



AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

ANNEX 1

DESIGN PRINCIPLE EVALUATION PBN DEPARTURES

Version 1.0



Version 1.0 (July 2023)

Heathrow



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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 Departures - 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 maintain existing level of safety, or improve on it but further safety assurances required	Issues identified which could be detrimental to safety		
			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 met all 3 design principles		
			Overall AMS Evaluation				All 4 AMS known outcomes Met	All 4 evaluations Partly Met or a Mixture of Met, Partly Met and Not Met	All 4 evaluations not met
			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 ACNBS and National Parks, as part of Tranquility)	<p>ANG states that the LOAEL 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 LOAEL, and is a more suitable indicator of noise impacts than an overnight cone. For departures, the end of an A320 70dB SEL footprint is analogous to c.4000ft. This is a qualitative assessment of the extent to which the option meets this policy objective. Therefore this quantitative evaluation considers the population number within the combined 70dB SEL footprints of each option.</p>	<p>Within the lowest 25th percentile of the data</p>	<p>Within the middle 50th percentile of the data</p>	<p>Within the highest 25th percentile of the data</p>		
				A quantitative assessment which considers the number of people overflown (at least once a day on average) 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) 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 associated with each option from the end of the runway to either DVR, XAMAB, SAM, CPT, TNT or CLN as appropriate.	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 ACNBS 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		
Tranquility	A qualitative SME assessment of whether the option would overfly Richmond Park at least 20 times a day, on average 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 20 times per day on average	N/A	Option is expected to overfly Richmond Park 20 times per day on average					
	Ecology and/or biodiversity	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 (~1640ft). 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 qualitative 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				
		A qualitative statement on whether the options could be expected to affect local air quality. ANG2017 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 'Partly Met' but 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	
		Overall DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met	
	Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise	Continuous Climb operations (CCO)	CCO to 7000ft has been assumed for all design options. However, if there is anything about the route positioning that the SMEs feel could inhibit CCO, this will be described here.	Option has the potential to achieve CCO	Option has the potential to largely achieve CCO although small trade offs may be required	Option is not expected to achieve CCO and/or will require significant trade-offs to be achieved			
Noise Abatement Departure Procedures (NADP) Steeper Climb		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 options. This will be described here.	N/A	An aspect identified by SMEs to suggest noise efficient operational practices may not be able to be applied to the options				
Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities	Overall DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met		
	Overall DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met		
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 DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met		
	Overall DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met		
Provide predictable and meaningful respite to those affected by noise from Heathrow's movements	Overall DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met		
	Overall DP 3 Evaluation				Both evaluations Met	Mixture of Met, Partly Met and Not Met	Both evaluations Not Met		
Seek to avoid overflying the same communities with multiple routes including those to/from other airports	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.	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				
		Gatwick	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				
		Overall DP 7 Evaluation				All 8 evaluations Met	Mixture of Met and Not Met	All 8 evaluations not met	
		Overall DP 7 Evaluation				All 8 evaluations Met	Mixture of Met and Not Met	All 8 evaluations not met	
Contribute to minimising the negative impacts of night flights	Overall DP 7 Evaluation				All 8 evaluations Met	Mixture of Met and Not Met	All 8 evaluations not met		
	Overall DP 7 Evaluation				All 8 evaluations Met	Mixture of Met and Not Met	All 8 evaluations not met		
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.	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 day 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 day 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				
		The number of people who are potentially newly overflown at least 20 times per day on average compared to the baseline.	Within the lowest 25th percentile of the data	Within the middle 50th percentile of the data	Within the highest 25th percentile of the data				
We also note 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 2019 Stage 2 average departure baseline.	Overall DP 9 Evaluation				All 4 evaluations Met	All 4 evaluations Partly Met or a Mixture of Met and Not Met	All 4 evaluations not met		
	Overall DP 9 Evaluation				All 4 evaluations Met	All 4 evaluations Partly Met or a Mixture of Met and Not Met	All 4 evaluations not met		
Keep the total number of people who experience noise from the future airspace design to a minimum	Overall DP 9 Evaluation				All 4 evaluations Met	All 4 evaluations Partly Met or a Mixture of Met and Not Met	All 4 evaluations not met		
	Overall DP 9 Evaluation				All 4 evaluations Met	All 4 evaluations Partly Met or a Mixture of Met and Not Met	All 4 evaluations not met		
And should also	10	Keep the total number of people who experience noise from the future airspace design to a minimum	A qualitative assessment considering the total number of people overflown 0-7000ft (at least once) and the population number within the combined 70dB SEL footprints of each option	Population number within the combined 70dB SELs	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			
			Overall DP 10 Evaluation				Both evaluations Met	Both evaluations Partly Met or a Mixture of Met and Not Met	Both evaluations Not Met
			General Aviation	A qualitative assessment by SME on whether GA will be impacted by the option by assessing whether changes to existing CAS may be required	Option is not expected to require any additional CAS	Option may require additional CAS, further work is required	Option requires additional CAS		
				RAF Northolt	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
				Luton	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
				Stansted	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
				London City	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
				Biggin Hill	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
			Adjacent Airports	A qualitative assessment by SME of whether Heathrow's option could restrict CO/CDD to/from 7000ft of adjacent airports options.	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
				Gatwick	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
				Farnborough	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A	Option may restrict CO/CDD to/from 7000ft of airports FASI options		
Southampton	Option does not restrict CO/CDD to/from 7000ft of airports FASI options	N/A		Option may restrict CO/CDD to/from 7000ft of airports FASI options					
Military	A qualitative SME assessment of whether the option is expected to affect or impede defence and security objectives. MoD feedback received in Stage 2 has been used to inform this assessment.	Option not expected to affect defence and security objectives		N/A	Option expected to impede defence and security objectives				
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 helicopter routes, further work is required		Option may impact existing helicopter routes, further work is required	Option will impact helicopter routes, further work required				
Overall DP 11 Evaluation				All 11 evaluations Met	A Mixture of Fully and Not Met	All 11 evaluations not met			
Minimise the impact to all stakeholders from future changes to Heathrow's airspace	A qualitative assessment of whether the option is compatible with known, conceptual or paused future changes to Heathrow's airspace.	Easterly Alternation (Review)	Option may be compatible with the future change	Unclear if option compatible with the future change	Option is not compatible with the future change				
		AXM (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 Departures

Control Strategy	Diagram Description	Diagram									
		Diagram 1	Diagram 2	Diagram 3	Diagram 4	Diagram 5	Diagram 6	Diagram 7	Diagram 8	Diagram 9	Diagram 10
1. Runway 27L - PBN Departures	Diagram Description	[Diagram 1-10]									
	Diagram 1	[Diagram 1-10]									
	Diagram 2	[Diagram 1-10]									
	Diagram 3	[Diagram 1-10]									
	Diagram 4	[Diagram 1-10]									
	Diagram 5	[Diagram 1-10]									
	Diagram 6	[Diagram 1-10]									
	Diagram 7	[Diagram 1-10]									
	Diagram 8	[Diagram 1-10]									
	Diagram 9	[Diagram 1-10]									
2. Runway 27L - PBN Departures	Diagram Description	[Diagram 1-10]									
	Diagram 1	[Diagram 1-10]									
	Diagram 2	[Diagram 1-10]									
	Diagram 3	[Diagram 1-10]									
	Diagram 4	[Diagram 1-10]									
	Diagram 5	[Diagram 1-10]									
	Diagram 6	[Diagram 1-10]									
	Diagram 7	[Diagram 1-10]									
	Diagram 8	[Diagram 1-10]									
	Diagram 9	[Diagram 1-10]									
3. Runway 27L - PBN Departures	Diagram Description	[Diagram 1-10]									
	Diagram 1	[Diagram 1-10]									
	Diagram 2	[Diagram 1-10]									
	Diagram 3	[Diagram 1-10]									
	Diagram 4	[Diagram 1-10]									
	Diagram 5	[Diagram 1-10]									
	Diagram 6	[Diagram 1-10]									
	Diagram 7	[Diagram 1-10]									
	Diagram 8	[Diagram 1-10]									
	Diagram 9	[Diagram 1-10]									
4. Runway 27L - PBN Departures	Diagram Description	[Diagram 1-10]									
	Diagram 1	[Diagram 1-10]									
	Diagram 2	[Diagram 1-10]									
	Diagram 3	[Diagram 1-10]									
	Diagram 4	[Diagram 1-10]									
	Diagram 5	[Diagram 1-10]									
	Diagram 6	[Diagram 1-10]									
	Diagram 7	[Diagram 1-10]									
	Diagram 8	[Diagram 1-10]									
	Diagram 9	[Diagram 1-10]									
5. Runway 27L - PBN Departures	Diagram Description	[Diagram 1-10]									
	Diagram 1	[Diagram 1-10]									
	Diagram 2	[Diagram 1-10]									
	Diagram 3	[Diagram 1-10]									
	Diagram 4	[Diagram 1-10]									
	Diagram 5	[Diagram 1-10]									
	Diagram 6	[Diagram 1-10]									
	Diagram 7	[Diagram 1-10]									
	Diagram 8	[Diagram 1-10]									
	Diagram 9	[Diagram 1-10]									

Runway 09L - PBN Departures

The table is a detailed operational chart for PBN departures from Runway 09L. It is organized into 12 columns, each representing a different flight path or departure procedure. Each column begins with a small map showing the flight route. The main body of the table consists of numerous rows, each representing a specific flight profile. The cells within these rows are color-coded: red indicates a specific operational status or restriction, green indicates a standard or approved status, and yellow indicates a caution or specific condition. The rows are grouped into several major sections, likely corresponding to different aircraft types, altitudes, or departure phases. The overall layout is highly structured and technical, typical of an aviation operations manual or flight deck display.



Runway 09R - PBN Departures

Runway 09R - PBN Departures		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10
1.0	1.1	1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8	1.1.9	1.1.10
	1.2	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5	1.2.6	1.2.7	1.2.8	1.2.9	1.2.10
	1.3	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.3.6	1.3.7	1.3.8	1.3.9	1.3.10
	1.4	1.4.1	1.4.2	1.4.3	1.4.4	1.4.5	1.4.6	1.4.7	1.4.8	1.4.9	1.4.10
	1.5	1.5.1	1.5.2	1.5.3	1.5.4	1.5.5	1.5.6	1.5.7	1.5.8	1.5.9	1.5.10
	1.6	1.6.1	1.6.2	1.6.3	1.6.4	1.6.5	1.6.6	1.6.7	1.6.8	1.6.9	1.6.10
	1.7	1.7.1	1.7.2	1.7.3	1.7.4	1.7.5	1.7.6	1.7.7	1.7.8	1.7.9	1.7.10
	1.8	1.8.1	1.8.2	1.8.3	1.8.4	1.8.5	1.8.6	1.8.7	1.8.8	1.8.9	1.8.10
	1.9	1.9.1	1.9.2	1.9.3	1.9.4	1.9.5	1.9.6	1.9.7	1.9.8	1.9.9	1.9.10
	1.10	1.10.1	1.10.2	1.10.3	1.10.4	1.10.5	1.10.6	1.10.7	1.10.8	1.10.9	1.10.10
2.0	2.1	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	2.1.6	2.1.7	2.1.8	2.1.9	2.1.10
	2.2	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.2.7	2.2.8	2.2.9	2.2.10
	2.3	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.3.6	2.3.7	2.3.8	2.3.9	2.3.10
	2.4	2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	2.4.6	2.4.7	2.4.8	2.4.9	2.4.10
	2.5	2.5.1	2.5.2	2.5.3	2.5.4	2.5.5	2.5.6	2.5.7	2.5.8	2.5.9	2.5.10
	2.6	2.6.1	2.6.2	2.6.3	2.6.4	2.6.5	2.6.6	2.6.7	2.6.8	2.6.9	2.6.10
	2.7	2.7.1	2.7.2	2.7.3	2.7.4	2.7.5	2.7.6	2.7.7	2.7.8	2.7.9	2.7.10
	2.8	2.8.1	2.8.2	2.8.3	2.8.4	2.8.5	2.8.6	2.8.7	2.8.8	2.8.9	2.8.10
	2.9	2.9.1	2.9.2	2.9.3	2.9.4	2.9.5	2.9.6	2.9.7	2.9.8	2.9.9	2.9.10
	2.10	2.10.1	2.10.2	2.10.3	2.10.4	2.10.5	2.10.6	2.10.7	2.10.8	2.10.9	2.10.10
3.0	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.1.6	3.1.7	3.1.8	3.1.9	3.1.10
	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	3.2.7	3.2.8	3.2.9	3.2.10
	3.3	3.3.1	3.3.2	3.3.3	3.3.4	3.3.5	3.3.6	3.3.7	3.3.8	3.3.9	3.3.10
	3.4	3.4.1	3.4.2	3.4.3	3.4.4	3.4.5	3.4.6	3.4.7	3.4.8	3.4.9	3.4.10
	3.5	3.5.1	3.5.2	3.5.3	3.5.4	3.5.5	3.5.6	3.5.7	3.5.8	3.5.9	3.5.10
	3.6	3.6.1	3.6.2	3.6.3	3.6.4	3.6.5	3.6.6	3.6.7	3.6.8	3.6.9	3.6.10
	3.7	3.7.1	3.7.2	3.7.3	3.7.4	3.7.5	3.7.6	3.7.7	3.7.8	3.7.9	3.7.10
	3.8	3.8.1	3.8.2	3.8.3	3.8.4	3.8.5	3.8.6	3.8.7	3.8.8	3.8.9	3.8.10
	3.9	3.9.1	3.9.2	3.9.3	3.9.4	3.9.5	3.9.6	3.9.7	3.9.8	3.9.9	3.9.10
	3.10	3.10.1	3.10.2	3.10.3	3.10.4	3.10.5	3.10.6	3.10.7	3.10.8	3.10.9	3.10.10