AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

STEP 2B
INITIAL OPTIONS APPRAISAL

APPENDIX C

VECTORED ARRIVALS
Runway 09L - Part 8

Heathrow

Table of Contents

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.

Vectored Arrivals – RWY 09L Option D

Option Description

This option has a vectoring area with Runway 09L Final Approach joining points between 11 and 15nm.

Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA_{eq}, 16h)	31,400	+300
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	31,500	No change
Population experiencing at least one event of N65 (daytime)	230,100	-7,200
Population experiencing at least one event of N60 (night-time)	207,200	+75,800

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)	236km^2	+39km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	59km^2	+15km^2
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	0km^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, there is no other evidence to suggest an optimal landing rate cannot be achieved with this length final.

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.

Assuming a smaller vectoring area has no negative effect on capacity, vectoring to final approach is expected to deliver the required landing rate.

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 RAF Northolt, Gatwick and Farnborough, subject to the preferred options taken forward by those airports.

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 and providing system resilience to the benefit of airspace users, where a sole reliance on PBN Arrivals is not expected to achieve this.

Outcome of Vectored Arrival RWY09L Option D

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

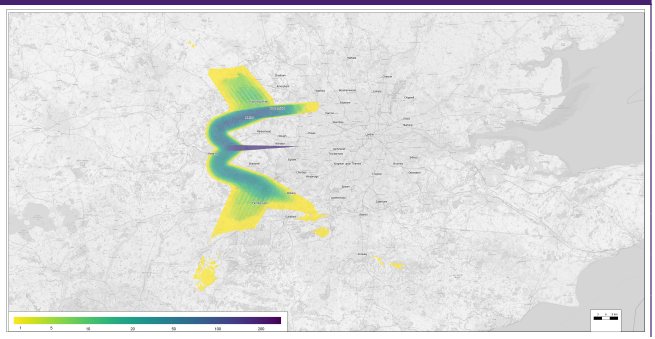
VECTOR Arrivals – RWY 09L Option D (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option D
≥ 1	2,227,400	892,600
≥ 5	1,207,700	622,700
≥ 10	644,100	358,400
≥ 20	263,900	208,600
≥ 50	33,600	58,000
≥ 100	19,600	22,200
≥ 200	0	0

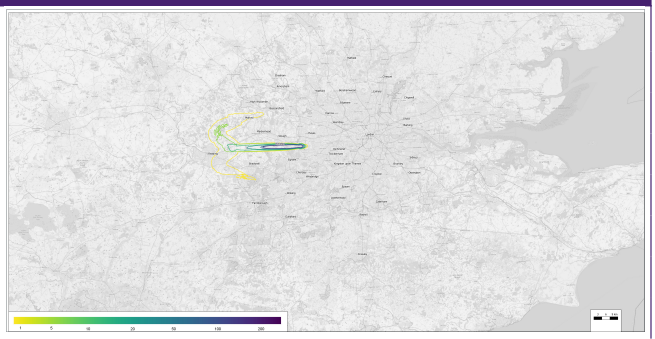
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option D
≥ 1	237,300	230,100
≥ 5	57,800	66,700
≥ 10	45,400	53,400
≥ 20	41,600	41,600
≥ 50	31,400	30,900
≥ 100	27,100	27,300
≥ 200	0	0

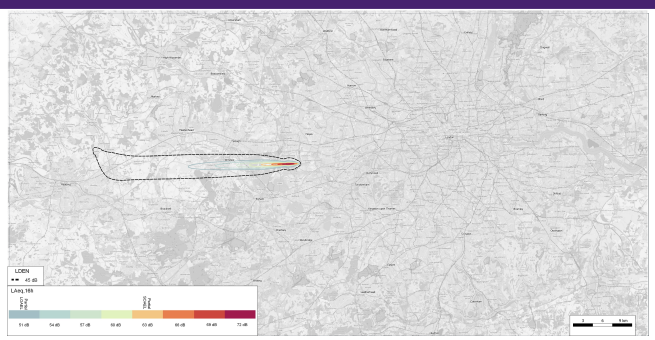
N65 events contour map



Noise Exposures

Population count	Baseline	Option D
Estimated total population above WHO Threshold (>45 dB L_{den})	62,000	66,300
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	31,100	31,300

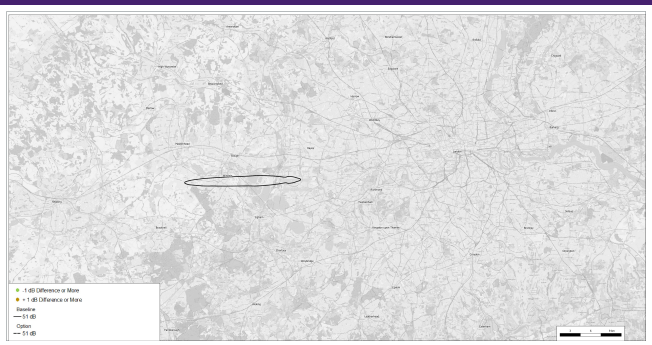
Partial LOAEL contour map



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	0 (of which 0 brought out of Partial LOAEL by Option)	31,100	200 (of which 200 brought into Partial LOAEL by Option)

Change in noise exposure map



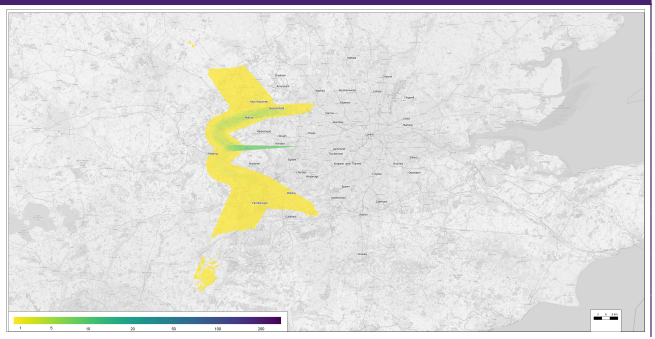
VECTOR Arrivals – RWY 09L Option D (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown	
	Baseline	Option D
≥ 1	200,400	227,800
≥ 5	20,600	23,900
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

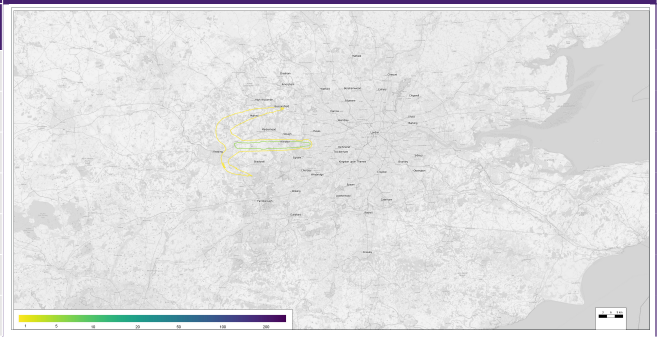
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day	
	Baseline	Option D
≥ 1	131,400	207,200
≥ 5	46,500	49,100
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

N60 events contour map



Noise Exposures

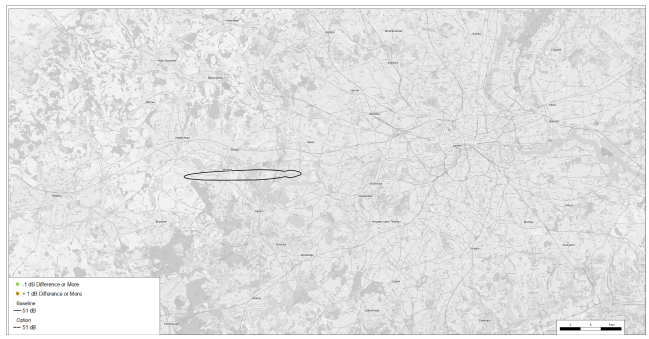
Population count	Baseline	Option D
Estimated total population above WHO Threshold (>40 dB L_{night})	46,600	46,700
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	31,500	31,500

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	0 (of which 0 brought out of Partial LOAEL by Option)	31,500	0 (of which 0 brought into Partial LOAEL by Option)

Change in noise exposure map



Vectored Arrivals – RWY 09L Option E

Option Description

This option has a vectoring area with Runway 09L Final Approach joining points between 12 and 16nm.

Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA_{eq}, 16h)	31,300	+200
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	31,500	No change
Population experiencing at least one event of N65 (daytime)	250,300	+13,000
Population experiencing at least one event of N60 (night-time)	212,300	+80,900

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)	244km^2	+47km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	64km^2	+20km^2
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	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, there is no other evidence to suggest an optimal landing rate cannot be achieved with this length final.

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.

Assuming a smaller vectoring area has no negative effect on capacity, vectoring to final approach is expected to deliver the required landing rate.

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 RAF Northolt, Gatwick and Farnborough, subject to the preferred options taken forward by those airports.

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 and providing system resilience to the benefit of airspace users, where a sole reliance on PBN Arrivals is not expected to achieve this.

Outcome of Vectored Arrival RWY09L Option E

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

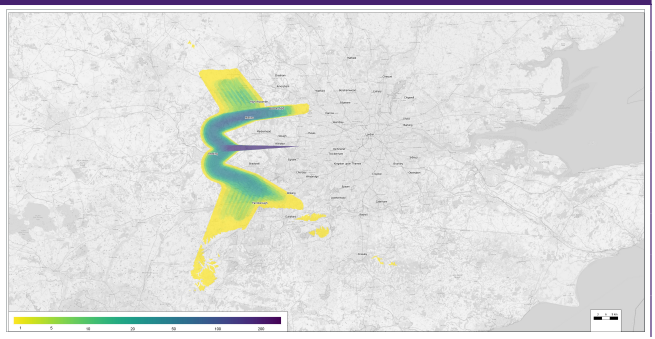
VECTOR Arrivals – RWY 09L Option E (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option E
≥ 1	2,227,400	833,000
≥ 5	1,207,700	584,500
≥ 10	644,100	379,800
≥ 20	263,900	225,300
≥ 50	33,600	51,500
≥ 100	19,600	27,800
≥ 200	0	0

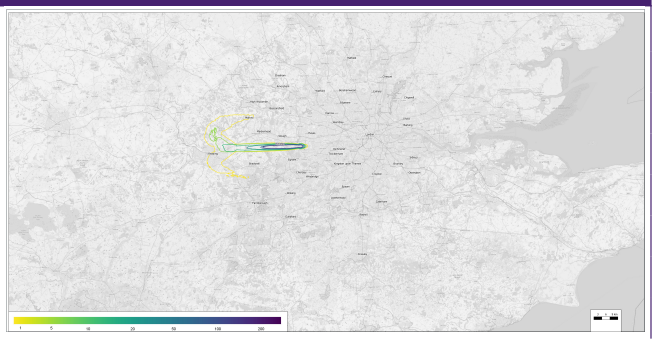
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option E
≥ 1	237,300	250,300
≥ 5	57,800	62,800
≥ 10	45,400	57,000
≥ 20	41,600	41,600
≥ 50	31,400	30,900
≥ 100	27,100	27,300
≥ 200	0	0

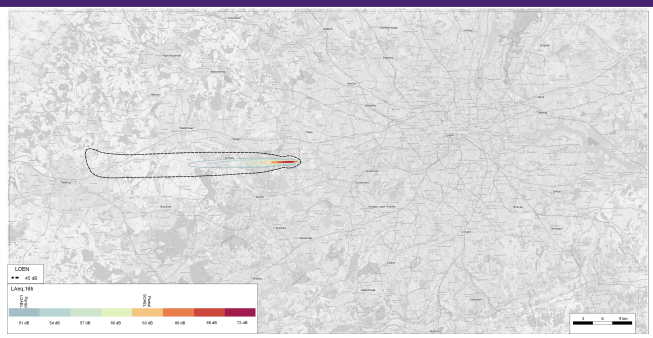
N65 events contour map



Noise Exposures

Population count	Baseline	Option E
Estimated total population above WHO Threshold (>45 dB L_{den})	62,000	67,900
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	31,100	31,300

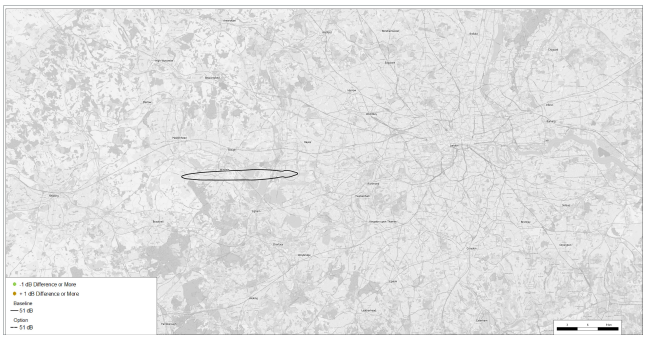
Partial LOAEL contour map



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	0 (of which 0 brought out of Partial LOAEL by Option)	31,100	200 (of which 200 brought into Partial LOAEL by Option)

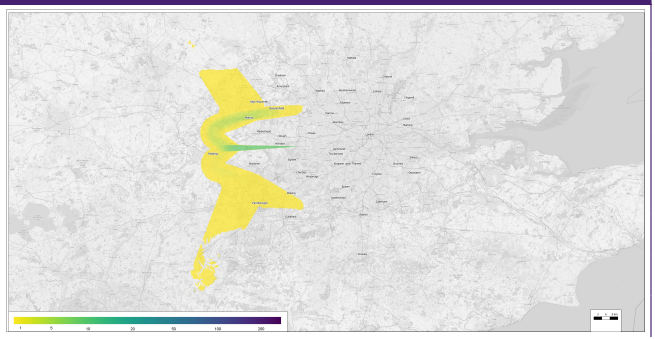
Change in noise exposure map



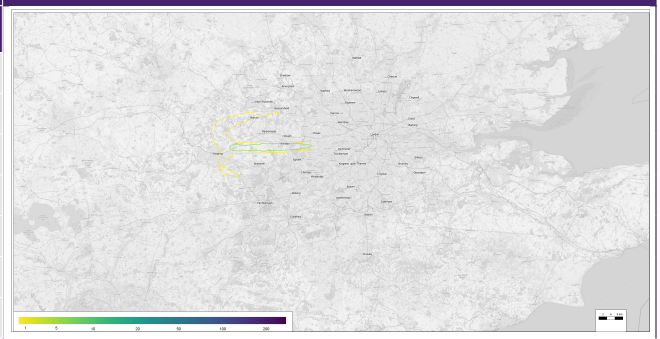
VECTOR Arrivals – RWY 09L Option E (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option E	
≥ 1	200,400	253,700	
≥ 5	20,600	32,600	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

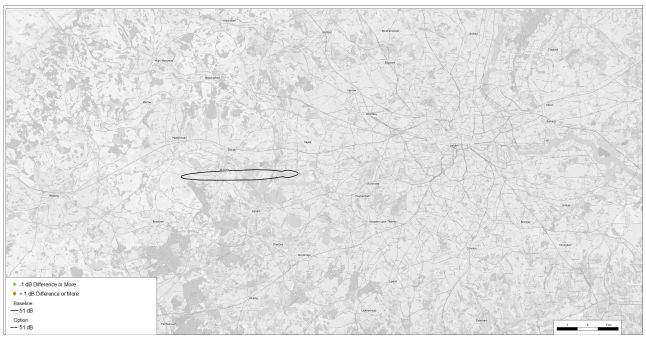
Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option E	
≥ 1	131,400	212,300	
≥ 5	46,500	56,600	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option E	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L_{night})	46,600	50,900	
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	31,500	31,500	

Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0 (of which 0 brought out of Partial LOAEL by Option)	31,500	0 (of which 0 brought into Partial LOAEL by Option)	

Vectored Arrivals – RWY 09L Option F

Option Description

This option has a vectoring area with Runway 09L Final Approach joining points between 13 and 17nm.

Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA_{eq}, 16h)	31,300	+200
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	31,500	No change
Population experiencing at least one event of N65 (daytime)	244,300	+7,000
Population experiencing at least one event of N60 (night-time)	205,000	+73,600

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)	263km^2	+66km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	69km^2	+25km^2
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	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, there is no other evidence to suggest an optimal landing rate cannot be achieved with this length final.

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.

Assuming a smaller vectoring area has no negative effect on capacity, vectoring to final approach is expected to deliver the required landing rate.

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 RAF Northolt, Gatwick and Farnborough, subject to the preferred options taken forward by those airports.

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 and providing system resilience to the benefit of airspace users, where a sole reliance on PBN Arrivals is not expected to achieve this.

Outcome of Vectored Arrival RWY09L Option F

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

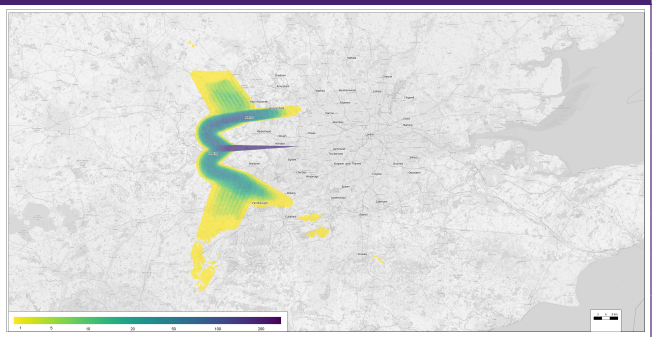
VECTOR Arrivals – RWY 09L Option F (Day)

07:00 - 23:00

Overflight

Rate	Population Overflown	
	Baseline	Option F
≥ 1	2,227,400	716,800
≥ 5	1,207,700	473,200
≥ 10	644,100	375,600
≥ 20	263,900	219,800
≥ 50	33,600	43,700
≥ 100	19,600	32,500
≥ 200	0	0

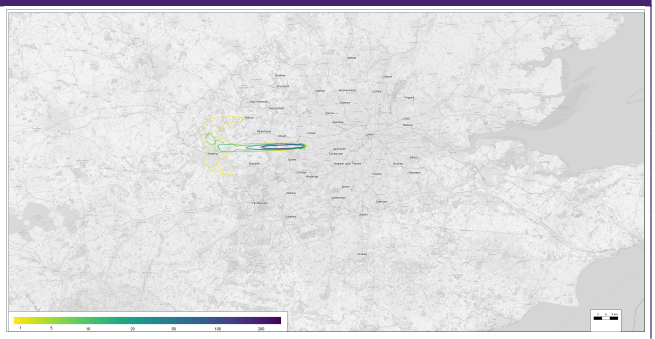
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day	
	Baseline	Option F
≥ 1	237,300	244,300
≥ 5	57,800	66,300
≥ 10	45,400	58,700
≥ 20	41,600	41,600
≥ 50	31,400	30,900
≥ 100	27,100	27,300
≥ 200	0	0

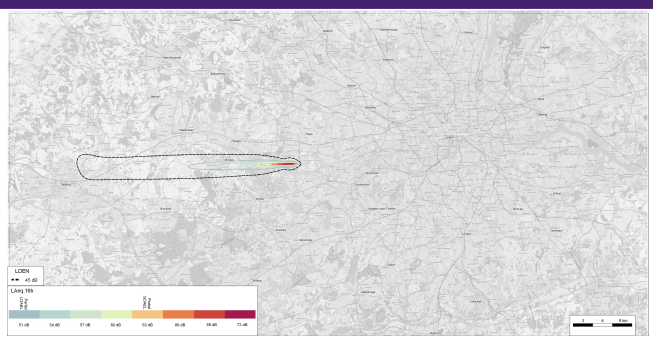
N65 events contour map



Noise Exposures

Population count	Baseline	Option F
Estimated total population above WHO Threshold (>45 dB L_{den})	62,000	70,000
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	31,100	31,300

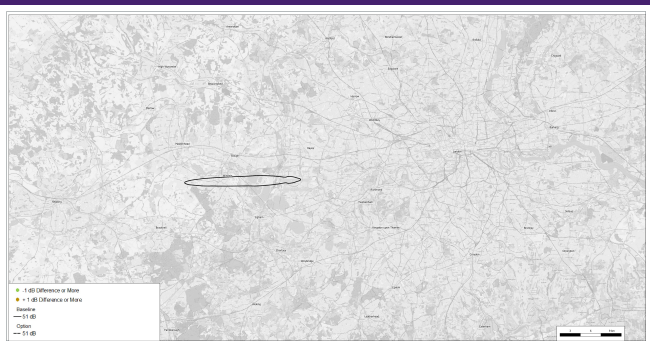
Partial LOAEL contour map



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	0 (of which 0 brought out of Partial LOAEL by Option)	31,100	200 (of which 200 brought into Partial LOAEL by Option)

Change in noise exposure map



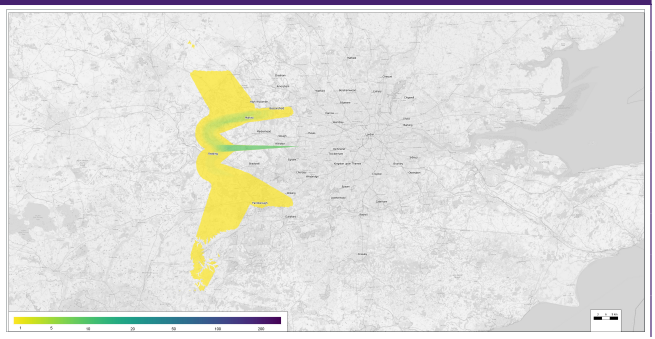
VECTOR Arrivals – RWY 09L Option F (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown	
	Baseline	Option F
≥ 1	200,400	234,700
≥ 5	20,600	34,900
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

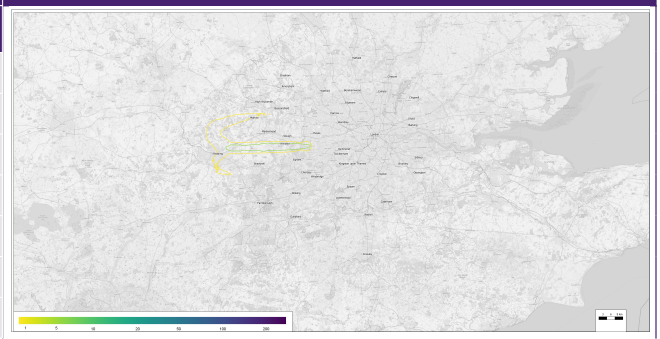
Overflight (0-7000 ft) contour map



Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day	
	Baseline	Option F
≥ 1	131,400	205,000
≥ 5	46,500	58,000
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

N60 events contour map



Noise Exposures

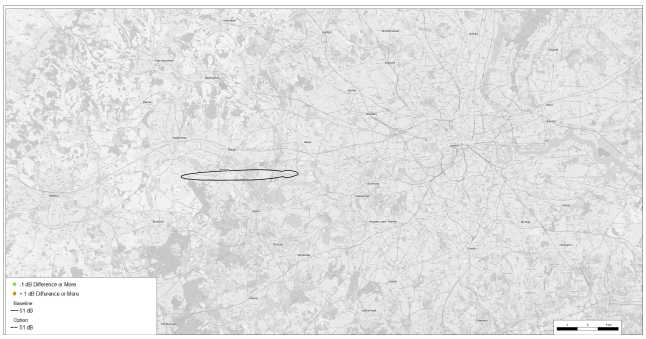
Population count	Baseline	Option F
Estimated total population above WHO Threshold (>40 dB L_{night})	46,600	54,100
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	31,500	31,500

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	0 (of which 0 brought out of Partial LOAEL by Option)	31,500	0 (of which 0 brought into Partial LOAEL by Option)

Change in noise exposure map



Vectored Arrivals – RWY 09L Option G

Option Description

This option has a vectoring area with Runway 09L Final Approach joining points between 14 and 18nm.

Communities – Noise impact on health & quality of life

Metric	Option Value	Difference to Baseline
Population above Partial LOAEL (daytime, LA_{eq}, 16h)	31,300	+200
Population above Partial LOAEL (night-time, LA_{eq}, 8h)	31,500	No change
Population experiencing at least one event of N65 (daytime)	223,800	-13,500
Population experiencing at least one event of N60 (night-time)	195,700	+63,300

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)	286km^2	+89km^2
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	67km^2	+23km^2
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km^2	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-1640ft which observe a potential change in location overflown	0	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0-3000ft which observe a potential change in location overflown	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 RAF Northolt and Farnborough, subject to the preferred options taken forward by those airports.

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 and providing system resilience to the benefit of airspace users, 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 RWY09L Option G

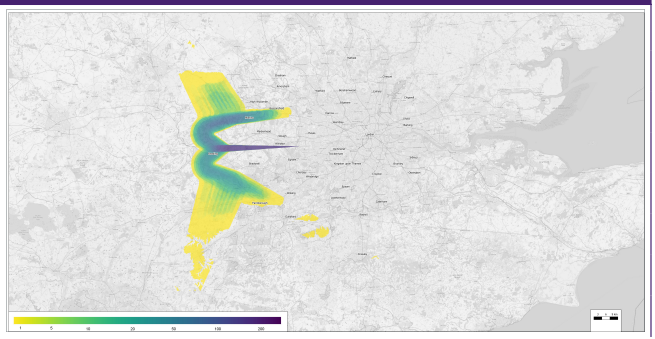
All vectored arrival options have been retained into Stage 3 to allow us to determine if it would be beneficial and/or feasible to use different vectoring areas during different periods to provide respite or relief from noise. This will be informed by our Concept work during Stage 3 system assembly.

OPTION CARRIED FORWARD TO STAGE 3

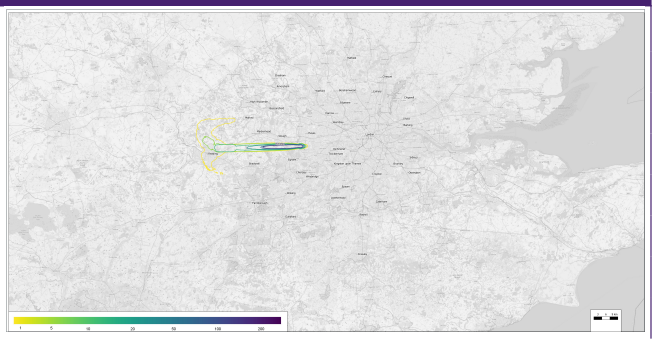
VECTOR Arrivals – RWY 09L Option G (Day)

07:00 - 23:00

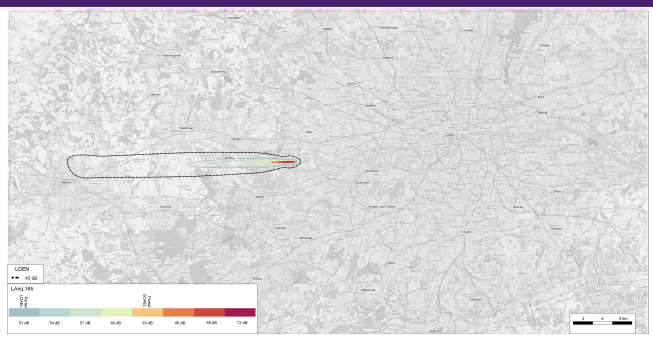
Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	2,227,400	578,100	
≥ 5	1,207,700	422,300	
≥ 10	644,100	344,800	
≥ 20	263,900	198,500	
≥ 50	33,600	43,200	
≥ 100	19,600	34,100	
≥ 200	0	0	

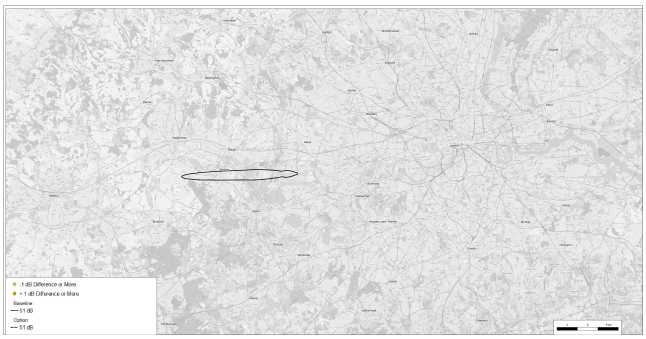
Aircraft Noise Events

Rate	Population experiencing noise events above N65 each day		N65 events contour map
	Baseline	Option G	
≥ 1	237,300	223,800	
≥ 5	57,800	76,800	
≥ 10	45,400	59,100	
≥ 20	41,600	41,600	
≥ 50	31,400	30,900	
≥ 100	27,100	27,300	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option G	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L_{den})	62,000	76,600	
Total population within Partial LOAEL (>51 dB $L_{Aeq,16h}$)	31,100	31,300	

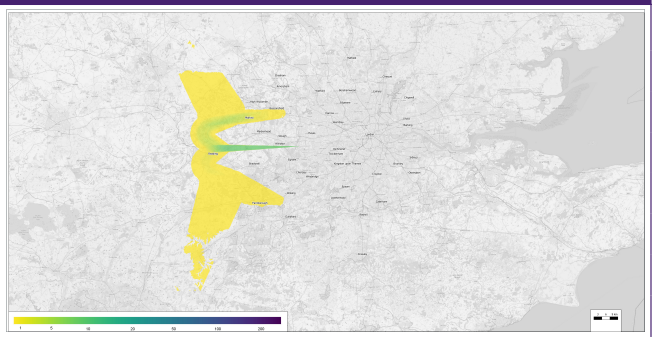
Noise Exposure Change

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 (of which 0 brought out of Partial LOAEL by Option)	31,100	200 (of which 200 brought into Partial LOAEL by Option)	

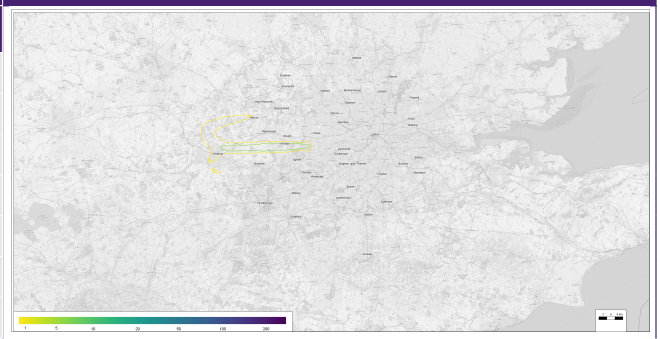
VECTOR Arrivals – RWY 09L Option G (Night)

23:00 - 07:00

Overflight

Rate	Population Overflown		Overflight (0-7000 ft) contour map
	Baseline	Option G	
≥ 1	200,400	233,400	
≥ 5	20,600	35,900	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Aircraft Noise Events

Rate	Population experiencing noise events above N60 each day		N60 events contour map
	Baseline	Option G	
≥ 1	131,400	195,700	
≥ 5	46,500	58,000	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	
≥ 200	0	0	

Noise Exposures

Population count	Baseline	Option G	Partial LOAEL contour map
Estimated total population above WHO Threshold (>40 dB L_{night})	46,600	55,200	
Total population within Partial LOAEL (>45 dB $L_{Aeq,8h}$)	31,500	31,500	

Noise Exposure Change

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0 (of which 0 brought out of Partial LOAEL by Option)	31,500	0 (of which 0 brought into Partial LOAEL by Option)