



***AIRSPACE MODERNISATION AIRSPACE CHANGE  
PROPOSAL***

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

***APPENDIX C***

***VECTORED ARRIVALS  
PART 6***



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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

## Vectored Arrivals

### Runway 27R



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)

# Vectored Arrivals – RWY 27R Option H



## Option Description

This option has a vectoring area with Runway 27R Final Approach joining points between 15 and 19nm.

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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	715,500	+145,300
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	914,000	+102,300
Population experiencing at least one event of N65 (daytime)	1,539,400	-1,652,200
Population experiencing at least one event of N60 (night-time)	2,267,900	-836,800

## Communities - Air Quality

As there is no change to track distribution below 1000ft, there is no effect on Air Quality from this option.

## Wider Society – Greenhouse Gas Impact

Metric	Option Value
Overall Track Miles of the option (nm)	Not possible to assess at this time, owing to uncertainty in new stack locations.

## 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)	144km <sup>2</sup>	+120km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km <sup>2</sup>	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	0km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	0	No change

## Wider Society – Capacity/Resilience

The ability to constrain the vectoring area to joining final approach to within just a 4nm window is untested at Heathrow. There is a chance that the loss of flexibility could result in a degradation in landing rate, as an over delivery of arrivals will result in needing to extend arrival beyond the 4nm swathe. Assuming that can be managed or occasional excursions from the small vectoring area is allowed, running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

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

## General Aviation – Access

No additional CAS envisaged.

Option would not facilitate the release of CAS.

Option not expected to impact existing helicopter routes.

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

No economic effect expected on GA operations.

Running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)

Not able to quantify at this time, owing to uncertainty in new stack locations.

## Commercial Airlines – Other costs

None identified.

## Commercial Airlines – Training costs

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

## Airport/ANSP – Infrastructure costs

No changes to infrastructure costs envisaged.

## Airport/ANSP – Deployment costs

There will be considerable costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, there is not expected to be any differences in these costs between the different options.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs.

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 by enabling an efficient flow of traffic, accommodating demand & providing system resilience, where a sole reliance on PBN Arrivals is not expected to achieve this. A consistently longer final approach could impact landing rates. This will be assessed further in Stage 3 should this option be favourable from an environmental &/or design perspective.

## Interdependencies, Conflicts & Trade-Offs

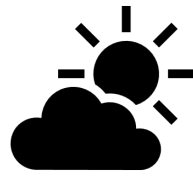
Option may restrict CCO/CDO to/from 7000ft for London City, Biggin Hill, Gatwick and Farnborough. However, a consistently longer final approach could enable improved vertical profiles for London City departures to above 3000/4000ft.

## Outcome of Vectored Arrival RWY27R Option H

All vectored arrival options have been retained into Stage 3 to allow us to determine if it would be beneficial and/or feasible to use different vectoring areas during different periods to provide respite or relief from noise. This will be informed by our Concept work during Stage 3 system assembly.

## OPTION CARRIED FORWARD TO STAGE 3

# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## VECTOR Arrivals – RWY 27R Option H (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option H	
≥ 1	7,318,500	3,545,900	
≥ 5	5,318,700	3,025,900	
≥ 10	4,371,500	2,583,200	
≥ 20	3,320,800	2,036,500	
≥ 50	1,498,900	1,185,200	
≥ 100	360,600	635,900	
≥ 200	209,400	441,700	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option H	
≥ 1	3,191,600	1,539,400	
≥ 5	1,235,700	949,200	
≥ 10	726,400	848,800	
≥ 20	339,500	535,800	
≥ 50	170,200	171,900	
≥ 100	83,900	83,300	
≥ 200	70,000	70,100	

### Noise Exposures

Population count	Baseline	Option H	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	3,163,500	2,226,400	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	570,200	715,500	

### 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	3,600 (of which 3,600 brought out of Partial LOAEL by Option)	530,800	184,600 (of which 148,900 brought into Partial LOAEL by Option)	



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS

## VECTOR Arrivals – RWY 27R Option H (Night)



23:00 - 07:00

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option H	
≥ 1	4,354,100	2,605,700	
≥ 5	1,603,900	1,242,600	
≥ 10	542,400	712,300	
≥ 20	214,900	434,800	
≥ 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	3,104,600	2,267,900	
≥ 5	1,210,300	1,338,700	
≥ 10	889,700	1,041,800	
≥ 20	330,500	468,800	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option H	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	2,208,300	1,825,600	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	811,700	914,000	

### Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	10,700 (of which 10,700 brought out of Partial LOAEL by Option)	735,300	178,600 (of which 112,900 brought into Partial LOAEL by Option)	



# Vectored Arrivals – RWY 27R Option I

## Option Description

This option has a vectoring area with Runway 27R Final Approach joining points between 16 and 20nm.



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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	728,200	+158,000
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	922,200	+110,500
Population experiencing at least one event of N65 (daytime)	1,384,900	-1,806,700
Population experiencing at least one event of N60 (night-time)	2,059,500	-1,045,200

## Communities - Air Quality

As there is no change to track distribution below 1000ft, there is no effect on Air Quality from this option.

## Wider Society – Greenhouse Gas Impact

Metric	Option Value
Overall Track Miles of the option (nm)	Not possible to assess at this time, owing to uncertainty in new stack locations.

## 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)	152km <sup>2</sup>	+128km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km <sup>2</sup>	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	0km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	0	No change

## Wider Society – Capacity/Resilience

The ability to constrain the vectoring area to joining final approach to within just a 4nm window is untested at Heathrow. There is a chance that the loss of flexibility could result in a degradation in landing rate, as an over delivery of arrivals will result in needing to extend arrival beyond the 4nm swathe. Assuming that can be managed or occasional excursions from the small vectoring area is allowed, running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

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

## General Aviation – Access

No additional CAS envisaged.

Option would not facilitate the release of CAS.

Option not expected to impact existing helicopter routes.



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

No economic effect expected on GA operations.

Running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)

Not able to quantify at this time, owing to uncertainty in new stack locations.

## Commercial Airlines – Other costs

None identified.

## Commercial Airlines – Training costs

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

## Airport/ANSP – Infrastructure costs

No changes to infrastructure costs envisaged.

## Airport/ANSP – Deployment costs

There will be considerable costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, there is not expected to be any differences in these costs between the different options.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs.

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 by enabling an efficient flow of traffic, accommodating demand & providing system resilience, where a sole reliance on PBN Arrivals is not expected to achieve this. A consistently longer final approach could impact landing rates. This will be assessed further in Stage 3 should this option be favourable from an environmental &/or design perspective.

## Interdependencies, Conflicts & Trade-Offs

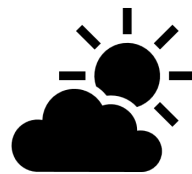
Option may restrict CCO/CDO to/from 7000ft for London City, Biggin Hill, Gatwick and Farnborough. However, a consistently longer final approach could enable improved vertical profiles for London City departures to above 3000/4000ft.

## Outcome of Vectored Arrival RWY27R Option I

All vectored arrival options have been retained into Stage 3 to allow us to determine if it would be beneficial and/or feasible to use different vectoring areas during different periods to provide respite or relief from noise. This will be informed by our Concept work during Stage 3 system assembly.

## OPTION CARRIED FORWARD TO STAGE 3

### VECTOR Arrivals – RWY 27R Option I (Day)



07:00 - 23:00

#### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option I	
≥ 1	7,318,500	3,178,000	
≥ 5	5,318,700	2,808,000	
≥ 10	4,371,500	2,427,700	
≥ 20	3,320,800	2,021,800	
≥ 50	1,498,900	1,074,500	
≥ 100	360,600	599,600	
≥ 200	209,400	461,300	

#### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option I	
≥ 1	3,191,600	1,384,900	
≥ 5	1,235,700	948,900	
≥ 10	726,400	861,000	
≥ 20	339,500	558,600	
≥ 50	170,200	171,900	
≥ 100	83,900	83,300	
≥ 200	70,000	70,100	

#### Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	3,163,500	2,155,300	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	570,200	728,200	

#### 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	3,600 (of which 3,600 brought out of Partial LOAEL by Option)	530,800	197,300 (of which 161,600 brought into Partial LOAEL by Option)	



VECTOR Arrivals – RWY 27R Option I (Night)



23:00 - 07:00

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option I	
≥ 1	4,354,100	2,520,100	
≥ 5	1,603,900	1,104,600	
≥ 10	542,400	667,100	
≥ 20	214,900	453,700	
≥ 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	3,104,600	2,059,500	
≥ 5	1,210,300	1,328,300	
≥ 10	889,700	1,058,900	
≥ 20	330,500	469,400	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	2,208,300	1,771,100	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	811,700	922,200	

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	10,700 (of which 10,700 brought out of Partial LOAEL by Option)	735,800	186,400 (of which 121,200 brought into Partial LOAEL by Option)	



# Vectored Arrivals – RWY 27R Option J



## Option Description

This option has a vectoring area with Runway 27R Final Approach joining points between 17 and 21nm.

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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	742,800	+172,600
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	944,000	+132,300
Population experiencing at least one event of N65 (daytime)	1,282,700	-1,908,900
Population experiencing at least one event of N60 (night-time)	1,942,000	-1,162,700

## Communities - Air Quality

As there is no change to track distribution below 1000ft, there is no effect on Air Quality from this option.

## Wider Society – Greenhouse Gas Impact

Metric	Option Value
Overall Track Miles of the option (nm)	Not possible to assess at this time, owing to uncertainty in new stack locations.

## 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)	130km <sup>2</sup>	+106km <sup>2</sup>
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km <sup>2</sup>	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	0km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	0	No change

## Wider Society – Capacity/Resilience

The ability to constrain the vectoring area to joining final approach to within just a 4nm window is untested at Heathrow. There is a chance that the loss of flexibility could result in a degradation in landing rate, as an over delivery of arrivals will result in needing to extend arrival beyond the 4nm swathe. Assuming that can be managed or occasional excursions from the small vectoring area is allowed, running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

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

## General Aviation – Access

No additional CAS envisaged.

Option would not facilitate the release of CAS.

Option not expected to impact existing helicopter routes.

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

No economic effect expected on GA operations.

Running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)

Not able to quantify at this time, owing to uncertainty in new stack locations.

## Commercial Airlines – Other costs

None identified.

## Commercial Airlines – Training costs

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

## Airport/ANSP – Infrastructure costs

No changes to infrastructure costs envisaged.

## Airport/ANSP – Deployment costs

There will be considerable costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, there is not expected to be any differences in these costs between the different options.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs.

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 by enabling an efficient flow of traffic, accommodating demand & providing system resilience, where a sole reliance on PBN Arrivals is not expected to achieve this. A consistently longer final approach could impact landing rates. This will be assessed further in Stage 3 should this option be favourable from an environmental &/or design perspective.

## Interdependencies, Conflicts & Trade-Offs

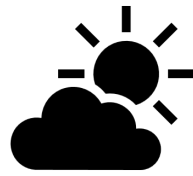
Option may restrict CCO/CDO to/from 7000ft for London City, Biggin Hill, Gatwick and Farnborough. However, a consistently longer final approach could enable improved vertical profiles for London City departures to above 3000/4000ft.

## Outcome of Vectored Arrival RWY27R Option J

All vectored arrival options have been retained into Stage 3 to allow us to determine if it would be beneficial and/or feasible to use different vectoring areas during different periods to provide respite or relief from noise. This will be informed by our Concept work during Stage 3 system assembly.

**OPTION CARRIED FORWARD TO STAGE 3**

### VECTOR Arrivals – RWY 27R Option J (Day)



07:00 - 23:00

#### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option J	
≥ 1	7,318,500	2,695,200	
≥ 5	5,318,700	2,299,700	
≥ 10	4,371,500	1,995,800	
≥ 20	3,320,800	1,695,200	
≥ 50	1,498,900	959,300	
≥ 100	360,600	633,800	
≥ 200	209,400	506,900	

#### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option J	
≥ 1	3,191,600	1,282,700	
≥ 5	1,235,700	925,900	
≥ 10	726,400	853,400	
≥ 20	339,500	588,500	
≥ 50	170,200	171,900	
≥ 100	83,900	83,300	
≥ 200	70,000	70,100	

#### Noise Exposures

Population count	Baseline	Option J	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	3,163,500	2,017,400	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	570,200	742,800	

#### 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	3,600 (of which 3,600 brought out of Partial LOAEL by Option)	530,500	212,200 (of which 174,500 brought into Partial LOAEL by Option)	



VECTOR Arrivals – RWY 27R Option J (Night)



23:00 - 07:00

Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option J	
≥ 1	4,354,100	2,037,400	
≥ 5	1,603,900	1,025,400	
≥ 10	542,400	669,100	
≥ 20	214,900	504,100	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option J	
≥ 1	3,104,600	1,942,000	
≥ 5	1,210,300	1,293,700	
≥ 10	889,700	1,067,700	
≥ 20	330,500	469,400	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option J	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	2,208,300	1,717,400	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	811,700	944,100	

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	11,000 (of which 11,000 brought out of Partial LOAEL by Option)	735,600	208,500 (of which 135,200 brought into Partial LOAEL by Option)	



# Vectored Arrivals – RWY 27R Option K



## Option Description

This option has a vectoring area with Runway 27R Final Approach joining points between 18 and 22nm.

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

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA <sub>eq</sub> , 16h)	751,500	+181,300
Population above Partial LOAEL (night-time, LA <sub>eq</sub> , 8h)	950,400	+138,700
Population experiencing at least one event of N65 (daytime)	880,800	-2,310,800
Population experiencing at least one event of N60 (night-time)	1,739,600	-1,365,100

## Communities - Air Quality

As there is no change to track distribution below 1000ft, there is no effect on Air Quality from this option.

## Wider Society – Greenhouse Gas Impact

Metric	Option Value
Overall Track Miles of the option (nm)	Not possible to assess at this time, owing to uncertainty in new stack locations.

## 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)	101km <sup>2</sup>	+77km <sup>2</sup>
Total Area of AONBs/NPs overflowed experiencing at least one event of N65 on average (daytime)	0km <sup>2</sup>	No change
Total Area of Richmond Park overflowed between 0-7000ft at least once a day on average (daytime)	0km <sup>2</sup>	0km <sup>2</sup>
Number of sites (RAMSAR, SAC, SPA, SSSI) overflowed between 0-1640ft which observe a potential change in location overflow	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflowed between 0-3000ft which observe a potential change in location overflow	0	No change

## Wider Society – Capacity/Resilience

The ability to constrain the vectoring area to joining final approach to within just a 4nm window is untested at Heathrow. There is a chance that the loss of flexibility could result in a degradation in landing rate, as an over delivery of arrivals will result in needing to extend arrival beyond the 4nm swathe. Assuming that can be managed or occasional excursions from the small vectoring area is allowed, running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

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

## General Aviation – Access

No additional CAS envisaged.

Option would not facilitate the release of CAS.

Option not expected to impact existing helicopter routes.



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

No economic effect expected on GA operations.

Running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive speed control on final approach, than on base-leg.

This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.

## General Aviation / Commercial Airlines – Fuel Burn

Change in Fuel Burn (compared to the Baseline - annual - tonnes)

Not able to quantify at this time, owing to uncertainty in new stack locations.

## Commercial Airlines – Other costs

None identified.

## Commercial Airlines – Training costs

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

## Airport/ANSP – Infrastructure costs

No changes to infrastructure costs envisaged.

## Airport/ANSP – Deployment costs

There will be considerable costs associated with deployment in terms of operational training and system upgrades which will be quantified in Stage 3. However, there is not expected to be any differences in these costs between the different options.

## Airport/ANSP – Operational costs

This option is not anticipated to change airport or ANSP operational costs.

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 by enabling an efficient flow of traffic, accommodating demand & providing system resilience, where a sole reliance on PBN Arrivals is not expected to achieve this. A consistently longer final approach could impact landing rates. This will be assessed further in Stage 3 should this option be favourable from an environmental &/or design perspective.

## Interdependencies, Conflicts & Trade-Offs

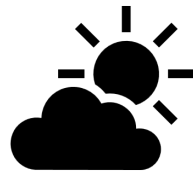
Option may restrict CCO/CDO to/from 7000ft for London City, Biggin Hill, Gatwick and Farnborough. However, a consistently longer final approach could enable improved vertical profiles for London City departures to above 3000/4000ft.

## Outcome of Vectored Arrival RWY27R Option K

All vectored arrival options have been retained into Stage 3 to allow us to determine if it would be beneficial and/or feasible to use different vectoring areas during different periods to provide respite or relief from noise. This will be informed by our Concept work during Stage 3 system assembly.

## OPTION CARRIED FORWARD TO STAGE 3

# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS



07:00 - 23:00

## VECTOR Arrivals – RWY 27R Option K (Day)

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option K	
≥ 1	7,318,500	2,234,600	
≥ 5	5,318,700	1,973,000	
≥ 10	4,371,500	1,705,700	
≥ 20	3,320,800	1,394,400	
≥ 50	1,498,900	872,500	
≥ 100	360,600	656,500	
≥ 200	209,400	542,800	

### Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option K	
≥ 1	3,191,600	880,800	
≥ 5	1,235,700	862,400	
≥ 10	726,400	808,100	
≥ 20	339,500	570,400	
≥ 50	170,200	171,900	
≥ 100	83,900	83,300	
≥ 200	70,000	70,100	

### Noise Exposures

Population count	Baseline	Option K	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L <sub>den</sub> )	3,163,500	1,963,200	
Total population within Partial LOAEL (>51 dB L <sub>Aeq,16h</sub> )	570,200	751,500	

### 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	3,600 (of which 3,600 brought out of Partial LOAEL by Option)	530,500	221,000 (of which 176,900 brought into Partial LOAEL by Option)	



# CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS

## VECTOR Arrivals – RWY 27R Option K (Night)



23:00 - 07:00

### Overflight

Rate	Population Overflow		Overflight (0-7000 ft) contour map
	Baseline	Option K	
≥ 1	4,354,100	1,778,700	
≥ 5	1,603,900	889,700	
≥ 10	542,400	675,400	
≥ 20	214,900	536,400	
≥ 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 K	
≥ 1	3,104,600	1,739,600	
≥ 5	1,210,300	1,304,900	
≥ 10	889,700	1,070,200	
≥ 20	330,500	469,400	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

### Noise Exposures

Population count	Baseline	Option K	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L <sub>night</sub> )	2,208,300	1,688,600	
Total population within Partial LOAEL (>45 dB L <sub>Aeq,8h</sub> )	811,700	950,400	

### 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	11,100 (of which 11,100 brought out of Partial LOAEL by Option)	735,400	215,000 (of which 136,400 brought into Partial LOAEL by Option)	

