AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

STEP 2B
INITIAL OPTIONS APPRAISAL

APPENDIX C

VECTORED ARRIVALS PART 3

Heathrow

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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 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)

Vectored Arrivals – RWY 27L Option H

Option Description

This option has a vectoring area with Runway 27L 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_{eq}, 16h)	691,600	+145,400
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	932,500	+52,300
Population experiencing at least one event of N65 (daytime)	1,525,200	-1,666,300
Population experiencing at least one event of N60 (night-time)	2,154,900	-296,100

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) overflown between 0-7000ft once a day on average (daytime)	166km^2	+134km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km^2	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	Less than 1km^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	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.

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.

Safety

No IFP Design issues identified.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

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.

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.

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.

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.

Outcome of Vectored Arrival RWY27L 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

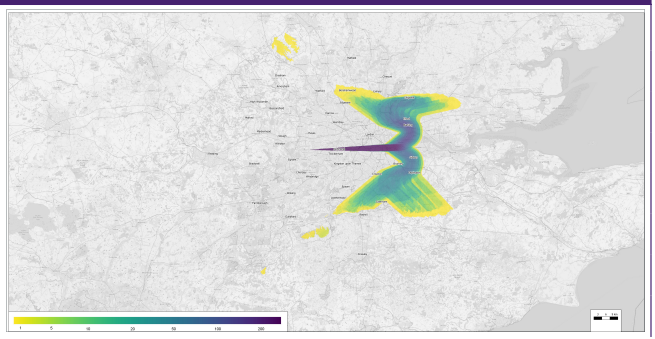
VECTOR Arrivals – RWY 27L Option H (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option H
≥ 1	7,438,600	3,640,700
≥ 5	5,415,000	3,160,100
≥ 10	4,440,400	2,719,500
≥ 20	3,348,800	2,076,700
≥ 50	1,528,700	1,230,600
≥ 100	353,100	602,900
≥ 200	218,500	441,500

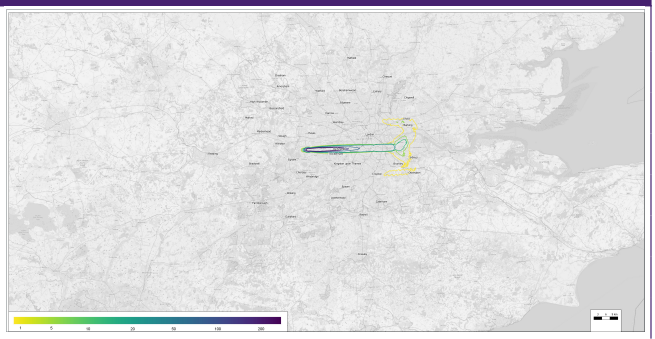
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option H
≥ 1	3,191,500	1,525,200
≥ 5	1,235,200	918,500
≥ 10	693,800	793,100
≥ 20	445,400	668,700
≥ 50	177,500	178,200
≥ 100	105,300	105,700
≥ 200	84,900	86,300

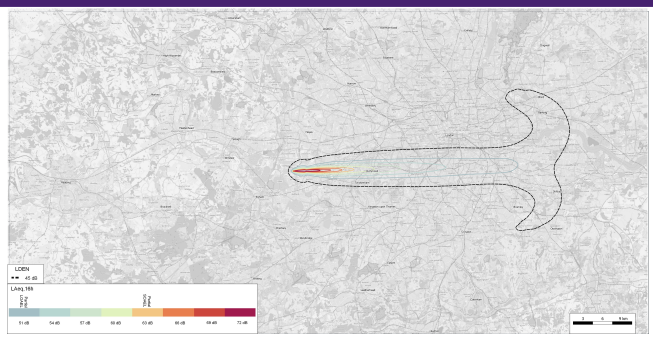
N65 events contour map



Noise Exposures

Population count	Baseline	Option H
Estimated total population above WHO Threshold (>45 dB L_{den})	3,160,200	2,140,500
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	546,200	691,600

Partial LOAEL contour map



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
Partial LOAEL	5,100 (of which 5,100 brought out of Partial LOAEL by Option)	509,700	181,900 (of which 150,600 brought into Partial LOAEL by Option)

Change in noise exposure map

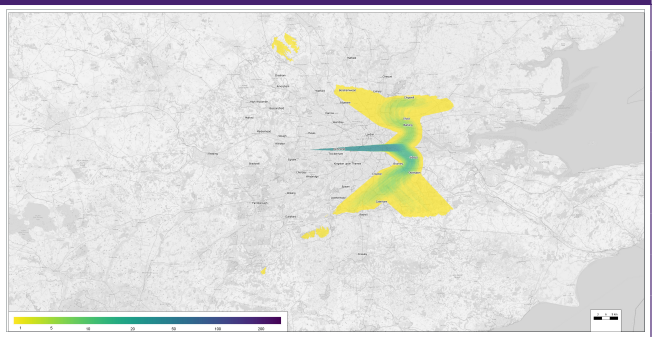
VECTOR Arrivals – RWY 27L Option H (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown	
	Baseline	Option H
≥ 1	3,800,500	2,460,100
≥ 5	1,172,300	907,200
≥ 10	546,400	584,400
≥ 20	295,800	478,200
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

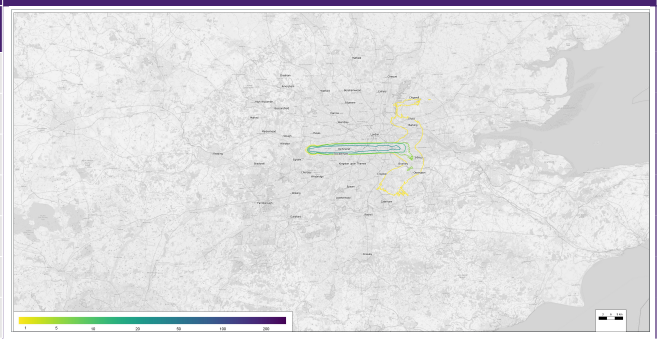
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day	
	Baseline	Option H
≥ 1	2,451,100	2,154,900
≥ 5	1,142,200	1,103,400
≥ 10	881,700	970,800
≥ 20	416,800	536,100
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

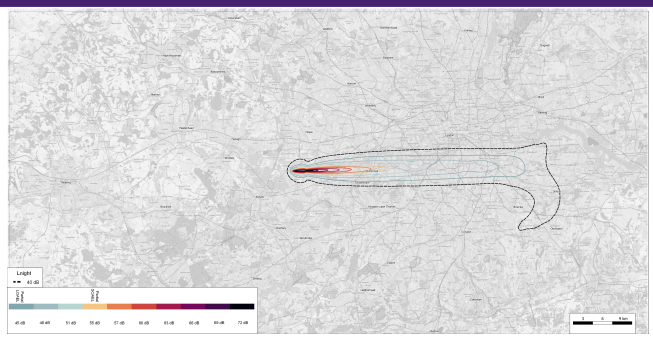
N60 events contour map



Noise Exposures

Population count	Baseline	Option H
Estimated total population above WHO Threshold (>40 dB L_{night})	1,835,500	1,660,500
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	880,200	932,500

Partial LOAEL contour map



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
Partial LOAEL	26,900 (of which 26,700 brought out of Partial LOAEL by Option)	741,900	190,400 (of which 79,000 brought into Partial LOAEL by Option)

Change in noise exposure map

Vectored Arrivals – RWY 27L Option I

Option Description

This option has a vectoring area with Runway 27L 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_{eq}, 16h)	702,900	+156,700
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	948,000	+67,800
Population experiencing at least one event of N65 (daytime)	1,408,000	-1,783,500
Population experiencing at least one event of N60 (night-time)	1,926,000	-525,000

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)	179km^2	+147km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km^2	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	Less than 1km^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	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.

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.

Safety

No IFP Design issues identified.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

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.

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.

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.

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.

Outcome of Vectored Arrival RWY27L 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

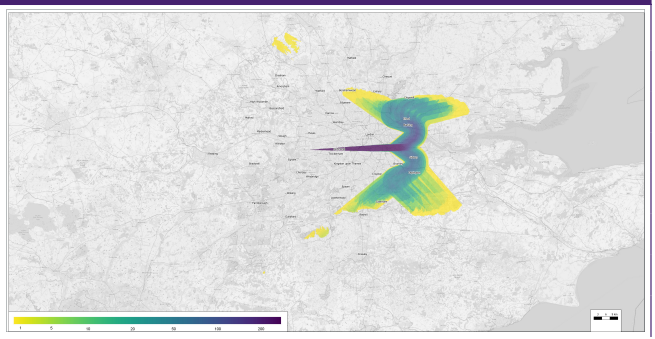
VECTOR Arrivals – RWY 27L Option I (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option I
≥ 1	7,438,600	3,295,800
≥ 5	5,415,000	2,825,500
≥ 10	4,440,400	2,513,000
≥ 20	3,348,800	2,114,700
≥ 50	1,528,700	1,083,900
≥ 100	353,100	558,300
≥ 200	218,500	460,400

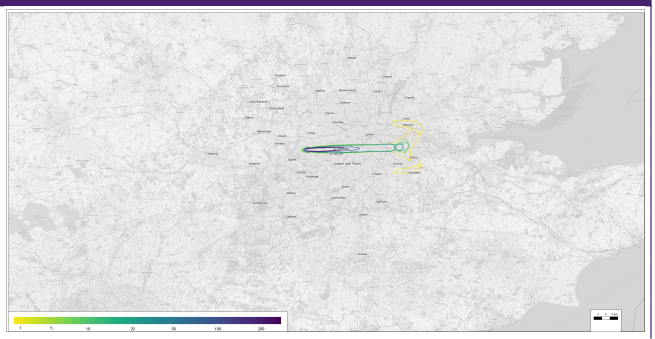
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option I
≥ 1	3,191,500	1,408,000
≥ 5	1,235,200	874,200
≥ 10	693,800	779,200
≥ 20	445,400	698,300
≥ 50	177,500	178,200
≥ 100	105,300	105,700
≥ 200	84,900	86,300

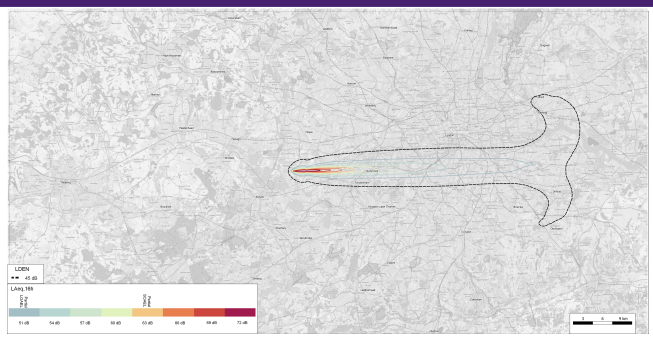
N65 events contour map



Noise Exposures

Population count	Baseline	Option I
Estimated total population above WHO Threshold (>45 dB L_{den})	3,160,200	2,046,100
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	546,200	702,900

Partial LOAEL contour map



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
Partial LOAEL	5,100 (of which 5,100 brought out of Partial LOAEL by Option)	509,100	193,800 (of which 161,800 brought into Partial LOAEL by Option)

Change in noise exposure map

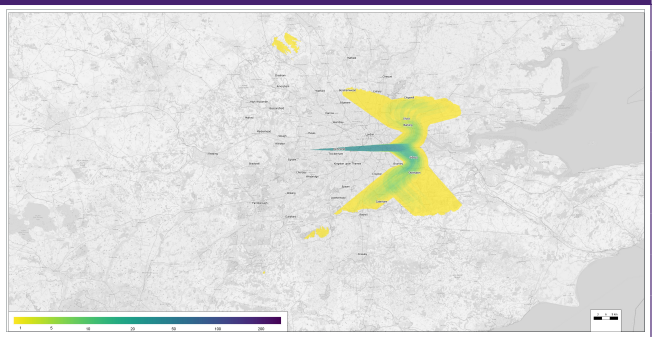
VECTOR Arrivals – RWY 27L Option I (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown	
	Baseline	Option I
≥ 1	3,800,500	2,521,600
≥ 5	1,172,300	818,800
≥ 10	546,400	605,400
≥ 20	295,800	495,000
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

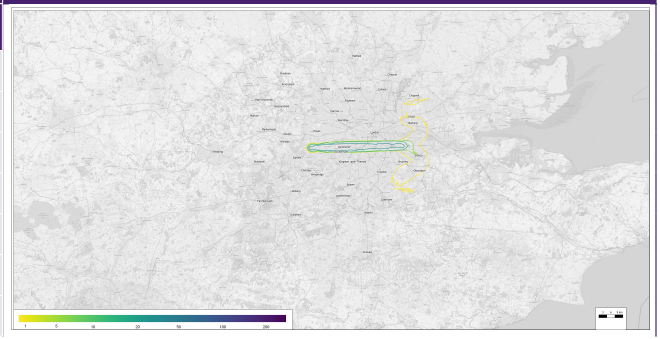
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day	
	Baseline	Option I
≥ 1	2,451,100	1,926,000
≥ 5	1,142,200	1,117,200
≥ 10	881,700	977,800
≥ 20	416,800	552,700
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

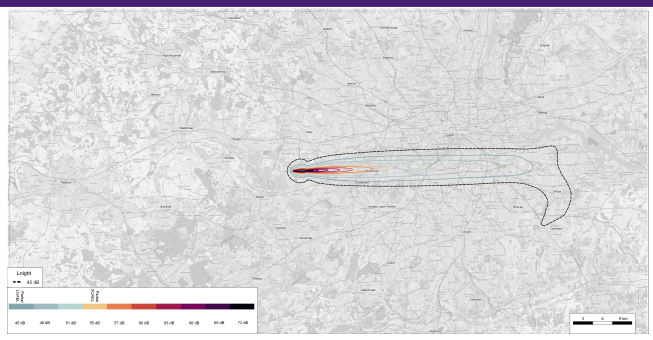
N60 events contour map



Noise Exposures

Population count	Baseline	Option I
Estimated total population above WHO Threshold (>40 dB L_{night})	1,835,500	1,663,800
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	880,200	948,000

Partial LOAEL contour map



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
Partial LOAEL	28,800 (of which 28,600 brought out of Partial LOAEL by Option)	738,400	209,400 (of which 96,400 brought into Partial LOAEL by Option)

Change in noise exposure map

Vectored Arrivals – RWY 27L Option J

Option Description

This option has a vectoring area with Runway 27L 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_{eq}, 16h)	712,600	+166,400
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	955,500	+75,300
Population experiencing at least one event of N65 (daytime)	1,208,800	-1,982,700
Population experiencing at least one event of N60 (night-time)	1,263,900	-1,187,100

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) overflown between 0-7000ft once a day on average (daytime)	159km^2	+127km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km^2	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	Less than 1km^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	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.

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.

Safety

No IFP Design issues identified.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

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.

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.

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.

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.

Outcome of Vectored Arrival RWY27L 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

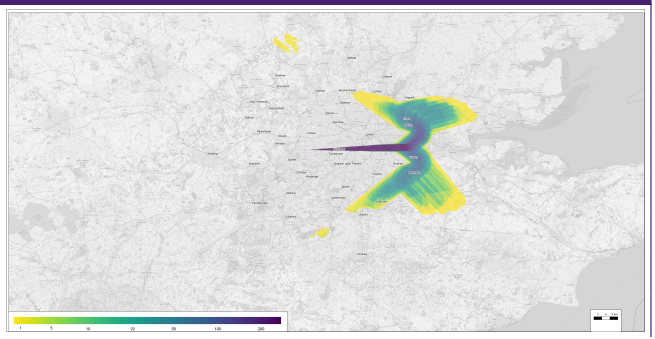
VECTOR Arrivals – RWY 27L Option J (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option J
≥ 1	7,438,600	2,716,600
≥ 5	5,415,000	2,271,500
≥ 10	4,440,400	1,977,000
≥ 20	3,348,800	1,664,900
≥ 50	1,528,700	901,200
≥ 100	353,100	605,800
≥ 200	218,500	483,200

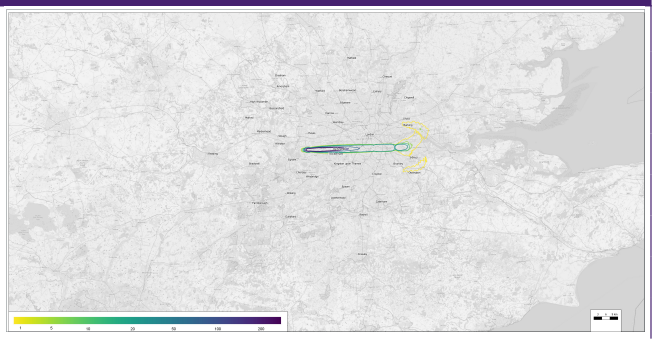
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option J
≥ 1	3,191,500	1,208,800
≥ 5	1,235,200	842,600
≥ 10	693,800	777,200
≥ 20	445,400	707,900
≥ 50	177,500	178,200
≥ 100	105,300	105,700
≥ 200	84,900	86,300

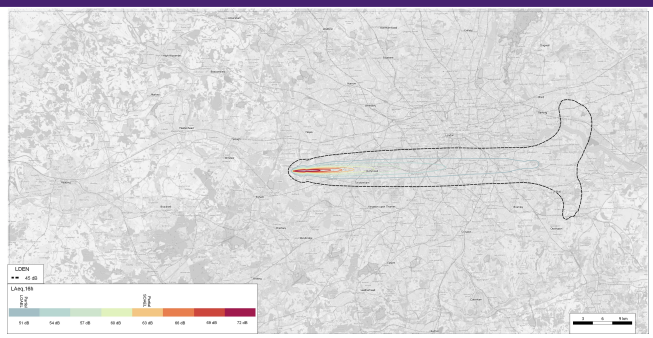
N65 events contour map



Noise Exposures

Population count	Baseline	Option J
Estimated total population above WHO Threshold (>45 dB L_{den})	3,160,200	1,896,900
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	546,200	712,600

Partial LOAEL contour map



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
Partial LOAEL	5,100 (of which 5,100 brought out of Partial LOAEL by Option)	509,000	203,600 (of which 171,500 brought into Partial LOAEL by Option)

Change in noise exposure map

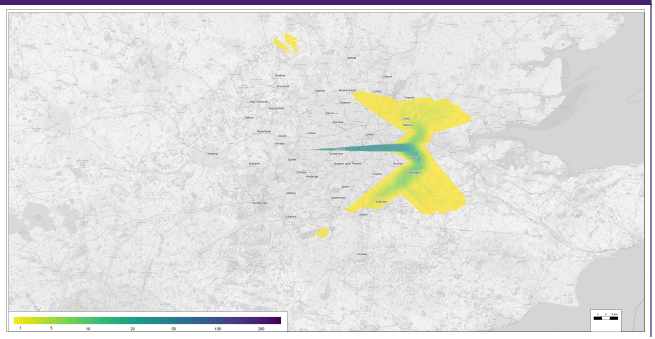
VECTOR Arrivals – RWY 27L Option J (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown	
	Baseline	Option J
≥ 1	3,800,500	1,957,400
≥ 5	1,172,300	818,800
≥ 10	546,400	615,700
≥ 20	295,800	519,200
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

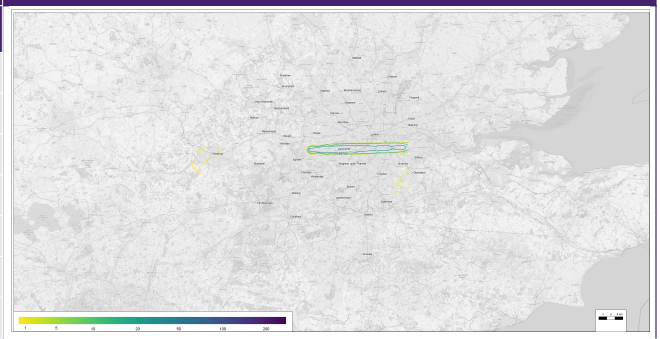
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day	
	Baseline	Option J
≥ 1	2,451,100	1,263,900
≥ 5	1,142,200	1,074,700
≥ 10	881,700	983,700
≥ 20	416,800	555,500
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

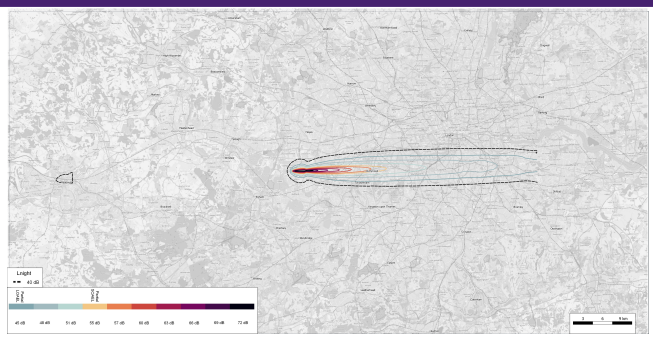
N60 events contour map



Noise Exposures

Population count	Baseline	Option J
Estimated total population above WHO Threshold (>40 dB L_{night})	1,835,500	1,480,700
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	880,200	955,500

Partial LOAEL contour map



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
Partial LOAEL	28,700 (of which 28,500 brought out of Partial LOAEL by Option)	743,300	212,000 (of which 103,700 brought into Partial LOAEL by Option)

Change in noise exposure map

Vectored Arrivals – RWY 27L Option K

Option Description

This option has a vectoring area with Runway 27L 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_{eq}, 16h)	714,000	+167,800
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	964,000	+83,800
Population experiencing at least one event of N65 (daytime)	1,061,800	-2,129,700
Population experiencing at least one event of N60 (night-time)	1,543,600	-907,400

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)	115km^2	+83km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	0km^2	No change
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	Less than 1km^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	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.

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.

Safety

No IFP Design issues identified.

Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.

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.

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.

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.

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.

Outcome of Vectored Arrival RWY27L 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

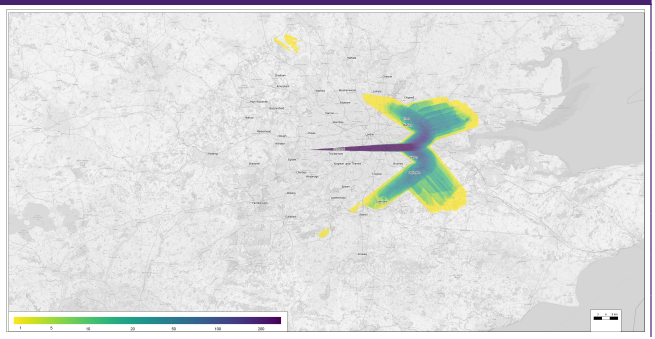
VECTOR Arrivals – RWY 27L Option K (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option K
≥ 1	7,438,600	2,245,000
≥ 5	5,415,000	1,903,500
≥ 10	4,440,400	1,603,000
≥ 20	3,348,800	1,283,800
≥ 50	1,528,700	825,300
≥ 100	353,100	633,700
≥ 200	218,500	515,400

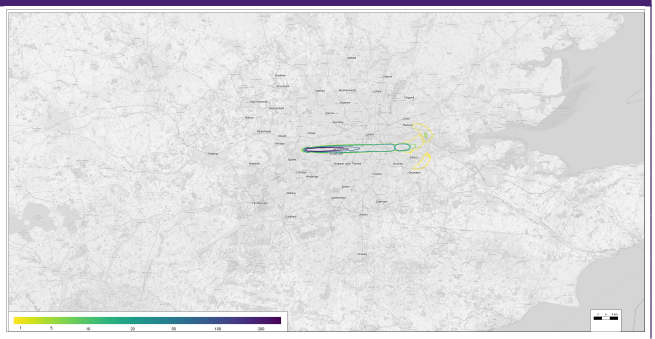
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option K
≥ 1	3,191,500	1,061,800
≥ 5	1,235,200	848,200
≥ 10	693,800	780,500
≥ 20	445,400	721,300
≥ 50	177,500	178,200
≥ 100	105,300	105,700
≥ 200	84,900	86,400

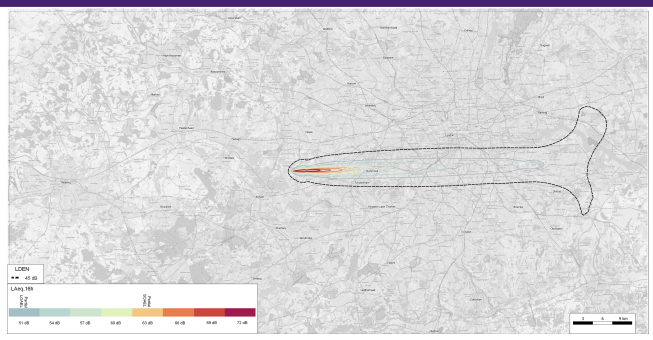
N65 events contour map



Noise Exposures

Population count	Baseline	Option K
Estimated total population above WHO Threshold (>45 dB L_{den})	3,160,200	1,849,000
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	546,200	714,000

Partial LOAEL contour map



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
Partial LOAEL	5,100 (of which 5,100 brought out of Partial LOAEL by Option)	508,900	205,100 (of which 172,200 brought into Partial LOAEL by Option)

Change in noise exposure map

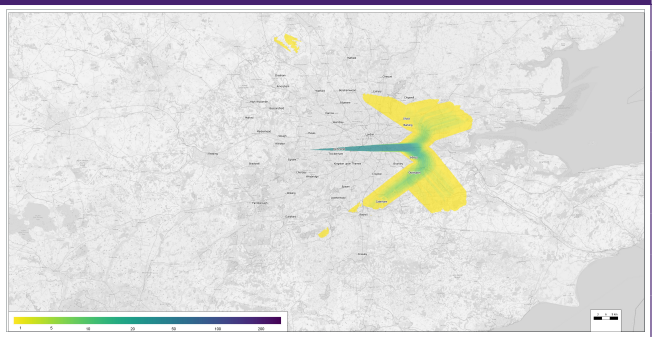
VECTOR Arrivals – RWY 27L Option K (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown	
	Baseline	Option K
≥ 1	3,800,500	1,540,000
≥ 5	1,172,300	796,100
≥ 10	546,400	631,400
≥ 20	295,800	546,800
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

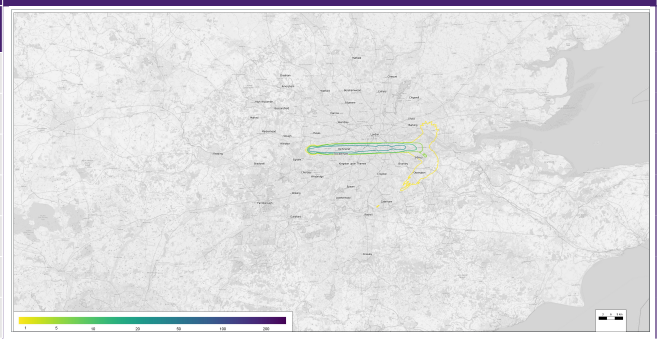
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day	
	Baseline	Option K
≥ 1	2,451,100	1,543,600
≥ 5	1,142,200	1,166,400
≥ 10	881,700	1,011,500
≥ 20	416,800	555,500
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

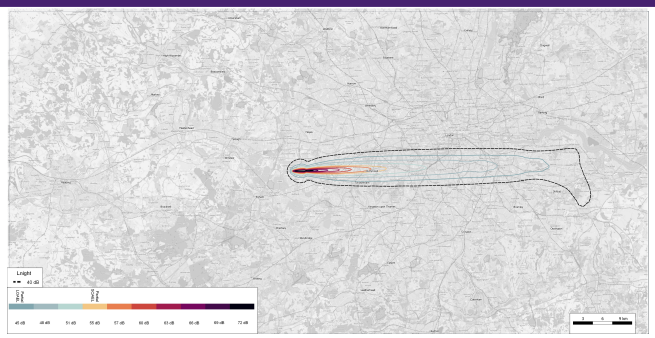
N60 events contour map



Noise Exposures

Population count	Baseline	Option K
Estimated total population above WHO Threshold (>40 dB L_{night})	1,835,500	1,643,400
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	880,200	964,000

Partial LOAEL contour map



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
Partial LOAEL	28,700 (of which 28,500 brought out of Partial LOAEL by Option)	743,200	220,500 (of which 104,600 brought into Partial LOAEL by Option)

Change in noise exposure map