



# ***AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL***

## ***STEP 2B INITIAL OPTIONS APPRAISAL***

### ***APPENDIX A***

#### ***PERFORMANCE BASED NAVIGATION (PBN) STANDARD INSTRUMENT DEPARTURES (SIDs)***

***Version 2  
PART 7***

**Heathrow**



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### Revision History

Version	Date	Amendment	Author
1.0	28 <sup>th</sup> July 2023	Initial issue	Heathrow Airport Ltd
2.0	07 <sup>th</sup> June 2024	All option outcome statements amended following the revision of the shortlisting methodology to remove reference to AONB's and Richmond Park.	Heathrow Airport Ltd

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.



# Initial Options Appraisal

## PBN Standard Instrument Departures (SIDs)

### Runway 09L



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.

Version 2.0 (June 2024)

# PBN SIDs – RWY 09L Option F



## Option Description

This option was developed to address DP9.

## Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	176,500	+176,500
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	43,500	+33,000
Population experiencing at least one event of N65 (daytime)	1,840,000	+1,840,000
Population experiencing at least one event of N60 (night-time)	488,000	+433,100

## Communities - Air Quality

Introduction of PBN SIDs at Heathrow could affect track distribution below 1000ft within an AQMA. This may or may not have an effect on Air Quality. This is the same for all departure options and is not a differentiating factor at this stage. Any Air Quality impacts will be investigated at Full Options Appraisal (FOA).

## Wider Society – Greenhouse Gas Impact

Metric	Option Value	Difference to Baseline
Overall Track Miles of the option (nm)	438	-2

## Wider Society – Tranquillity & Biodiversity

Metric	Option Value	Difference to Baseline
Total Area of AONBs/National Parks (NPs) overflown between 0-7000ft once a day on average (daytime)	10km <sup>2</sup>	+10km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	8km <sup>2</sup>	+8km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	7km <sup>2</sup>	+7km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	10	+10

## Wider Society – Capacity/Resilience

Expected to perform better than the 'Do Nothing' scenario owing to anticipated improved departure separations.

Heathrow's capacity for this ACP is limited by the existing 480,000 movement cap.

## General Aviation – Access

No additional CAS envisaged.

Systemised SIDs requiring less tactical intervention and with improved CCO could facilitate release of portions of CAS.

SIDs could impact helicopter routes H10, H3 and/or H9.



## General Aviation / Commercial Airlines – Economic impact from increased effective capacity

If this option did enable sponsors to release some portions of CAS there could be a small, positive economic effect on GA operations outside CAS but this is not quantifiable at this stage.

The economic impact on commercial airlines from a reduction in ground delay is expected to provide an overall benefit in comparison to the Baseline.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)	+74,830
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## Commercial Airlines – Training costs

None identified.

## Commercial Airlines – Other costs

None identified.

## Airport/ANSP – Infrastructure costs

Option may require re-location and/or addition of Noise Monitoring Terminals.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs. The implementation of PBN SIDs removes Heathrow’s dependency on conventional ground-based navigation equipment (VORs), which contributes to a reduction in Heathrow and NERL’s operational costs as it enables VOR rationalisation.

## Airport/ANSP – Deployment costs

There will be significant costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, no differences are expected in these costs between the different options.

Option may lead to a change in the number of properties eligible for the noise insulation scheme which could lead to a change in operational costs for the airport.

## Safety

Designing first turn within PANS OPS may be challenging.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

## Adherence to AMS

Supports the AMS through increased systemisation and meeting the Government’s key environmental objectives by utilising PBN. Used in combination with suitable arrival options, the option supports CCO/CDA operations enabling quicker & cleaner journeys. PBN Departures provide opportunity to potentially reduce CAS & enable integration of UAM in the future. Efficiency benefits to the LTMA are not yet known.

## Interdependencies, Conflicts & Trade-Offs

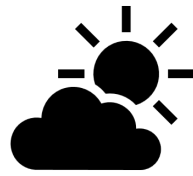
Option is expected to result in conflicts/interdependencies with RAF Northolt, Luton, Biggin Hill, Stansted, London City, Farnborough and Gatwick.

## Outcome of PBN SID RWY09L Option F

Runway 09L is not generally used for departures today due to the legacy of the Cranford Agreement. All departure options therefore perform worse than the Baseline. We have not discontinued any of these options and will investigate the likely impacts of them in Stage 3.

## OPTION CARRIED FORWARD TO STAGE 3

# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY 09L Option F (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option F	
≥ 1	0	1,388,300	
≥ 5	0	1,227,300	
≥ 10	0	1,105,700	
≥ 20	0	859,200	
≥ 50	0	46,800	
≥ 100	0	3,700	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option F	
≥ 1	0	1,840,000	
≥ 5	0	802,600	
≥ 10	0	517,600	
≥ 20	0	345,300	
≥ 50	0	133,200	
≥ 100	0	44,900	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option F	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	0	<b>737,700</b>	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	0	<b>176,500</b>	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
<b>Partial LOAEL</b>	<b>0</b>  (of which 0 brought out of Partial LOAEL by Option)	<b>0</b>	<b>176,500</b>  (of which 138,700 brought into Partial LOAEL by Option)	





# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY09L Option F (Night)

### Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option F	
≥ 1	3,200	606,700	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option F	
≥ 1	54,900	488,000	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

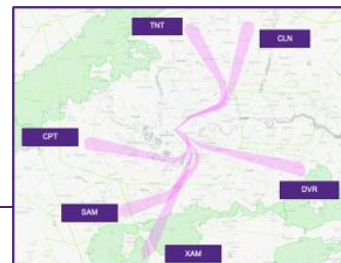
Population count	Baseline	Option F	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	50,400	123,100	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	10,500	43,500	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL		Population experiencing no change in noise exposure within partial LOAEL		Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL		Change in noise exposure map
	Baseline	Option F	Baseline	Option F	Baseline	Option F	
Partial LOAEL	0	0	0	0	43,500	43,500	
	(of which 0 brought out of Partial LOAEL by Option)				(of which 32,900 brought into Partial LOAEL by Option)		



# PBN SIDs – RWY 09L Option G



## Option Description

This option was developed to represent today’s nominal SID centrelines.

## Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	189,800	+189,800
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	27,100	+16,600
Population experiencing at least one event of N65 (daytime)	2,035,000	+2,035,000
Population experiencing at least one event of N60 (night-time)	515,900	+461,000

## Communities - Air Quality

Introduction of PBN SIDs at Heathrow could affect track distribution below 1000ft within an AQMA. This may or may not have an effect on Air Quality. This is the same for all departure options and is not a differentiating factor at this stage. Any Air Quality impacts will be investigated at Full Options Appraisal (FOA).

## Wider Society – Greenhouse Gas Impact

Metric	Option Value	Difference to Baseline
Overall Track Miles of the option (nm)	448	+8

## Wider Society – Tranquillity & Biodiversity

Metric	Option Value	Difference to Baseline
Total Area of AONBs/National Parks (NPs) overflown between 0-7000ft once a day on average (daytime)	32km <sup>2</sup>	+32km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	1km <sup>2</sup>	+1km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	4km <sup>2</sup>	+4km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	8	+8

## Wider Society – Capacity/Resilience

Expected to perform the same as the ‘Do Nothing’ scenario.

Heathrow's capacity for this ACP is limited by the existing 480,000 movement cap.

## General Aviation – Access

No additional CAS envisaged.

Systemised SIDs requiring less tactical intervention and with improved CCO could facilitate release of portions of CAS.

SIDs could impact helicopter routes H10, H3 and/or H9.

## General Aviation / Commercial Airlines – Economic impact from increased effective capacity

If this option did enable sponsors to release some portions of CAS there could be a small, positive economic effect on GA operations outside CAS but this is not quantifiable at this stage.

There is no change to expected economic impact on commercial airlines from a reduction in ground delay in comparison to the Baseline.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)	+75,320
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## Commercial Airlines – Other costs

None identified.

## Commercial Airlines – Training costs

None identified.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs. The implementation of PBN SIDs removes Heathrow's dependency on conventional ground-based navigation equipment (VORs), which contributes to a reduction in Heathrow and NERL's operational costs as it enables VOR rationalisation.

Option may lead to a change in the number of properties eligible for the noise insulation scheme which could lead to a change in operational costs for the airport.

## Airport/ANSP – Infrastructure costs

Option may require re-location and/or addition of Noise Monitoring Terminals.

## Airport/ANSP – Deployment costs

There will be significant costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, no differences are expected in these costs between the different options.

## Safety

Designing first turn within PANS OPS may be challenging.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

## Adherence to AMS

Supports the AMS through increased systemisation and meeting the Government's key environmental objectives by utilising PBN. Used in combination with suitable arrival options, the option supports CCO/CDA operations enabling quicker & cleaner journeys. PBN Departures provide opportunity to potentially reduce CAS & enable integration of UAM in the future. Efficiency benefits to the LTMA are not yet known.

## Interdependencies, Conflicts & Trade-Offs

Option is expected to result in conflicts/interdependencies with RAF Northolt, Luton, Biggin Hill, Stansted, London City, Farnborough and Gatwick.

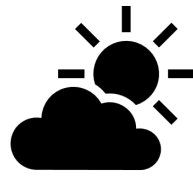
## Outcome of PBN SID RWY09L Option G

Runway 09L is not generally used for departures today due to the legacy of the Cranford Agreement. All departure options therefore perform worse than the Baseline. We have not discontinued any of these options and will investigate the likely impacts of them in Stage 3.

## OPTION CARRIED FORWARD TO STAGE 3



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY 09L Option G (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	0	1,661,000	
≥ 5	0	1,493,600	
≥ 10	0	1,350,400	
≥ 20	0	1,063,200	
≥ 50	0	29,700	
≥ 100	0	0	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option G	
≥ 1	0	2,035,000	
≥ 5	0	867,100	
≥ 10	0	555,900	
≥ 20	0	369,500	
≥ 50	0	125,400	
≥ 100	0	22,300	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option G	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	0	<b>777,900</b>	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	0	<b>189,800</b>	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
<b>Partial LOAEL</b>	<b>0</b>  (of which 0 brought out of Partial LOAEL by Option)	<b>0</b>	<b>189,800</b>  (of which 185,000 brought into Partial LOAEL by Option)	





# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY09L Option G (Night)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	3,200	746,300	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option G	
≥ 1	54,900	515,900	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

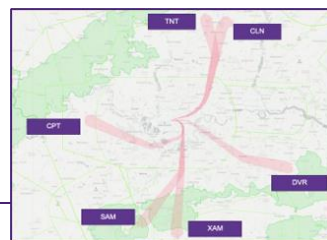
Population count	Baseline	Option G	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	50,400	127,600	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	10,500	27,100	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	100 (of which 100 brought out of Partial LOAEL by Option)	2,400	24,700 (of which 16,700 brought into Partial LOAEL by Option)	



# PBN SIDs – RWY 09L Option H



## Option Description

This option was developed to address DP10.

## Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	178,900	+178,900
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	43,900	+33,400
Population experiencing at least one event of N65 (daytime)	1,598,400	+1,598,400
Population experiencing at least one event of N60 (night-time)	464,800	+409,900

## Communities - Air Quality

Introduction of PBN SIDs at Heathrow could affect track distribution below 1000ft within an AQMA. This may or may not have an effect on Air Quality. This is the same for all departure options and is not a differentiating factor at this stage. Any Air Quality impacts will be investigated at Full Options Appraisal (FOA).

## Wider Society – Greenhouse Gas Impact

Metric	Option Value	Difference to Baseline
Overall Track Miles of the option (nm)	443	+3

## Wider Society – Tranquillity & Biodiversity

Metric	Option Value	Difference to Baseline
Total Area of AONBs/National Parks (NPs) overflown between 0-7000ft once a day on average (daytime)	66km <sup>2</sup>	+66km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	4km <sup>2</sup>	+4km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	7km <sup>2</sup>	+7km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	7	+7

## Wider Society – Capacity/Resilience

Expected to perform better than the 'Do Nothing' scenario owing to anticipated improved departure separations.

Heathrow's capacity for this ACP is limited by the existing 480,000 movement cap.

## General Aviation – Access

No additional CAS envisaged.

Systemised SIDs requiring less tactical intervention and with improved CCO could facilitate release of portions of CAS.

SIDs could impact helicopter routes H10, H3 and/or H9.



## General Aviation / Commercial Airlines – Economic impact from increased effective capacity

If this option did enable sponsors to release some portions of CAS there could be a small, positive economic effect on GA operations outside CAS but this is not quantifiable at this stage.

The economic impact on commercial airlines from a reduction in ground delay is expected to provide an overall benefit in comparison to the Baseline.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)	+75,050
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## Commercial Airlines – Training costs

None identified.

## Commercial Airlines – Other costs

None identified.

## Airport/ANSP – Infrastructure costs

Option may require re-location and/or addition of Noise Monitoring Terminals.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs. The implementation of PBN SIDs removes Heathrow’s dependency on conventional ground-based navigation equipment (VORs), which contributes to a reduction in Heathrow and NERL’s operational costs as it enables VOR rationalisation.

## Airport/ANSP – Deployment costs

There will be significant costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, no differences are expected in these costs between the different options.

Option may lead to a change in the number of properties eligible for the noise insulation scheme which could lead to a change in operational costs for the airport.

## Safety

Designing first turn within PANS OPS may be challenging.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

## Adherence to AMS

Supports the AMS through increased systemisation and meeting the Government’s key environmental objectives by utilising PBN. Used in combination with suitable arrival options, the option supports CCO/CDA operations enabling quicker & cleaner journeys. PBN Departures provide opportunity to potentially reduce CAS & enable integration of UAM in the future. Efficiency benefits to the LTMA are not yet known.

## Interdependencies, Conflicts & Trade-Offs

Option is expected to result in conflicts/interdependencies with RAF Northolt, Luton, Biggin Hill, Stansted, London City, Farnborough and Gatwick.

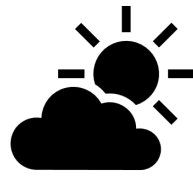
## Outcome of PBN SID RWY09L Option H

Runway 09L is not generally used for departures today due to the legacy of the Cranford Agreement. All departure options therefore perform worse than the Baseline. We have not discontinued any of these options and will investigate the likely impacts of them in Stage 3.

## OPTION CARRIED FORWARD TO STAGE 3



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY 09L Option H (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option H	
≥ 1	0	1,071,100	
≥ 5	0	950,000	
≥ 10	0	878,700	
≥ 20	0	802,300	
≥ 50	0	53,500	
≥ 100	0	3,700	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option H	
≥ 1	0	1,598,400	
≥ 5	0	806,300	
≥ 10	0	514,600	
≥ 20	0	339,400	
≥ 50	0	142,200	
≥ 100	0	44,900	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option H	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	0	734,900	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	0	178,800	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0  (of which 0 brought out of Partial LOAEL by Option)	0	178,800  (of which 146,800 brought into Partial LOAEL by Option)	





# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY 09L Option H (Night)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option H	
≥ 1	3,200	668,100	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option H	
≥ 1	54,900	464,800	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

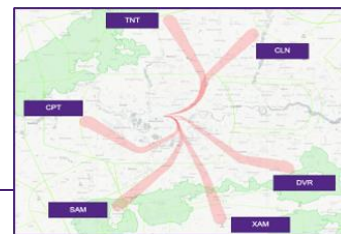
Population count	Baseline	Option H	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	50,400	126,900	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	10,500	43,900	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0 (of which 0 brought out of Partial LOAEL by Option)	0	43,900 (of which 33,400 brought into Partial LOAEL by Option)	



## PBN SIDs – RWY 09L Option I



### Option Description

This option was developed to address a blend of DPs 2, 4, 9 & 10.

### Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	179,800	+179,800
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	44,600	+34,100
Population experiencing at least one event of N65 (daytime)	1,722,200	+1,722,200
Population experiencing at least one event of N60 (night-time)	472,500	+417,600

### Communities - Air Quality

Introduction of PBN SIDs at Heathrow could affect track distribution below 1000ft within an AQMA. This may or may not have an effect on Air Quality. This is the same for all departure options and is not a differentiating factor at this stage. Any Air Quality impacts will be investigated at Full Options Appraisal (FOA).

### Wider Society – Greenhouse Gas Impact

Metric	Option Value	Difference to Baseline
Overall Track Miles of the option (nm)	436	-4

### Wider Society – Tranquillity & Biodiversity

Metric	Option Value	Difference to Baseline
Total Area of AONBs/National Parks (NPs) overflown between 0-7000ft once a day on average (daytime)	12km <sup>2</sup>	+12km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	6km <sup>2</sup>	+6km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	7km <sup>2</sup>	+7km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	8	+8

### Wider Society – Capacity/Resilience

Expected to perform better than the 'Do Nothing' scenario owing to anticipated improved departure separations.

Heathrow's capacity for this ACP is limited by the existing 480,000 movement cap.

### General Aviation – Access

No additional CAS envisaged.

Systemised SIDs requiring less tactical intervention and with improved CCO could facilitate release of portions of CAS.

SIDs could impact helicopter routes H10, H3 and/or H9.

## General Aviation / Commercial Airlines – Economic impact from increased effective capacity

If this option did enable sponsors to release some portions of CAS there could be a small, positive economic effect on GA operations outside CAS but this is not quantifiable at this stage.

The economic impact on commercial airlines from a reduction in ground delay is expected to provide an overall benefit in comparison to the Baseline.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)	+74,590
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## Commercial Airlines – Training costs

None identified.

## Commercial Airlines – Other costs

None identified.

## Airport/ANSP – Infrastructure costs

Option may require re-location and/or addition of Noise Monitoring Terminals.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs. The implementation of PBN SIDs removes Heathrow’s dependency on conventional ground-based navigation equipment (VORs), which contributes to a reduction in Heathrow and NERL’s operational costs as it enables VOR rationalisation.

## Airport/ANSP – Deployment costs

There will be significant costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, no differences are expected in these costs between the different options.

Option may lead to a change in the number of properties eligible for the noise insulation scheme which could lead to a change in operational costs for the airport.

## Safety

Designing first turn within PANS OPS may be challenging.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

## Adherence to AMS

Supports the AMS through increased systemisation and meeting the Government’s key environmental objectives by utilising PBN. Used in combination with suitable arrival options, the option supports CCO/CDA operations enabling quicker & cleaner journeys. PBN Departures provide opportunity to potentially reduce CAS & enable integration of UAM in the future. Efficiency benefits to the LTMA are not yet known.

## Interdependencies, Conflicts & Trade-Offs

Option is expected to result in conflicts/interdependencies with RAF Northolt, Luton, Biggin Hill, Stansted, London City, Farnborough and Gatwick.

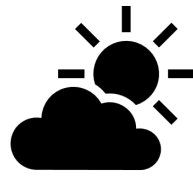
## Outcome of PBN SID RWY09L Option I

Runway 09L is not generally used for departures today due to the legacy of the Cranford Agreement. All departure options therefore perform worse than the Baseline. We have not discontinued any of these options and will investigate the likely impacts of them in Stage 3.

## OPTION CARRIED FORWARD TO STAGE 3



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY09L Option I (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option I	
≥ 1	0	1,398,600	
≥ 5	0	1,195,500	
≥ 10	0	1,073,300	
≥ 20	0	883,600	
≥ 50	0	50,100	
≥ 100	0	3,700	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option I	
≥ 1	0	1,772,200	
≥ 5	0	811,300	
≥ 10	0	515,600	
≥ 20	0	345,300	
≥ 50	0	144,600	
≥ 100	0	45,300	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	0	732,600	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	0	179,800	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0  (of which 0 brought out of Partial LOAEL by Option)	0	179,800  (of which 151,000 brought into Partial LOAEL by Option)	





# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY 09L Option I (Night)

### Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option I	
≥ 1	3,200	646,500	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option I	
≥ 1	54,900	472,500	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	50,400	132,900	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	10,500	44,600	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0 (of which 0 brought out of Partial LOAEL by Option)	0	44,600 (of which 34,100 brought into Partial LOAEL by Option)	

