

ASSESSMENT SUMMARY

		Impact relative to current situation				
Criterion	Constituency	++ve	+ve	Neutral	-ve	--ve
Strategic fit						
Economy	Airport					
	Airlines					
	Passengers					
	Connectivity					
	Employment					
	Public accounts					
Surface access	Road access capacity					
	Rail capacity					
	Journey time					
Environment	Noise					
	Air quality					
	Climate change					
People	Employment					
	Housing & demolition					
	Vulnerable groups					
	Quality of life					
	Social impacts					
Costs	Capital					
	Operating					
	Surface access					
Operational	Resilience					
	Efficiency (delay)					
	Reliability					
	Passenger experience					
	Safety					
	Scalability					
	Airspace					
Delivery	Timescales					
	Technical & operational risk					
	Planning risk					

ASSESSMENT RESULTS

Summary	This scenario presents clear wins for people living near airports, but likely does so at some cost to resilience. While some elements of the package might be of interest, the package as a whole feels as though it would be difficult to square with the Airports Commission's terms of reference particularly as it would result in a reduction or end to night flights and despite this delivers less CO ₂ savings as the core package due in part to the likely increase in delays caused by the measures in this scenario.
Strategic fit	Compared to the core package, the measures in this scenario would almost entirely have a positive impact only on exposure to noise. Whilst this package would deliver considerable respite from night noise, the consequential reduction or ban in night flights would not support maintaining or improving the UK's hub airport status as it would mean some routes, frequencies and airlines may be displaced from Heathrow, which would be highly unlikely to relocate to another UK airport (e.g. direct services to/from Australia). It would have a significant negative impact on airlines, airline passengers and wider connectivity for the economy, as it would see a reduction in flights to some high value long haul destinations (especially in Asia). This scenario may be likely to lead to reduced competition on such routes and increased fares (and travel times for those who would divert to less direct routes).
Economy	Net NPV of nearly £1B (2014-2030) compared with the status quo ¹ , largely due to implementation of most of the core package of measures, but it would be a decrease in NPV of around £1.6B compared with the core package, in part due to the reduction or termination of night flights and in part due to measures to increase public acceptability (resulting in more delays compared to the core package). The introduction of a reduced capacity declaration at Heathrow would have a negligible negative impact on airlines that wish to introduce or increase services, consumers and connectivity. Incumbent airlines at Heathrow would see increases in the values of their existing slot pairs due to increased scarcity. There would also be a marginal reduction in employment at Heathrow Airport due to the reduction or suspension of night flights.
Surface Transport	Negligible impacts compared to the core package.
Environment	There is a mixed environmental benefit from this package compared to the core package. Air quality emissions savings are reduced compared to the core package, although still an improvement on the status quo, and carbon emissions deliver 1.31Mt savings from 2014 to 2030, showing an NPV of £38.0M costed on a central scenario of traded carbon prices (compared to 7.12Mt CO ₂ and £147.9 NPV for the core). This package will, however, result in reduced noise impacts compared to the core package. The key element of this is seen as the reduction or ban in night flights and the development of a comprehensive noise compensation scheme. The concentration flights during the daytime will mean that there will remain a significant noise impact from Heathrow operations and that the 16 hour LEq will initially increase as all ATMs will be during this period.
People	Negligible impacts compared to the core package, but with an initial increase in daytime noise compensated for by reduced night time noise, which given the sensitivity of the latter, could be seen as a positive impact. Immediate effects on employment are limited, but over time, constraints on growth may impact employment opportunities.
Cost	Negligible impacts compared to the core package
Operational Viability	Reduced capacity declaration at Heathrow likely to result in only one less flight per day over a 10 year period, as demand is unlikely to see capacity surrendered.
Delivery	Need for regulatory measures to prohibit business and general aviation from Heathrow and Gatwick

¹ The 'status quo' means current operations using a baseline of 2008 data.

ECONOMIC IMPACTS

Impact on Industry (summary commentary)

Compared to “the status quo” this scenario will reduce costs for airlines and passengers, delivering net economic benefits of around **£1 billion** (NPV) by 2030 for the aviation sector and its users, including the value of the remaining core package measures. This is **£1.6 billion** (NPV) **lower** than the core package. Compared to the core package, the net impact will be fewer flights, fewer passengers and less connectivity at Heathrow, with significantly higher airborne and ground delays. The primary impact of the maximum mitigation scenario on the aviation industry will be at Heathrow, but it would also have minor impacts on other airports due to the introduction of a noise regulator and QC system into full day operations at all major airports. The primary impact for Heathrow Airport, and its airline and passenger customers, will occur because of the elimination of night flights at Heathrow, the resulting constrained implementation of operational freedoms and the lower capacity declaration at Heathrow. These measures will see the termination of some high value services, reducing connectivity and competition on those routes, and may result in the exit of an airline from the UK market, increasing airfares. Some services may shift to other time periods, displacing frequencies and routes to other destinations, which will also reduce connectivity and increase total travel times and fares to those destinations.

Airports

Compared to the core package, Heathrow Airport will have reduced business, because of reduced flights, passengers and cargo, resulting in marginally lower employment at the airport. This is primarily due to the termination of high value night flights (between 2300-0620). Heathrow will have higher delays and lower reliability compared to the core package. The introduction of the night flight ban is unlikely to substantially benefit other UK airports, as airlines operating routes at those times are unlikely to find such services viable to non-hub airports (as the arrival times are partly driven by the ability to access connecting flights). Heathrow will also lose incremental traffic (average 4.9 flights per day) from a prohibition on business/general aviation traffic (Gatwick will lose on average 5.7 flights per day from such a prohibition). The introduction of a comprehensive noise regime is likely to impose incremental compliance costs on airports as part of monitoring and enforcement. These costs are likely to be largely transferred to airlines (and thus to airline customers). Heathrow will likely reduce future investments in existing infrastructure due to the reduction in capacity and passengers.

Airlines

Compared to the core package, the maximum mitigation package will deliver **lower** quantifiable airline cost savings (2014 to 2030) by around **£872M NPV** primarily due to substantially less time and fuel savings (a total of **£636M NPV** in savings). Airlines operating at Heathrow during the current night period will either terminate services or use slots at other times, displacing other services. This is likely to be particularly difficult for foreign airlines operating long haul services that may not have suitable slots at other times that may be reallocated. An airline may choose to either relocate services at another airport (e.g. Gatwick) or prefer to exit the UK market, reducing competition and increasing fares on the routes it services. The imposition of higher charges to incentivise quieter aircraft and flying during day times is likely to result in airlines transferring costs onto passengers, where airlines have limited flexibility to make additional fleet and scheduling choices to address noise issues in the short term. Airlines are likely to increase the size of aircraft serving Heathrow to meet any growth in demand.

Passengers

Compared to the core package, the maximum mitigation package will deliver **lower** passenger cost savings (2014 to 2030) of **£437M NPV** (a total of **£142M NPV in savings**) primarily due to substantially lower time savings at Heathrow. Furthermore, compared to the core package the cancellation of night flights and the reduced capacity declaration is likely to create a further loss to passengers and airlines together of around **£394M NPV**. The primary impact on passengers will be loss of direct services to some destinations and reduced frequencies, which will increase fares and travel times (as passengers will have less convenient choices of direct services or will need to utilise indirect services to access destinations no longer served directly).

DfT WebTAG Impacts (summary commentary)

- Economic Surplus Producers: Compared to the core package, at least **£872M NPV less** in surplus due to higher delays, fuel consumption and labour costs.
- Economic Surplus Passengers: **£437M NPV less** benefits compared to the core package to passengers due to higher delays.
- Time Savings From Delay Reduction: Not calculated relative to core package, but likely to be lower.
- Public Accounts: Likely to be negative, due to less APD revenue from lower passenger numbers and because of the costs of establishing and maintaining a noise regulator.
- Wider Impacts And Regeneration: (See National Economic Impacts, Local & Regional Economic Impacts);

<ul style="list-style-type: none"> Surface Access Impacts: Nil 	
User benefits	Reduced delays and cancellations; improved resilience
Externalities (e.g. noise & CO ₂)	This package delivers considerably reduced savings compared to the core package. Based on CO ₂ savings, and the central scenario value of traded carbon costs ² , savings are indicated over the period 2014 to 2030 of approximately £38.0M NPV , with a very marginal saving at LHR related to less than 0.3M tonnes CO ₂ reduction. Noise cost benefits have not been quantified. Shifting night flights to daytime will mean that TEAM needs to be applied more frequently and respite will be lost.
Connectivity to domestic markets (summary commentary) Introducing a ban on night flights is likely to result in some transfer of long haul services to utilise slots currently used for domestic flights, reducing domestic connectivity.	
International connectivity (interline vs. point-to-point; market access)	A ban on night flights will likely reduce international connectivity to long haul destinations serviced at those times, particularly Asia and Australia. It may also reduce connectivity to some short haul international destinations as some higher value long haul services utilise slots currently used for international services to other destinations, e.g. Europe.
Domestic connectivity (surface transport & domestic aviation)	Impacts are expected to be negligible.
National Economic Impacts (summary) Compared to the core package, the maximum mitigation scenario will not result in significant improvements to airline operating costs or time-savings for passengers. The introduction of a ban on night flights and reducing the capacity declaration at Heathrow will reduce connectivity at that airport and for the UK, as the services that would be affected are almost entirely not routes operated to other airports in the UK, which can be partly attributed to the hub characteristics of Heathrow. It is possible that such a ban on night flights could result in the withdrawal of an airline from Heathrow, as the viability of alternative flight times may not be sufficient to justify the cost of rescheduling services when Heathrow has little scope for accommodating such rescheduling. The effect is likely to increase fares further due to the increased capacity constraints at Heathrow and Gatwick, particularly for services to destinations outside Europe. This will also see a commensurate increase in air cargo prices. This will have a negative effect on overall connectivity for the UK, negatively influencing trade, investment and tourism.	
Local & Regional Economic Impacts (summary) <ul style="list-style-type: none"> Support to trade: Introducing new constraints to capacity at Heathrow will reduce competition, increasing fares, which is likely to negative impact upon inbound tourism, foreign investment and trade (as air cargo prices also rise). Creation of new industries: A reduction in connectivity at Heathrow is likely to negatively affect the likelihood of new industries being created that are supported by access to air passenger and/or cargo services. Land Impact: The introduction of new restrictions on development within the noise contours of Heathrow will reduce such development and have a marginal impact on inflating land (and residential and commercial) prices outside such contours. However, this may be marginally affected by the reduction in flights and consequential employment at Heathrow. Direct Employment: Prohibitions on night flights will reduce employment at Heathrow Airport and with airlines operating at those times, including the possible withdrawal of an airline from the UK. Indirect Employment: Reduced available capacity at Heathrow will constrain longer term growth in inbound tourism, particularly from locations outside Europe. Induced Employment: Reduced available capacity at Heathrow is likely to have a negative impact on induced employment. Catalytic Employment: Reduced available capacity at Heathrow is likely to have a negative impact on catalytic employment. Agglomeration Impacts: Reduced available capacity at Heathrow is likely to have a negative impact on agglomeration. Residual Value: Not relevant 	

² <https://www.gov.uk/carbon-valuation>

ENVIRONMENT

Noise

This scenario will result in reduced noise impacts compared to the core package. The overall benefit of this scenario is seen to be positive in noise terms. The key element of this is seen as the reduction or ban in night flights and the development of a comprehensive noise compensation scheme. The lower capacity declaration at Heathrow is also positive as are the proposed displaced thresholds and restriction on new development within the contours. The measures to incentivise quieter aircraft and develop higher night time landing charges are not expected to be significant as operators are expected to pay given the high value of slots. General aviation and business traffic forms a very small proportion of the Heathrow activity so excluding it is not seen as significant. With the expected modernisation of the fleet the situation will be improved further from that resulting from the measures in this scenario. The concentration of flights during the daytime will mean that there will remain a significant noise impact from Heathrow operations and that the 16 hour LEq will initially increase as all ATMs will be during this period. The benefit of an independent noise regulator is not clear, but is related to limited trust in noise data circulated by airports and the CAA. This suggests a perception issue rather than one of technical noise, and regulatory structures may not be able to address this. A new regulatory body would need to align with Government commitments to reduce the overall regulatory burden, and would have both set up and operating costs associated, although these have not been determined at this stage.

Local air quality

This scenario delivers lower NO_x emissions reductions than the core package (6,850 tonnes). Quantitative analysis indicates savings of approximately **4,300 tonnes** of NO_x at Heathrow over the period 2014 to 2030³, compared to the status quo based on 2008 operations and performance, extrapolated to 2030 taking into account fleet changes. Some savings from the core package are no longer available due to increased delays. No savings have been ascribed to reduced engine taxi⁴, despite the potential NO_x and noise benefits, as the concentration of flights within a shorter operating window will restrict the opportunity for ground movement flexibility due to constrained taxiway availability.

Climate change

This scenario delivers significantly lower CO₂ savings than the core package (7.12Mt). Quantitative analysis indicates savings from this scenario of approximately **1.3M tonnes** of CO₂ over the period 2014 to 2030⁵, compared to the status quo based on 2008 operations and performance, extrapolated to 2030 taking into account fleet changes. This is a result of increased emissions at Heathrow from shifting night flights to daytime and using TEAM with a 20 minute trigger to manage arrivals delay: an average penalty of an additional 256,000 tonnes per year. There are likely to be further, impacts on climate change through reduced engine taxi procedures across main airports excluding Heathrow that could save 23,250 tonnes of CO₂ per year from 2016.

³ LeighFisher analysis has estimated delay and NO_x benefits from a relationship to CO₂, derived from estimates of fuel burn generated using the ground holding delay models developed in the CAA runway resilience study (http://www.caa.co.uk/docs/589/ICF_runway_resilience_final_report_16Feb09.pdf) augmented by emissions predictions generated using the ICAO Aircraft Engine Emissions Databank and the Eurocontrol BADA (Base of Aircraft DATA), <http://www.eurocontrol.int/services/bada>

⁴ Reduced engine taxi benefits for NO_x and CO₂ have been calculated from reference to BMI trial results at Heathrow (<http://www.heathrowairport.com/about-us/community-and-environment/sustainability/case-studies/taxiing-the-way-to-lower-emissions>), the estimate of ground level Aircraft NO_x at Heathrow (http://www.heathrowairport.com/static/Heathrow/Downloads/PDF/air-quality-strategy_LHR.pdf) and apportioned to 25,000 ATMs based on CAA activity data for 2008. Sustainable Aviation CO₂ roadmap identified that taxiway availability would constrain any benefits from RET, so the approach here is conservative.

⁵ Carbon impact calculated from estimated fuel savings, using emission factor for Jet A1: <http://www.ukconversionfactorscarbonsmart.co.uk/>

PEOPLE

Employment

Although no immediate major impacts on employment are anticipated from deployment of the maximum mitigation scenario, the elimination of night flights at Heathrow and reduction in capacity declaration for Heathrow will constrain growth in employment, by reducing direct employment at the airport and for the relevant airlines at those times, and with consequential indirect impacts on employment. This may have wider effects on e.g. transport, retail and catering businesses, as over the longer term the reduction in connectivity constrains growth in trade and tourism.

Housing and demolitions

No housing demolitions will be required. The impact on housing from concentrating flights during the 16 hour Leq period will see an initial increase in daytime noise. Constraints on construction within specified noise contours will have an incremental effect on future housing supply and prices.

Number of Houses*New**Demolished*

Nil

Nil

Vulnerable groups

No significant impacts on vulnerable groups are anticipated from deployment of the core package, as noise impacts are anticipated to reduce over time, although concentration of noise during the day may result in specific local impacts.

Quality of life

There will be a steady decrease in noise levels, reflecting the fleet mix. Redistribution of noise to the daytime is likely to be seen as a positive, notwithstanding the initial increase in noise during the 16 hour Leq period.

At Heathrow, removal of night flights will clearly reduce night noise but will likely cause additional de-alternation and loss of respite during the day as night slots are transferred to daytime operations.

Social impacts

No additional social impacts compared to those indicated under the above sections are anticipated.

COST

Capital

Airlines currently holding valuable slots for night periods will see the value of these removed by regulation, affecting the value of intangible assets on their balance sheets.

Operating

Airlines currently operating during night periods will face considerable costs in acquiring or reallocating slots at other times to support these services.

Mitigation and compensation

Unknown at this stage.

Surface access

To be considered in separately.

OPERATIONAL IMPACT**Resilience**

Prohibiting night flights will result in more limited capacity to manage early arrivals, reducing the incremental capacity for resilience. At Heathrow, resilience measures⁶ (forming part of the Airport's Airfield Operational Efficiency Programme) are forecast to deliver savings in cancellations of **£201M NPV** from 2014 to 2030, although this is likely to be at risk due to the increased pressure on the airport from transferring night flights to the daytime. The 2008 runway resilience study showed that Heathrow is far more prone to large-scale cancellations than other airports, due to its operating very near to capacity. Resilience measures will likely have much more impact at Heathrow than at other airports.

Efficiency

At Heathrow, maximum mitigation coupled to the core package measures⁷ is likely to deliver savings in delays to airlines of **£483M**, due to reduced delays from 2014 to 2030 and a cost saving to passengers of **£322M NPV** from 2014 to 2030 compared to *the status quo* based on 2008 operations and performance, extrapolated to 2030 taking into account forecast fleet changes.

Reliability

The increased pressure on capacity due to transferring night flights to the daytime and associated delay increases is likely to mean that there will be no opportunity to reduce block-time buffers.

Passenger Experience

Compared to the core package, the passenger experience will be inferior, primarily because high demand night flights will be cancelled, with some such services shifting to less preferable times, displacing other services, increasing use of the constrained capacity of the airport at those times reduces the main benefits of the core package for passengers. Business and general aviation users who currently prefer to use Gatwick and Heathrow will see a reduction in user experience from a ban on such users at those airports. Qualitatively the passenger experience will be affected:

- potentially by reduced ground holding at Heathrow due to local A-CDM
- through increased airborne holding at Heathrow due to shifting night flights to the daytime.

Safety

Compared to the core package there is a negligible impact on safety.

Scalability

The package is not easily scalable.

Airspace

No changes beyond the core package are anticipated.

DELIVERY**Timescale**

The measures would be delivered in phases starting in 2014 with the core package.

Technical and operational risks

The principal technical and operational risks are:

- safety cases for displaced thresholds.
- the delivery of infrastructure and operational measures to ensure that airlines apply displaced thresholds consistently to reduce noise.
- limits upon the commercial ability of airlines to accelerate changes in fleets to reduce noise due to relatively full order books, build and delivery times and financing arrangements.

Planning risk

Beyond issues identified within the core package, there is planning risk associated with:

- moving night time slots to the daytime
- permission to prohibit night flights at Heathrow, including from airlines seeking compensation
- removing landing slots from airlines during night periods, particularly foreign carriers in the context of existing bilateral air services agreements, which may see this as a breach of existing access rights
- restricting land development within specific noise contours, in the absence of an agreed approach following the

⁶ Derived from fuel savings information provided by Heathrow Airport.

⁷ Delays are derived from modelling and are then monetised using values derived from: Standard inputs for Eurocontrol cost benefit analyses, edition 5.0, December 2011.

rescinding of national Planning Policy Guidance (notably Planning Policy Guidance 24)

- inequality of impact on origin countries from departure time impacts of banning night flights.

MEASURES INCLUDED IN THE PACKAGE INCREMENTAL TO THE CORE PACKAGE

Measure	Description	Template ref.
Reduction or ban on night flights at Heathrow		
Lower capacity declaration at major airports	This measure would provide a lower capacity declaration at airports, to manage down congestion over time (or prevent airports reaching full capacity) so as to minimise the impacts of congestion on resilience. The proposal would be for a greater focus to be provided on the efficient utilisation of slots through the slot allocation process.	SSR-DMA-1
Displaced thresholds	The 'threshold' is the physical point on a runway where an aircraft aims to touch down. Operating a displaced threshold results in that point being further along the runway. Operating a displaced threshold would result in aircraft being higher above the ground at a specific distance from touchdown, with a resultant reduction in noise contours.	ApOP-GOI-4
Restrict new development within noise contours	This measure supports the development of clear guidance on the planning, policy and compensatory action that would be considered appropriate to address significant environmental and community effects at the local level around airports.	EMit-PAC-1
Develop comprehensive noise compensation regime	This would lead to the development of an agreed noise compensatory package based on best practice across all airports.	EMit-PAC-2
Develop higher night time landing charges at Heathrow	This proposal would see the introduction of a variable landing charge regime which charged night aircraft movements higher landing charges than those operating during the daytime.	REG-ACR-2
Ban general aviation and business aviation from Heathrow and Gatwick	This would prevent general and business aviation flights from using Heathrow (and potentially Gatwick), with the intention of improving capacity usage at those airports.	REG-ACR-1
Incorporate noise regulator	Support for the creation of an independent body responsible for the regulation of aircraft (and potentially other sources of) noise, to introduce transparency and consistency into the system.	Emit-NMT-3
Incorporate QC system into full day operations at all major airports.	This measure proposes an expansion in the current use of QC categories as a method for incorporating noise management into airport capacity management. The QC system allows each night flight to be individually counted against an overall noise quota (or noise budget) for an airport according to the QC rating (i.e. the noisiness) of the aircraft used. This measure would extend this QC system to day time operations.	EMit-NMT-1

ASSUMPTIONS

Core package

Measure	Approach and assumptions
En route arrival management	Starts 2019. Assumes linear holding can absorb 2 to 3 minutes of stack holding. Modified stack holding is calculated from operational data by subtracting the linear hold from each flight's stack hold and averaging over summer and winter seasons to give an average reduction in stackholding. Assumes that there is no time saving because the queue is shifted upstream. Assumes that there is a saving in CO ₂ emissions driven by the reduction in average stack holding time with the multiplier derived from the analysis underpinning the Helios airborne holding report (reference: Feasibility and options for reducing airborne holding for Heathrow arrival, Helios, 30 June 2012 produced under contract 1387 (Helios) service order number 20, commissioned jointly by CAA and NATS). Gives a lower bound of the CO ₂ saving because it omits the saving from the en route phase of flight arising because of a slower cruise speed, even though the flight is 2 to 3 minutes longer. Calculation is limited to Heathrow flights even though benefits likely to accrue at other airports during busy arrival periods. Simple scaling is possible for Gatwick based on the 2008 runway resilience report that shows airborne holding delays at LGW are 16% of those at LHR in summer and 7% in winter. Averaged this gives a yearly average of 14% - assumes that en route arrival management delivers 14% of the benefits at Gatwick that it delivers at Heathrow. Calculation limited to Heathrow and Gatwick even though benefits likely to accrue at other airports during busy arrival periods.
Time based separations	Starts 2019. Assumes that TBS delivers increased arrival flows during high (20 knots at 3000ft) headwind conditions (reference operational freedoms trigger condition). Assumes that this condition is met 20% of the time in summer and 36% of the time in winter. TBS adds 2 to 4 arrivals per hour during very high headwind conditions (source: NATS). Half this increase is assumed as a baseline. Benefits calculated in terms of reduced stackholding using the models developed for the CAA runway resilience study that includes the impact of strong winds for the day from 08:00 onwards (assumes that pre-08:00 is dealt with through TEAM which is applied virtually every day from 06:00 to 08:00. This impact is neutralised by adding back TBS capacity scaled in proportion to the likely occurrence of strong winds (2 to 4x0.20 for summer and 2-4x0.35 in winter).
Single runway for early morning arrivals	It is assumed that this measure is not allowed in this package.
Independent parallel approaches at Heathrow	Enables optimum TEAM.
Reduction in separation between SIDs	Starts 2016. Assume 10 to 15% increase in departure capacity due to reduced separation between SIDs achieved either by PBN/RNAV capabilities or through controller vectoring. The impacts of this are calculated using the Heathrow delay curve models for time and CO ₂ savings. CO ₂ saving is translated into a fuel saving (1 tonne of fuel = 3.149 tonnes of CO ₂) and then translated into NO _x (1 tonne of fuel = 12.8kg of NO _x) The 2008 runway resilience report shows a very similar average ground holding delay at Gatwick compared to Heathrow. The total delays therefore scale according to traffic (assumed to be 2:1): assume departure benefits at Gatwick are 50% of those at Heathrow
Local A-CDM	Starts 2014. Assumes A-CDM and other process improvements deliver (source: Information provided by Heathrow Airport) the following at LHR: <ul style="list-style-type: none"> - reduction in departure holding of 1.5 minutes per flight (assumed also to apply at Gatwick and scales from Heathrow results on a 2:1 basis, as explained above) - avoidance of 200 cancellations per year.
Operational freedoms	Starts 2014. Assume that the availability of operational freedoms is used to overcome the negative capacity impact of increasing numbers of A380s (21 arrivals in 2014 (3%), 30 arrivals per day in 2016 (4.5%), 62 arrivals in 2030 (5.5%)) (Source: NATS). The Helios airborne holding report (reference: Feasibility and options for reducing airborne holding for Heathrow arrival, Helios, 30 June 2012 produced under contract 1387 (Helios) service order number 20, commissioned jointly by CAA and NATS) is used to compare the difference in delay using a 20 minute trigger for TEAM with the assumption that all A380s are landed on the departure runway (i.e. no negative impact on capacity).

Scenario: 3	Maximum mitigation		
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	<p>This difference is assumed to be the sole quantifiable benefit of operational freedoms based on the results of the recent trial.</p> <p>The negative impact on departures is calculated by adding the A380 arrivals to the departure runway loading taking account of the additional capacity gained through reduction in separation of SIDs</p>
LVP	Information provided by Heathrow Airport suggests that improved LVP procedures will result in 600 fewer cancellations per year split at a ratio of 70:730 long haul:short haul.
Block time reduction	The 2008 runway resilience study shows an increase in block time of short haul flights to LHR of up to 18 minutes over 20 years. It is assumed that increases in reliability/resilience will reverse this increase by 50% over a period of 10 years, starting in 2019. Eurocontrol standard figures for strategic delays are used to calculate the associated benefit of this. Assumed not to be applicable in this package..

Maximum mitigation increments

Measure	Approach and assumptions
Reduction of night flights at Heathrow	Starts 2014. Assumes that pre-06:00 arrivals are not allowed at Heathrow and the early morning arrivals are distributed evenly over 13 hours from 06:00 (13 hours is chosen to get a reasonable hourly delay performance at or around 10 minutes average delay without the need to apply TEAM over extended periods). The reduction of night flights will only affect arrivals as there are no scheduled departures at Heathrow during the night period.
Lower capacity declaration at Heathrow	Starts 2014. Assumes that the capacity declaration is reduced to provide a cap at 90% of capacity (similar to the Gatwick cap in this package). However, because of grandfather rights it is unlikely that slots will be handed back so the underlying (constrained) demand level will remain the same. The impact of the lower capacity declaration will be to remove the capacity to award ad hoc slots to back-fill the schedule when flights are cancelled – it is assumed that this will prevent general and business aviation from operating at the airport and reduce on the day demand by approximately 8 arrivals and departures per day (1%).
Ban general and business aviation from Heathrow and Gatwick	Starts 2014. This is covered by the reduced capacity declaration, above, at Heathrow. At Gatwick it will likely mean that the actual demand will be approximately 89% of capacity instead of at the 90% cap as it will not be possible to backfill cancellations with ad hoc slots for general and business aviation.
General	All three components of the package increment have to be considered together as they are not separable nor additive.

Quantitative assessment for resilience and efficiency

Item	Costs	Annual benefits/savings		
		Low	Med.	High
En-route arrival management, from 2019 onwards	£6M (ref: NATS)	70ktonnes CO2 saving. Fuel cost saving: £15M	105ktonnes CO2 saving Fuel cost saving: £22M	135ktonnes CO2 Fuel cost saving: £29M
Time based separations starting in 2019	N/A	N/A	N/A	N/A
Early morning arrivals on single runway from 2016 to 2019	Small	55ktonnes CO2 saving Total aircraft operating cost saving:£8.5M Pax opportunity cost saving: £4.1M		83ktonnes CO2 saving Total aircraft operating cost saving:£13.6M Pax opportunity cost saving: £6.6M
Independent parallel approaches at LHR	TBD		51ktonnes CO2 saving Total aircraft operating cost saving:£9.0M Pax opportunity cost saving: £4.3M	
Reduction in separation between SIDs from 2016 to 2019	£500k (source: NATS)	34ktonnes CO2 saving 138 tonnes NOx savings Total aircraft operating cost saving:£14.7M Pax opportunity cost saving: £10.0M		47ktonnes CO2 saving 191 tonnes NOx savings Total aircraft operating cost saving:£20.1M Pax opportunity cost saving: £13.8M
Local A-CDM from 2014	Sunk		26ktonnes CO2 saving 106 tonnes NOx savings Total aircraft operating cost saving:£10.9M Pax opportunity cost saving: £7.4M. Avoided cancellations: £6.3M	
Operational freedoms to reduce impact of A380s (2014 to 2016)	Small cost and 15 additional de-alternated flights per day		68ktonnes CO2 saving Total aircraft operating cost saving:£44M Pax opportunity cost saving: £19M.	
Operational freedoms to reduce impact of A380s (2016 to 2019)	Small cost and 20 additional de-alternated flights per day		93ktonnes CO2 saving Total aircraft operating cost saving:£49M Pax opportunity cost saving: £21M.	

Improved LVP processes: triggers for application; and increased flow rates with MLS, from 2014			Avoided cancellations: £11M	

Quantitative assessment for resilience – maximum public acceptability

Item	Costs	Annual benefits/savings		
		Low	Med.	High
Ban night flights at Heathrow and move the existing night flights to the daytime, while banning business and general aviation.	Small		256ktonnes CO ₂ penalty due to increased arrival delays. No impact on NOx Airline delay cost penalty of: £59M from increased arrival delays Passenger cost penalty of: £29M from increased arrival delays.	