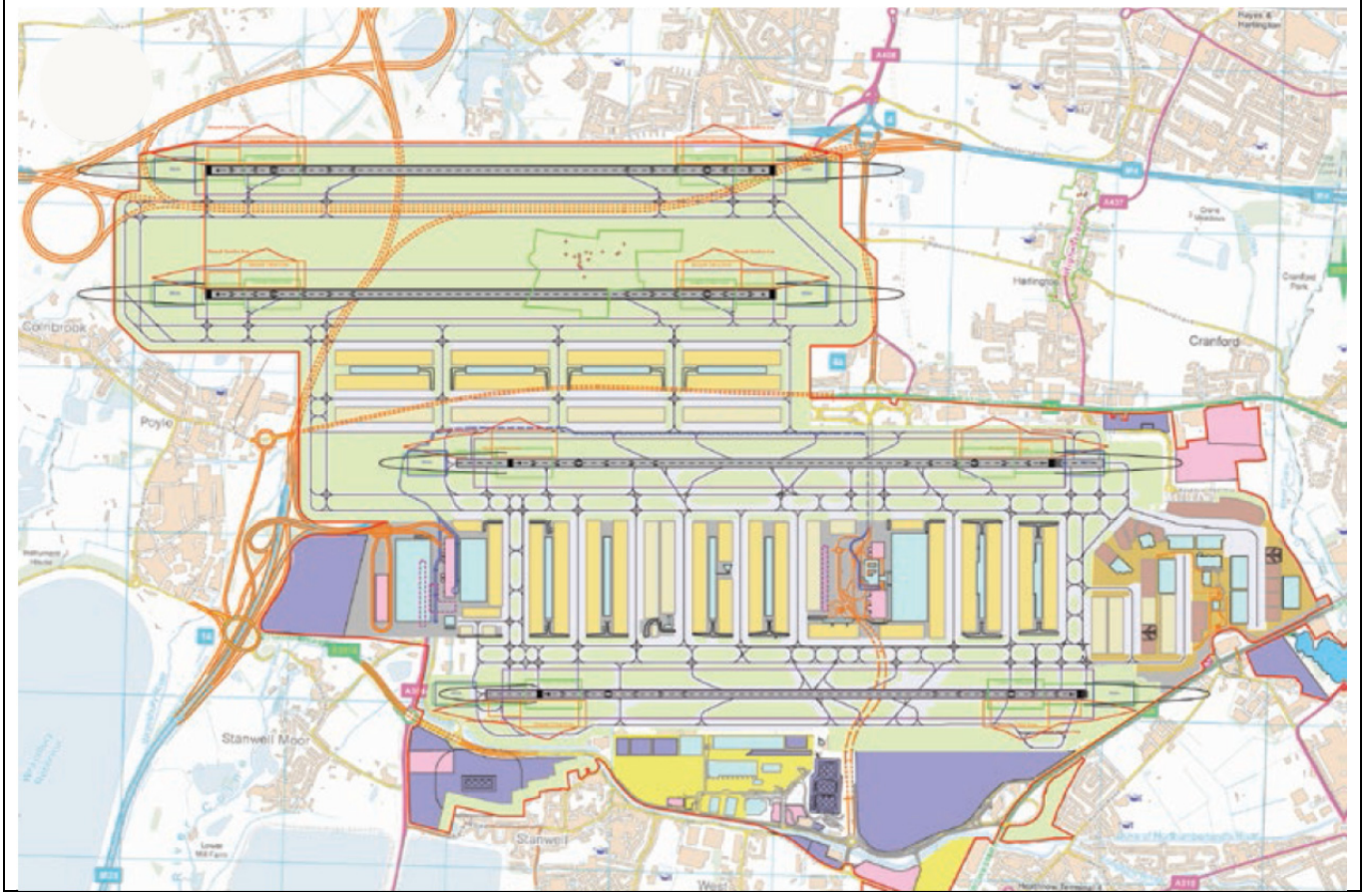
PROPOSAL TITLE:	4 Runway: North-West	Group:	Existing
SUBMITTED BY:	Heathrow Airport Limited	Reference No.:	68

PROPOSAL

Based upon a concept presented by HAL, two new 3,500m runways constructed to the north-west of the existing airport. The new runways are themselves dependent but are independent of the existing runways. Includes expansion of existing terminals plus new Terminal 6 immediately west of Terminal 5 serving new satellites and aprons located between the new and current northern runways. Requires tunnelling of the M25 and the M4 under the new development, plus reconfiguration of the existing M4/M25 interchange.



ASSESSMENT SUMMARY

STRATEGIC FIT / ECONOMY / OPERATIONS

Runways (net increase)	Passengers (net mppa)	ATMs (net)	London Airports Impact
	62	▶ 370,000 ◀	LHR
▶ 2 ◀	▶ 60 ◀	317,000	LGW
	53	268,000	
1	46	260,000	STN
	40	250,000	
	34	222,500	LTN
	30	190,000	LCY

ENVIRONMENT

57 dBA Leq 2030 pop'n with scheme	Listed Bldgs Grades I&II*, SM, CA, RP&G	Heritage & Designations Affected
1,400	0	SPA
2,500	3	Ramsar
6,300		
13,500	▶ 4 ◀	SSSI
142,600	5	Grade I
▶ 144,000 ◀	8	Grade II*
144,600		
180,900	14	Sched. Mon.

SURFACE ACCESS

45 min Population (millions)	1hr Population (millions)	2hr Population (millions)
17	18	38
▶ 14 ◀	▶ 16 ◀	▶ 36 ◀
10	14	27
9	13	25
6	12	20

COST / DELIVERY

2030 Risk-Adjusted Total (£bn)	Aero Yield (relative to LHR Q6)
9-13	1.3x
10-13	1.5x
13-18	
▶ 16-22 ◀	▶ 1.6x ◀
50-67	2.4x
82-112	3.4x

PEOPLE

Houses Demolished	IMD (Average within5km
200	26
260	21
720	▶ 20 ◀
800	19
1,300	14
1,500	8
▶ 1,600 ◀	7

Leigh Fisher JACOBS Bickerdike Allen Partners Architecture Acoustics Technology

Airports Commission

PROPOSAL TITLE:	4 Runway: North-West	Group:	Existing
SUBMITTED BY:	Heathrow Airport Limited	Reference No.:	68

OVERVIEW

Approach

Essentially a later phase of a north-west 3rd runway option. However, the proposed layout differs from the north-west 3rd runway proposal (the 3rd runway is more southerly), therefore likely to require agreement for this longer term configuration at the outset.

Opening Year: 2037

Operational Viability

Delivery of the full net system benefit over a third runway would require fundamental redesign of the London TMA.

Capacity	Airport	Net	Forecast Use of Maximum Capacity 2030	2050
Runways	4	2		
ATM	850,000	370,000	70%	100%
pax	150	60	65%	97%

Cost

£b	Airport	Access	Other	Total	Risk	OB	Risk Adjusted Total	Promoter Estimate
2030	5 -7	2-3	~1	8-10	3-4	5-7	16 - 22	n/a
2050	9-13	2-3	~1	12-16	5-6	8-11	25 - 34	

Surface Access

- Based on a public transport mode share of 50% for pax (41% currently) and a 'sustainable modes' share of 40% for employees (30% currently). Primarily achieved by additional rail services. Rail provision includes current HEX; Crossrail, improved Piccadilly line; Western Rail Access Line (all committed); and the currently un-committed Southern Rail Access Line and HS2 spur schemes. These rail services have sufficient capacity to cope with the predicted airport-related demand.
- Local capacity improvements to M4 spur, J4A and M25 and M4 tunnels.
- Some additional airport related traffic on M4 J4-J7 and M25 J10-J15; analysis suggests capacity enhancements are not due to this traffic alone.

Isochrone	Popn (million)
45 min	14
1 hr	16
2 hr	36
London centre	15 miles

Economic

Borough	Hillingdon	Hounslow	Ealing	Slough	Spelthorne	Runnymede	Windsor
Unempnt (%)	7.9	7.5	10.7	8.2	4.4	4.3	4.2
Ave. Salary (£/yr)	31,086	29,323	29,427	26,837	31,569	30,930	37,705

County	Bucks	Greater London	Berkshire	Surrey
GVA (£/cap)	22,125	34,779	31,057	25,432

Environment

- Noise impact similar to the north-west option in 2030, but slightly greater due to the location of the additional runway.
- Loss of two communities including Harmondsworth Conservation Area and listed buildings, including Grade I and II* buildings. Part of Colnbrook Conservation Area is affected. Similar level of cultural heritage impacts to Isle of Grain but less extensive impacts compared to those of a Stansted hub.
- Limited impact and no direct loss to water storage reservoirs and SPA/Ramsar/SSSI designations.
- Additional impacts due to M25 and M4 diversion and tunnelling.

57 dBA L_{eq}		
	2012 local	239,600
	2030 local - with scheme	144,000
	2030 Net Local Impact	(6,700)
	2030 system - with scheme	194,350
	2030 Net System Impact	(51,350)
55 L_{DEN}	2030	382,000
50 L_{night}	2030	172,000
N70	2030	102,000-105,000

SAC[1]	SPA[1]	Ramsar	CA[1]	AONB[1]	SSSI[1]	Listed Buildings	SM[1]
-	-	-	2	-	-	32	-

People

IMD	Houses Lost
20	1,600

Delivery

Aero Yield Increase	Airport Only	Including Access
Indexation	~15%	~20%
No indexation	~50%	~60%

[1] SAC: Special Areas of Conservation; SPA: Special Protection Areas; CA: Conservation Area; AONB: Area of Outstanding Natural Beauty; SSSI: Site of Special Scientific Interest; SM: Scheduled Monument.

ECONOMY

Borough	Hillingdon	Hounslow	Ealing	Slough	Spelthorne	Windsor	Runnymede
Unemployment (%)	7.9	7.5	10.7	8.2	4.4	4.2	4.3
Ave. Salary (£/yr)	31,086	29,323	29,427	26,837	31,569	37,705	30,930
County	Bucks	Greater London	Berkshire	Surrey			
GVA (£/capita)	22,125	34,779	31,057	25,432			

Impact on Industry

Adding a fourth runway at Heathrow would provide sufficient capacity for the airport to meet expected long term demand, although it would concentrate supply at Heathrow. However, capacity above a third runway is dependent upon a redesign of the London airspace system. The increased Heathrow capacity would allow more services with reduced delays due to improved resilience. This would support growth of aviation, tourism, logistics and related support businesses, and contribute to the agglomeration of industry clustered in the Thames Valley/M4 corridor. It would allow significant expansion of airlines based at Heathrow, and a significant improvement in connectivity to a wide range of long haul destinations, Europe and in connecting other parts of the UK to long haul destinations. It is likely to help increase the share of airline traffic carried by UK based network carriers.

Airports	Adding a fourth runway at Heathrow would provide a capacity increase of c 370,000 to the existing 480,000 ATM fully segregated operation at Heathrow. The competition dynamic in the London airport system would change. Heathrow could be expected to attract a proportion of traffic from Gatwick.
Airlines	Airlines currently using Heathrow and others seeking to use it would benefit from the increase in capacity to offer more services, with reduced delays due to greater resilience. Airlines would continue to have the same choices of airports as at present. Some network traffic may transfer from Gatwick because of the greater interlining opportunities, freeing capacity at Gatwick potentially increasing airport choice for LCCs and charter airlines. Competition among carriers at Heathrow would be expected to increase, although British Airways and Virgin Atlantic in particular would be much less constrained in their ability to compete with major network carriers are airports with more capacity (e.g. Air France/KLM at Charles De Gaulle and Schiphol, Lufthansa at Frankfurt and Munich, and Emirates and Etihad at Dubai and Abu Dhabi respectively).
Passengers	Passengers would benefit from increased capacity due to delay reductions and a greater choice of destinations/enhanced frequencies and increased competition, reducing travel times and fares.

Local & Regional Economic Impacts

The new expanded airport would facilitate growth of new and existing industries in airport and aviation support services and travel, tourism, logistics and other related sectors, to service growth in passenger and freight demand. Almost all would be able to continue serving customers of the airport from their existing position on the M4 corridor. This proposal would support agglomeration in the Thames Valley/M4 corridor, given its proximity to existing commercial developments supported by Heathrow. The scale of direct and indirect employment would be in proportion to the numbers of additional passengers. Direct, indirect and induced employment effects would be in the immediate vicinity and along key corridors to Heathrow.

National Economic Impacts

The main national economic impacts come from the provision of new capacity, enabling more flights and connectivity, and the increase in business and leisure trips, and trade in goods and services, and indirect effects on inward investment. Increased choices of flights and airlines, reducing air travel time and possibly fares, should generate significant consumer/welfare benefits.

Time/Distance to Central London	Isochrone pop^{n} (million)		Key required upgrade schemes (above those already committed)
Paddington 15 mins (by rail) Docklands 40 mins (by rail) 15 miles	45 min	14	▪ Southern rail access line. ▪ M4/M4A junction improvements. ▪ M25 and M4 tunnelling under the new development. ▪ HS2 spur.
Journey times to other population centre	60 min	16	
Birmingham 50 mins Manchester 70 mins	120 min	36	

Modal Split Assumptions

Currently 41% of passengers use public transport modes to access Heathrow: 18% using the underground, 13% bus/coach and 10% rail. The surface access strategy is based on increasing the public transport mode share of passengers to 50% in 2031. This is a realistic assumption given the significant planned improvements in rail services. The schemes should increase the current combined rail/underground mode split from 28% to around 35%, and further improvements to bus services for areas not well served by rail should increase the bus/coach rail share from 13% to around 15%. Furthermore, changes to road traffic unrelated to the airport would increase congestion and make access by road less attractive. Currently, 35% of employees use "sustainable modes" to access the airport. The target is to increase this to 40%, building on the continuous reduction in the car driver mode share for airport staff, (dropped from 79% in 1991 to 59% in 2011). This target to be achieved by public transport service improvements and staff incentives in line with suggestions from HAL (e.g. 75% off Heathrow Connect), and reduced staff car parking supply, with greater priority given to car sharers in the issuing of staff parking permits.

Rail Infrastructure Capacity Analysis

Peak hour one-directional rail flows to/from LHR on a 'busy day' in 2031 estimated to be ~3,500 passengers per hour in the peak direction (pphpd). Based on the current geographic distribution of airport-related rail trips estimated one-way peak hour airport-related demand (pphpd), as follows: HEX (900), Crossrail (1,100), Piccadilly Line (600), Western Rail Access Link (300); and Southern Rail Access Link (500). Estimated volume/capacity (v/c) ratios for airport-related demand on the services as follows: Overall (0.15); HEX (0.30); Crossrail (0.35); Piccadilly Line (0.05); Western Rail Access Link (0.20) and Southern Rail Access Link (0.70). Whereas HEX would only be used by airport-related demand, the other services would be used by both airport-related and other (commuter and leisure) demand. Appears reasonable that the level of overall demand taken up by airport-related trips (30%) provides sufficient capacity for other commuter and leisure trips and thus we conclude that the provision of rail lines and services as specified is sufficient to accommodate LHR surface access demand in 2030.

Highways Capacity Analysis

The air passenger road-based mode share is predicted to reduce from 59% in 2011 to 50% in 2031, and the proportion of employees driving (single occupancy) is predicted to reduce from 61% in 2011 to less than 50% in 2031 (due to the measures discussed in the section below). We conclude that the increase in air passengers more than outweighs the reduction in car-based mode shares, and that there would be some additional airport-related traffic on the road network in 2031. This conflicts with the analysis of the promoter who stated that it is possible to deliver a third runway without airport-related traffic on the roads, partly as they assumed significant reductions in 'kiss and fly' and taxi surface access movements that we are unable to validate. As above, based on the current geographic distribution of airport-related car trips and estimated v/c ratios on each motorway link, capacity improvements are required at the central terminal area end of the airport tunnel to dissipate the traffic, and on junction 4A of the motorway spur. Peak hour, peak direction (phpd) airport-related flows to the airport of around 400 vehicles are predicted on the M4 between junctions 7 and 4 and on the M25 between junctions 10 and 15. However, our initial analysis suggests that on the M4 the total flows on this section would be below capacity and on the M25 the over capacity section (junctions 10-12) would be over capacity due to background traffic and not airport-related traffic. Over a wider area, airport-related traffic dissipates quickly to less than 200 vehicles phpd on any link. Therefore, it seems that beyond the local M4 access roads, the local motorway network could cope with the additional airport-related car demand, or is over capacity even without it.

Accessibility to Population & Business centres

Heathrow is well located in relation to the strategic highway network, with direct access from the M25 and M4, as well as being within 10 miles of the M3 and M40. 6 of the 16 million people within a 60 minute journey time have a public transport option. Reasonable, albeit regularly congested highway connections exist towards west and central London and towards north London. Heathrow is currently connected to Central London by the Heathrow Express (taking 15 minutes), Heathrow Connect (25 minutes) and the Piccadilly Line (45-60 minutes). Crossrail and the Piccadilly Line upgrade would considerably improve access to central London, as well as Canary Wharf and other locations to the east and north-east. The Western Rail Link would improve rail connections to Reading, the wider Thames Valley, Bristol and Wales, whilst the proposed Southern Rail Access would improve connectivity to south and southwest London, Surrey and the South Coast.

Accessibility to Transport Interchanges

Key transport interchanges directly served by existing and proposed rail services include: Paddington; Bond Street: Tottenham Court Road; Canary Wharf; Stratford; Old Oak Common and Reading. An HS2 Heathrow Spur would enable direct services to Birmingham, Leeds, Manchester, Nottingham, Edinburgh and Glasgow, with rail journey time savings of between 80 and 120 minutes, compared to today's journey times (partly by removing the need for a trip into central London). The Piccadilly line connects Heathrow to Kings Cross and St Pancras Stations.

Accessibility to Workforce

Currently most of the workforce is located locally, with Hounslow, Hillingdon and Ealing and the District of Slough having the highest numbers of workers. The catchment area is expected to increase, with improvements to rail and bus services.

Demand Management Assumptions

The following demand management measures are proposed by the promoter to influence travel behaviour to meet the mode choice targets: new and improved bus/coach routes, doubling the frequency of existing services and targeting new routes to key catchment areas such as Portsmouth, Southampton, Brighton, Luton and High Wycombe; real time information and journey planning tools to raise awareness of travel choices to passengers and influence travel behaviour; systems and incentives to encourage more efficient taxi use; improvements to the cycle network and further development of the Heathrow Cycle Hub to offer incentives and support to cyclists using the airport; and collaboration with freight operators to deliver further consolidation of freight movements.

Overall noise impact

By 2030, of the 144,000 people within the 57 dBA L_{eq} contour, 35,000 would be newly affected at this level. *Although there is a net reduction in noise exposure from 2012, this is broadly due to improved aircraft technology, and under 2runway operations without the northern runway development the affected population would have reduced to 150,700; this option therefore offers a further reduction of 6,700 people as the increased movements are spread over 4 runways.

57 dBA L_{eq}		
	2012 local	239,600
	2030 local - without scheme	150,700
	2030 local - with scheme	144,000
	2012-2030 Local Impact with scheme	(95,600)
	2030 Net Local Impact	**(6,700)**
	2012 system	269,250
	2030 system - without scheme	245,700
	2030 system - with scheme	194,350
	2012-2030 system impact with scheme	(74,900)
	2030 Net System* Impact	**(51,350)**
2030 population within 2012 and 2030 57 L_{eq} contour		114,800
2030 additional population within 2030 57 L_{eq} contour		35,000
55 L_{DEN}	2030	382,000
50 L_{night}	2030	172,000
N70	2030	103,500

SAC	SPA	Ramsar	CA	AONB	SSSI	Listed Buildings	SM
-	-	-	2	-	-	32	-

Air Quality

Although HAL did not develop its four runway concepts, the following observations, in 2030, regarding the three runway schemes are representative of the four runway configuration. Heathrow is located in the southern part of the Hillingdon AQMA with exceedences for $N0_2$ predominately at residential properties close to heavily trafficked roads. Promoter proposes, for its three runway schemes, in mitigation to maximise public transport use and restrict access to Low emission vehicles only and to work with partners in surrounding areas to ensure air quality limits are not breached. HAL also states that additional capacity can be delivered at Heathrow whilst meeting air quality standards. HAL's analysis is based on modelled results and assumptions for:

- 2030 with 570,000 ATMs and for 2040 with 740,000 ATMs and expected improved standards and aircraft fleet for 2030; and
- Improvements in road vehicle emissions and assuming an increased use of passenger public transport to 50%. Airside emission assumptions include increased use of low emission vehicles.

These assumptions are considered not unreasonable but it should be noted that transport analysis indicates an overall increase in airport related traffic on the road network even accounting for reduction in car-based mode share. No significant difference between Heathrow runway options for meeting air quality standards: all options are partly within 3 AQMAs for Hillingdon, Hounslow and Spelthorne.

Noise

2030 Forecast: Independent noise modelling provided the following results based on 2030 forecast population distribution (adjusted for housing demolished) and forecast aircraft mix appropriate for the number of aircraft movements and passenger load. Only 3 of the 4 runways would be operational by 2030, so that the noise impact would be similar to the north-west 3rd runway option. The 4 runway option 3rd runway is located ~300m to the south, and 300m to the east resulting in a small difference in the overall noise impact compared to the north-west 3rd runway. The independent noise assessment is based on the north-west 3rd runway adjusted for the slightly different location:

- 57 dBA L_{eq}: 144,000 people affected of which around 35,000-36,000 are not currently affected at this level. This is similar to the south-west 3rd runway option (144,600) and slightly higher than the north-west 3rd runway option (142,600) but lower than the Heathrow Hub 3rd runway option (180,900).
- Overall the 4 runway option, would lead to a reduction of around 95,600 people affected at 57 L_{eq} compared to today, but only around 6,000 fewer affected compared to 2 runway operations in 2030.
- 55 L_{DEN}: ~382,000 – 385,000 people affected.
- 50 L_{night}: ~172,000 – 175,000 people affected – with greater opportunity for night time respite compared to 3 runway north-west option.
- N70: Approx. 102,000-105,000 people affected at the 50 event contour – this is similar to the other Heathrow 3 runway options but significantly higher than alternative hub options (11,900 at Stansted and 900 at Isle of Grain).

2050 Forecast The change from 3 runways in use in 2030 to all 4 by 2050 would result in two effects. For the existing runways and the southern most of the new runways there would be a small increase in movements, around 8%, which should be outweighed by technology improvements. Consequently for locations to the south, south east and south west of the airport there should be improvements in the noise climate. Conversely, as the northern most new runway would then be in operation there would be increases in noise for locations to the north, and to a lesser extent to the north east and north west of the airport. The airport expansion from 3 to 4 runways would provide greater capacity with potential to

reduce population exposure to noise with more westerly operations and more flexibility for providing respite at night. Even without a change to measured noise levels however there is potential for increased nuisance to residents from the greater numbers of flights passing overhead. Overall aircraft noise from this 3 and then 4 runway option affects a much greater population compared to Hubs at Stansted and Isle of Grain.

Net Noise: The net reduction in noise exposure for 144,000 in 2030 compared to 239,600 affected in 2012 is largely due to improved aircraft technology. With continued 2 runway operations, by 2030 the affected population would have reduced to 150,700; the 3 of 4 runway operation option therefore offers a further reduction of 6,700 people exposed at the 57 dBA level while increasing capacity.

Designations

Ecology:

- No direct impacts on the reservoirs and SPA/Ramsar site although within an area of influence and would need to be assessed for indirect effects.

Cultural Heritage:

- Loss of Harmondsworth, a large part of which is designated as Conservation Area, and listed buildings in Longworth. A total of around 32 listed buildings may be lost. Part of Colnbrook Conservation Area would be affected with severe impacts on the setting of the remainder of the Conservation Area.
- The Great Tithe Barn, a Grade I listed building, and St Mary's Church, a Grade II* listed building, would both be lost as for the NW 3 runway option, with the rest of the listed buildings being Grade II.
- This 4 runway scheme has a much greater direct impact on historic buildings than the south-west and Heathrow Hub options. All Heathrow options would affect the setting for surrounding cultural heritage features. All the 4/5 runway Hub options affect high value cultural heritage interest.
- Mitigation may be limited to relocation of the Grade I and II*buildings although this removes them from their original setting.

Landscape and Townscape:

No national landscape designations affected

Climate Change

Operation: Proposer claims a four runway Heathrow is consistent with meeting UK's legally binding climate change targets dependent on level of constrained demand by 2050. This is the same for all Heathrow options and all hub options. Increased efficiency of aircraft movements (in air, on ground) would improve carbon efficiency per ATM / PAX than current operations at currently congested airports. Mitigation could include proposal to increase passenger use of public transport to 50% to contribute to reduced $C0_2$ emissions. Efficiency potential in technology, modal shift design and operation.

Construction and demolition: Includes M25 and M4 tunnel diversions. Construction related carbon emissions are indicated as 1.06Mt in a central estimate based on runway, taxiway and terminal build, but excluding significant highways improvements. Lowest embodied carbon impact of hub airport options.

Other Issues

Water Resources and Flood Risk:

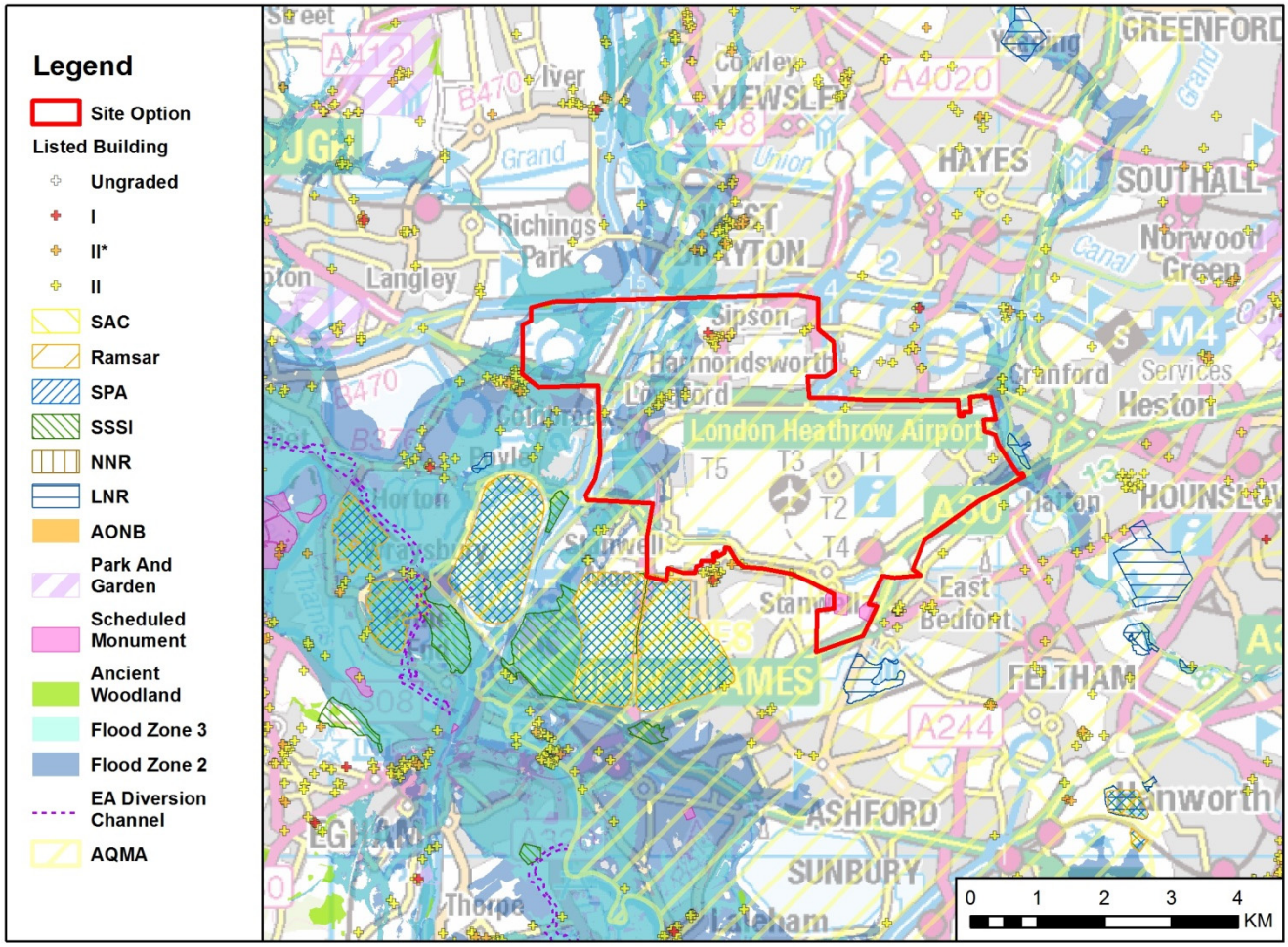
- Flood plain (flood zones 2 & 3) loss, 23% of the airport area (i.e. 480ha).
- The runways cut across part of the River Colne flood plain with loss of around 166,000m^2 zone 3 storage area (compared to 116,000m^2 for the north-west 3rd runway option), but still much less than the flood plain storage lost with the south-west option and also without flood conveyance obstruction and loss of a flood diversion channel.
- No water supply storage impact as Wraysbury Reservoir (impacted by south-west option) can be retained.
- Approximately 0.6Mm3 of flood compensation storage would be required to be provided in addition to significant drainage attenuation.

Land Use and Development:

- Greenbelt losses and open space recreational amenity losses including Harmondsworth Moor Country Park located on a restored landfill site.
- Loss of over 380ha of Grade 1 and 2 (best and most versatile); mainly Grade 1 agricultural land.
- Approximately 460ha of greenfield land would be lost; the largest area of all the Heathrow options. This may include loss of some local landscape and cultural heritage features, hedgerows, protected species habitat, footpaths and archaeological interest.
- Major works are required to divert/tunnel transport infrastructure around the northern runway affecting the M25, M4 and junction. This is likely to require further land take (~130ha compared to north-west runway option) and possible housing demolition (~100 compared to north-west runway option).
- Landfill sites within runway footprint (may require relocation).
- Loss of Old Lane Sewage treatment works and Saxon Lake.
- Loss of Harmondsworth cemetery.

Surface Access Improvements:

- Potential impacts related to all access improvements.



PEOPLE

Housing	Demolished
Housing within Longford and Harmondsworth and on the edge of Colnbrook would need to be demolished. A slightly greater number of residential properties would be lost for the 4 runway option compared to the north-west 3rd runway option. Along with the increase in employment opportunities all Heathrow options are likely to add to housing pressure in the region.	1,600

Vulnerable Groups

- Loss of Longworth and Harmondsworth as geographical communities. Loss of the Heathrow Special Needs Farm.
- The Index of Multiple Deprivation (IMD), averaged within 5km of the airport, is 19.7 only marginally different to the other Heathrow options which range from 18.7- 20.8, indicating a greater proportion of the population around Heathrow is affected by deprivation compared to the areas around Stansted and Gatwick (IMDs of 7.5 and 14.4 respectively), but lower than population around the Isle of Grain (26.1).
- The area around Heathrow is more densely populated than the area around Gatwick, Stansted or the Isle of Grain and the numbers of people within more vulnerable groups such as elderly and children are likely correspondingly greater. There are also 4 schools located within the footprint.
- Vulnerable groups may be more sensitive to the negative effects of aircraft noise. However, some vulnerable groups may also benefit from economic opportunities from airport expansion.
- This option avoids the potential impact on vulnerable groups, occasioned by the Stansted and Isle of Grain hub alternatives, through the loss of employment, reduced opportunities, access and services resulting from the closure of Heathrow over the transition period to new employment.

Quality of Life and Health

- Approximately 145,075 and 514,178 people located within 2km and 5km respectively of the airport.
- Affects an area between M4/M25 junction and existing airport therefore an area already heavily affected by major transport infrastructure. Major transport infrastructure works to the M25 and M4 would also affect population to the north of the M25 and impacts from road traffic noise and air quality emissions.
- Population noise impact is slightly higher than the north-west and south-west 3rd runway options although the 4th runway offers greater night time respite. The noise impact is less than the Heathrow Hub 3rd runway option.
- The scheme brings around 35,000 to 36,000 people into the 57 L_{eq} contour that were not previously affected by this level of aircraft noise. The population noise impacts are much greater compared to the Isle of Grain and Stansted Hubs.
- Less open space lost than for south-west and Heathrow Hub options and less severance effects for surrounding communities than for the south-west option. All the Heathrow options cause a smaller loss of open space/greenfield than the Stansted and Isle of Grain options.

Wider Social Impacts

Little difference between Heathrow runway options in terms of wider social impacts.

COST

Capital Cost

2030 cost estimate based upon a 3 runway layout allowing independent parallel operations. 2050 cost includes construction of 4th runway and associated infrastructure.

Cost estimate for 2030 includes purchase of all land and reclamation works for a 4 runway layout.

£bn	2030	2050
Airport	5 - 7	9 - 13
Access	2 - 3	2 - 3
Other	~1	~1
Total	8 - 10	12 - 16
Risk	3 - 4	5 - 6
Optimism Bias	5 - 7	8 - 11
Risk Adjusted Total	16 - 22	25 - 34

Key Risks

- Part of construction area currently occupied by reservoirs.
- Construction over the M25, M4 and the M25/M4 interchange.
- Construction adjacent to and in line with the existing northern runway.
- Tunnelling for rail and road links including M25 and M4.

Risk and Contingency Allowances

40% contingency and 50% optimism bias applied to risk adjusted cost.

Surface Access Costs

Based upon modifying motorway layouts (M25 & M4), capacity upgrades to existing central terminal area tunnel and new rail link to the South West of the airport at Staines. Surface Access costs are higher than the three runway options due to more tunnels, road diversions, highways infrastructure. Assumes that a new rail connection to the north of the airport, upgrade of the Piccadilly underground line and HS2 high speed rail connection are schemes that would be funded by others.

Infrastructure investment to 2030 along with wider transport infrastructure upgrades, currently unknown, is expected to accommodate the increase in passenger demand at the airport to 2050.

Other Off-Airport Costs

Significant levels of mitigation and/or compensation required to ensure Water Framework Directive and flood risk storage requirements are met. This includes mitigation measures for compensatory habitat provision. These costs have been incorporated into the 'other costs'.

OPERATIONAL VIABILITY

Capacity

The stated net benefit would require a fundamental redesign of the London TMA. Should this not be possible, the extent of interaction could negatively impact capacity at Gatwick, Stansted, Luton and London City airports. Depending upon the extent of that interaction, the net benefit may be no greater than the third runway at Heathrow schemes.

	Net	Airport	Net	Forecast Usage of Maximum Capacity	
				2030	2050
Runways	4		2		
ATM	850,000		370,000	70%	100%
pax	150		60	65%	97%

Resilience, Reliability and Efficiency

Transfer between terminal zones may exceed times acceptable to airlines, however it is assumed that alliances would operate from within a terminal zone and therefore inter-terminal zone transfer is less likely to be important. Capacity has been constrained to limit noise impacts, which would also improve resilience over current operations.

Safety

The proposal could be designed to comply with safety requirements, but would cause an increase in flights over central London. The proposal increases the number of flights over central London.

Scalability

A fifth runway and associated terminal zone could be constructed in the location of the Southwest "third runway" proposed by HAL, although this would establish a third operational centre remote from the two that would exist at that time.

Airspace

The proposal would require significant airspace redesign throughout the London system. The boundaries of the London terminal manoeuvring area would be amended and Heathrow's SIDs, STARS and interfaces with en route airspace would be amended to include the additional runway. Similar redesign at others airport across the system may also be required. However, given the long-term nature of the option and the likely airspace and air traffic management developments may be able to be achieved. There would not need to be any change of international boundaries.

DELIVERY

Timescale

Essentially a later phase of HAL's proposed northwest 3rd runway option. The proposed layout differs from the northwest 3rd runway however, therefore likely to require agreement for this longer term configuration at the outset.

Commercial Deliverability

Independent high level assessment suggests that, to meet the full debt requirement, aero yield may have to be increased by between ~15% and ~20% and indexed at 2.5% per annum thereafter, depending upon the level of contribution to surface access costs. Alternatively, without indexation, an increase of between ~50% and ~60% may be required.

Aeronautical yield index relative to Heathrow Q6 to breakeven: 1.6.

The borrowing requirement is large and above precedent for finance to be raised in the context of a wholly privately funded, single transaction. Bond issuance under a RAB model might be possible for the on-airport-only works, although there might be investor concerns about investment concentration in a single asset. Likely therefore that there would need to be an element of Government support.