SHORT (& MEDIUM) TERM MEASURES - EXECUTIVE SUMMARY

MEASURE SET	**Airspace operations**
MEASURE TITLE	Departure management
MEASURE SUMMARY	This measure includes multiple proposals to improve airport departure management processes to deliver efficiency, noise and resilience benefits.
MEASURE INVOLVES	☐ Behavioural Change ☒ Operational Change ☒ Technical Change ☒ Infrastructure Change ☐ Regulatory Change ☒ Policy Change

WHAT DOES THIS ADDRESS?

This measure addresses the departure process once the aircraft have taken off from the departure runway. Currently, the aircraft fly along Standard Instrument Departure routes (SIDs) that are defined as the centreline of a swath defining the noise preferential route established, where necessary, to ensure that aircraft avoid overflying noise sensitive areas. SIDs are defined as single routes and departing aircraft using the same SID fly in-trail along the route with their minimum separations being defined according to ATC rules. For a constant stream of aircraft departing down the same SID, this ATC separation requirement is the constraining factor for the throughput. Offsetting the angle between successive departures so that they are not in-in trail along a single route effectively relaxes the required minimum separation and increases the departure runway throughput. After taking-off, the aircraft follows the horizontal and vertical trajectory as specified in the SID definition along the centreline of the SID, unless under vector control by ATC. Often the vertical trajectory is effectively stepped and, in the London area, the aircraft is often held at an altitude of 6000 feet due to airspace structure and interactions with inbound traffic – these limitations restrict the scope for continuous climb departures as departing aircraft are held in horizontal flight at 6000 feet for a considerable amount of time.

WHAT WOULD BE DONE?

This first part of this measure would use the advanced navigation capability of modern aircraft to optimise departure separation using offset departure routes: effectively splitting a current single SIDs into two or more routes separated by small angles. This requires the aircraft and crew to be able to fly accurate area navigation (RNAV) routes autonomously without extensive ATC intervention. This concept would require airspace change and might require redefinition of noise preferential routes. It would, however, enable aircraft to be dispersed within the noise preferential route swath rather than being concentrated on the centreline as at present. This technique could be used to disperse the noise across the noise preferential route swath, either concentrating on a few flight paths with respite (possibly detrimental to capacity increases) or more general dispersion. Steeper climb out after departure means that aircraft reach higher altitudes earlier, potentially reducing their noise footprint. However, near to the airport at steeper ascent rates departures cold be noisier than at present if higher engine thrust settings are use and there may also be a negative impact on emissions. Continuous climb departures would reduce fuel burn although it is not possible to implement them within the current structure of London airspace.

WHAT IS THE IMPACT?

The impacts would be expected to be:

- higher departure runway throughput when this is constrained by SIDs
- reduced departure noise other than close to the airport when noise intensity might increase and there could, potentially be an increase in emissions due to higher thrust settings for steeper ascents
- redistribution of noise within the noise preferential route swath
- reduced emissions associated with continuous climb departures.

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MEASURE TITLE:	Departure management	Medium Term	X

MEASURE SUMMARY

Proposed by:	Gatwick Airport (019), HACAN (021), Heathrow Airport (024), Individuals, LACC/AOC (043), NATS (053)
Proposal: AsOP-DPM-1 AsOP-DPM-2 AsOP-DPM-3	The measure includes three proposals relating to enhanced management of departures. These are: • optimisation of departure separation using advanced aircraft capability • steeper climb outs/continuous climb departure (CCD) • distributing departure routes within noise preferential route (NPR) swaths. With the exception of continuous climb departure, the other proposals have the potential to be enacted in the short-term. Continuous climb departures would require significant airspace change in the London area and would likely only be a medium-term option.
Approach	The approach for each of the proposals within this measure is as follows: • optimised departure separation enabled through use of advanced aircraft navigation capability: this is effectively the creation of new departure routes with less than the current spacing and potentially down to less than the current 15° minimum standard (see for example trial results at Atlanta Airport) • steeper climb out/continuous climb departure after take-off • distributing departure routes within NPR swaths principally for respite but potentially also for resilience (Heathrow and Gatwick) as in operational freedoms vectoring. Stated Capital Cost: Not stated Capacity (mppa): Not stated Capacity (atm): 10% to 15% increase in departure capacity subject to comparable increases in arrival capacity(source: NATS proposal)
Benefits	The principal benefits of the measure are: (i) increased departure capacity due to optimisation of departure route separation and (ii) reduced noise due to steeper climb-out and ultimately CCD but potentially increased noise on the ground; (iii) reduced GHG emissions and improved LAQ due to reduced ground holding enabled by the additional departure capacity reserved for resilience; (iv) cost savings also enabled by the proportion of additional capacity that is reserved for resilience. NATS' analysis shows that c.20% of Heathrow traffic is constrained by the current SID structure, and NATS estimate that c.15% could benefit from more flexible departure tracks. It should be noted that without improvement to arrival capacity this measure can only improve peak departure throughput.
Issues & Risks	The main risks that need to be addressed are: (i) the need to follow airspace change process to support the definition of new SIDs and potentially realign noise preferential routes; (ii) the need for the aircraft fleet to be suitably equipped/capable to deliver the capacity increase. Although most modern aircraft will have the required capability, there is a risk that the overall effectiveness of the measure might be prejudiced by a small proportion of older aircraft with lesser capability; (iii) the balance between additional slots/resilience/respite enabled by additional capacity; (iv) the safety cases/arguments that are needed; (v) limitations on what can be achieved with steeper climb-out/CCD because of existing airspace constraints; (vi) additional air traffic controller workload generated by vectoring aircraft within existing NPR swaths.
Mitigations	Early public consultation on the airspace changes required to support any changes to the SID structures in place would be required.
Dependencies	The main dependencies for the measure are: • the need for aircraft with advanced navigation capability to enable the benefits of reduced departure separations, potentially requiring mandated minimum performance standards at specific airports • airspace change necessary to accommodate new routes that would be needed • airspace change in the London area to enable CCD (this is part of the Future Airspace Strategy and the London Airspace Management Programme) • the balance of the capacity gains taken for additional slots vs resilience vs respite • the need for concomitant increases in arrival capacity if the benefits are taken in the form of capacity rather than resilience or respite.

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	• Regulatory approval of departure routes at reduced angles would be required.

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ASSESSMENT SUMMARY

Strategic Fit	Not stated – depends on long-term options.
Economy	The potential positive economic impacts are likely associated with an increased departure capacity of up to 10% to 15% enabled by additional departure routes. This would, however, be reduced if the routes were used to guarantee periods of respite or for resilience purposes. Resilience would, however, deliver cost savings through reduced departure delays/improved departure punctuality.
Surface Transport	The impact on surface transport would depend on the degree to which additional capacity was used for new slots. This could range from no impact to up to 15% in passenger volume (assuming a direct translation of increased departure capacity into passenger demand).
Environment	The potential positive environmental impacts would include: • reduced GHG emissions and improved LAQ due to reduced ground holding delays that might be enabled through additional departure route capacity used for resilience • better managed noise footprints, including periods of respite, but with noise redistributed so that some communities currently only lightly affected might suffer an increase whereas others will benefit from a decrease • reduced departure noise intensity due to steeper climb-out and CCD (where possible) but potentially higher emissions due to the increased thrust needed for steeper climbs • CCD should also result in lower emissions.
People	The measure could enable predictable periods of respite under departure routes (on top of that already delivered by the LHR alternation pattern). However, this would result in a redistribution of the noise footprint and there would likely be winner and losers. The measure would likely deliver reduced noise intensity due to steeper climb-out and ultimately CCD, although those living closest to the ends of the departure runways might experience higher noise intensity due to the increased thrust needed for steeper climbs.
Cost	Significant costs expected associated with airspace changes required; public consultation; revision to training & procedures; and safety cases.
Operational Viability	Barriers to be overcome include: • the potential need for a formal airspace change process and associated consultation • need for aircraft with advanced navigation capability to enable optimised departure separation • air traffic controller workload to vector departures within the NPR swath. NATS currently consider that vectoring within a swathe is impractical as a permanent solution; this would require precision based navigation on pre-defined routes. • safety cases/arguments on an airport-by-airport basis • airspace constraints in the short-term on steeper climb-out and CCD.

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Delivery	Delivery is dependent on airspace change as well as safety cases for the new procedures to be applied.