yellow | Yellow | Yellow | Green | Yellow |
| | Enable the efficiency of other airspace users' operations | Overall DP11 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | Overall DP12 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |



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PBN Departure Options from Runway 09L

| Option Name | | "Do Nothing" | Option A | Option B | Option C | Option D | Option E | Option F | Option G | Option H | Option I | Option J | |
|-------------------------------------|---|-------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|
| Design Principle | | Design Principle Number | | | | | | | | | | | |
| Our new airspace design must | Be safe | Overall DP1 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | |
| | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Overall AMS Objectives | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | | Overall DP2 | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Overall DP3 | Red | Green | Green | Green | Green | Green | Green | Green | Green | Green | Green |
| | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Overall DP4 | Yellow | Red | Green | Green | Green | Yellow | Yellow | Red | Red | Yellow | Yellow |
| | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Overall DP5 | Yellow | Green | Green | Green | Green | Green | Green | Green | Green | Green | Yellow |
| And should also | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Overall DP6 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | |
| | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Overall DP7 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | |
| | Contribute to minimising the negative impacts of night flights | Overall DP8 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | |
| | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Overall DP9 | Grey | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Green | Yellow | Yellow |
| | Keep the total number of people who experience noise from the future airspace design to a minimum | Overall DP10 | Grey | Green | Green | Green | Green | Yellow | Green | Green | Green | Green | Green |
| | Enable the efficiency of other airspace users' operations | Overall DP11 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | Overall DP12 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |



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PBN Departure Options from Runway 09R

| Option Name | | "Do Nothing" | Option A | Option B | Option C | Option D | Option E | Option F | Option G | Option H | Option I | Option J | |
|-------------------------------------|---|-------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|
| Design Principles | | Design Principle Number | | | | | | | | | | | |
| Our new airspace design must | Be safe | Overall DP1 | Green | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | |
| | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Overall AMS Objectives | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | | Overall DP2 | Red | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Overall DP3 | Red | Green | Green | Green | Green | Green | Green | Green | Green | Green | Green |
| | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Overall DP4 | Red | Red | Yellow | Green | Green | Yellow | Yellow | Red | Red | Yellow | Yellow |
| | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Overall DP5 | Yellow | Green | Green | Green | Green | Green | Green | Green | Green | Green | Yellow |
| And should also | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Overall DP6 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | |
| | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Overall DP7 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | |
| | Contribute to minimising the negative impacts of night flights | Overall DP8 | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | Grey | |
| | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Overall DP9 | Grey | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Green | Yellow |
| | Keep the total number of people who experience noise from the future airspace design to a minimum | Overall DP10 | Grey | Green | Green | Green | Yellow | Yellow | Yellow | Yellow | Green | Green | Yellow |
| | Enable the efficiency of other airspace users' operations | Overall DP11 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | Overall DP12 | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |



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PBN Arrival Options from Runway 27L

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|--------------|-------------------------------------|---|--|---|---|---|---|--|--|---|---|--|--------------|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" | Green | Red | Red | Green | Yellow | Yellow | Grey | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Yellow | Yellow |
| Option B | Yellow | Yellow | Yellow | Green | Red | Yellow | Grey | Yellow | Grey | Green | Green | Yellow | Yellow |
| Option C | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option D | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Yellow | Yellow |
| Option E | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option F | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option G | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option H | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option I | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option J | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option K | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option L | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option M | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option N | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option O | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Yellow | Yellow |
| Option P | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option Q | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Yellow | Yellow |
| Option R | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option S | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Yellow | Yellow |
| Option T | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option U | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option V | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option W | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |



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PBN Arrival Options from Runway 27R

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|--------------|-------------------------------------|---|--|---|---|---|---|--|--|---|---|--|--------------|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" | Green | Red | Red | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow |
| Option A | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option B | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option C | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option D | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option E | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option F | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option G | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option H | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option I | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option J | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option K | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option L | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option M | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option N | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option O | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option P | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option Q | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option R | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option S | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option T | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option U | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option V | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option W | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |
| Option X | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Green | Green | Yellow |



Step 2A Options Development

PBN Arrival Options from Runway 09L

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|--------------|-------------------------------------|---|--|---|---|---|---|--|--|---|---|--|--------------|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" | Green | Red | Red | Green | Yellow | Yellow | Grey | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option B | Yellow | Yellow | Yellow | Green | Red | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option C | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option D | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option E | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option G | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option H | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option I | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option J | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Red | Red | Green | Yellow |
| Option K | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option L | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option M | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option N | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option O | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option P | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option Q | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option R | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option S | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option T | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option U | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |



Step 2A Options Development

PBN Arrival Options from Runway 09R

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|--------------|-------------------------------------|---|--|---|---|---|---|--|--|---|---|--|--------------|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" | Green | Red | Red | Green | Grey | Yellow | Grey | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A | Yellow | Yellow | Yellow | Green | Yellow | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option B | Yellow | Yellow | Yellow | Green | Red | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option C | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option D | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option E | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option F | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option G | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option H | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option I | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Red | Red | Green | Yellow |
| Option J | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option K | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option L | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option M | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option N | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option O | Yellow | Yellow | Yellow | Green | Red | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option P | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option Q | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option R | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Green | Yellow |
| Option S | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option T | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |
| Option U | Yellow | Yellow | Yellow | Green | Green | Yellow | Grey | Yellow | Grey | Green | Green | Green | Yellow |



Step 2A Options Development

Vectored Arrival Options from Runway 27L

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|-----------------------|-------------------------------------|---|--|---|---|---|---|--|--|---|---|--|--------------|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" (8-18nm) | Green | Red | Red | Green | Grey | Yellow | Grey | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A 8-12nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option B 9-13nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option C 10-14nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option D 11-15nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option E 12-16nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option F 13-17nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option G 14-18nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option H 15-19nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option I 16-20nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option J 17-21nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option K 18-22nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |



Step 2A Options Development

Vectored Arrival Options from Runway 27R

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|-----------------------|-------------------------------------|---|--------------|--|---|---|---|---|--|--|---|---|--|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" (8-18nm) | Green | Red | Red | Green | Grey | Yellow | Grey | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A 8-12nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option B 9-13nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option C 10-14nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option D 11-15nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option E 12-16nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option F 13-17nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option G 14-18nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option H 15-19nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option I 16-20nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option J 17-21nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option K 18-22nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |



Step 2A Options Development

Vectored Arrival Options from Runway 09L

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|-----------------------|-------------------------------------|---|--|---|---|---|---|--|--|---|---|--|--------------|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace | |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" (8-18nm) | Green | Red | Red | Green | Grey | Yellow | Red | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A 8-12nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option B 9-13nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option C 10-14nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option D 11-15nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option E 12-16nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option F 13-17nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option G 14-18nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option H 15-19nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option I 16-20nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option J 17-21nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option K 18-22nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |



Step 2A Options Development

Vectored Arrival Options from Runway 09R

| Option Name | Our new airspace design must | | | | | | And should also | | | | | | |
|-----------------------|-------------------------------------|---|--------------|--|---|---|---|---|--|--|---|---|--|
| | Be safe | Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits | | Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise | Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities | Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities | Provide predictable and meaningful respite to those affected by noise from Heathrow's movements | Seek to avoid overflying the same communities with multiple routes including those to/from other airports | Contribute to minimising the negative impacts of night flights | Keep the number of people who experience an increase in noise from the future airspace design to a minimum | Keep the total number of people who experience noise from the future airspace design to a minimum | Enable the efficiency of other airspace users' operations | Minimise the impact to all stakeholders from future changes to Heathrow's airspace |
| DP Number | Overall DP1 | Overall AMS Objectives | Overall DP 2 | Overall DP3 | Overall DP4 | Overall DP5 | Overall DP6 | Overall DP7 | Overall DP8 | Overall DP9 | Overall DP10 | Overall DP11 | Overall DP12 |
| "Do Nothing" (8-18nm) | Green | Red | Red | Green | Grey | Yellow | Red | Yellow | Grey | Grey | Grey | Yellow | Yellow |
| Option A 8-12nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option B 9-13nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |
| Option C 10-14nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option D 11-15nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option E 12-16nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option F 13-17nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option G 14-18nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option H 15-19nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option I 16-20nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option J 17-21nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Yellow | Yellow | Yellow |
| Option K 18-22nm | Yellow | Yellow | Yellow | Green | Grey | Yellow | Grey | Yellow | Grey | Yellow | Green | Yellow | Yellow |



5.5 Outcomes of the DPE

- 1.1.1 The DPE allows the CAA and stakeholders to review how the change sponsor’s design options have responded to the Design Principles³⁰. This has been achieved by including a specific assessment of overflight of Richmond Park within the evaluation. This was added because, although this local circumstance was not proposed in our engagement during Stage 1, its relevance was raised during Stage 2 and therefore a specific consideration was deemed appropriate.
- 1.1.2 The DPE results generated demonstrate how the options are aligned with the Design Principles and supports the methodology derived to develop the Comprehensive List of Options. As an example, and referencing the PBN Departure Options in Annex 1:
- 1.1.3 Option A (from all runways) was designed to prioritise noise to 7000ft and in the breakdown of the assessment of Design Principle 2, it can be seen that these options all ‘Met’ the evaluations of noise.

| | |
|--|---|
| Overall Pop in 70db SEL | Within the lowest 25th percentile of the data |
| Overall Pop overflow 0-4000ft (1x per day on average) | Within the lowest 25th percentile of the data |
| Overall Pop overflow 4-7000ft (at least 1x per day on average) | Within the lowest 25th percentile of the data |

Figure 38: Example of a section of the DPE

- 5.5.1 Option C (from all runways) was designed to prioritise Design Principle 4 (prioritise carbon) to 7000ft, and these options all “Met” the Design Principle 4 evaluation.

| | |
|----------------------|---|
| Overall mileage (nm) | Within the lowest 25th percentile of the data |
|----------------------|---|

Figure 39: Example of a section of the DPE

Discontinuation

- 5.5.2 When considering safety (DP1), the DPE methodology determined that an option would be evaluated as ‘Not Met’ if safety issues were identified that could not be mitigated. None of our options were assessed as “Not Met” for this principle but if we felt an option was not safe, or was unable to be ‘made safe’, there would have been no point in pursuing the option as it would not have been viable.
- 5.5.3 When considering the extent to which an option “accords with the CAA’s published Airspace Modernisation Strategy” (captured within Design Principle 2), all Heathrow’s options were considered to have “Partially Met” this principle with the exception of the ‘Do Nothing’ options.
- 5.5.4 A ‘Do Nothing’ option would not deliver airspace modernisation for Heathrow, so would not address the AMS objectives for environmental and operational benefits and would also not address the Statement of Need either.

³⁰ CAP1616 Paragraph 128



- 5.5.5 The 'Do Nothing' options have therefore been discontinued in their own right; however, they will remain present throughout the ACP as baseline scenarios for comparison.

5.6 Stakeholder Engagement on the DPE

- 5.6.1 In March 2023, Heathrow undertook stakeholder engagement on the methodology and results of the DPE. Heathrow also took this opportunity to share a summary of stakeholder feedback on the CLOO and Heathrow's responses to this feedback.
- 5.6.2 Information on this stakeholder engagement can be found in the *Stakeholder Engagement Summary* document and associated appendices *Stakeholder Engagement Appendices B-F*.



6. ***NEXT STEPS***

- 6.1.1 The ACP now progresses to Step 2B of CAP1616 Stage 2. This involves carrying out an Initial Options Appraisal (IOA) of the remaining options, to understand in further detail the benefits and impacts of each option.
- 6.1.2 The IOA is the first of three phases of appraisal undertaken as part of the ACP. It forms part of the iterative process of CAP1616, whereby the detail of analysis builds as options are refined and matured through the stages.
- 6.1.3 The IOA may enable Heathrow to discontinue some options where the remainder will then be used to create 'system options' in Stage 3 ahead of a full appraisal of those options. A system option is a full suite of westerly and easterly arrivals and departures. Heathrow's system options will need to integrate with the wider airspace network.



7. GLOSSARY OF TERMS

| Acronym | Term | Description |
|---------|------------------------------------|---|
| ACOG | Airspace Change Organising Group | Established in 2019 at the request of the Department for Transport and the Civil Aviation Authority to coordinate the delivery of key elements of the UK's Airspace Modernisation Strategy. ACOG is a fully independent organisation and is responsible for coordinating airports' individual airspace changes via an Airspace Masterplan. |
| - | Airspace Change Portal | The CAA's Airspace Change Portal is a publicly-accessible website where all ACP Sponsors are required to upload information on their ACPs. |
| - | Airspace Change Process | The CAA's airspace change process is known as 'CAP1616'. The process is designed to ensure that the CAA meets modern standards for regulatory decision-making, and is fair, transparent, consistent and proportionate. The process ensures that when the CAA decides whether or not to approve a proposal to change UK airspace, it does so in an impartial and evidence-based way that takes proper account of the needs and interests of all affected stakeholders. |
| ACP | Airspace Change Proposal | Airspace change proposals (ACPs) are requests from a 'change sponsor', usually an airport or a provider of air navigation services (including air traffic control), to change the notified airspace design. ACPs must follow the CAA's CAP1616 airspace change process. |
| - | ACP Sponsor | An organisation that proposes, or sponsors, a change to the airspace design in accordance with the CAA's airspace change process. Heathrow is the sponsor of this airspace change. |
| - | Altitude Based Priorities | Altitude based priorities are a set of rules, incorporated in statutory guidance and used by the CAA. They are designed to ensure that potential noise impacts are prioritised over other factors such as carbon emissions in airspace change proposals up to 7,000 ft above sea level. |
| AMS | Airspace Modernisation Strategy | The Airspace Modernisation Strategy, or AMS, is co-sponsored by the CAA and DfT. It sets out the 'ends', 'ways', and 'means' of modernising the design, technology, and operations of airspace. A nationwide airspace modernisation programme is underway across UK airports in support of the AMS. |
| AMSL | Above Mean Sea Level | A measure of the vertical distance of a location in reference to a historic mean sea level taken as a vertical datum. |
| ANSP | Air Navigation Service Provider | An organisation that provides an air traffic service of managing aircraft in flight or on the manoeuvring area of an airport and which is the legitimate holder of that responsibility. |
| AONB | Area of Outstanding Natural Beauty | An area of countryside in England, Wales or Northern Ireland that has been designated for protection by the Countryside and Rights of Way Act 2000 (CRoW Act) due to its significant landscape value. The Act protects the land to conserve and enhance its natural beauty. |



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| ATC | Air Traffic Control | Air Traffic Control, or ATC, is a service provided by ground-based air traffic controllers who direct aircraft on the ground and through a given section of controlled airspace and can provide advisory services to aircraft in non-controlled airspace. |
| ATM | Air Traffic Movement | An aircraft take-off or landing at an airport. For airport traffic purposes one arrival and one departure are counted as two movements. Heathrow airport currently operates under an annual cap of 480,000 ATMs, which is set by the government. |
| - | Baseline | As part of the IOA, CAP1616 requires airspace change sponsors to set a baseline which is used for environmental evaluation of the options. Heathrow has used a 'Do Nothing' scenario which uses 2019 data to best reflect the current environment. The baseline scenario was modelled to generate a set of environmental metrics that have been used to compare each option against. |
| - | Biodiversity | Biodiversity is the variety of all life on Earth including all species of animals and plants. Biodiversity supports the vital benefits humans obtain from the natural environment. |
| CAA | Civil Aviation Authority | The CAA is the UK's aviation regulator, overseeing and regulating all aspects of civil aviation in the UK. The Secretary of State for Transport placed a statutory duty upon the CAA to have a strategy and plan for modernising airspace. |
| CAP1616 | Civil Aviation Publication 1616 | CAP1616 is the CAA's airspace change process guidance, introduced in December 2017. CAP1616 established additional CAA scrutiny and validation of sponsors' work and evidence as they develop proposals; increased requirements relating to transparency and engagement; and introduced new opportunities for those impacted by proposals to have their voices heard. |
| CAP2250 | Civil Aviation Publication 2250 | CAP2250 is the CAA's "Survey of Noise Attitudes 2014: Aircraft Noise and Annoyance, Further Analysis" published in December 2022. It sets out recommended categories for noise levels and annoyance that can be used by ACP sponsors when carrying out noise modelling. |
| - | Capacity | A term used to describe how many aircraft can be accommodated within an airspace area without compromising safety or generating excessive delay. |
| CAS | Controlled Airspace | A defined area of airspace in which Air Traffic Control (ATC) services are provided. Controlled airspace usually exists in the immediate vicinity of busier airports and at higher levels where air transport flights would tend to cruise. |
| - | Centreline | The nominal track for a published route. |
| - | Concentration | Refers to a density of aircraft flight paths over a given location, this generally refers to high density where tracks are not spread out; this is the opposite of dispersal. |
| CCO | Continuous Climb Operations | CCO is a departure procedure whereby the aircraft climbs continuously to its cruising level without levelling off. Heathrow's Comprehensive List of Options assumes that aircraft will perform a CCO to at least 7,000ft. |



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| CDO/ CDA | Continuous Descent Operations/ Continuous Descent Approaches | An aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight to the extent permitted by the safe operation of the aircraft, and compliance with published procedures and ATC instructions. Also known as Continuous Descent Approaches. |
| - | Climb Gradient | The climb gradient is how steeply the aircraft climbs on departure. It is the ratio between distance travelled over the ground and altitude gained, and is usually expressed as a percentage. |
| CLOO | Comprehensive List of Options | Airspace change sponsors are required to develop a Comprehensive List of Options at Stage 2 of the CAP1616 process. The CLOO should include a comprehensive set of airspace design options that address the Statement of Need and align with the Design Principles set at Stage 1. |
| - | Conventional navigation | The historic navigation standard where aircraft fly with reference to ground-based radio navigation aids. |
| - | Conventional route | Routes defined to the conventional navigation standard, i.e. using ground based radio navigation beacons to determine their position. |
| - | Cranford Agreement | Runway alternation currently only happens on westerly operations (when aircraft come into land over London and take off towards Windsor). This is because of the legacy of the Cranford Agreement which was established in the 1950s. Cranford is a village at the eastern end of the northern runway. The agreement prevented aircraft from taking off over the village except in exceptional circumstances and applied when Heathrow was on easterly operations. This means that during easterly operations, most arriving aircraft will land on the northern runway, with most departures taking off from the southern runway. In 2009, the Government announced that the Cranford Agreement should end following consultation with local residents. |
| dB | Decibels | A unit used to measure the intensity of a sound (or the power level) of an electrical signal by comparing it with a given level on a logarithmic scale. |
| DfT | Department for Transport | The Department for Transport (DfT) is the United Kingdom government department responsible for the English transport network (and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved). |
| DP | Design Principle | Design Principles encompass the objectives that the airport seeks to achieve through the airspace change. They are set through stakeholder engagement in Stage 1 of the CAP1616 process and guide the airspace designers to create suitable flight path options at Stage 2. |
| DPE | Design Principle Evaluation | The Design Principle Evaluation is a requirement of the CAP1616 airspace change process at Stage 2. It involves assessing the Comprehensive List of Options against each Design Principle. |
| - | Dispersion | The dispersion patterns around Heathrow's departure routes are a result of ground-based navigation technology and a high degree of vectoring by ATC. This means that current dispersion patterns are generally larger than would occur |



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| | | within a PBN environment, where modern satellite navigation technology results in the aircraft flying a narrower flightpath. |
| - | Easterly Alternation | A Heathrow project to enable respite for easterly operations. The timescales to deliver full easterly alternation will be subject to both the ACP and the process for seeking permission for revised planning requirements and associated groundworks. |
| - | Easterly Operation | When a runway at Heathrow is operating such that aircraft are taking off and landing in an easterly direction. |
| ft | Feet | The standard measure for vertical distances used in air traffic control. |
| - | Final Approach | The final part of an arrival flight path that is directly lined up with the runway. |
| FL | Flight Level | The Altitude above sea-level in 100 feet units measured according to the international standard atmosphere. A flight level is an indication of pressure, not of altitude. Only above the transition level (which depends on the local QNH but is typically 4,000 feet above sea level) are flight levels used to indicate altitude; below the transition level feet are used. |
| - | Flight Path Options | Flight path options are operationally viable (flyable) flight paths developed by Heathrow's technical team. |
| FASI | Future Airspace Strategy Implementation | Heathrow is part of the 'Future Airspace Strategy Implementation-South' programme to re-design airspace in the south of the UK. There is also a 'FASI-N' programme for the north of the UK. |
| FOA | Full Options Appraisal | The FOA is required at Stage 3A of the CAP1616 process. It requires a quantitative assessment of the shortlist of flight path options. |
| GA | General Aviation | All civil flying other than commercial airline operations, encompassing a wide range of aviation activity from powered parachutes, gliding and ballooning to corporate business jets, and including all sport and recreational flying. |
| - | Holding Stack | Holding stacks are areas of airspace used as a waiting room which allow air traffic controllers to organise the planes before they land. Heathrow has four holding stacks located over navigation beacons that lend them their names. The locations of Heathrow's stacks have been the same since the 1960s. |
| ICAO | International Civil Aviation Organisation | An agency of the United Nations that coordinates the principles and techniques of international air navigation. |
| ILS | Instrument Landing System | The Instrument Landing System is a precision radio navigation system that provides short-range guidance to arriving aircraft on approach to the runway. |
| IOA | Initial Options Appraisal | The IOA is required at Step 2B of the CAP1616 process. It involves an assessment of the impacts (costs and benefits) of each of the viable options. The appraisal must use TAG, the DfT's appraisal guidance, which includes consideration of environmental impacts, economic impacts and health impacts associated with noise. |



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| L _{Aeq} | | <p>L_{Aeq} is the most common international measure of noise and means 'equivalent continuous noise level'. 51dB L_{Aeq} 16hr (daytime noise) and 45dB L_{Aeq} 8hr (night-time noise) contours form part of the primary CAP1616 metrics used to evaluate the benefits and impacts of an airspace change. These contours represent the daytime and night-time Lowest Observable Adverse Effect Level (LOAEL) contour defined in UK airspace policy.</p> <p>L_{Aeq} contours are the equivalent sound level of aircraft noise in dB. This is based on the daily average movements that take place in the 16hr daytime period (0700-2300) or 8hr night period (2300-0700).</p> |
| L _{Amax} | | <p>L_{Amax} is the maximum sound level measured during a single noise event.</p> |
| LOAEL | Lowest Observed Adverse Effect Level | <p>Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected. It is set at 51 dB L_{Aeq} for daytime periods and 45 dB L_{Aeq} for night-time periods. The LOAEL and the L_{Aeq} metrics which underpin it are based on average noise measured over a 92-day period, taking into account all arrival and departure operations.</p> |
| - | Lower Airspace | <p>Airspace in the general vicinity of the airport containing arrival and departure routes below 7,000 feet. Airports have the primary accountability for the design of this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency.</p> |
| N _x | N60/N65 noise events | <p>A noise metric which describes the number of aircraft noise events above a noise level of 60 L_{Amax} for night-time periods and 65 L_{Amax} for daytime periods. These are event-based metrics which can be used to better understand the number of noise events that occur and where.</p> |
| NADP 1/2 | Noise Abatement Departure Procedures 1/2 | <p>A noise abatement departure procedure defines the height at which the flight crew will reduce engine power after take-off and the height at which acceleration from the take-off speed commences. The balance between how much energy is put into gaining altitude and speed, and at what altitudes power reduction and acceleration are initiated and in what order, impacts the noise footprint of the aircraft. ICAO guidance provides two examples, NADP1 and NADP2.</p> |
| NATS (ATC) | NATS Air Traffic Control | <p>NATS ATC is the air navigation service provider at Heathrow under commercial contract for the aerodrome control provision.</p> |
| NATS (NERL) | NATS En-Route Limited | <p>NATS is the air navigation service provider responsible for the UK's airspace above 7,000ft, and at many airports (including at Heathrow). NATS is the parent company of NERL who provide ATC services to aircraft flying in airspace over the UK and the eastern part of the North Atlantic.</p> |
| nm | Nautical Mile | <p>A nautical mile is a unit of length used in air, marine, and space navigation.</p> |
| - | Network Airspace/Upper network | <p>En-route airspace above 7,000 feet in which NATS has accountability for safe and efficient air traffic services for aircraft travelling between UK airports and the airspace of neighbouring states.</p> |



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| - | Night Flights | <p>There is no formal ban on night flights at Heathrow, but the Government has placed restrictions on them since the 1960s. Night-time (23:30 - 06:00) operations at Heathrow are heavily restricted by the Government, which sets a limit of 5,800 night-time take-offs and landings a year. A night quota limit is also in place, which caps the amount of noise the airport can make at night.</p> <p>Around 80% of the night flights at Heathrow are between 04:30 - 06:00 with an average of 16 aircraft arriving each day between these hours. Heathrow has a voluntary ban in place that prevents flights scheduled between 04:30 - 06:00 from landing before 04:30. We also do not schedule any departures between 23:00 - 06:00.</p> |
| - | Noise Efficient Operational Practices | <p>Noise efficient operational practices are considered to be: Continuous Climb Operations (CCO), Continuous Descent Operations (CDO), Noise Abatement Departure Procedures (NADPs), Steeper Approaches, Steeper Climbs, Landing Gear Deployment, and Low Power Low Drag.</p> |
| NPR | Noise Preferential Route | <p>Aircraft taking off from some airports are required to follow specific flight paths called Noise Preferential Routes (NPRs), unless directed otherwise by Air Traffic Control (ATC). The NPRs at Heathrow are designated and overseen by the Secretary of State for Transport (not the CAA) and were designed to avoid the overflight of built-up areas where possible. They set a path for the aircraft to take-off from the runway until they reach the main UK air traffic routes.</p> |
| NTK | Noise Track Keeping | <p>A system that monitors and records radar data to monitor aircraft operations and report statistics focused on noise.</p> |
| - | Overflight | <p>CAA's CAP1498 document sets out a definition of overflight for use in ACPs. "Overflown" is defined as "an aircraft in flight passing an observer at an elevation angle of 48.5° from the ground at an altitude below 7000ft" (CAA). The overflight metric enables the number of overflights experienced at locations on the ground to be calculated according to the agreed definition.</p> |
| - | Overflight cones | <p>The CAA's CAP1498 document states that overflight above a given location should be measured using a cone. The cone identifies the airspace above a given location within which an aircraft might be perceived as "overflying" that location. This is because an aircraft does not need to be directly overhead to have an impact (noise and/or visual) on the local population.</p> |
| Partial LOAEL | Partial Lowest Observed Adverse Effect Level Contour | <p>At Stage 2 we have quantified the number of people adversely affected by noise impacts of options using Partial LOAEL contours. This is because the options are being assessed per single runway operation (e.g. an arrival route to one runway end) and a complete system of westerly and easterly departures and arrivals to/from both runways is required to develop a LOAEL contour</p> |
| PBN | Performance Based Navigation | <p>PBN improves the accuracy of where aircraft fly by using modern satellite navigation and moving away from outdated and conventional navigation techniques using ground-based beacons (it is similar to GPS "sat nav" devices that most people use in their cars today). PBN is being adopted worldwide through International, Regional and State level initiatives and regulations.</p> |



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| - | Qualitative analysis | A method of assessment based on observations and expertise of the technical team, including non-numerical information such as air traffic control procedures or other airports' design options. |
| - | Quantitative analysis | A method of assessment based on numerical data and metrics. |
| QC | Quota Count | The amount of Quota (QC points) assigned to an individual night movement at Heathrow. |
| RAMSAR | Ramsar sites | A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention (also known as "The Convention on Wetlands"), an intergovernmental environmental treaty established in 1971 by UNESCO in Ramsar, Iran. |
| - | Relief | A break from, or a reduction in, aircraft noise. |
| - | Respite | Scheduled relief from aircraft noise for a set period of time. |
| RNAV/RNAV 1 | aRea NAVigation | This is a generic term for a particular specification of Performance Based Navigation. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline of the route 95% or more of the time. In practice the accuracy is much greater than this. |
| - | Runway Alternation | Heathrow has two runways, with one used for arrivals and one used for departures at most times. During the day, when planes are landing and taking off to the west (westerly operations), we alternate the use of our two runways to provide local communities with respite. The alternation pattern means that for part of the day we use one runway for landings and the other for take-offs, then halfway through our operational day (at 15:00) we switch over. Runway alternation is not currently possible when planes are landing and taking off to the east (easterly operations). |
| SAC | Special Areas of Conservation | Protected areas in the UK designated under Government environmental regulations. These sites are classified as making a significant contribution to conserving habitats and species identified in the Habitats Directive. |
| SEL | Sound Exposure Level | Occasional loud noise measure in the UK. An SEL footprint can be created to show the geographical area over which a particular SEL is reached from a single noise event. |
| - | Separation | Aircraft under Air Traffic Control are kept apart by standard separation distances, as agreed by international safety standards. Participating aircraft are kept apart by at least 3nm or 5nm lateral separation (depending on the air traffic control operation), or 1,000 feet vertical separation. |
| - | Shortlisting | At Stage 2 CAP1616 requires sponsors to assess the CLOO against criteria and use the IOA results to narrow down the list of options, producing a shorter list of options that will be progressed to Stage 3 for further analysis. |
| SID | Standard Instrument Departure procedures | Heathrow's Standard Instrument Departures are air traffic control (ATC) procedures that provide a clear path from the runway end to 6 common network points in the airspace for flights to depart. |



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| SoN | Statement of Need | At the first stage of the airspace change process, airport sponsors are required to outline the objectives of the ACP, by setting out the airspace issue or opportunity it is seeking to address and what outcome it wishes to achieve. |
| SPA | Special Protection Areas | Protected areas in the UK for migratory birds and certain particularly threatened birds. |
| SSSI | Sites of Special Scientific Interest | An area that is of particular interest to science due to the rare species of fauna or flora it contains – or important geological or physiological features that may lie in its boundaries. These areas have high conservation value and need to be protected. Natural England is the official authority in England determining which sites have SSSI status. |
| - | Supplementary Metrics | Supplementary metrics are those that have been used to better articulate the likely noise impacts of the options to stakeholders. These include overflight, noise exposure contours and single aircraft noise events. |
| System Option | System Option | At Stage 3 Heathrow will design system options which are arrivals and departures together, on easterly and westerly operations. |
| TAG | DfT's Transport Appraisal Guidance | TAG (formerly known as WebTAG) is the DfT's suite of guidance on how to assess the expected impacts of transport policy proposals and projects. As part of the CAP1616 process, Heathrow is required to apply specific noise metrics and quantify the benefits and impacts on an airspace change using the TAG tool. The TAG tool is a workbook using calculations and formulae that are set by DfT. The CAP1616 process requires TAG analysis methods to be used for evaluation of quantified noise benefits and disbenefits. |
| TMA/LTMA | Terminal Manoeuvring Area (Terminal Airspace)/London Terminal Manoeuvring Area | An aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of traffic. The LTMA is the name given to the airspace that surrounds the major London airports, including Heathrow. |
| - | Vector/Vectoring | Vectoring is the provision of navigational guidance to aircraft by air traffic controllers (ATC). Vectoring helps to maximise use of available airspace. ATC instruct the pilot to fly on a given compass heading and at a specific altitude. |
| - | Westerly operation | When a runway at Heathrow is operating such that aircraft are taking off and landing in a westerly direction. |
| WHO | World Health Organisation | WHO is a specialised agency of the United Nations responsible for international public health. WHO has provided guidance on recommended maximum noise levels for sleep and education. |