



AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

ANNEX 2

DESIGN PRINCIPLE EVALUATION PBN ARRIVALS

Version 1.0





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How to view this document

Due to the amount of information contained within the DPE spreadsheets, it will be necessary to zoom into the sheets to read the content of each option.

The zoom function on PDF's is normally along the top bar of a computer screen, or at the bottom of a document page.
For example,



Or



You can change the level of zoom using the drop-down arrow or by clicking the + symbol. Heathrow recommend you read this document at 400%.

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.

PBN Arrivals - DPE Methodology

Must/Should	No	Design Principle	Detailed Criteria	Approach to Evaluation	Met	Partially Met	Not Met	
Our new airspace design must	1	Be safe	N/A	A qualitative assessment undertaken by SME as to whether the option is expected to maintain or improve safety, whether further safety assurances will be required or whether there are issues identified which could be detrimental to safety.	Maintains existing level of safety, or improves it	Expected to improve level of safety, or improves on it but further safety assurances required	Issues are identified which could be detrimental to safety and are not resolved	
	2	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 Order). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits	Safety	The outcome of DP1 will be used to evaluate this AMS objective	Evaluated in DP1	Evaluated in DP1	Evaluated in DP1	
				Integration of diverse users	The outcome of DP11 will be used to evaluate this AMS objective	Evaluated in DP11	Evaluated in DP11	Evaluated in DP11
				Simplification, reducing complexity and improving efficiency	The outcome of DP5 will be used to evaluate this AMS objective	Evaluated in DP5	Evaluated in DP5	Evaluated in DP5
				Environmental sustainability	The outcomes of DP2, DP3 and DP4 will be used to evaluate this AMS objective.	Evaluated in DP2, DP3 and DP4 and met all 3 design principles	Evaluated in DP2, DP3 and DP4 and met all 3 design principles	Evaluated in DP2, DP3 and DP4 and did not meet all 3 design principles
	2	Minimise and where possible reduce, the total adverse effects on health and quality of life from aircraft noise and altitude-based priorities (See below for consideration of AONBs and National Parks, as part of Tranquillity)	Tranquillity	ANC states that the L _{0.1} is regarded as the point at which adverse effects begin to be seen on a community basis. The 70dB SEL can be considered an indicator of potential effects on the L _{0.1} and is a more suitable indicator of noise impacts than an overflight cone. For arrivals, the end of an A320 70dB SEL footprint is analogous to c.5000ft. A quantitative assessment considering the number of people within a 70dB SEL during the Early Morning Arrival (0430-0600) period for each option.	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data	
				A quantitative assessment which considers the number of people overflown (at least once a day on average during the 0430-0600 period) between 0-4000ft.	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data	
				A quantitative assessment which considers the number of people overflown (at least once a day on average during the 0430-0600 period) between 4-7000ft.	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data	
				A quantitative assessment which considers the track mileage from points within the Network (LOGAN, TOBID, BEDEK, BEGTO or ALESO as appropriate) to the runway thresholds	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data	
	2	Tranquillity	A qualitative assessment which considers the area (km2) of AONBs and National Parks overflown for each option	A quantitative assessment which considers the area (km2) of AONBs and National Parks overflown for each option	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data	
				A quantitative assessment which considers the area (km2) of Historic Parks and Gardens and Public Parks overflown.	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data	
				A qualitative SME assessment of whether the option would overfly Richmond Park at least once a day, between 0430-0600, below 7000ft. This separate assessment has been performed due to stakeholder feedback. Note that Richmond Park is also included within the Parks and Gardens, SSSI and SAC assessments.	Option is not expected to overfly Richmond Park at least once a day between the 0430-0600 period	N/A	Option is expected to overfly Richmond Park at least once per day between the 0430-0600 period	
The effects of airspace change on ecology or biodiversity are expected to be minimal. CAA guidance states that "In general, airspace change proposals are unlikely to have an impact upon biodiversity because they do not involve ground-based infrastructure. As such they are unlikely to have a direct impact that would engage the Birds or Habitats legislation". Though there is limited research available on the effects of aircraft noise on wildlife, there is some evidence that disturbance effects associated with aircraft can occur during take-off and landing where aircraft are below around 500m (~1540ft). Consideration will therefore be given to the effects on ecology and biodiversity where options overfly Special Protection Areas, Special Areas of Conservation, and Sites of Special Scientific Interest, particularly at altitudes below 2000ft. For the purposes of our assessment ecology is equivalent to biodiversity as described in CAP1616. This is a quantitative assessment which considers the area (km2) of SPA, SACs and/or SSSIs overflown below 3000ft in each option.				Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data		
2	Prevent any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits	Ecology and/or biodiversity	A qualitative statement on whether the options could be expected to affect local air quality. ANC2017 states that due to the effects of mixing and dispersion, emissions from aircraft above 1000ft are unlikely to have a significant impact on local air quality. Therefore the impact of airspace design on local air quality is generally negligible compared to changes in the volume of air traffic, and that of the local transport infrastructures feeding the airport. If an option has a change to flightpaths below 1000ft it will be evaluated as 'Partially Met' however further analysis will be required to determine the scale of change to local air quality. If an option has no change to flightpaths below 1000ft it will be evaluated as 'Met'.	Option is unlikely to affect local air quality	Option has potential to affect local air quality below 1000ft	N/A - Not possible to ascertain without detailed modelling		
			Overall DP 2 Evaluation	All 9 evaluations Met	All 9 evaluations Partly Met or a Mixture of Met and Not Met	All 9 evaluations Not Met		
3	Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise	Continuous Descent operations (CDO)	CDO from 7000ft has been assumed for all design options. However, if there is anything about the route positioning that the SMEs feel could inhibit CDO, this will be described here.	Option has the potential to achieve CDO	Option has the potential to largely achieve CDO although small take-offs may be required	Option is not expected to achieve CDO and/or require significant take-offs to be achieved		
			Low Power Low Drag, Landing Gear Deployment, Steeper Approaches	All these noise efficient operational practices are expected to be able to be applied to all options and this will be considered in more detail in Stage 3. However, if there is anything about the construct of the options that the SMEs feel could inhibit any of these practices, this will be described here.	Nothing identified by SMEs to suggest noise efficient operational practices cannot be applied to the option	N/A	An aspect identified by SMEs to suggest noise efficient operational practices may not be able to be applied to the option	
3	Overall DP 3 Evaluation	Both evaluations Met	Mixture of Met and Not Met	Both evaluations Not Met	All 9 evaluations Met	All 9 evaluations Partly Met or a Mixture of Met and Not Met	All 9 evaluations Not Met	
								Overall DP 3 Evaluation
4	Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities	As aircraft emissions arise from the combustion of aviation fuel, the track mileage associated with each option from points within the Network (LOGAN, TOBID, BEDEK, BEGTO or ALESO as appropriate) to the runway threshold is considered in this quantitative evaluation.	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data			
5	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	A qualitative SME assessment of whether the option has characteristics that are expected to degrade, maintain or enhance Heathrow's operational performance in terms of providing sufficient capacity and resilience to handle demand.	Option considered to enhance operational performance and/or resilience, subject to further work	Option considered to maintain operational performance and/or resilience, subject to further work	Option considered to degrade operational performance and/or resilience			
6	Provide predictable and meaningful respite to those affected by noise from Heathrow's movements	We have identified 3 potential concepts for delivering respite or relief from noise. This can't be assessed until system options are developed and so our options can't be evaluated against this at this time.	Not possible to assess at this time	Not possible to assess at this time	Not possible to assess at this time			
7	Seek to avoid overflying the same communities with multiple routes including those to/from other airports	Qualitative SME assessment of whether the option would overfly the same communities below 7000ft by both airports identified. This assessment considers the interactions with the FAS1 airspace design options of adjacent airports compared to each of Heathrow's options. Where those options are in Stage 3, the assessment is against their shortlisted options. Where the sponsor is still in Stage 2, the assessment considers their CLO. Where those options are not available as the sponsor is still in Stage 1, it considers interactions with the arrival and departure areas of adjacent airports, as contained within the Masterplan Iteration 2. This assessment does not consider interactions with Heathrow's other route options (e.g. Arrivals or departures from the other runway) as system options have not yet been created. In terms of the DP overall, if all airports evaluations are green then the DP overall is green. If they are all red, the DP overall is red. If they are a mixture of red and green the DP overall is partly met.	RAF Northolt	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			Luton	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			Stansted	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			London City	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			Biggin Hill	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			Galwick	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			Farnborough	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
			Southampton	No overflight of same communities below 7000ft by both airports identified	N/A	Overflight of same communities below 7000ft by both airports has been identified		
8	Contribute to minimising the negative impacts of night flights	We have identified 3 potential concepts to be further considered to deliver this design principle. This will be further explored in Stage 3 once system options are developed.	Not possible to assess at this time	Not possible to assess at this time	Not possible to assess at this time			
			Overall DP 7 Evaluation	All 3 evaluations Met	Mixture of Met and Not Met	All 3 evaluations Not Met		
9	Keep the number of people who experience an increase in noise from the future airspace design to a minimum	We consider that owing to the concentration of PBN combined with reduced tactical ATC intervention, those people living under a PBN route will experience an increase in noise owing to the increased frequency of overflight whether they are currently overflown already or not. For this evaluation at this stage, we are therefore assuming that the routes that affect the fewest people will keep the number of people who experience an increase in noise from the future airspace design to a minimum. This is a quantitative assessment which considers: - The population number within the combined 70dB SEL footprints of each option. - The total number of people overflown 0-7000ft (at least once a day and at least 20 times per day on average) by each option. We also state the number of people who may be potentially newly overflown (at a rate of 20 times per day or more on average) for the option compared to the Early Morning Arrival baseline.	Population number within the 70dB SEL	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data		
			Population overflown 0-7000ft (at least once a night on average)	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data		
			Population overflown 0-7000ft (at least 20 times per night on average)	N/A there are not enough flights at this time to overfly anybody at least 20x a day on average	N/A there are not enough flights at this time to overfly anybody at least 20x a day on average	N/A there are not enough flights at this time to overfly anybody at least 20x a day on average		
			Overall DP 9 Evaluation	All 3 evaluations Met	All 3 evaluations Partly Met or a Mixture of Met and Not Met	All 3 evaluations Not Met		
10	Keep the total number of people who experience noise from the future airspace design to a minimum	A quantitative assessment considering the number of people within a 70dB SEL during the Early Morning Arrival (0430-0600) period for each option.	Population number within the 70dB SEL	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data		
			Population overflown 0-7000ft	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data		
11	Enable the efficiency of other airspace users' operations	General Aviation	A qualitative assessment by SME on whether GA will be impacted by the option, assessing whether changes to existing CAS may be required	Both evaluations Met	Both evaluations Partly Met or a Mixture of Met and Not Met	Both evaluations Not Met		
				RAF Northolt	Option not expected to require any additional CAS	Option may require additional CAS, further work is required	Option requires additional CAS	
				Luton	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				Stansted	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				London City	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				Biggin Hill	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				Galwick	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				Farnborough	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				Southampton	Option does not restrict CO/CDO to/from 7000ft of airports' FAS1 options.	N/A	Option may restrict CO/CDO to/from 7000ft of airports' FAS1 options.	
				Overall DP 10 Evaluation	Both evaluations Met	Both evaluations Partly Met or a Mixture of Met and Not Met	Both evaluations Not Met	
				Overall DP 10 Evaluation	Both evaluations Met	Both evaluations Partly Met or a Mixture of Met and Not Met	Both evaluations Not Met	
				12	Minimise the impact to all stakeholders from future changes to Heathrow's airspace	Adjacent Airports	A qualitative assessment by SME of whether Heathrow's option could restrict CO/CDO to/from 7000ft of adjacent airports' options. Owing to the assumption of these PBN arrival routes being used 0430-0600 only, this assessment takes into account the operating hours of the adjacent airports i.e. if the adjacent airport does not operate during this period then no impact on that airport's CO/CDO exists.	Option not expected to affect defence and security objectives. MoD feedback received in Stage 2 has been used to inform this assessment.
Military	Option not expected to impact existing Hel routes	Option may impact existing Hel routes, further work is required	Option will impact Hel routes, further work required					
Helicopters	A qualitative assessment by SME on whether existing helicopter routes within the London CTR could be impacted by the option	Option is not expected to impact existing Hel routes	Option may impact existing Hel routes, further work is required					Option will impact Hel routes, further work required
Overall DP 11 Evaluation	All 11 evaluations Met	A mixture of Fully and Not Met	All 11 evaluations Not Met					
12	Minimise the impact to all stakeholders from future changes to Heathrow's airspace	Easterly Alternation (known)	A qualitative assessment of known, conceptual or paused future changes to Heathrow's airspace.	Option may be compatible with the future change	Unclear if option compatible with the future change	Option is not compatible with the future change		
				AMA (conceptual)	Option may be compatible with the future change	Unclear if option compatible with the future change	Option is not compatible with the future change	
				3rd Runway (paused)	Option may be compatible with the future change	Unclear if option compatible with the future change	Option is not compatible with the future change	
				Overall DP 12 Evaluation	All 3 evaluations Met	All 3 evaluations Partly Met or a mixture of Fully, Partly Met and Not met.	All 3 evaluations Not met	

Runway 27L - PBN Arrivals

The table is a detailed operational plan for PBN arrivals at Runway 27L. It is organized into several main sections:

- Leftmost Column:** Contains small diagrams or maps of the runway and surrounding area, with handwritten annotations in blue, red, and purple.
- Second Column:** A vertical list of identifiers, likely aircraft call signs or flight numbers.
- Third Column:** A vertical list of times, representing the scheduled arrival times for each flight.
- Remaining Columns:** A grid of colored cells (green, yellow, red, orange) representing different operational parameters or status indicators for each flight. The colors likely correspond to different phases of the arrival process or specific operational requirements.

Runway 27R - PBN Arrivals

The table is a highly detailed data matrix. It features a header section with multiple columns, likely representing different parameters such as aircraft type, time of day, or specific procedural steps. The main body of the table consists of numerous rows, each containing a grid of colored cells (green, yellow, red, orange) and small text descriptions. The colors likely represent different states or conditions for each data point. The text descriptions are small and difficult to read but appear to be procedural instructions or notes. The table is organized into several main sections, likely representing different flight paths or arrival procedures. Each row contains detailed information, possibly including aircraft type, time, and specific procedural steps. The table is very dense and spans most of the page width and height.

Runway 09R - PBN Arrivals

The table is a detailed data matrix for PBN arrivals at Runway 09R. It is organized into several main sections:

- Column 1:** Contains small maps or diagrams of the runway area, each with a colored path (blue, green, red, orange) indicating a specific arrival procedure.
- Column 2:** A vertical column of text providing a brief description for each arrival procedure.
- Columns 3-10:** A series of columns containing numerical data, likely representing various performance metrics or parameters for each procedure.
- Column 11:** A vertical column of text, possibly identifying the procedure type or category.
- Column 12:** A vertical column of text, possibly indicating the status or availability of the procedure.
- Column 13:** A vertical column of text, possibly providing additional details or notes.
- Column 14:** A vertical column of text, possibly indicating the source or authority of the data.
- Column 15:** A vertical column of text, possibly providing a reference or code.
- Column 16:** A vertical column of text, possibly providing a final note or status.

The data cells are color-coded: green for standard or approved procedures, yellow for procedures with specific conditions or restrictions, and red for procedures that are not applicable or have specific limitations. The table contains approximately 20 rows of data, each corresponding to a different arrival procedure.