



AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

STEP 2B INITIAL OPTIONS APPRAISAL

APPENDIX A

PERFORMANCE BASED NAVIGATION (PBN) STANDARD INSTRUMENT DEPARTURES (SIDs) PART 10



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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 09R



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 1.0 (July 2023)

PBN SIDs – RWY 09R 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 _{eq} , 16h)	171,600	+2,400
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	22,000	+1,100
Population experiencing at least one event of N65 (daytime)	2,040,500	-164,500
Population experiencing at least one event of N60 (night-time)	479,600	-12,700

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)	446	+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)	37km ²	-79km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	1km ²	1km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	4km ²	No change
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 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)	+90
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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.

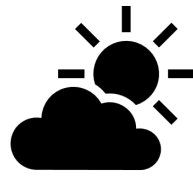
Outcome of PBN SID RWY09R Option G

Option G provides small decreases to the population experiencing at least one N65 (daytime) or N60 (night) noise event when compared to the Baseline. It decreases the total area of AONBs and NPs overflown. The option indicates an improvement in airport resilience. There is no change to Richmond Park overflight.

There is an increase in the population above the Partial LOAEL (night) and a small increase in the population above the Partial LOAEL (daytime). There is an increase in track miles. There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown

OPTION CARRIED FORWARD TO STAGE 3

CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

PBN Departures – RWY 09R Option G (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	3,602,900	1,604,200	
≥ 5	2,049,700	1,456,100	
≥ 10	1,356,800	1,318,700	
≥ 20	672,800	1,027,500	
≥ 50	5,000	15,800	
≥ 100	300	600	
≥ 200	0	0	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option G	
≥ 1	2,205,000	2,040,500	
≥ 5	857,200	847,800	
≥ 10	525,800	509,700	
≥ 20	342,200	335,400	
≥ 50	110,300	112,000	
≥ 100	33,500	22,300	
≥ 200	0	0	

Noise Exposures

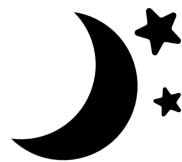
Population count	Baseline	Option G	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	734,200	738,500	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	169,200	171,600	

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	60,400 (of which 27,500 brought out of Partial LOAEL by Option)	56,600	82,100 (of which 29,900 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY 09R Option G (Night)

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	339,800	718,900	
≥ 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	492,300	479,600	
≥ 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 _{night})	119,900	119,400	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	20,900	22,000	

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	8,300 (of which 7,200 brought out of Partial LOAEL by Option)	7,200	13,700 (of which 8,300 brought into Partial LOAEL by Option)	



PBN SIDs – RWY 09R 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 _{eq} , 16h)	193,500	+24,300
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	31,100	+10,200
Population experiencing at least one event of N65 (daytime)	1,668,200	-536,800
Population experiencing at least one event of N60 (night-time)	453,800	-38,500

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	-1

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)	65km ²	-51km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	3km ²	+3km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	7km ²	+3km ²
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	5	+5

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)	+120
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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 RWY09R Option H

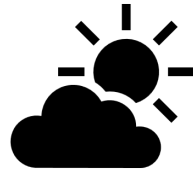
Option H significantly reduces the population experiencing N65 (daytime) and N60 (night) noise events and indicates an improvement in airport resilience when compared with the Baseline. It reduces the total area of AONBs and NPs overflowed and there is a negligible decrease in track miles.

There are increases in Richmond Park overflight and a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflowed. There is an increase in N65 events for AONBs and NPs. Critically, the option failed Test 1 of the shortlisting process as it increases the population above the Partial LOAEL (night) by 50%.

OPTION DISCONTINUED



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

PBN Departures – RWY 09R Option H (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option H	
≥ 1	3,602,900	1,128,600	
≥ 5	2,049,700	1,002,400	
≥ 10	1,356,800	935,900	
≥ 20	672,800	838,100	
≥ 50	5,000	44,500	
≥ 100	300	3,100	
≥ 200	0	0	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option H	
≥ 1	2,205,000	1,668,200	
≥ 5	857,200	768,200	
≥ 10	525,800	483,600	
≥ 20	342,200	339,500	
≥ 50	110,300	144,600	
≥ 100	33,500	52,100	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option H	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	734,200	683,100	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	169,200	193,500	

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
Partial LOAEL	83,700 (of which 56,200 brought out of Partial LOAEL by Option)	45,200	120,900 (of which 80,500 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY 09R Option H (Night)

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option H	
≥ 1	339,800	676,400	
≥ 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	492,300	453,800	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

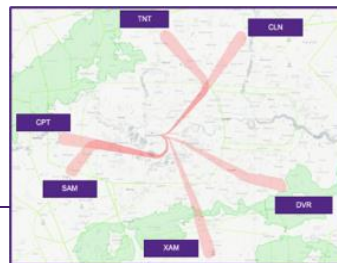
Population count	Baseline	Option H	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L _{night})	119,900	139,500	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	20,900	31,100	

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	6,100 (of which 5,600 brought out of Partial LOAEL by Option)	10,600	20,000 (of which 15,800 brought into Partial LOAEL by Option)	



PBN SIDs – RWY 09R 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 _{eq} , 16h)	174,000	+4,800
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	19,500	-1,400
Population experiencing at least one event of N65 (daytime)	1,825,000	-380,000
Population experiencing at least one event of N60 (night-time)	513,800	+21,500

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)	433	-11

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)	11km ²	-105km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	7km ²	+7km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	5km ²	+1km ²
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	3	+3
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	6	+6

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)	-920
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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.

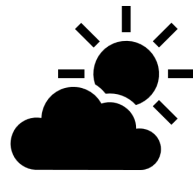
Outcome of PBN SID RWY09R Option I

Option I reduces the total area of AONBs and NPs overflown, reduces the population experiencing at least one N65 (daytime) event, and reduces the track miles. There is a small decrease in the population above the Partial LOAEL (night) and the option indicates an improvement in airport resilience.

There are small increases in the population above the Partial LOAEL (daytime) and in N65 noise events over AONBs and NPs. There are increases in the population experiencing at least one N60 (night) noise event and in the total area of Richmond Park overflown. There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown.

OPTION CARRIED FORWARD TO STAGE 3

CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

PBN Departures – RWY 09R Option I (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option I	
≥ 1	3,602,900	1,341,100	
≥ 5	2,049,700	1,127,000	
≥ 10	1,356,800	1,034,300	
≥ 20	672,800	889,600	
≥ 50	5,000	6,000	
≥ 100	300	600	
≥ 200	0	0	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option I	
≥ 1	2,205,000	1,824,900	
≥ 5	857,200	853,700	
≥ 10	525,800	534,500	
≥ 20	342,200	349,800	
≥ 50	110,300	104,400	
≥ 100	33,500	34,100	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	734,200	767,800	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	169,200	174,000	

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	59,600 (of which 26,700 brought out of Partial LOAEL by Option)	73,400	67,700 (of which 31,500 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY09R Option I (Night)

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option I	
≥ 1	339,800	670,300	
≥ 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 I	
≥ 1	492,300	513,800	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L _{night})	119,900	120,100	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	20,900	19,500	

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
Partial LOAEL	7,000 (of which 5,300 brought out of Partial LOAEL by Option)	9,200	8,600 (of which 3,900 brought into Partial LOAEL by Option)	



PBN SIDs – RWY 09R Option J



Option Description

This option was developed to address stakeholder feedback from Stage 2A engagement to avoid Richmond Park.

Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA _{eq} , 16h)	174,700	+5,500
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	19,400	-1,500
Population experiencing at least one event of N65 (daytime)	1,844,200	-360,800
Population experiencing at least one event of N60 (night-time)	567,900	+75,600

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)	433	-11

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)	9km ²	-106km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	7km ²	+7km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0.0km ²	-4km ²
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	3	+3
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	4	+4

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.

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)	-920
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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 RWY09R Option J

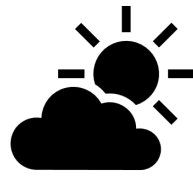
Option J decreases the total area of AONBs and NPs overflown and reduces the population experiencing at least one N65 (daytime) noise event. It decreases the track miles, offers a small reduction in the population above the Partial LOAEL (night) and indicates an improvement in airport resilience.

There are small increases in the population above the Partial LOAEL (daytime) and in the N65 noise events over AONBs and NPs. There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown and a significant increase in the population experiencing at least one N60 (night) noise event. This option will be explored further in Stage 3.

OPTION CARRIED FORWARD TO STAGE 3



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

PBN Departures – RWY 09R Option J (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option J	
≥ 1	3,602,900	1,414,300	
≥ 5	2,049,700	1,192,600	
≥ 10	1,356,800	1,099,300	
≥ 20	672,800	950,700	
≥ 50	5,000	6,300	
≥ 100	300	600	
≥ 200	0	0	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option J	
≥ 1	2,205,000	1,844,200	
≥ 5	857,200	899,200	
≥ 10	525,800	594,800	
≥ 20	342,200	382,000	
≥ 50	110,300	105,200	
≥ 100	33,500	33,700	
≥ 200	0	0	

Noise Exposures

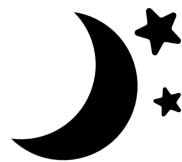
Population count	Baseline	Option J	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	734,200	813,900	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	169,200	174,700	

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	50,500 (of which 17,800 brought out of Partial LOAEL by Option)	84,000	58,000 (of which 23,300 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY09R Option J (Night)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option J	
≥ 1	339,800	723,800	
≥ 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 J	
≥ 1	492,300	567,900	
≥ 5	0	0	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option J	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L _{night})	119,900	123,500	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	20,900	19,400	

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	7,700 (of which 5,600 brought out of Partial LOAEL by Option)	8,300	8,900 (of which 4,000 brought into Partial LOAEL by Option)	

