



***AIRSPACE MODERNISATION AIRSPACE  
CHANGE PROPOSAL***

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

***APPENDIX A***

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

***PART 1***



## Table of Contents

<b>1. Initial Options Appraisal - Runway 27L .....</b>	<b>3</b>
<b>2. Initial Options Appraisal - Runway 27L Baseline 'Do nothing'.....</b>	<b>4</b>
<b>3. Initial Options Appraisal - Runway 27L Option A .....</b>	<b>8</b>
<b>4. Initial Options Appraisal - Runway 27L Option B.....</b>	<b>12</b>
<b>5. Initial Options Appraisal - Runway 27L Option C.....</b>	<b>16</b>

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)

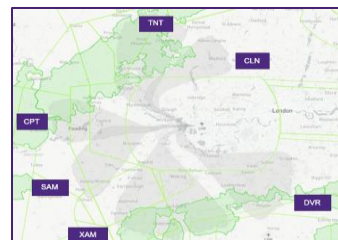
### Runway 27L



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)

**Standard Instrument Departures (SIDs) – Runway (RWY) 27L Baseline ‘Do Nothing’**



**Option Description**

This represents the baseline for ‘Doing Nothing’ with 27L departures. The image represents the areas overflowed at least once per day on average by 27L departures in 2019.

**Communities – Noise Impact on Health & Quality of Life**

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	174,800	N/A
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	26,300	N/A
Population experiencing at least one event of N65 (daytime)	689,000	N/A
Population experiencing at least one event of N60 (night-time)	280,700	N/A

**Communities - Air Quality**

As this is the Baseline ‘Do Nothing’ there is no change to Air Quality.

**Wider Society – Greenhouse Gas Impact**

Metric	Option Value	Difference to Baseline
Overall Track miles (nm)	452	N/A

**Wider Society – Tranquillity & Biodiversity**

Metric	Option Value	Difference to Baseline
Total Area of AONBs/National Parks (NPs) overflowed between 0-7000ft once a day on average (daytime)	293km <sup>2</sup>	N/A
Total Area of AONBs/NPs overflowed experiencing at least one event of N65 on average (daytime)	50km <sup>2</sup>	N/A
Total Area of Richmond Park overflowed between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	N/A
Number of sites (RAMSAR, SAC, SPA, SSSI) overflowed between 0-1640ft which observe a potential change in location overflow	N/A	N/A
Number of sites (RAMSAR, SAC, SPA, SSSI) overflowed between 0-3000ft which observe a potential change in location overflow	N/A	N/A

**Wider Society – Capacity/Resilience**

As this is the Baseline ‘Do Nothing’, there is no impact on Capacity/Resilience.

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

**General Aviation (GA) – Access**

No additional Controlled Airspace (CAS) required.

Option does not facilitate the release of CAS. Furthermore, doing nothing could inhibit adjacent aerodromes from operating Continuous Climb Operations (CCO) and release of any of their CAS volumes.

Option not expected to impact existing helicopter routes.

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

As this is the Baseline ‘Do Nothing’ there is no economic impact from increased effective capacity on General Aviation or Commercial Airlines.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (annual - tonnes)	No change
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## Commercial Airlines – Training costs

Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines.

## Commercial Airlines – Other costs

None identified.

## Airport/Air Navigation Service Provider (ANSP) – Infrastructure costs

Doing nothing means no changes to infrastructure costs.

## Airport/ANSP – Operational costs

Heathrow’s current SIDs are dependent on conventional ground-based navigation equipment (VORs) which are currently undergoing a rationalisation programme by NATS NERL. Heathrow is currently progressing RNAV substitution to mitigate VOR rationalisation however this is an interim measure that can only be used to bridge the gap ahead of Future Airspace Strategy Implementation (FASI).

## Airport/ANSP – Deployment costs

Doing nothing means no deployment costs.

Failure to mitigate the impacts of VOR rationalisation in the long term could result in critical operational issues and significant loss of revenue, as well as not meeting the requirements of the AMS, should a long-term reliance on RNAV substitution not be permitted by the Civil Aviation Authority (CAA).

## Safety

Doing nothing means no Instrument Flight Procedure (IFP) design considerations.

At current traffic levels, there are no safety concerns with the current arrangements at Heathrow. Future traffic growth could however result in increased complexity and workload for Air Traffic Control (ATC) and pilots, which may lead to traffic levels within the London Terminal Manoeuvring Area (LTMA) being capped, or increased aircraft holding on the ground to maintain safety.

## Adherence to Airspace Modernisation Strategy (AMS)

Doing nothing with Westerly departures will not align with the AMS. It will not enable any environmental benefits, increase airspace capacity, reduce noise impacts, introduce PBN or maximise benefits from NERL’s re-design of the LTMA. No change and therefore no ACP submission will not enable enhancements to safety, enhanced integration or reductions in the volume of controlled airspace.

## Interdependencies, Conflicts & Trade-Offs

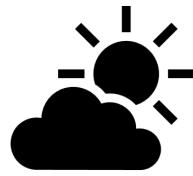
Doing nothing would not be in support of the AMS. There are many interdependencies with routes to/from other airports in the LTMA and without changes to Heathrow's routes, enhancements to the wider LTMA would be severely constrained.

## Outcome of SID RWY27L Baseline ‘Do Nothing’

The Baseline (Do Nothing) Option was discontinued during the Design Principles Evaluation (DPE) phase of Stage 2, owing to the option not meeting the objectives set by the Airspace Modernisation Strategy (AMS).

**OPTION DISCONTINUED (During DPE)**

# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY27L Do Nothing (Day)

### Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Do Nothing	
≥ 1	1,483,800	1,483,800	
≥ 5	716,100	716,100	
≥ 10	442,000	442,000	
≥ 20	280,000	280,000	
≥ 50	105,600	105,600	
≥ 100	28,300	28,300	
≥ 200	400	400	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Do Nothing	
≥ 1	688,900	688,900	
≥ 5	317,600	317,600	
≥ 10	245,200	245,200	
≥ 20	176,100	176,100	
≥ 50	67,800	67,800	
≥ 100	18,500	18,500	
≥ 200	8,000	8,000	

### Noise Exposures

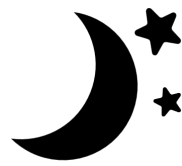
Population count	Baseline	Do Nothing	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	602,400	602,400	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	174,800	174,800	

### 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 (0 brought out of Partial LOAEL by Option)	0	0 (0 brought into Partial LOAEL by Option)	



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY 27L Do Nothing (Night)

### Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Do Nothing	
≥ 1	164,000	164,000	
≥ 5	1,000	1,000	
≥ 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	Do Nothing	
≥ 1	280,600	280,600	
≥ 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	Do Nothing	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	105,200	105,200	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	26,300	26,300	

### 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	0 (0 brought out of Partial LOAEL by Option)	0	0 (0 brought into Partial LOAEL by Option)	



# PBN SIDs – RWY 27L Option A



## Option Description

This option was developed to address DP2.

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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	124,700	-50,100
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	21,800	-4,500
Population experiencing at least one event of N65 (daytime)	450,200	-238,800
Population experiencing at least one event of N60 (night-time)	183,100	-97,600

## 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)	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)	109km <sup>2</sup>	-184km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	39km <sup>2</sup>	-11km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	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.

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

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, Stansted, London City, Farnborough and Gatwick.

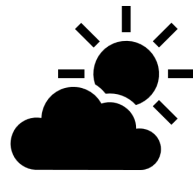
## Outcome of PBN SID RWY27L Option A

Option A significantly reduces the population within the Partial LOAEL (daytime) and the population experiencing at least one noise event during the day (N65) and night (N60). The option indicates a reduction in the population above the Partial LOAEL (night) and the overflight of AONBs and NPs compared to the Baseline.

There is a small increase in track miles and a significant number of biodiversity sites between 0-3000ft may potentially 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 A (Day)

### Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option A	
≥ 1	1,483,800	456,800	
≥ 5	716,100	360,900	
≥ 10	442,000	323,600	
≥ 20	280,000	264,600	
≥ 50	105,600	113,200	
≥ 100	28,300	44,600	
≥ 200	400	1,900	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option A	
≥ 1	688,900	450,200	
≥ 5	317,600	230,300	
≥ 10	245,200	148,600	
≥ 20	176,100	116,400	
≥ 50	67,800	52,000	
≥ 100	18,500	26,900	
≥ 200	8,000	12,300	

### Noise Exposures

Population count	Baseline	Option A	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	602,400	568,800	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	174,800	124,700	

### 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	81,100 (of which 60,200 brought out of Partial LOAEL by Option)	64,900	38,900 (of which 10,100 brought into Partial LOAEL by Option)	



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY27L Option A (Night)

### Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option A	
≥ 1	164,000	235,600	
≥ 5	1,000	7,000	
≥ 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 A	
≥ 1	280,600	183,100	
≥ 5	20,000	26,400	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option A	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	105,200	<b>71,800</b>	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	26,300	<b>21,800</b>	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
<b>Partial LOAEL</b>	<b>9,300</b> (of which 9,000 brought out of Partial LOAEL by Option)	<b>14,400</b>	<b>7,000</b> (of which 4,400 brought into Partial LOAEL by Option)	



## PBN SIDs – RWY 27L Option B

### Option Description

This option was developed to prioritise noise to 4000ft and give more weight to CO<sub>2</sub> from 4000ft to 7000ft.



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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	148,300	-26,500
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	26,500	+200
Population experiencing at least one event of N65 (daytime)	769,900	+80,900
Population experiencing at least one event of N60 (night-time)	252,300	-28,400

### 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)	441	-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)	85km <sup>2</sup>	-208km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	36km <sup>2</sup>	-14km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	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 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)	-1,920
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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 RWY27L Option B

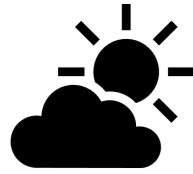
Option B reduces the Partial LOAEL (daytime) and the population experiencing at least one N60 night event. It provides a small decrease in track miles. The option indicates a reduction in overflight of AONBs and NPs compared to the Baseline.

There is a significant number of biodiversity sites between 0-3000ft that may experience a change in location overflown and airport resilience performs the same as the Baseline. Critically, the option failed Test 2 of the shortlisting process as it creates an increase of more than 10% in people who would experience noise events during the day.

**OPTION DISCONTINUED**



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY27L Option B (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option B	
≥ 1	1,483,800	969,300	
≥ 5	716,100	848,700	
≥ 10	442,000	692,600	
≥ 20	280,000	515,100	
≥ 50	105,600	173,500	
≥ 100	28,300	39,600	
≥ 200	400	1,200	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option B	
≥ 1	688,900	769,900	
≥ 5	317,600	313,200	
≥ 10	245,200	191,000	
≥ 20	176,100	146,700	
≥ 50	67,800	62,700	
≥ 100	18,500	25,200	
≥ 200	8,000	9,600	

### Noise Exposures

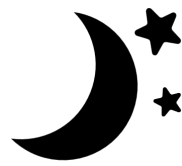
Population count	Baseline	Option B	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	602,400	748,800	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	174,800	148,300	

### 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	68,700 (of which 37,900 brought out of Partial LOAEL by Option)	71,800	45,700 (of which 11,400 brought into Partial LOAEL by Option)	



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY27L Option B (Night)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option B	
≥ 1	164,000	505,800	
≥ 5	1,000	2,000	
≥ 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 B	
≥ 1	280,600	252,300	
≥ 5	20,000	24,600	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option B	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	105,200	92,000	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	26,300	26,500	

### 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	8,300 (of which 7,400 brought out of Partial LOAEL by Option)	14,600	11,000 (of which 7,600 brought into Partial LOAEL by Option)	



## PBN SIDs – RWY 27L Option C



### Option Description

This option was developed to address DP4.

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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	173,300	-1,500
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	36,900	+10,600
Population experiencing at least one event of N65 (daytime)	916,600	+227,600
Population experiencing at least one event of N60 (night-time)	308,800	+28,100

### 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)	433	-19

### 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)	106km <sup>2</sup>	-187km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	34km <sup>2</sup>	-16km <sup>2</sup>
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	4	+4
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	14	+14

### 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)	-3,310
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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.

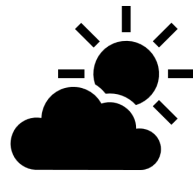
## Outcome of PBN SID RWY27L Option C

Option C offers a small reduction in the population above the Partial LOAEL for daytime and reduces the track miles. The option indicates a reduction in overflight of AONBs and NPs and indicates better airport resilience than the Baseline.

Critically, the option failed Test 1 of the shortlisting process as it creates a 40% increase in the total population within the Partial LOAEL for night.

**OPTION DISCONTINUED**

# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## PBN Departures – RWY27L Option C (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option C	
≥ 1	1,483,800	1,007,800	
≥ 5	716,100	901,700	
≥ 10	442,000	786,500	
≥ 20	280,000	616,400	
≥ 50	105,600	214,600	
≥ 100	28,300	12,300	
≥ 200	400	800	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option C	
≥ 1	688,900	916,600	
≥ 5	317,600	357,500	
≥ 10	245,200	229,400	
≥ 20	176,100	170,200	
≥ 50	67,800	86,600	
≥ 100	18,500	21,500	
≥ 200	8,000	7,700	

### Noise Exposures

Population count	Baseline	Option C	Partial LOAEL contour map	
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	602,400	848,100		
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	174,800	173,300		

### 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	91,600 (of which 55,300 brought out of Partial LOAEL by Option)	49,900	87,000 (of which 53,800 brought into Partial LOAEL by Option)	



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



23:00 - 07:00

## PBN Departures – RWY27L Option C (Night)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option C	
≥ 1	164,000	566,900	
≥ 5	1,000	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 C	
≥ 1	280,600	308,800	
≥ 5	20,000	21,900	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option C	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	105,200	122,700	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	26,300	36,900	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	12,900 (of which 10,700 brought out of Partial LOAEL by Option)	12,400	22,300 (of which 21,200 brought into Partial LOAEL by Option)	

