



***AIRSPACE MODERNISATION AIRSPACE
CHANGE PROPOSAL***

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

APPENDIX A

***PERFORMANCE BASED NAVIGATION (PBN) STANDARD
INSTRUMENT DEPARTURES (SIDs)
PART 2***



Table of Contents

1.	<i>Initial Options Appraisal - Runway 27L</i>	3
2.	<i>Initial Options Appraisal - Runway 27L Option D.....</i>	4
3.	<i>Initial Options Appraisal - Runway 27L Option E</i>	8
4.	<i>Initial Options Appraisal - Runway 27L Option F.....</i>	12
5.	<i>Initial Options Appraisal - Runway 27L Option G.....</i>	16

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)

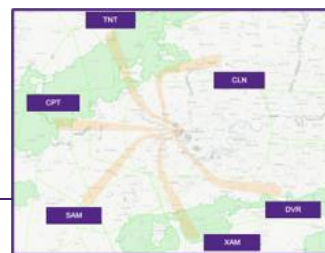
Runway 27L



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 27L Option D



Option Description

This option was developed to address DP5.

Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA _{eq} , 16h)	205,300	+30,500
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	29,600	+3,300
Population experiencing at least one event of N65 (daytime)	803,500	+114,500
Population experiencing at least one event of N60 (night-time)	324,600	+43,900

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)	438	-14

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)	117km ²	-176km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	57km ²	+7km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km 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	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.

Option not expected to impact existing helicopter routes.



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)	-2,460
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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 RWY27L Option D

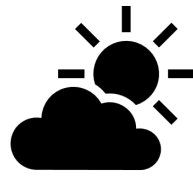
Option D reduces the total track miles and indicates a reduction in the overflight of AONBs and NPs. The option indicates better airport resilience than the Baseline.

There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown and it performs poorly against all the noise metrics. Critically, the option failed Test 1 of the shortlisting process as it creates a 20% increase in the total population within the Partial LOAEL.

OPTION DISCONTINUED



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

PBN Departures – RWY27L Option D (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option D	
≥ 1	1,483,800	799,600	
≥ 5	716,100	708,100	
≥ 10	442,000	644,500	
≥ 20	280,000	475,200	
≥ 50	105,600	133,400	
≥ 100	28,300	6,000	
≥ 200	400	700	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option D	
≥ 1	688,900	803,500	
≥ 5	317,600	420,700	
≥ 10	245,200	291,400	
≥ 20	176,100	197,800	
≥ 50	67,800	84,300	
≥ 100	18,500	19,500	
≥ 200	8,000	7,600	

Noise Exposures

Population count	Baseline	Option D	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	602,400	748,800	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	174,800	205,300	

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	52,900 (of which 23,100 brought out of Partial LOAEL by Option)	81,700	93,800 (of which 53,600 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY27L Option D (Night)

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option D	
≥ 1	164,000	392,900	
≥ 5	1,000	1,200	
≥ 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 D	
≥ 1	280,600	324,600	
≥ 5	20,000	20,000	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

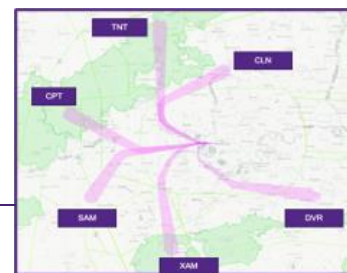
Population count	Baseline	Option D	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L _{night})	105,200	123,100	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	26,300	29,600	

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	1,800 (of which 1,200 brought out of Partial LOAEL by Option)	23,800	5,200 (of which 4,500 brought into Partial LOAEL by Option)	



PBN SIDs – RWY 27L Option E



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 _{eq} , 16h)	120,100	-54,700
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	27,100	+800
Population experiencing at least one event of N65 (daytime)	586,000	-103,000
Population experiencing at least one event of N60 (night-time)	222,700	-58,000

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)	450	-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)	103km ²	-190km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	35km ²	-15km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km 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	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.

Option not expected to impact existing helicopter routes.

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)	-420
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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 RWY27L Option E

Option E performs well against the majority of the noise metrics when compared to the Baseline. It significantly reduces the population within the Partial LOAEL, provides a small decrease in track miles and a reduction in overflight of AONBs and NPs. The option indicates better airport resilience than the Baseline.

There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown and there is a small increase in the population within the LOAEL at night. 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 – RWY27L Option E (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option E	
≥ 1	1,483,800	582,900	
≥ 5	716,100	455,200	
≥ 10	442,000	391,100	
≥ 20	280,000	323,600	
≥ 50	105,600	102,400	
≥ 100	28,300	16,900	
≥ 200	400	1,100	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option E	
≥ 1	688,900	586,000	
≥ 5	317,600	299,900	
≥ 10	245,200	190,300	
≥ 20	176,100	123,100	
≥ 50	67,800	58,000	
≥ 100	18,500	24,600	
≥ 200	8,000	9,400	

Noise Exposures

Population count	Baseline	Option E	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	602,400	660,400	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	174,800	120,100	

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	92,400 (of which 66,600 brought out of Partial LOAEL by Option)	53,300	41,000 (of which 11,900 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY27L Option E (Night)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option E	
≥ 1	164,000	268,000	
≥ 5	1,000	1,400	
≥ 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 E	
≥ 1	280,600	222,700	
≥ 5	20,000	24,800	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option E	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L _{night})	105,200	87,200	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	26,300	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	7,900 (of which 6,700 brought out of Partial LOAEL by Option)	16,300	9,600 (of which 7,500 brought into Partial LOAEL by Option)	



PBN SIDs – RWY 27L Option F



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)	172,700	-2,100
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	29,400	+3,100
Population experiencing at least one event of N65 (daytime)	683,500	-5,500
Population experiencing at least one event of N60 (night-time)	276,600	-4,100

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)	446	-6

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)	88km ²	-205km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	32km ²	-18km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km 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	3	+3

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.

Option not expected to impact existing helicopter routes.

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)	-1,340
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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.

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.

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.

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 RWY27L Option F

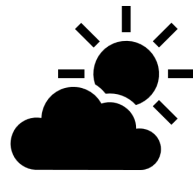
Option F offers small improvements against the majority of the noise metrics when compared to the Baseline. The option indicates a small reduction in track miles and a decrease in overflight of AONBs and NPs.

The option indicates similar airport resilience performance to the Baseline. There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown and there is a significant increase in the population within the LOAEL at night. 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 – RWY27L Option F (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option F	
≥ 1	1,483,800	775,700	
≥ 5	716,100	680,700	
≥ 10	442,000	569,200	
≥ 20	280,000	442,400	
≥ 50	105,600	136,600	
≥ 100	28,300	37,100	
≥ 200	400	800	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option F	
≥ 1	688,900	683,500	
≥ 5	317,600	362,500	
≥ 10	245,200	238,400	
≥ 20	176,100	172,400	
≥ 50	67,800	74,500	
≥ 100	18,500	19,100	
≥ 200	8,000	8,000	

Noise Exposures

Population count	Baseline	Option F	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	602,400	727,600	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	174,800	172,700	

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	9,100 (of which 7,300 brought out of Partial LOAEL by Option)	159,400	11,500 (of which 5,200 brought into Partial LOAEL by Option)	



PBN Departures – RWY27L Option F (Night)



23:00 - 07:00

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option F	
≥ 1	164,000	350,500	
≥ 5	1,000	1,300	
≥ 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	280,600	276,600	
≥ 5	20,000	19,600	
≥ 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 _{night})	105,200	104,100	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	26,300	29,400	

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	0 (of which 0 brought out of Partial LOAEL by Option)	25,400	4,000 (of which 3,100 brought into Partial LOAEL by Option)	



PBN SIDs – RWY 27L Option G



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)	124,400	-50,400
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	21,700	-4,600
Population experiencing at least one event of N65 (daytime)	457,200	-231,800
Population experiencing at least one event of N60 (night-time)	183,000	-97,700

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)	455	+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)	112km ²	-181km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	39km ²	-11km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km 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	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.

Option not expected to impact existing helicopter routes.

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)	+1,070
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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

No IFP Design issues identified.

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, London City, Farnborough and Gatwick.

Outcome of PBN SID RWY27L Option G

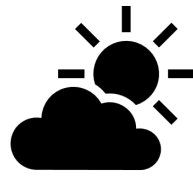
Option G offers significant reductions for the population within the Partial LOAEL (daytime) and the population experiencing at least one N65 (day) or N60 (night) noise event. It indicates a reduction in the population above the Partial LOAEL (night), a reduction in overflight of AONBs and NPs, and an improvement to airport resilience.

There is a small increase in track miles and a significant number of biodiversity sites between 0-3000ft may experience a change in location overflown. 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 – RWY27L Option G (Day)

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	1,483,800	453,700	
≥ 5	716,100	360,500	
≥ 10	442,000	323,800	
≥ 20	280,000	265,800	
≥ 50	105,600	113,400	
≥ 100	28,300	44,700	
≥ 200	400	1,800	

Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option G	
≥ 1	688,900	457,200	
≥ 5	317,600	232,000	
≥ 10	245,200	149,600	
≥ 20	176,100	116,500	
≥ 50	67,800	52,000	
≥ 100	18,500	26,700	
≥ 200	8,000	12,300	

Noise Exposures

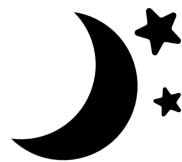
Population count	Baseline	Option G	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	602,400	573,300	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	174,800	124,400	

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	81,300 (of which 60,300 brought out of Partial LOAEL by Option)	65,100	38,300 (of which 9,900 brought into Partial LOAEL by Option)	



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

PBN Departures – RWY 27L Option G (Night)

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	164,000	237,400	
≥ 5	1,000	6,900	
≥ 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	280,600	183,000	
≥ 5	20,000	26,100	
≥ 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})	105,200	70,900	
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	26,300	21,700	

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	9,300 (of which 9,000 brought out of Partial LOAEL by Option)	14,100	7,400 (of which 4,400 brought into Partial LOAEL by Option)	

