Classification: Public





AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

STEP 2B INITIAL OPTIONS APPRAISAL

APPENDIX C

VECTORED ARRIVALS Runway 09R - Part 12





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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.

Vectored Arrivals – RWY 09R Option H

Option Description

This option has a vectoring area with Runway 09R 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)	7,000	+6,900
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	7,100	+2,100
Population experiencing at least one event of N65 (daytime)	208,200	+194,200
Population experiencing at least one event of N60 (night-time)	217,600	+54,600

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)	262km ²	+262km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	54km ²	+54km 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	4	+4
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0- 3000ft which observe a potential change in location overflown	8	+8

Wider Society – Capacity/Resilience

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.



General Aviation / Commercial Airlines – Economic impact from increased effective capacity	General Aviation / Commercial Airlines – Fuel Burn	
No economic effect expected on GA operations.	Change in FuelNot able to quantifyBurn (comparedat this time, owing to	
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.	to the Baseline - annual - tonnes) uncertainty in new stack locations.	
This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.	None identified.	
Commercial Airlines – Training costs	Airport/ANSP – Operational costs	
Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines.	This option is not anticipated to change airport or ANSP operational costs.	
Airport/ANSP – Infrastructure costs	Option may lead to a change in the number of properties eligible for the noise	
No changes to infrastructure costs envisaged.	insulation scheme which could lead to a change in operational costs for the	
Airport/ANSP – Deployment costs	airport.	
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.	Adherence to AMS	
Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.	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	
Interdependencies, Conflicts & Trade-Offs	reliance on PBN Arrivals is not expected to achieve this. A consistently longer final	
Option may restrict CCO/CDO to/from 7000ft for RAF Northolt and Farnborough, subject to the preferred options taken forward by those airports.	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 RWY09R 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.





CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option H (Day)

	Overflight					
Data	Population Overflown		Overflight (0-7000 ft) contour ma			
Rate	Baseline	Option H				
≥1	5,700	573,800				
≥ 5	0	322,000				
10	0	253,200				
20	0	165,500				
50	0	75,000				
L00	0	29,500				
200	0	0				

Aircraft Noise Events

Pata		ng noise events above ach day
Rate	Baseline	Option H
≥1	14,000	208,200
≥ 5	0	104,700
≥ 10	0	54,200
≥ 20	0	13,100
≥ 50	0	6,700
≥ 100	0	5,500
≥ 200	0	0

Noise Exposures

Population count	Baseline	Option H	Partial LOAEL contour map	
Estimated total population above WHO Threshold (>45 dB L _{den})	1,100	107,200		
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	100	7,000		

Noise Exposure Change Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL opulation experiencing Population Change in Change in noise exposure map at least 1 dB reduction within partial LOAEL or experiencing no Noise change in noise brought out of partial LOAEL exposure within partial LOAEL Exposure 0 7,000 Partial (of which 0 (of which 6,900 0 LOAEL brought out of brought into Partial LOAEL Partial LOAEL by Option) by Option)

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CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option H (Night)

		0
Rate	Population	Overflown
Raie	Baseline	Option H
≥1	170,900	205,100
≥ 5	0	48,600
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

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Aircraft Noise Events

Data		ng noise events above ach day
Rate	Baseline	Option H
≥1	163,000	217,600
≥ 5	0	45,200
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

Noise Exposures

Population count	Baseline	Option H	Partial LOAEL contour map		
Estimated total population above WHO Threshold (>40 dB L _{night})	13,400	30,100			
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	5,000	7,100			

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of partial LOAEL	Population experiencing no change in noise exposure within partial LOAEL	Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL	Change in noise exposure map
Partial LOAEL	0 (of which 0 brought out of Partial LOAEL by Option)	0	7,100 (of which 2,100 brought into Partial LOAEL by Option)	+ 1 does a la contra transmission de la co encorte de la contra transmission de la contra transm



Vectored Arrivals – RWY 09R Option I

Option Description

This option has a vectoring area with Runway 09R 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)	7,000	+6,900
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	7,100	+2,100
Population experiencing at least one event of N65 (daytime)	207,300	+193,300
Population experiencing at least one event of N60 (night-time)	235,200	+72,200

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)	272km ²	+272km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	53km ²	+53km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km²	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0- 1640ft which observe a potential change in location overflown	4	+4
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0- 3000ft which observe a potential change in location overflown	8	+8

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 may facilitate the release of CAS (LTMA 1) to the north and south of final approach, as the aircraft would not be on base-leg in this area. Assumes option would not be used in conjunction with another vectored arrival option.



General Aviation / Commercial Airlines – Economic impact from increased effective capacity	General Aviation / Commercial Airlines – Fuel Burn		
No economic effect expected on GA operations.	Change in FuelNot able to quantifyBurn (comparedat this time, owing to		
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.	to the Baseline - uncertainty in new annual - tonnes) stack locations.		
This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.	Commercial Airlines – Other costs None identified.		
Commercial Airlines – Training costs	Airport/ANSP – Operational costs		
Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines.	This option is not anticipated to change airport or ANSP operational costs.		
Airport/ANSP – Infrastructure costs	Option may lead to a change in the number of properties eligible for the noise		
No changes to infrastructure costs envisaged.	insulation scheme which could lead to a change in operational costs for the		
Airport/ANSP – Deployment costs	airport.		
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.	Adherence to AMS		
Although new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be achievable.	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		
Interdependencies, Conflicts & Trade-Offs	reliance on PBN Arrivals is not expected to achieve this. A consistently longer final		
Option may restrict CCO/CDO to/from 7000ft for RAF Northolt and Farnborough, subject to the preferred options taken forward by those airports.	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 RWY09R 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.





CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option I (Day)

		0	verflight
Rate	Population	Overflown	Overflight (0-7000 ft) contour map
Rale	Baseline	Option I	
≥1	5,700	538,600	
≥ 5	0	300,600	
≥ 10	0	251,100	
≥ 20	0	177,300	
≥ 50	0	88,200	
≥ 100	0	43,400	
200	0	0	

Aircraft Noise Events

Pata	Population experiencing noise events above N65 each day	
Rate	Baseline	Option I
≥1	14,000	207,300
≥ 5	0	117,400
≥ 10	0	74,100
≥ 20	0	13,100
≥ 50	0	6,700
≥ 100	0	5,500
≥ 200	0	0

Noise Exposures

Population count	Baseline	Option I	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	1,100	127,500	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	100	7,000	

Noise Exposure Change Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL opulation experiencing Population Change in Change in noise exposure map at least 1 dB reduction within partial LOAEL or experiencing no Noise change in noise brought out of partial LOAEL exposure within partial LOAEL Exposure 0 7,000 Partial (of which 0 (of which 6,900 0 LOAEL brought out of brought into Partial LOAEL Partial LOAEL by Option) by Option) * 1 dB
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CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option I (Night)

		(Overflight
Data	Population	Overflown	Overflight (0-7000 ft) contour map
Rate	Baseline	Option I	CANNEL LANDER TO
≥1	170,900	196,200	
≥ 5	0	66,400	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	And the second second
≥ 200	0	0	

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Aircraft Noise Events

Pata	Population experiencing noise events above N60 each day	
Rate	Baseline	Option I
≥1	163,000	235,200
≥ 5	0	58,200
≥ 10	0	0
≥ 20	0	0
≥ 50	0	0
≥ 100	0	0
≥ 200	0	0

Noise Exposures

Population count	Baseline	Option I	Option I Partial LOAEL contour map	
Estimated total population above WHO Threshold (>40 dB L _{night})	13,400	30,400		
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	5,000	7,100		

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of	Population experiencing no change in noise exposure within	Population experiencing at least 1 dB increase within partial LOAEL or brought into	Change in noise exposure map
LAposure	partial LOAEL	partial LOAEL	partial LOAEL	
Partial LOAEL	0 (of which 0 brought out of	0	7,100 (of which 2,100 brought into	
LUAEL	Partial LOAEL by Option)		Partial LOAEL by Option)	 A difference fore - 1 d



Vectored Arrivals – RWY 09R Option J

Option Description

This option has a vectoring area with Runway 09R 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)	7,000	+6,900
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	7,100	+2,100
Population experiencing at least one event of N65 (daytime)	202,300	+188,300
Population experiencing at least one event of N60 (night-time)	248,000	+85,000

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)	277km ²	+277km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	48km ²	+48km 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	4	+4
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0- 3000ft which observe a potential change in location overflown	8	+8

Wider Society – Capacity/Resilience

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 may facilitate the release of CAS (LTMA 1) to the north and south of final approach, as the aircraft would not be on base-leg in this area. Assumes option would not be used in conjunction with another vectored arrival option.



General Aviation / Commercial Airlines – Economic impact from increased effective capacity	General Aviation / Commercial Airlines – Fuel Burn		
No economic effect expected on GA operations.	Change in FuelNot able to quantifyBurn (comparedat this time, owing to		
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.	to the Baseline - annual - tonnes) uncertainty in new stack locations.		
This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective.	Commercial Airlines – Other costs None identified.		
Commercial Airlines – Training costs	Airport/ANSP – Operational costs		
Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines.	This option is not anticipated to change airport or ANSP operational costs.		
Airport/ANSP – Infrastructure costs	Option may lead to a change in the		
No changes to infrastructure costs envisaged.	number of properties eligible for the noise insulation scheme which could lead to a change in operational costs for the		
Airport/ANSP – Deployment costs	airport.		
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.			
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			
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.	Adherence to AMS		
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	Supports the AMS by enabling an efficient flow of traffic, accommodating demand and providing system resilience to the		
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	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		
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.	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		

Outcome of Vectored Arrival RWY09R 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.



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option J (Day)

		0	verflight
Rate	Population	Overflown	Overflight (0-7000 ft) contour map
Rale	Baseline	Option J	
≥1	5,700	445,100	
≥ 5	0	240,700	
≥ 10	0	208,100	
≥ 20	0	180,500	
≥ 50	0	115,000	
≥ 100	0	68,300	
≥ 200	0	0	

Aircraft Noise Events

Data	Population experiencing noise events above N65 each day		
Rate	Baseline Option J		
≥1	14,000	202,300	
≥ 5	0	117,400	
≥ 10	0	93,300	
≥ 20	0	13,100	
≥ 50	0	6,700	
≥ 100	0	5,500	
≥ 200	0	0	

Noise Exposures

Population count	ulation count Baseline Option J		Partial LOAEL contour map		
Estimated total population above WHO Threshold (>45 dB L _{den})	1,100	145,600			
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	100	7,000			

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	0 (of which 0 brought out of Partial LOAEL by Option)	0	7,000 (of which 6,900 brought into Partial LOAEL by Option)	I defense are 1 d



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CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option J (Night)

		(Dverflight
Doto	Population	Overflown	Overflight (0-7000 ft) contour map
Rate	Baseline	Option J	EXAMPLE IN A POINT
≥1	170,900	198,200	
≥ 5	0	87,800	
≥ 10	0	0	
≥ 20	0	0	
≥ 50	0	0	
≥ 100	0	0	Constant of 200 and a start of a
≥ 200	0	0	

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Aircraft Noise Events

Pata	Population experiencing noise events above N60 each day		
Rate	Baseline	Baseline Option J	
≥1	163,000	247,900	
≥ 5	0	66,700	
≥ 10	0	0	
≥ 20	0	0	
≥ 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 _{night})	13,400	30,300			
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	5,000	7,100			

Change in Noise Exposure	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of	experiencing no change in noise exposure within	Population experiencing at least 1 dB increase within partial LOAEL or brought into	Change in noise exposure map
Partial LOAEL	0 (of which 0 brought out of Partial LOAEL by Option)	partial LOAEL	7,100 (of which 2,100 brought into Partial LOAEL by Option)	 A second sec second second sec



Vectored Arrivals – RWY 09R Option K

Option Description

This option has a vectoring area with Runway 09R 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)	7,000	+6,900
Population above Partial LOAEL (night-time, LA _{eq} , 8h)	7,100	+2,100
Population experiencing at least one event of N65 (daytime)	179,200	+165,200
Population experiencing at least one event of N60 (night-time)	243,500	+80,500

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)	293km ²	+293km ²
Total Area of AONBs/NPs overflown experiencing at least one event of N65 on average (daytime)	43km ²	+43km ²
Total Area of Richmond Park overflown between 0-7000ft at least once a day on average (daytime)	0km²	No change
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0- 1640ft which observe a potential change in location overflown	4	+4
Number of sites (RAMSAR, SAC, SPA, SSSI) overflown between 0- 3000ft which observe a potential change in location overflown	8	+8

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 may facilitate the release of CAS (LTMA 1) to the north and south of final approach, as the aircraft would not be on base-leg in this area. Assumes option would not be used in conjunction with another vectored arrival option.



No economic effect expected on GA operations. Not able to quantify Running a longer final approach could start to degrade the ability to consistently provide optimal spacing. This is gue control on final approach, than on base-leg. Not able to quantify and the spacing. This is 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 - Other costs None identified. None identified. Airport/ANSP - Infrastructure costs Airport/ANSP - Infrastructure costs No changes to infrastructure costs envisaged. Drion may lead to a change in the onise insulation scheme which could lead to a change in operational costs. Option may test to be any differences in these costs between the different options. Stafety No IFP Design issues identified. Athough new or revised safety assurances may be needed, an acceptable safety argument is envisaged to be any differences in these costs between the different options. Supports the AMS by enabling an efficient flow of traffic, acommodating demand and providing system realience to the benefit of airspace users, where a sole reliance on PEN Arrivals is not expected to achieve this. A consistently longer final approach, could this option be favourable from an environmental aporo.	General Aviation / Commercial Airlines – Economic impact from increased effective capacity	General Aviation / Commercial Airlines – Fuel Burn		
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. annual - tonnes) stack locations. This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective. Commercial Airlines - Other costs None identified. Commercial Airlines - Training costs None identified. Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines. Airport/ANSP - Operational costs. Airport/ANSP - Infrastructure costs This option is not anticipated to change airport or ANSP operational costs. No changes to infrastructure costs envisaged. Option may lead to a change in 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. 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 provach subject to the preferred options taken forward by those airports.	No economic effect expected on GA operations.	Burn (compared at this time, owing to		
This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or design perspective. None identified. Commercial Airlines – Training costs Airport/ANSP – Operational costs Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines. Airport/ANSP – Operational costs. Airport/ANSP – Infrastructure costs This option is not anticipated to change airport or ANSP operational costs. No changes to infrastructure costs envisaged. Option may lead to a change in the noise insulation scheme which could lead to a change in operational costs for the airport. No IFP Design issues identified. Safety No IFP Design issues identified. Athough new or revised safety assurances may be eached, an acceptable safety argument is envisaged to be achievable. Interdependencies, Conflicts & Trade-Offs Northolt and Farnborough, subject to the preferred options taken forward by those airports. Subject to the preferred option be favourable from an	the ability to consistently provide optimal spacing. This is due to the requirement to maintain more active/restrictive	annual - tonnes) stack locations.		
Option does not require any re-equipage or upgrade costs for airlines. No training costs required for airlines. This option is not anticipated to change airport or ANSP operational costs. Airport/ANSP – Infrastructure 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. Airport/ANSP – Deployment 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. 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. Adherence to AMS Safety 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 option be favourable from an anticipated to change and this option be favourable from an anticipated to change and the providing system could be the preferred options taken forward by those airports.	This will be verified and quantified in Stage 3, should this option be favourable from an environmental and/or			
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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.				
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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.	Airport/ANSP – Deployment costs			
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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.	Safety			
Although new of 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.	No IFP Design issues identified.	Adherence to AMS		
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.	needed, an acceptable safety argument is envisaged to be	flow of traffic, accommodating demand and providing system resilience to the		
Option may restrict CCO/CDO to/from 7000ft for RAF Northolt and Farnborough, subject to the preferred options taken forward by those airports. approach could impact landing rates. This will be assessed further in Stage 3 should this option be favourable from an	Interdependencies, Conflicts & Trade-Offs	reliance on PBN Arrivals is not expected		
	Northolt and Farnborough, subject to the preferred	approach could impact landing rates. This will be assessed further in Stage 3 should this option be favourable from an		

Outcome of Vectored Arrival RWY09R 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.





CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option K (Day)

	Overflight			
Data	Population	Overflown	Overflight (0-7000 ft) contour map	
Rate	Baseline	Option K	CANALA LAND TO BE	
≥1	5,700	407,200		
≥ 5	0	242,200		
≥ 10	0	191,400		
≥ 20	0	163,400		
≥ 50	0	129,400		
≥ 100	0	92,100		
≥ 200	0	0		

Aircraft Noise Events

Pata	Population experiencing noise events above N65 each day	
Rate	Baseline	Option K
≥1	14,000	179,200
≥ 5	0	126,700
≥ 10	0	101,300
≥ 20	0	13,100
≥ 50	0	6,700
≥ 100	0	5,500
≥ 200	0	0

Noise Exposures

Population count	Baseline	Option K	Partial LOAEL contour map
Estimated total population above WHO Threshold (>45 dB L _{den})	1,100	161,800	
Total population within Partial LOAEL (>51 dB L _{Aeq,16h})	100	7,000	

Noise Exposure Change Population experiencing at least 1 dB increase within partial LOAEL or brought into partial LOAEL opulation experiencing Population Change in Change in noise exposure map at least 1 dB reduction within partial LOAEL or experiencing no Noise change in noise brought out of partial LOAEL exposure within partial LOAEL Exposure 0 7,000 Partial (of which 0 (of which 6,900 0 LOAEL brought out of brought into Partial LOAEL Partial LOAEL by Option) by Option)

Heathrow

23:00



CAP1616 - INITIAL OPTIONS APPRAISAL – SUPPLEMENTARY METRICS VECTOR Arrivals – RWY 09R Option K (Night)

		(Overflight
Data	Population	Overflown	Overflight (0-7000 ft) contour map
Rate	Baseline	Option K	CANAL LALAS P NO. 3
≥1	170,900	183,100	
≥ 5	0	109,000	
≥ 10	0	0	
20	0	0	
50	0	0	
100	0	0	
200	0	0	

⋞

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Aircraft Noise Events

Data	Population experiencing noise events above N60 each day	
Rate	Baseline	Option K
≥1	163,000	243,500
≥ 5	0	67,800
≥ 10	0	0
≥ 20	0	0
≥ 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 _{night})	13,400	30,300		
Total population within Partial LOAEL (>45 dB L _{Aeq,8h})	5,000	7,100		

Change in Noise	Population experiencing at least 1 dB reduction within partial LOAEL or brought out of	Population experiencing no change in noise exposure within	Population experiencing at least 1 dB increase within partial LOAEL or brought into	Change in noise exposure map
Exposure	partial LOAEL	partial LOAEL	partial LOAEL	
Dentiel	0		7,100	
Partial LOAEL	(of which 0 brought out of Partial LOAEL by Option)	0	(of which 2,100 brought into Partial LOAEL by Option)	

