



***AIRSPACE MODERNISATION AIRSPACE
CHANGE PROPOSAL***

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

APPENDIX A

***PERFORMANCE BASED NAVIGATION (PBN) STANDARD
INSTRUMENT DEPARTURES (SIDs)
PART 7***



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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 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 1.0 (July 2023)

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 _{eq} , 16h) | 176,500 | +176,500 |
| Population above Partial LOAEL (night-time, LA _{eq} , 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 ² | +10km ² |
| Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime) | 8km ² | +8km ² |
| Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime) | 7km ² | +7km 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 | 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 |
|--|---------|

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.

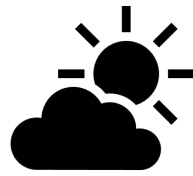
Outcome of PBN SID RWY09L Option F

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 _{den}) | 0 | 737,700 | |
| Total population within Partial LOAEL (>51 dB L _{Aeq,16h}) | 0 | 176,500 | |

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 | 0 (of which 0 brought out of Partial LOAEL by Option) | 0 | 176,500 (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 Overflow | | 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

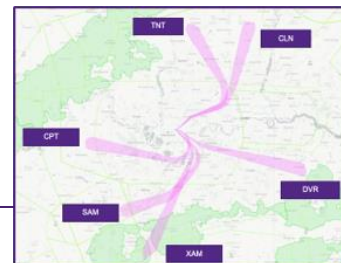
| Population count | Baseline | Option F | Partial LOAEL contour map |
|---|----------|----------|---------------------------|
| Estimated total population above WHO Threshold (>40 dB L _{night}) | 50,400 | 123,100 | |
| Total population within Partial LOAEL (>45 dB L _{Aeq,8h}) | 10,500 | 43,500 | |

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 |
|--------------------------|--|--|---|------------------------------|
| Partial LOAEL | 0 (of which 0 brought out of Partial LOAEL by Option) | 0 | 43,500 (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 _{eq} , 16h) | 189,800 | +189,800 |
| Population above Partial LOAEL (night-time, LA _{eq} , 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 ² | +32km 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 | +4km 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 | 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 |
|--|---------|

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.

Airport/ANSP – Infrastructure costs

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

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 – 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

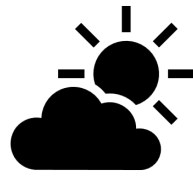
Option is expected to result in conflicts/interdependencies with RAF Northolt, Luton, Biggin Hill, Stansted, London City, Farnborough and Gatwick.

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

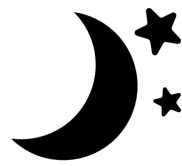
| Population count | Baseline | Option G | Partial LOAEL contour map |
|---|----------|----------------|---------------------------|
| Estimated total population above WHO Threshold (>45 dB L _{den}) | 0 | 777,900 | |
| Total population within Partial LOAEL (>51 dB L _{Aeq,16h}) | 0 | 189,800 | |

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 | 189,800 (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

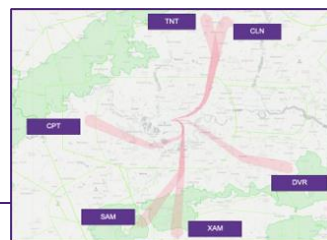
| Population count | Baseline | Option G | Partial LOAEL contour map |
|---|----------|----------|---------------------------|
| Estimated total population above WHO Threshold (>40 dB L _{night}) | 50,400 | 127,600 | |
| Total population within Partial LOAEL (>45 dB L _{Aeq,8h}) | 10,500 | 27,100 | |

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 _{eq} , 16h) | 178,900 | +178,900 |
| Population above Partial LOAEL (night-time, LA _{eq} , 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 ² | +66km ² |
| Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime) | 4km ² | +4km ² |
| Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime) | 7km ² | +7km 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 | 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 |
|--|---------|

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

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Adherence to AMS

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Interdependencies, Conflicts & Trade-Offs

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

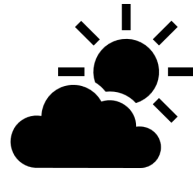
Outcome of PBN SID RWY09L Option H

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 _{den}) | 0 | 734,900 | |
| Total population within Partial LOAEL (>51 dB L _{Aeq,16h}) | 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 _{night}) | 50,400 | 126,900 | |
| Total population within Partial LOAEL (>45 dB L _{Aeq,8h}) | 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 |
|--------------------------|--|---|--|----------|---|--|------------------------------|
| | Baseline | Option H | Baseline | Option H | Baseline | Option H | |
| Partial LOAEL | 0 | (of which 0 brought out of Partial LOAEL by Option) | 0 | 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 _{eq} , 16h) | 179,800 | +179,800 |
| Population above Partial LOAEL (night-time, LA _{eq} , 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 ² | +12km ² |
| Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime) | 6km ² | +6km ² |
| Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime) | 7km ² | +7km 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 | 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 |
|--|---------|

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

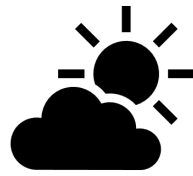
Option is expected to result in conflicts/interdependencies with RAF Northolt, Luton, Biggin Hill, Stansted, London City, Farnborough and Gatwick.

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 – RWY 09L 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 _{den}) | 0 | 732,600 | |
| Total population within Partial LOAEL (>51 dB L _{Aeq,16h}) | 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 _{night}) | 50,400 | 132,900 | |
| Total population within Partial LOAEL (>45 dB L _{Aeq,8h}) | 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) | |

