LEEDS BRADFORD AIRPORT
FASI AIRSPACE CHANGE PROPOSAL

ACP-2021-066

Stage 2B Submission Document
Initial Options Appraisal

January 2026

Version	Date	
1.0	05/01/26	New document prepared for Stage 2 submission January 2026

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1. INTRODUCTION

1.1 The UK's Airspace Modernisation Strategy

1.1.1 In 2017 the Secretary of State tasked the Civil Aviation Authority (CAA) with preparing and maintaining a coordinated strategy and plan for the use of UK airspace up to 2040.

1.1.2 The first Airspace Modernisation Strategy (AMS) was published in 2018 and set out the 'ends, ways, and means', of modernising airspace through a series of 'delivery elements' that will modernise the design, technology, and operations of the airspace.

1.1.3 The AMS was updated in 2023 and is split into 3 parts, published separately. Part 1 (Strategic objectives and enablers) explains the strategy's objectives, a high-level overview of what will enable those objectives to be fulfilled, and governance for overseeing delivery. Part 2 (Delivery elements) and Part 3 (Deployment) describe the short-term ambition and explain how the strategy is being delivered.

1.1.4 The AMS vision is to deliver quicker, quieter, and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace. The AMS does not propose specific airspace changes, but a key deliverable is a masterplan of airspace changes that will be necessary for modernisation.

1.2 Airspace Change Organising Group & the Masterplan

1.2.1 Following the publication of the AMS, the aviation industry is working together to deliver airspace modernisation through a coordinated programme. More than 20 UK airports and NATS are involved in the delivery of this national programme of airspace change, which is being coordinated by the Airspace Change Organising Group (ACOG).

1.2.2 Airports are responsible for designing the arrival and departure routes that support their operations from the ground to approximately 7000ft. They also take responsibility for the way the airspace is used and developed in this lower portion of airspace.

1.2.3 NATS is responsible for re-designing the airspace above 7000ft. They take responsibility for the route network, and for the way the airspace is used and developed above 7000ft.

1.2.4 ACOG are responsible for developing the Masterplan, a single coordinated implementation plan for airspace changes in the UK up to 2040. The Masterplan is being produced by ACOG in stages, with more detail added with each iteration. Across all iterations, the masterplan will:

- Identify where and when airspace change proposals are needed, with proposed timelines for implementation,
- Describe how these proposals relate to each other, and highlight potential conflicts between their designs,
- Explain how trade-off decisions to resolve these conflicts have been made,
- Demonstrate the anticipated cumulative impact of all the airspace change proposals.

1.2.5 Iteration 1 was published in 2020 and Iteration 2[1] was published in January 2022, with an Addendum in October 2022, which advised that some airports had joined and left the programme.

1.2.6 From Iteration 3 onwards the Masterplan is being developed separately for each region. This will allow designs brought forward by each cluster, once approved, to be deployed and the benefits realised, without waiting for all the ACPs to complete the airspace change process.

1.2.7 Leeds Bradford Airport (LBA) is part of the MTMA (Manchester Terminal Manoeuvring Area) cluster which includes, Manchester, Liverpool. East Midlands, Birmingham and NERL.

LBA's Potential Interdependencies

1.2.8 CAP2312B identifies the potential interdependencies between LBA and other airports in the MTMA cluster.

1.2.9 The analysis undertaken by ACOG in the MTMA airspace below 7000ft identifies potential interdependencies between LBA and Manchester Airport. In addition, LBA will need to ensure ongoing co-ordination with the NATS NERL ACP regarding the airspace above 7000ft.

1.3 The Airspace Change Process

1.3.1 CAP1616 lays out the regulatory process for changing flight paths, including the community engagement requirements. Proposals for changes to flight paths are submitted to, assessed, and approved by the CAA following the guidance set out in CAP1616.

1.3.2 There are seven-stages which provide a framework for changing airspace and CAP1616 places significant importance on engaging a wide range of stakeholders, including potentially affected communities.

1.3.3 In early 2023 the CAA conducted a consultation on proposed changes to the CAP1616 process and in October 2023 published Edition 5 of the document. Following discussion with the CAA it was agreed that as Stage 2 work had already commenced, LBA would continue Stage 2 in accordance with Edition 4 (March 2021) of CAP1616.

[1] ACOG Masterplan Iteration 2 (CAP2312B)

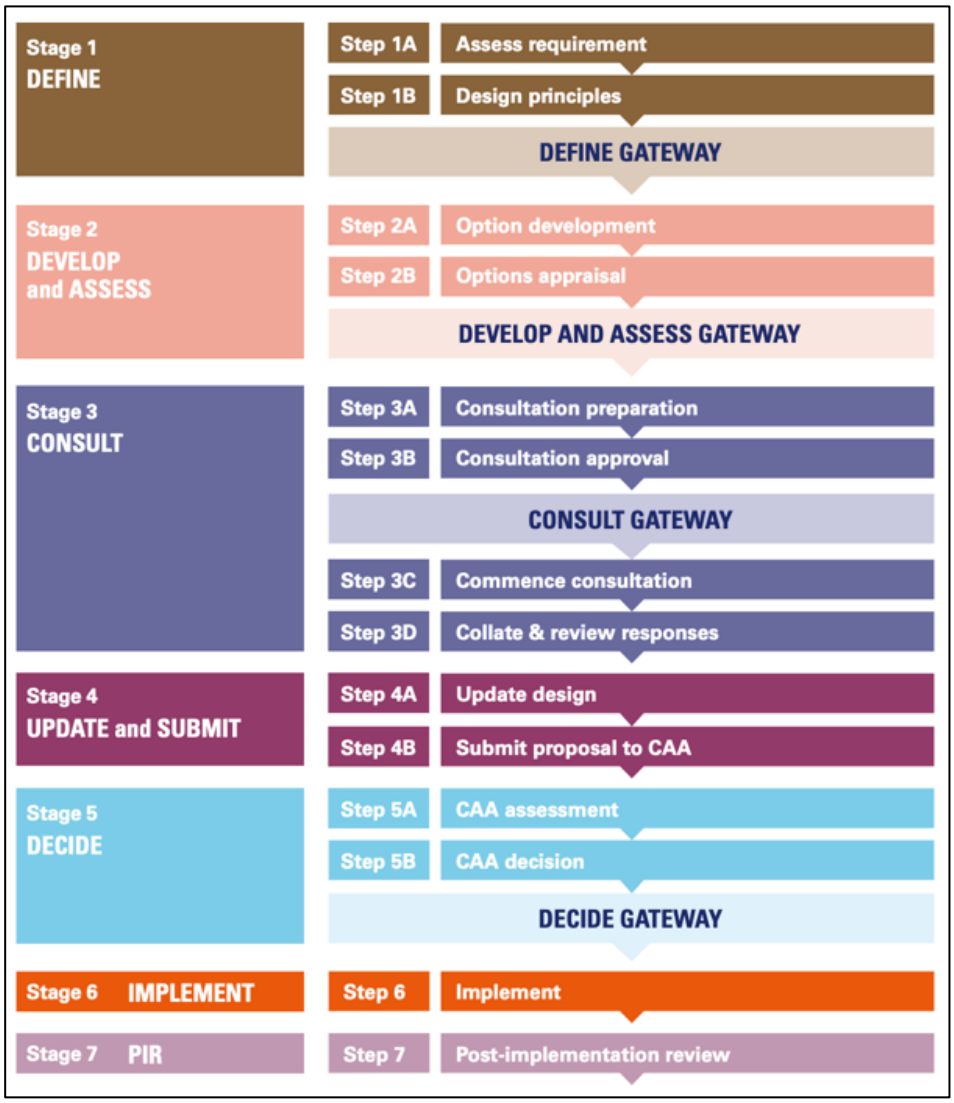


Figure 1: CAP1616 (Edition 4) 7-Stages

1.4 Airspace Modernisation at LBA

1.4.1 **Error! Reference source not found.** below summarises the CAP1616 stages already undertaken for this ACP, providing links to submission documents for those previous stages. All information submitted to the CAA for this ACP is available on the CAA's Airspace Change Portal.

Airspace Change Stage	Summary	Link to Documents
Stage 1 **Step 1A**	In Aug 2021, LBA submitted a Statement of Need (SoN) to the CAA.	Statement of Need
	In Sep 2021, LBA had an assessment meeting with the CAA, as part of Step 1A of the CAP1616 process. The purpose of the assessment meeting is for the change sponsor to present and discuss its SoN and to enable to the CAA to consider whether the proposal falls within the scope of the formal airspace change process.	Assessment Meeting Presentation Assessment Meeting Minutes
Stage 1 **Step 1B**	At Step 1B, LBA carried out engagement with stakeholder representatives to develop a set of Design Principles for this airspace change. The aim of the Design Principles is to provide the objectives that the change sponsor seeks to achieve through the airspace change and help the airspace change designers to create and compare different flight paths and design options. The CAA carried out the regulatory assessment to ensure that the Stage 1 requirements were followed, and LBA passed the Stage 1 Gateway in March 2022.	Design Principle Submission Document V3
Stage 2 **Step 2A**	At Step 2A, LBA developed options for the airspace change proposal, and evaluated how those options responded to the Design Principles created in Stage 1. These options were shared with the stakeholder representatives who were previously engaged with at Stage 1. Feedback from this engagement was then used to generate further information on existing options to aid engagement. The final part of Step 2A was to qualitatively, and where possible, quantitively assess the options against the Design Principles to produce a Design Principle Evaluation.	CAA's Airspace Change Portal.
Step 2B	At Stage 2B an Airspace Change Sponsor is required to undertake an Initial Options Appraisal (IOA) of the airspace change options which proceed from Stage 2A. This is where we are now. The following sections of the document initially describe the options under assessment	This document

	and the baseline options, followed by explaining the methodology used to assess each option, and then the IOA outcome. At the end of the document we explain, based on the IOA, the options which we intend to take forward to Stage 3.	

Table 1: Summary of CAP1616 work to date

1.4.2 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, our design principles, our appraisals and stakeholder engagement and consultation.

2. OVERVIEW OF OPTIONS UNDER ASSESSMENT

2.1.1 The Stage 2A document provides detailed information about the options development process and also how aircraft arrive and depart from LBA today.

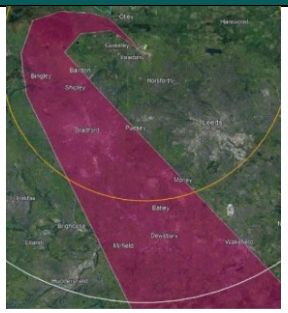
2.1.2 As part of the Stage 2A options development, the departure options have been broken down into either components or departure systems for runway 32 and runway 14. The arrivals are designed as overall systems which combine components for both runway 32 and runway 14 with the exception of two RNP-AR routes.

2.1.3 LBA then undertook a Design Principle Evaluation where we evaluated each option against each Design Principle. This was the first opportunity to shortlist options before we progress to this IOA. The outcome of our Stage 2A Design Principle Evaluation was that some options were discontinued including the baseline 'without airspace change' options.

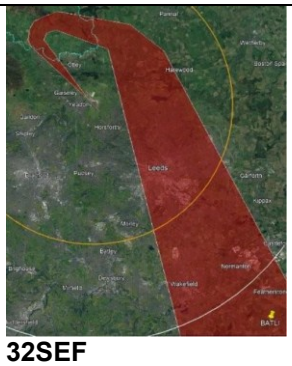
2.1.4 Although the 5 'do nothing' baseline scenarios (Runway 14 departures to the southeast, Runway 14 to the south and west, Runway 32 departures to the southeast, Runway 32 to the south and west, and Runway 32/14 arrivals) did not progress as options, CAP1616 requires the 'do nothing' scenarios to be appraised in this IOA as it provides a means of comparing the options to better understand and highlight the benefits and impacts of each new option. The 'do nothing' will also continue to be appraised as part of the Full Options Appraisal and Final Options Appraisal at Stage 3 and Stage 4.

2.1.5 The sub sections below provide a high-level overview of the 'do something' options taken to this IOA. More information about how we have developed and evaluated these options is available in our Stage 2A submission document on the CAA Airspace Change Portal.

2.2 Runway 32 Departures

	Runway 32 departure options	
 **32SEB** RH turn north of Otley and over East Leeds towards BALTI/MAMUL.	 **32SEC** RH turn North of Otley and over West Leeds and west of BALTI/MAMUL.	 **32SED** LH turn between Menston and Burley in Wharfdale and then towards MAMUL

32SEE
LH turn between Menston and Burley in Wharfdale but then turning more easterly towards BALTI/GOLES then MAMUL.



32SEF
Straight ahead to 4.5nm before RH turn over Leeds

32SEG
Straight ahead to 4.5nm before LH turn over Bradford towards MAMUL

32S&WA
RH wrap-around turn north of Otley then over Bradford towards POL and/or NELSA.

32S&WC
LH turn between Menston and Burley in Wharfdale then direct POL

32S&WD
LH turn between Menston and Burley in Wharfdale then direct NELSA

32S&WF
Straight ahead to 4.5nm before RH wrap-around turn north of Otley then over Shipley towards POL and/or NELSA

32S&WG
Straight ahead to 4.5nm before LH turn over Ilkley towards POL

32S&WH
Straight ahead to 4.5nm before LH turn over Ilkley towards NELSA

32NEWB
Early RH turn to avoid Otley, Menston and Burley in Wharfdale then LH turn over

32NEWC
Early RH turn south of Otley then a wrap-around before splitting in the Calverley area for POL/NELSA/LAMIX

32NEWD
Straight ahead then RH turn well north of Otley then a wrap-around

Askwith Moor then POL/NELSA/LAMIX		before splitting in the Greengates area for POL/NELSA/LAMIX
 **32NEWE** Early LH deviation before a RH turn west of Otley and a LH turn over Askwith Moor then splitting POL/NELSA/LAMIX		

Table 2: Runway 32 'with airspace change' departure options

2.3 Runway 14 Departures

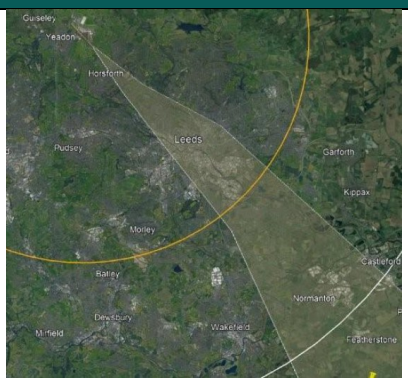
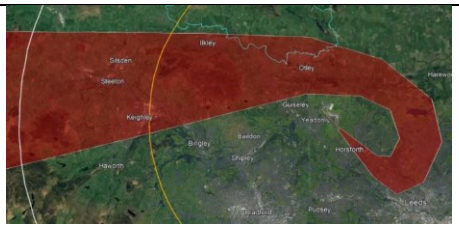
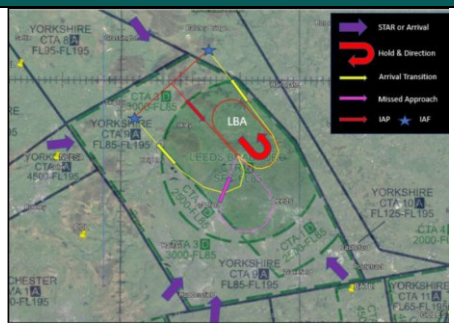
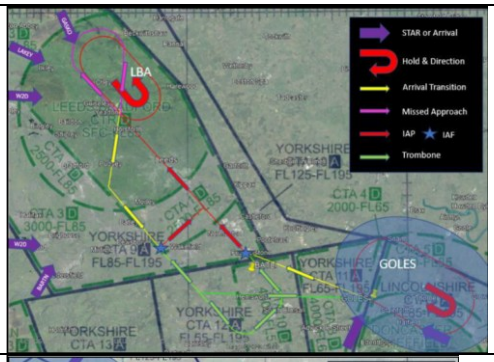
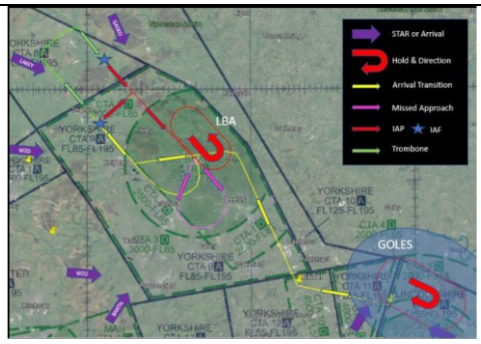
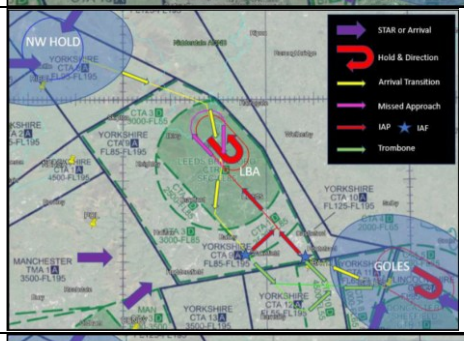
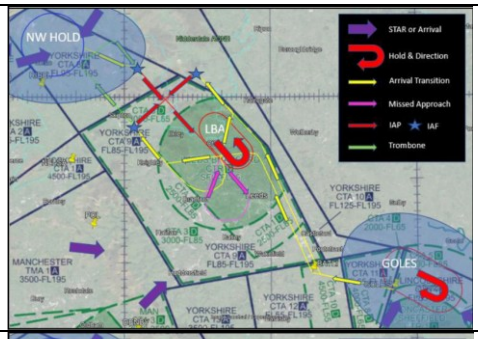
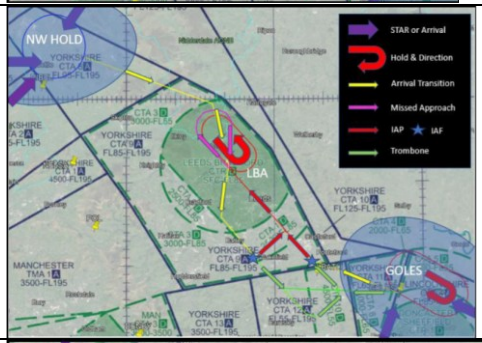
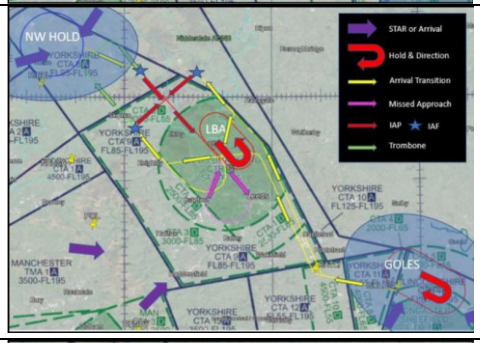
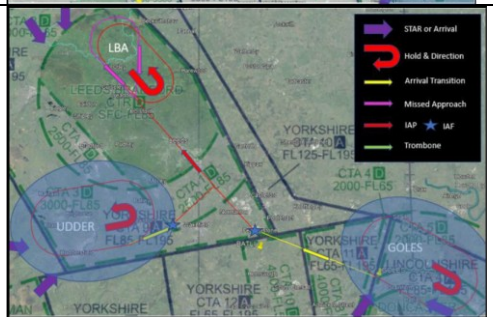
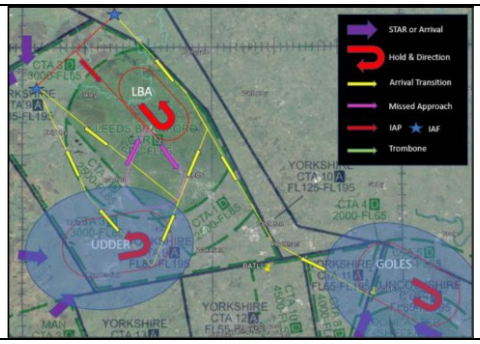
	Runway 14 departure options	
 **14SEA** RH turnover Central Leeds to position west of BATLI towards MAMUL	 **14SEB** Straight ahead towards BATLI then MAMUL	 **14S&WC** RH turn over Bradford towards POL and/or NELSA
 **14S&WD** LH turn over Alwoodley and Otley towards POL	 **14S&WE** LH turn over Alwoodley and Otley towards NELSA	 **14NEWA** Early RH turn towards Pudsey then splitting in the Birkenshaw area for POL/NELSA/LAMIX

Table 3: Runway 14 'with airspace change' departure options

2.4 Arrivals

Arrivals	RWY32	RWY14
System 1: One Hold LBA		
System 6: Two Holds LBA/GOLES		
System 7: Three Holds NW/LBA/GOLES		
System 8: Two Holds NW/GOLES		
System 9: Two Holds UDDER/GOLES		

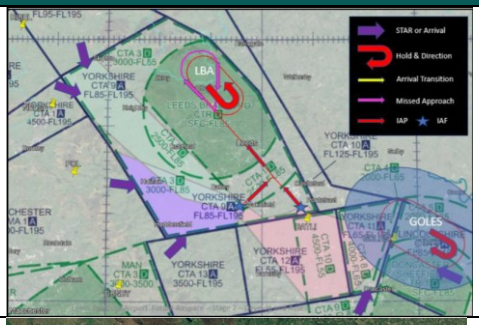
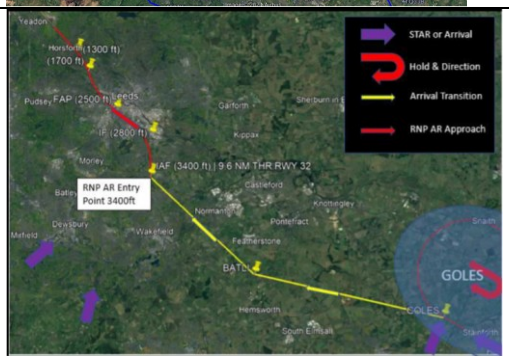
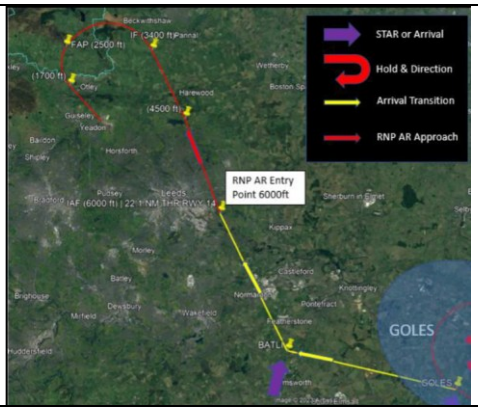
Arrivals	RWY32	RWY14
System 10: One hold GOLES for arrivals from the South and East only.		
System 11: New Eastern arrival transition for Runway 32		
RNP-AR (separate options not combined into a system)		

Table 4: LBA arrivals 'with airspace change' options

3. INITIAL OPTIONS APPRAISAL METHODOLOGY

3.1.1 The Initial Options Appraisal (IOA) is the first stage in a three-phase appraisal of airspace change options. It involves the mainly qualitative appraisal of the airspace change options that have proceeded from Step 2A (outlined in previous section of this document). As options progress through the airspace change process, the two following appraisals, the Full Options Appraisal and Final Options Appraisal undertaken at Stage 3 and 4, will quantitively evaluate options in further detail. The following sections outline the methodology LBA have followed whilst appraising its airspace change options as part of this IOA.

3.2 Defining the baseline 'do nothing' scenario

3.2.1 As part of the IOA, CAP1616 requires airspace change sponsors to set a baseline which is used for environmental evaluation of the options. CAP1616 explains that this will be a 'Do Nothing' scenario and will largely reflect the current-day scenario, although taking due consideration of known or anticipated factors that might affect that baseline, for example a planned housing development close to an airport, forecast growth in air traffic, or expected changes in airlines' fleet mix. Therefore, all environmental assessments must illustrate the difference between a pre-implementation ('Do Nothing') scenario and a post-implementation scenario, ensuring that the periods are comparable.

Year of implementation, movement numbers and traffic forecast

3.2.2 CAP1616 requires ACP Sponsors to consider the forecast growth of their operation in terms of the forecast number of movements. This forecast should not only consider growth between now and implementation of the proposed changes, but it should also consider the potential growth to 10 years beyond the implementation date.

3.2.3 The expected year of implementation for the MTMA proposals is currently to be confirmed, however there is an assumption that there will be no changes any earlier than 2027. Based on this, the implementation year for LBA's Stage 2 work is 2027, with 10 years beyond this assessed as 2036.

3.2.4 In Table 5 below, LBA have forecasted movement numbers out to 2036 however it should be noted that LBA's current business plan anticipates that by 2030, LBA will be serving 7 million passengers per year. Growth beyond 7 million passengers will require a new planning application due to the constraints of the existing terminal building. This is outside the scope of the ACP. LBA have forecasted movement numbers out to 2036 on the basis of the current business plan.

Table 5 LBA forecast movement numbers

Year	2018 (Latest noise modelling available)	2022 Current year for Stage 2 assessments	2024 Latest full year data available	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Annual aircraft movements	38680	33912	36926	44461	45970	45970	45970	45970	45970	45970	45970	45970	45970

3.2.5 Within the noise section of this IOA document, there are examples of indicative 'do nothing' noise contours based on 2030; this is because the number of movements in 2030 is expected to be the same in 2036.

Growth and Fleet Mix Forecast

3.2.6 For the fleet mix, LBA has a mixture of turbo-prop and jet operators, and the ratio of propulsion types is not expected to change dramatically over the next 10-15 years. This ratio is currently at 1 turbo-prop to every 10-jet aircraft (1:10). The vast majority of aircraft operating at LBA are made up of Boeing 737-800 and Boeing 737-300 variants.

3.2.7 LBA is expecting to see the introduction of more modern, and quieter new generation jet aircraft with Jet2 acquiring A321 Neos and Ryanair recently announcing they are acquiring B737-Max 10's.

3.2.8 When undertaking the indicative 2030 noise contour calculations, the fleet types assessed included Boeing 737 MAX (all series), Boeing 737-800, Boeing 787-8, Airbus A320 Neo, ATR 72, Embraer E195, Airbus A320 and A321 Neo.

3.2.9 As part of the Stage 3 Full Options Appraisal, the full fleet mix for the year of implementation and 10 years post implementation will be assessed as part of the quantitative noise modelling,

Modal split

3.2.10 The average modal split, based on a 5-year period from 2013-2018, was 23% RWY 14 and 77% RWY 32 during the day[2]. At night[3] it was 17% RWY 14 and 83% RWY 32.

3.2.11 For the purposes of the indicative noise modelling undertaken as part of this IOA, the above daytime modal split has been applied.

3.2.12 As part of the detailed quantitative assessment in the FOA LBA will identify the 20 year average modal split and apply this to the quantitative assessments.

Local developments

3.2.13 Local Planning Authorities (LPAs) have 'Development Plans' in which they identify proposed land usage for the future. Figure 2 below has been compiled from data contained within the Leeds City Council Site Allocations Plan that was adopted on 10 July 2019[4]. The main sites identified for housing in the immediate proximity to the LBA runway (in the centre) have been labelled such that they can be identified by the reader and the Number of Units planned on that site can be seen in Table 6.

[2] 0700-2300
[3] 2300-0700
[4] Leeds City Council Site Allocations Plan adopted 10 July 2019

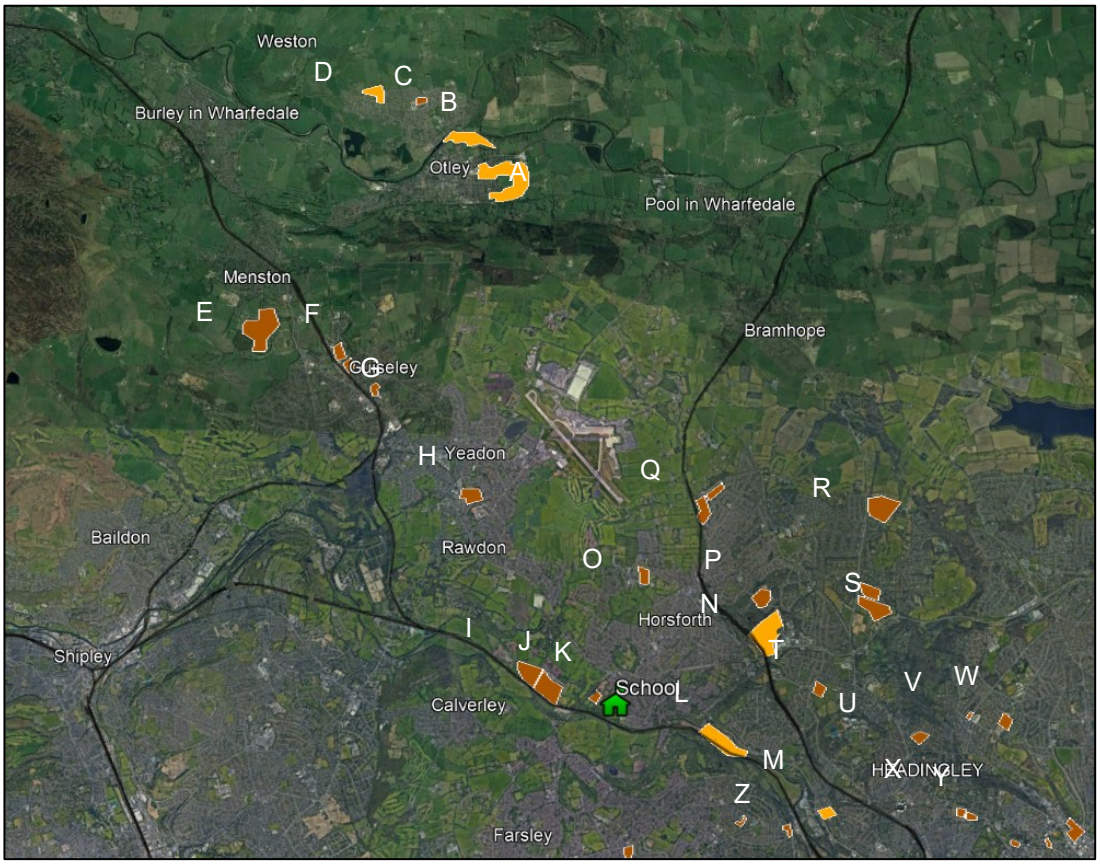


Figure 2: Leeds City Council Development Plans against a Google Earth Background

Label	Development Name	Housing Units
A	Otley East	550 Units
B	Mill Lane	245 Units
C	Wharfedale General Hospital	62 Units
D	Rumplecroft	135 Units
E	Bradford Road, High Royds	349 Units
F	Netherfield Road	214 Units
G	Springfield Road	54 Units
H	Green Lane	171 Units
I	Low Hall Road	131 Units
J	Calverley Lane	331 Units
K	Horsforth Campus	72 Units
L	Abbey Road	1385 Units
M	Kirkstall District Cent	55 Units
N	Ring road West Park	485 Units
O	Westbrook Lane	75 Units
P	Cookridge Hospital	326 Units
Q	Moseley Wood Gardens	198 Units
R	Church Lane	104 Units
S	Otley Road	256 Units
T	West Park Centre	69 Units
U	Moor Road	68 Units
V	Meanwood Road	54 Units
W	Beckhill Approach	79 Units
X	Victoria House	124 Units

Y	Leeds Girl's High School	105 Units
Z	Canal Wharf	84 Units

Table 6: Leeds City Council Development Plan Housing and Schools

3.2.14 At this stage, the local development work presented above provides an indication of the planned developments within the immediate vicinity of LBA, particularly within the scope of the primary noise contours.

3.2.15 Later in this document, we explain that noise has been qualitatively assessed as part of this IOA, with only the 'without airspace change' scenario being presented with an indicative L_{Aeq} contour for 2030 (see section 3.3 for more information).

3.2.16 When undertaking the qualitative assessment, we have cross referenced against this initial data however owing to fidelity of the assessment at this stage, and the developments identified above are typically within or adjacent to areas of existing population, they have not been called out as part of the IOA assessments.

3.2.17 In Stage 3, full quantitative noise assessment forms part of the Full Options Appraisal (FOA), and as part of this a full review of the local development data will be undertaken to ensure it is up to date and relevant at the point of undertaking the assessment. At this stage the data will be quantitatively included where appropriate to do so.

3.3 Initial Options Appraisal Methodology

Safety (all) – Methodology

3.3.1 A qualitative safety assessment of each option which compares against the baseline. Further detailed safety assessment work will be undertaken as part of the network wide integration work at Stage 3, followed by further work in preparation for ACP submission at Stage 4.

Noise impact on health and quality of life (Communities) – Methodology

3.3.2 At Stage 2, CAP1616 requires a qualitative assessment of the options shortlisted following the Stage 2A DPE and therefore for the purposes of this IOA, each option has been qualitatively assessed against the 'do nothing' baseline when considering potential impacts to noise.

3.3.3 There are a range of metrics used to describe aircraft noise and to inform policy. The most common international measure of noise is the L_{Aeq} which means 'equivalent continuous noise level'.

3.3.4 In the UK, daytime aircraft noise is typically measured by calculating the average noise level in decibels (dB) over 16 hours (0700-2300) during the daytime summer period, and over 8 hours (2300-0700) during the nighttime summer period. The summer period is 16 June to 15 September inclusive. Noise primary impacts are defined by these L_{Aeq} contours, above 51dB L_{Aeq} for day and 45dB L_{Aeq} for night. These are known as the Lowest Observed Adverse Effect Level or LOAEL.

3.3.5 The LOAEL is defined as the point at which adverse effects of noise begin to be seen on a community basis. i.e. those communities within the LOAEL are considered to be those who are most adversely affected by aircraft noise.

3.3.6 For the purposes of this IOA, our noise consultants have modelled the 'do nothing' daytime and nighttime L_{Aeq} contours based on the movement numbers for 2030 (movement numbers

are expected to remain broadly consistent between 2030 and 2036 – please see section 3.2 for further information). For the purposes of this IOA, these are considered indicative contours which have used a sample fleet mix; at Stage 3 full L_{Aeq} modelling will be undertaken.

3.3.7 A qualitative comparison of the options against these contours has then been undertaken to assess potential impacts to the L_{Aeq} contours. L_{Aeq} contours are calculated based on a system wide scenario (i.e taking into account all arrivals and all departures from the airport) and so this qualitative assessment has considered how the baseline component contributes to the overall contour and then assesses how the change in component may impact the shape of the contours. Note the size of the contour is not expected to materially change as the ACP does not result in increased movements at the airport.

3.3.8 In addition to the qualitative assessment of the impacts to the L_{Aeq}, the assessment has also looked at potential overflight. When undertaking quantitative assessment, overflight is calculated using the 48.5° cone defined in CAA document CAP1498. At this stage, quantitative assessment has not been undertaken, however the potential areas of overflight have been qualitatively identified.

3.3.9 To undertake this part of the qualitative assessment, actual data from aircraft arriving and departing from LBA has been used for the baseline, and the options have then been compared against this data. The data used is radar data during the period 16th June to the 15th September 2022 inclusive. Across this period there were just under 12,000 ATMs at the airport.

3.3.10 This qualitative assessment includes consideration of the increased concentration along route centrelines expected in future, and subsequently the changes in frequency of overflight for some areas. We have also considered whether there are potentially cumulative noise impacts, particularly for departures overlying the same areas as final approach.

3.3.11 As part of the Full Options Appraisal in Stage 3, LBA will undertake full quantitative modelling of noise.

Noise modelling category

3.3.12 The CAA has published its Policy on Minimum Standards of Noise Modelling (CAP 2091). This document defines categories of noise modelling sophistication and describes the different situations where the CAA require noise calculations to be provided. Moreover, it sets out requirements for the minimum category which different stakeholder or sponsor groups should use when providing noise calculations to the CAA for them to carry out their regulatory duties.

3.3.13 CAP2091, CAA Policy on Minimum Standards for Noise Modelling, require Change Sponsors to determine and declare what Noise Modelling Category they consider is appropriate for the ACP consultation. The minimum level of sophistication of the modelling process should depend on the size of the current or proposed noise effect of the airport on its local community. The category of noise modelling required by the CAA is based on the number of residents in the 51dBL_{Aeq16h} day or 45dB$L_{Aeq,8h}$ night contours either before or after the proposed change, whichever is greater.

3.3.14 Noise contours have been produced, and presented in the Stage 2A document, based on the actual aircraft movements for 16 June to 15 September 2018 and using the Aviation

Environmental Design Tool (AEDT) software (version 3d), developed by the Federal Aviation Administration (FAA). In addition to that, indicative contours for 2030 have been modelled and are shown in Appendix A.

3.3.15 Both sets of contours show that LBA falls into noise modelling Category C. This category is defined in CAP2091 as having a minimum population exposed to 51dB$L_{Aeq,16h}$ or above (day) and 45dB$L_{Aeq,8h}$ or above (night) of 20,000 to a maximum of 200,000.

3.3.16 When generating the contours however, the modelling has been undertaken to CAP2091 Category A standards and therefore the future noise analysis undertaken as part of the Stage 3 FOA will be required to meet category A standards.

Air quality (Communities) - Methodology

3.3.17 Qualitative assessment of changes to local air quality compared with the do-nothing baseline.

3.3.18 Due to the effects of mixing and dispersion, emissions of NOx, PM10 and PM2.5 from aircraft travelling above 1000ft are unlikely to have a significant impact on local air quality. The DfT's Air Navigation Guidance (2017) states that: "Studies have shown that NOx emissions from aviation related operations reduce rapidly beyond the immediate area around the runway. Therefore, the impact of airspace design on local air quality is generally negligible compared to changes in the volume of air traffic and that of the local transport infrastructures feeding the airport.". ICAO's Airport Air Quality Manual (International Civil Aviation Organization. Doc 9889 Airport Air Quality Manual. Second Edition, 2020. ICAO, Canada.) similarly states that 1000ft is the typical limiting altitude for ground-level NOx impacts from aircraft emissions. If a local authority finds any places where the national air quality objectives are not likely to be achieved, it must declare an Air Quality Management Area (AQMA) there. Then the local authority will put together a plan to improve the air quality.

3.3.19 This qualitative assessment will highlight if there could be lateral flight path changes below 1000ft (compared to the baseline) which could therefore have an impact on Local Air Quality.

3.3.20 Note there are no AQMA's within the scope of the 1000ft region of the air quality assessment. For more information about AQMA's please see the Defra website here: https://uk-air.defra.gov.uk/aqma/maps/.

Greenhouse gas impact (Wider society) and Fuel-burn (General aviation/ commercial airlines) – Methodology

3.3.21 An indicative quantitative assessment of changes to fuel burn and greenhouse gas impact for each departure option when compared to the 'do nothing' scenario. At this early stage where the departure designs are based on swathes, an indicative centreline was drawn down the centre of each swathe to either NELSA, POL or MAMUL accordingly. These are the points that NERL have requested departures are routed towards for the future MTMA design. These mileages were then compared to centrelines drawn down the centre of the baseline departure swathes and extended to the same 3 network points to provide a fair comparison for an indication on increased/decreased mileages. No account has been taken for changes to vertical climb profiles at this stage as this requires a combined system of arrivals and departures which will not be generated until Stage 3 of the ACP.

3.3.22 Fuel burn and CO_2 emissions as a result of the track mile changes have not been quantified, as the track miles are still crude estimates owing to network uncertainty.

3.3.23 For arrivals, a similar, basic quantitative assessment was not possible because the arrival fix varies in each option and the arrival flow within the future network could be significantly difference to today. This means a basic comparison across each option and the baseline would not provide a credible indication of track mileage differences, more detailed modelling would be required from further out in the network. The arrival assessment therefore provides a qualitative SME narrative to indicate whether the option would be expected to increase, decrease or make little difference to track miles for arriving aircraft.

3.3.24 As part of the Full Options Appraisal (Step 3A), track mileage, fuel burn and the associated greenhouse gas impact will be appraised in further detail.

Capacity / resilience (Wider society) – Methodology

3.3.25 Subject matter experts will qualitatively assess any impacts to capacity and/or resilience against the 'do nothing' scenario. Note that at this stage, due to the fidelity of the options (which are currently drawn in swathes), and how they are being assessed on a component basis, it is very difficult to assess any potential benefits and/or impacts to capacity.

3.3.26 The resilience assessment will review LBA's dependencies on RNAV substitution, which is a temporary solution to resolve Doppler VHF Omni-Directional Range (DVOR[5]) rationalisation which impacts LBA's standard instrument departures (SIDs). For more information about DVOR rationalisation and RNAV substitution, please see here: https://airspacechange.caa.co.uk/PublicProposalArea?pID=590

Tranquillity (Wider society) – Methodology

3.3.27 CAP1616 outlines the consideration of impacts upon tranquillity is with specific reference to National Parks and Areas of Outstanding Natural Beauty (AONB), plus any locally identified 'tranquil' areas

[5] DVOR is a standard International Civil Aviation Organisation (ICAO) ground based radio navigational aid that provides bearing information to aircraft to define air traffic control routes for en-route, terminal and instrument approach/departure procedures

that are identified through community engagement and are subsequently reflected within an airspace change proposal's design principles. AONB's and National parks are shown in Figure 3.

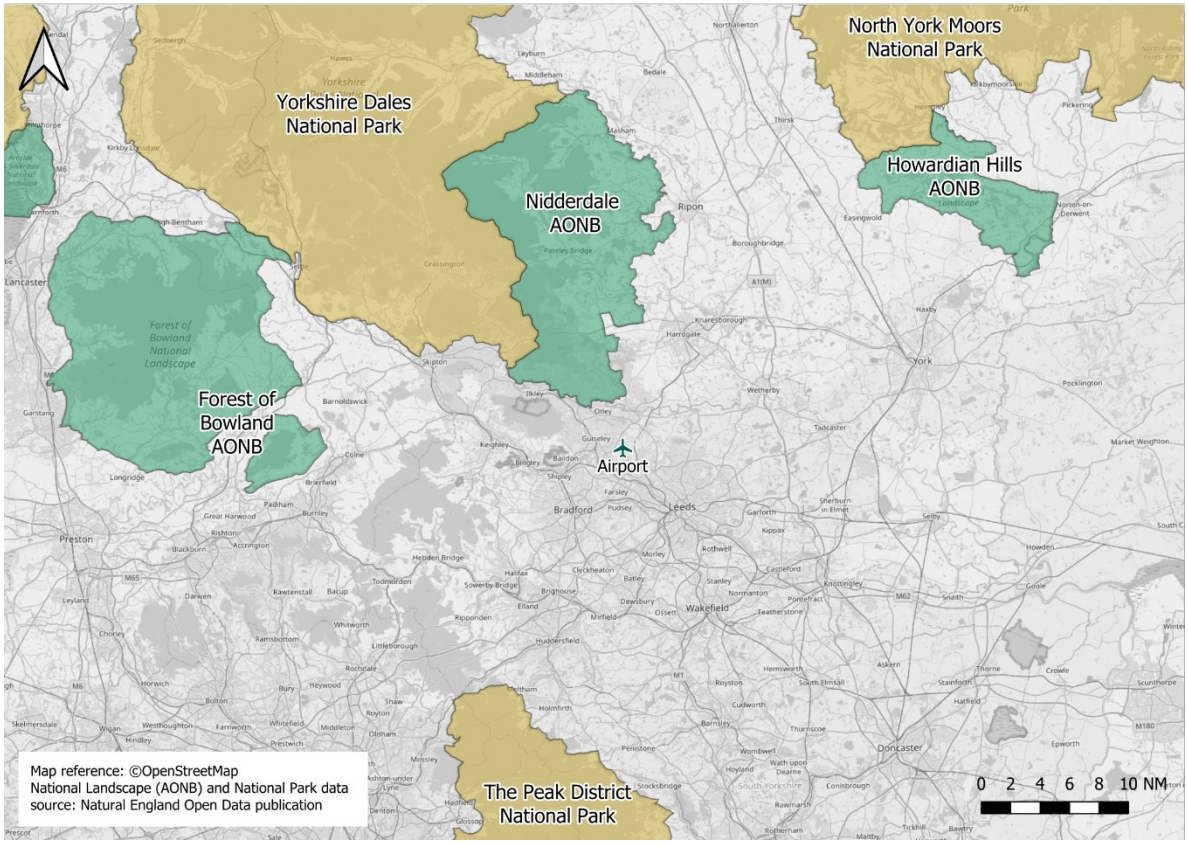


Figure 3 Map showing AONBs and National Parks.

3.3.28 In response to stakeholder feedback and local insight[6], the Ilkley Moor, which is part of the South Pennine Moors, have also been considered an area of tranquillity, despite not holding a statutory designation of an AONB or National Park. The South Pennine Moors are however a Special Area of Conservation (SAC) and Special Protection Area (SPA) and Figure 4 shows a map of the South Pennine Moors SAC/SPA.

3.3.29 As part of the Stage 2A stakeholder engagement, stakeholders have also shared other smaller sites which they believe should be considered for tranquillity. Examples include Baildon Moor and Bolton Abey. At this stage, as quantitative overflight analysis has not been undertaken and the options are currently swathes rather than defined routes, it would not be proportionate to qualitatively identify every site within the option swathes. However, in Stage 3, when the routes are defined and quantitative analysis of the options will be undertaken, LBA will assess tranquillity not only for overflight of AONBs and National Parks, but also for Candidate Quiet Areas, Country Parks, Gardens and Designated Landscapes, and Historic buildings. This data is expected to incorporate stakeholder suggestions however LBA will undertake a check of the commitments made in Stage 2 vs the data sources to ensure all sites agreed are captured as part of the analysis.

[6] Please see the Stage 2A Stakeholder Engagement information for more details.

3.3.30 At this stage of the ACP, we will qualitatively assess whether the option differs from 'do nothing' pre-implementation scenario and whether this has the potential to impact tranquillity with regards to AONBs, National Parks and the South Pennine Moors.

Biodiversity (Wider society) – Methodology

3.3.31 CAP1616 v4 explains the effects of airspace change on ecology or biodiversity are expected to be minimal. CAA guidance states that "In general, airspace change proposals are unlikely to have an impact upon biodiversity because they do not involve ground-based infrastructure. As such they are unlikely to have a direct impact that would engage the Birds or Habitats legislation.".

3.3.32 In October 2023 the CAA published Edition 5 of CAP1616 and as part of this there was a new requirement to undertake a Habitats Regulation Assessment (HRA) which looks at potential impacts to designated sites up to 3,000ft.

3.3.33 As this submission is required to be based on v4 of CAP1616 there is not the requirement to undertake a HRA assessment at this stage, but the biodiversity assessment will highlight where changes to within the options below 3000ft could change traffic patterns over Special Protection Areas (SPAs), Special Areas of Conservation (SACs), National Parks, RAMSAR and/or Sites of Special Scientific Interest (SSSI).

3.3.34 The following sites have been identified using mapping from Natural England Open Data publication. Note that the labels show the specific sites mentioned in IOA assessments.

Figure 4 SSSI, SPA, SAC, National Parks, and RAMSAR sites within the vicinity of LBA

3.3.35 It's important to note that at this stage this assessment is indicative, as the exact impacts on sites will depend on route positioning within the option swathes.

Airspace access (General Aviation) – Methodology

3.3.36 A qualitative assessment of changes to GA access to controlled airspace compared with the 'Do Nothing' baseline. Assessment will consider whether each option has potential to require more/less or no change to controlled airspace (CAS). In the absence of detailed designs, the actual changes to CAS required cannot be determined at this stage.

Economic impact from increased effective capacity (General aviation/ commercial airlines) - Methodology

3.3.37 Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations. These will be assessed as part of the FOA in Stage 3.

Training costs (Commercial airlines) – Methodology

3.3.38 The IOA will qualitatively estimate whether any training costs would be incurred by Commercial airlines in order to implement the option.

Other costs (Commercial airlines) – Methodology

3.3.39 The IOA will qualitatively estimate whether any other costs would be incurred by Commercial airlines in order to implement the option.

Infrastructure costs (Airport/ Air navigation service provider) – Methodology

3.3.40 The IOA will qualitatively estimate whether any infrastructure costs would be incurred by the airport or ANSP in order to implement the option.

Operational costs (Airport/ Air navigation service provider) – Methodology

3.3.41 The IOA will qualitatively estimate whether any operational costs would be incurred by the airport or ANSP in order to implement the option.

Deployment costs (Airport/ Air navigation service provider) - Methodology

3.3.42 The IOA will qualitatively estimate whether any deployment costs would be incurred by the airport or ANSP in order to implement the option.

Interdependencies conflicts and trade-offs (All) – Methodology

3.3.43 An airspace change proposal at a Stage 2 gateway in the CAP 1616 process should specify any interdependencies with other airspace changes identified in Iteration 2 of ACOG's Airspace Change Masterplan. Although the Masterplan has identified a small area of potential interdependencies, this IOA will take the information contained within the masterplan document around potential areas of conflict / interdependencies and identify if the option falls within these areas. This will give an indication of whether there is the potential for trade-offs with other airspace change sponsors required during Stage 3. The figure below shows the illustration provided within the masterplan that outlines potential interdependencies.

Figure 5 Potential interdependencies between airport-led ACPs in the MTMA region (Source: ACOG Masterplan Iteration 2)

Airspace Modernisation Strategy (All) - Methodology

3.3.44 The IOA will include a qualitative, high level, assessment of how the design options perform against objectives of the Airspace Modernisation Strategy. CAP1711 describes the vision as:

> *Deliver quicker, quieter, and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace.*

3.3.45 And the objectives as:

3.3.46 **Safety:** Maintaining and, where possible, improving the UK's high levels of aviation safety has priority over all other 'ends' to be achieved by airspace modernisation.

3.3.47 **Integration of diverse users:** Airspace modernisation should wherever possible satisfy the requirements of operators and owners of all classes of aircraft, including the accommodation of existing users (such as commercial, General Aviation, military, taking into account interests of national security) and new or rapidly developing users (such as remotely piloted aircraft systems, advanced air mobility, spacecraft, high-altitude platform systems).

3.3.48 **Simplification, reducing complexity and improving efficiency:** Consistent with the safe operation of aircraft, airspace modernisation should wherever possible secure the most efficient use of airspace and the expeditious flow of traffic*, accommodating new demand and improving system resilience to the benefit of airspace users, thus improving choice and value for money for consumers.

3.3.49 **Environmental sustainability:** Environmental sustainability will be an overarching principle applied through all airspace modernisation activities. Modernisation should deliver the Government's key environmental objectives with respect to air navigation as set out in the Government's Air Navigation Guidance and, in doing so, will take account of the interests of all stakeholders affected by the use of airspace.

4. INITIAL OPTIONS APPRAISAL: BASELINE 'DO NOTHING'

4.1 RWY 32 'Do nothing'(SE and S&W)

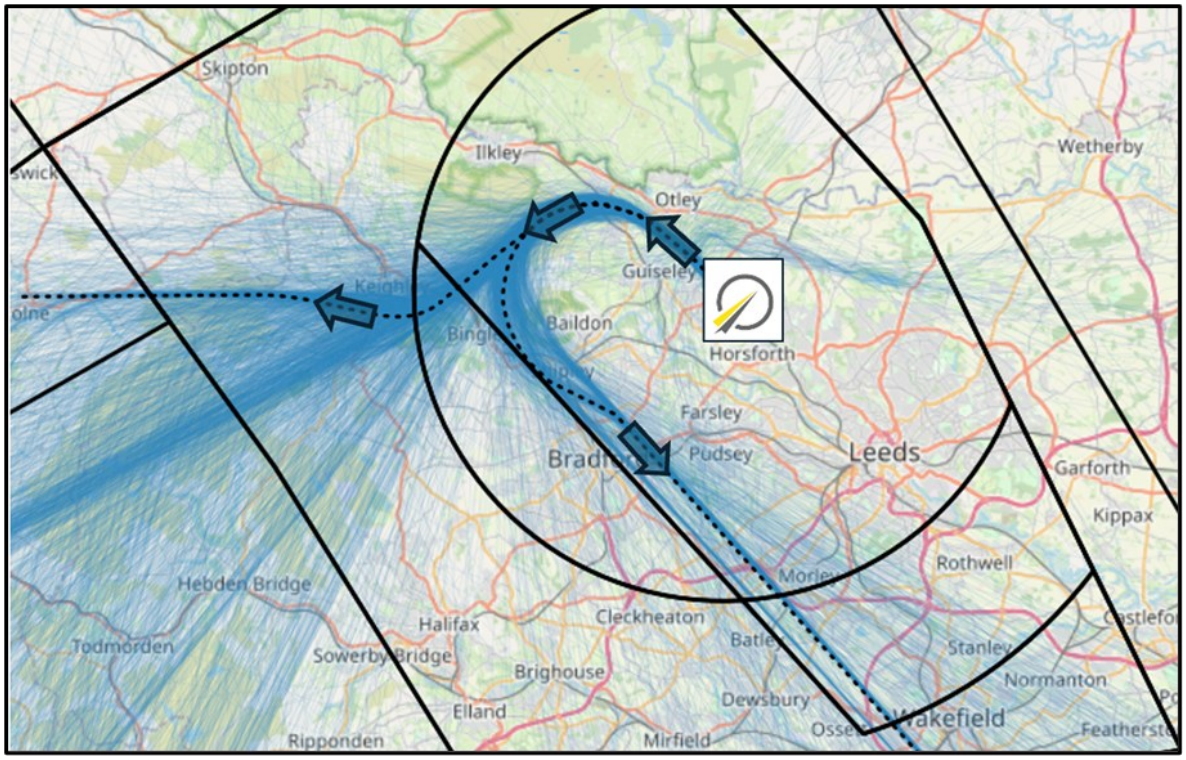


Figure 6 RWY 32 Baseline (S&W and SE)

4.1.1 Figure 6 shows the runway 32 SID centrelines illustrated with black dashed lines, the CAS boundaries in solid black lines and the tracks of all departures across the 2022 92-day period are shown in blue.

4.1.2 For the purposes of the DPE and IOA, a swathe has been generated for the SE 'do nothing' and the S&W 'do nothing' and these will be used to compare against the options. The swathes are shown in Figure 7.

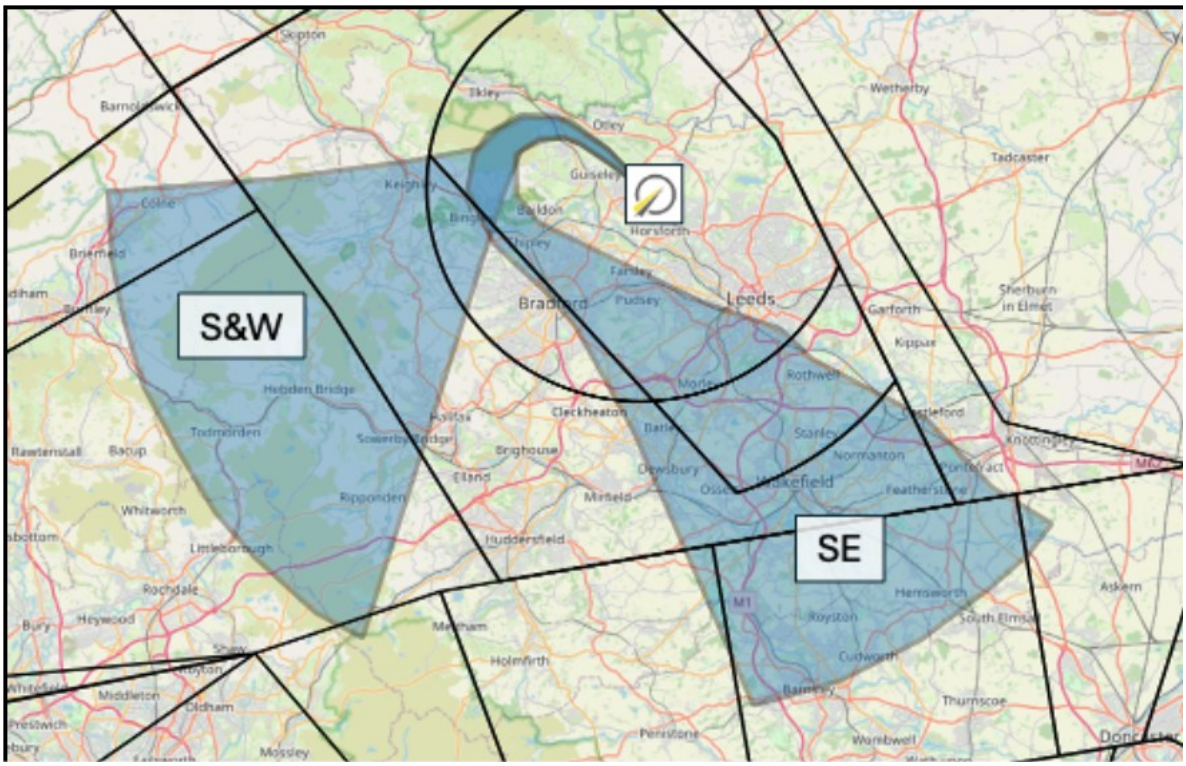


Figure 7 RWY 32 Baseline S&W and SE swathes for IOA

CAP1616 IOA group and category	Runway 32 SE 'Do nothing'	Runway 32 S&W 'Do nothing'
Description	Do nothing scenario for runway 32 departures towards the south-east. For the purposes of the IOA, a swathe has been drawn around the radar data, so that the 'do something' option swathes can be compared against this swathe. Currently traffic heading southeast routes to a waypoint called LAMIX	Do nothing scenario for runway 32 departures towards the south and west. For the purposes of the IOA, a swathe has been draw around the radar data, so that the 'do something' option swathes can be compared against this swathe. Currently traffic heading west routes to a waypoint called POL and southwest traffic routes to a waypoint called NELSA.
All: Safety	There are no safety concerns with the current arrangements at LBA.	
Communities: Noise impact on health and quality of life	Both runway 32 departure routes turn slightly left at around 0.5nm with the majority of the traffic initially following these routes. A very small amount of traffic is vectored to turn right almost immediately after take-off. Jet aircraft are required to follow the Noise Preferential Routings (NPRs). These were developed as a performance route to direct departing jet aircraft over the least populated areas. Within the Stage 2A document, there is more information about how these NPRs are defined. These NPRs are shown below. Four fixed noise monitors are in place to measure the noise levels from aircraft and to ensure the airport is operating in compliance with the noise restrictions, these are represented by the green dots. LBA also have a number of mobile noise monitors which we can move around within the local community, these are represented by the yellow dots.	

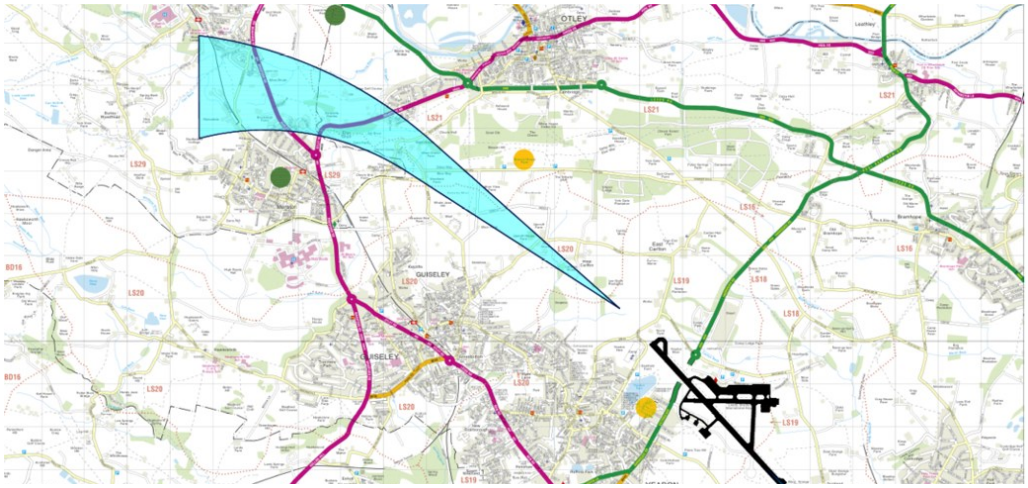


Figure 8 Runway 32 Noise Preferential Route (NPR)

Due to the NPRs, there is concentration along the initial straight ahead and first turn which can been seen in Figure 6 above. The route centrelines turn between the populated areas of Burley in Wharfedale and Menston although the L_{Aeq} contours show that some parts of these areas fall within the contours.

The indicative L_{Aeq} contours shown in appendix A follow the early part of the turn, which reflects the modal split of 77% of the year on Runway 32.

At the end of the NPR, ATC vector aircraft to take more direct tracks to points along their flight planned route and this leads to dispersion across the airspace.

When aircraft are heading towards the south-east, this includes flying over the populated areas of Bingley, Shipley, Eccleshill, Bradford before heading towards Batley, Dewsbury, Morley, Rothwell and Wakefield. Beyond Wakefield there is dispersed overflight of Horbury, Normanton, Featherstone and Hemsworth.

When aircraft are heading to the south and west, at the end of the NPR ATC vector aircraft over the populated areas of Keighley and Bingley. Beyond these areas it is generally less populated compared to the southeast, however there is overflight of Haworth, Halifax, Hebden Bridge and Todmorden.

As departing aircraft turn relatively soon after departure, there is little cumulative noise impacts for those communities living under the Runway 14 arrival final approach.

Communities: Air quality	No change; the options will be compared against the baseline to understand if they are expected to benefit or impact air quality (see methodology section for further details).	
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	Emissions of greenhouse gases arise from the combustion of aviation fuel, and as the combustion of aviation fuel is linked to track length, we have initially looked at the track length for the baseline. An indicative departure through the SE swathe has been measured as 41nm.	An indicative departure through the S&W swathe has been measured as 19.8nm.
Wider society: Capacity/ resilience	No change. Without modernisation, LBA will remain dependent on RNAV substitution (VOR rationalisation) which is a temporary resolution to the withdrawal of VORs.	
Wider society: Tranquillity	No change. Runway 32 departures to the south-east do not overfly any AONB or National Parks below 7,000ft. There is	Runway 14 departures to the south and west do not overfly any AONB or National Parks below 7,000ft however

	however overflight of the South Pennine Moors SAC/SPA; The area to the south of Ilkley sees aircraft that are being vectored beyond the end of the existing Noise Abatement Procedure.	there is vectored overflight of the South Pennine Moors SAC/SPA
Wider society: Biodiversity	The runway 32 'do nothing' to the southeast includes overflight of the South Pennine Moors SSSI/SAC/SPA and the Trench Meadows SSSI. Both areas experience some dispersion of traffic due to ATC vectoring beyond the first turn.	The runway 32 'do nothing' to the south and west includes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI. Both areas experience some dispersion of traffic due to ATC vectoring beyond the first turn.
General aviation: Access	No impact to Controlled airspace (CAS). This would remain as currently published in the AIP.	
General aviation/ commercial airlines: Economic impact from increased effective capacity	No change	
Commercial airlines: Training costs	As the baseline is already in operation, there are no training costs anticipated.	
Commercial airlines: Other costs	As the baseline is already in operation, there are no other costs anticipated.	
Airport/ Air navigation service provider: Infrastructure costs	As the baseline is already in operation, there are no infrastructure costs anticipated.	
Airport/ Air navigation service provider: Operational costs	As the baseline is already in operation, there are no operational costs anticipated.	
Airport/ Air Navigation service provider: deployment costs	As the baseline is already in operation, there are no deployment costs anticipated.	
All: Interdependencies conflicts and trade-offs	The DPE identified that the baseline is not a viable option to be integrated into the future MTMA airspace. The baseline is shown in this IOA for comparison purposes.	
All: AMS	Doing nothing will not align with the AMS. It will not enable any environmental benefits or maximise benefits from NERL's re-design of the MTMA. No change and therefore no ACP submission will not enable any reduction in the volume of controlled airspace.	

4.2 RWY 14 'Do nothing'(S&W and SE)

4.2.1 Figure 9 shows the runway 14 SID centrelines illustrated with black dashed lines, the CAS boundaries in solid black lines and the tracks of all departures across the 2022 92-day period are shown in blue.

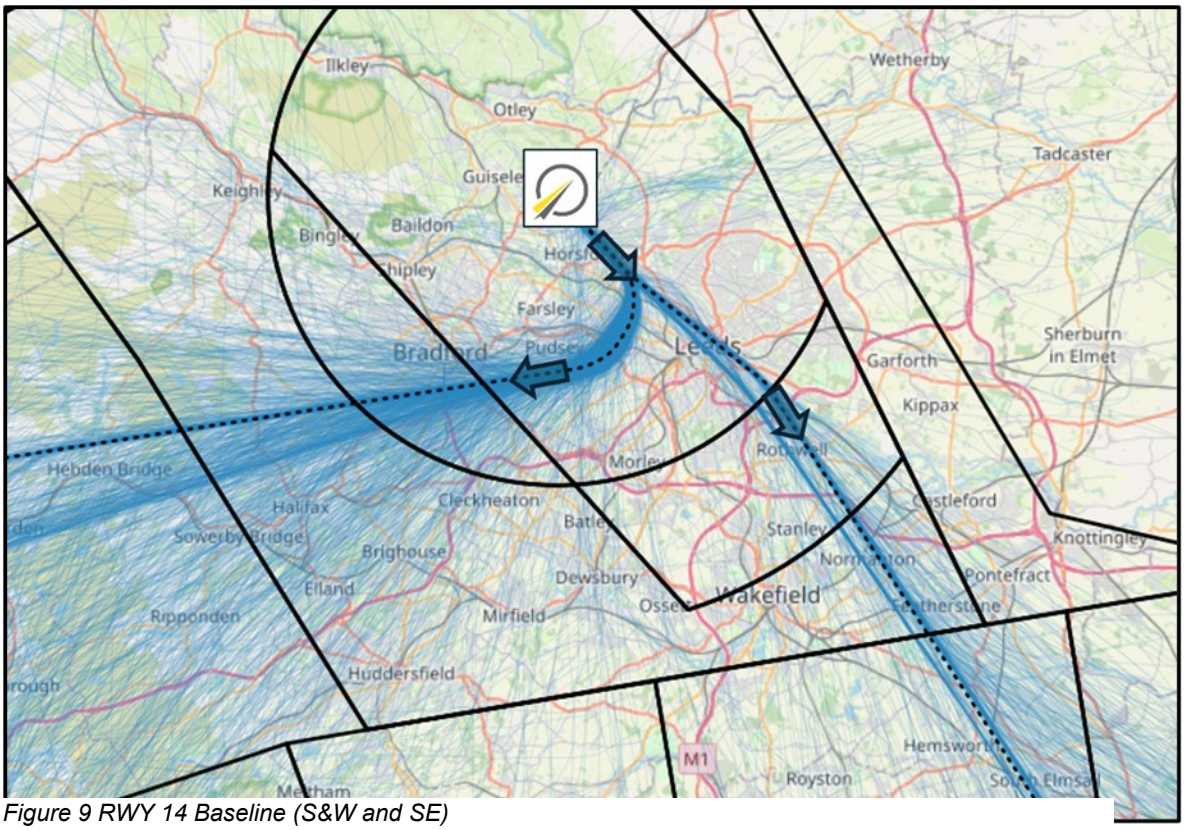


Figure 9 RWY 14 Baseline (S&W and SE)

4.2.2 For the purposes of the DPE and IOA, a swathe has been generated for the SE 'do nothing' and the S&W 'do nothing' and these will be used to compare against the options. The swathes are shown in Figure 10.

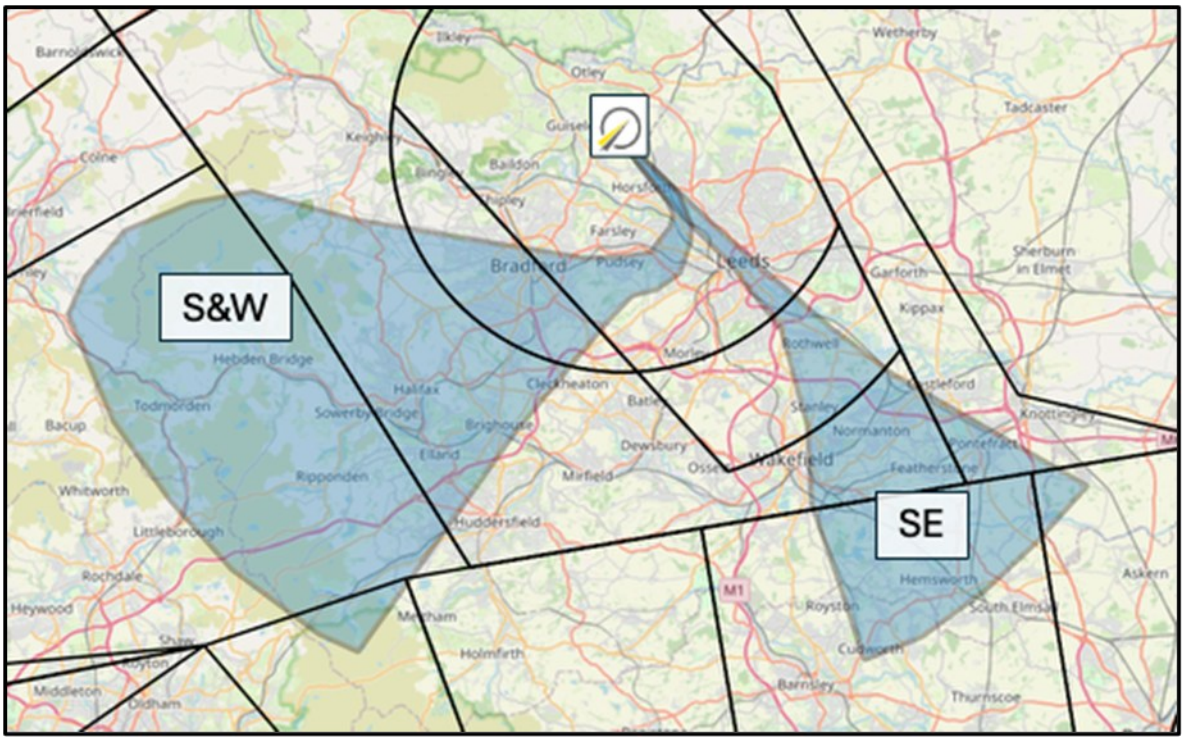


Figure 10 RWY 14 Baseline S&W and SE swathes

	Runway 14 SE 'Do nothing'	Runway 14 S&W 'Do nothing'
Description	Do nothing' scenario for runway 14 departures towards the southeast. For the purposes of the IOA, a swathe has been drawn around the radar data, so that the 'do something' option swathes can be compared against this swathe. Currently traffic heading southeast routes to a waypoint called LAMIX	Do nothing' scenario for runway 14 departures towards the south and west. For the purposes of the IOA, a swathe has been drawn around the radar data, so that the 'do something' option swathes can be compared against this swathe. Currently traffic heading west routes to a waypoint called POL and southwest traffic routes to a waypoint called NELSA.
All: Safety	There are no safety concerns with the current arrangements at LBA.	
Communities: Noise impact on health and quality of life	Both runway 14 departure swathes fly straight ahead until c.2nm with the majority of the traffic initially following these routes. A very small amount of traffic is vectored to turn left almost immediately after take-off.	

	Runway 14 SE 'Do nothing'	Runway 14 S&W 'Do nothing'
	Jet aircraft are required to follow the Noise Preferential Routings (NPRs). These were developed as a performance route to direct departing jet aircraft over the least populated areas. Within the Stage 2A document, there is more information about how these NPRs are defined. These NPRs are shown in Figure 11. Two fixed noise monitors are in place, to measure the noise levels from aircraft and to ensure the airport is operating in compliance with the noise restrictions, these are represented by the green dots. LBA also have a number of mobile noise monitors which we can move around within the local community, these are represented by the yellow dots. Due to the NPRs, there is concentration along the initial straight ahead which can be seen in Figure 9 above. Beyond the end of the NPR, aircraft heading towards the south and west turn right and overfly the area to the south of Pudsey. There is some concentration around the first turn (see Figure 9) and beyond this aircraft are dispersed as they are vectored by ATC. This includes some vectored overflight of Bradford and Halifax. Aircraft heading towards the southeast continue to fly straight ahead over the centre of Leeds before slightly turning at around Rothwell. Beyond this area, there tends to be more dispersion across the airspace as ATC vector aircraft to take more direct tracks to points along their flight planned route. Due to modal split (Runway 14 is operated around 23% of the year), and the departures to the south-east flying over the same area as final approach, it is difficult to attribute parts of the L_{Aeq} contour shown in Appendix A specifically to Runway 14 departures. That said, changes to the departures could have a small influence on the shape of the contours which will be explored in the later sections of this document. There are some cumulative noise impacts for those communities living under the Runway 32 arrival final approach due to the southeast departure routing straight ahead after take-off.	
Communities: Air quality	No change	
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	Emissions of greenhouse gases arise from the combustion of aviation fuel, and as the combustion of aviation fuel is linked to track length, we have initially looked at the track length for the baseline. An indicative departure through the SE swathe has been measured as 31.2nm	An indicative departure through the S&W swathe has been measured as 22.2nm
Wider society: Capacity/ resilience	No change. Without modernisation, LBA will remain dependent on RNAV substitution (VOR rationalisation) which is a temporary resolution to the withdrawal of VORs.	

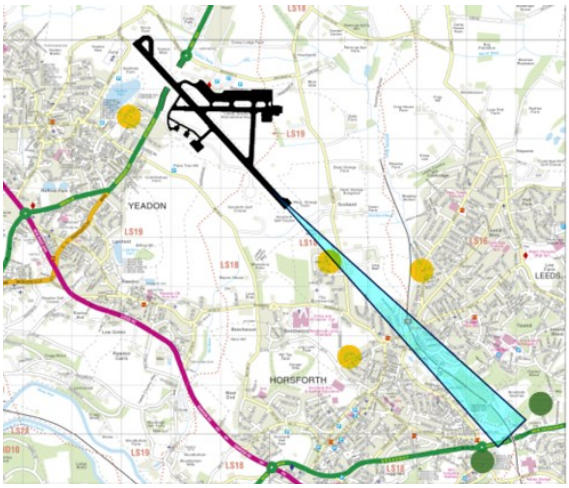


Figure 11 Runway 14 Noise Preferential Route (NPR)

	Runway 14 SE 'Do nothing'	Runway 14 S&W 'Do nothing'
Wider society: Tranquillity	Runway 14 departures to the south east do not overfly any AONB, National Parks or the South Pennine Moors below 7,000ft	Runway 14 departures to the south and west do not overfly any AONB or National Parks below 7,000ft however there is vectored overflight of the South Pennine Moors SAC/SPA
Wider society: Biodiversity	The runway 14 'do nothing' to the southeast does not overfly any SSSI/SPA/SAC/Ramsar site/National Parks below c.3000ft.	The runway 14 'do nothing' to the south and west overflies and the Leeds - Liverpool canal SSSI. Other than this, it does not overfly any other SSSI/SPA/SAC/Ramsar site/National Parks below c.3000ft.
General aviation: Access	No impact to Controlled airspace (CAS). This would remain as currently published in the AIP.	No impact to Controlled airspace (CAS). This would remain as currently published in the AIP.
General aviation/ commercial airlines: Economic impact from increased effective capacity	No change	
Commercial airlines: Training costs	As the baseline is already in operation, there are no training costs anticipated.	
Commercial airlines: Other costs	As the baseline is already in operation, there are no other costs anticipated.	
Airport/ Air navigation service provider: Infrastructure costs	As the baseline is already in operation, there are no infrastructure costs anticipated.	
Airport/ Air navigation service provider: Operational costs	As the baseline is already in operation, there are no operational costs anticipated.	
Airport/ Air Navigation service provider: deployment costs	As the baseline is already in operation, there are no deployment costs anticipated.	
All: Interdependencies conflicts and trade-offs	The DPE identified that the baseline is not a viable option to be integrated into the future MTMA airspace. The baseline is shown in this IOA for comparison purposes.	
All: AMS	Doing nothing will not align with the AMS. It will not enable any environmental benefits or maximise benefits from NERL's re-design of the MTMA. No change and therefore no ACP submission will not enable any reduction in the volume of controlled airspace.	

4.3 Arrivals 'Do nothing'

4.3.1 When developing the Comprehensive List of Options the arrival options were developed as systems. This means the options include designs for Runway 14 and Runway 32 within each option. Due to this, the 'do nothing' description incorporates information for both Runway 14 and Runway 32 arrivals.

Runway 32 Arrivals

4.3.2 Figure 12 shows the CAS boundaries in solid black lines and the runway 32 arrival tracks of all arrivals across the 92-day period are shown in red. There is a greater concentration of flights at lower altitude, once aircraft are positioned onto the ILS, prior to this point all arrivals are vectored by ATC. Some arrivals to arrive from the north but the vast majority arrive from the southeast and southwest.

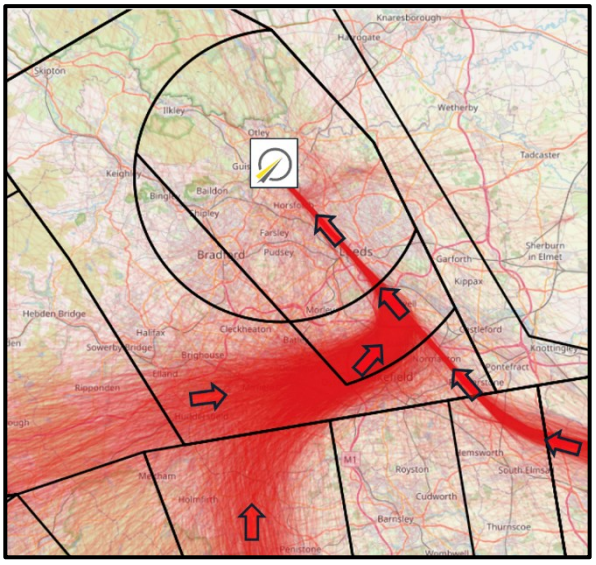


Figure 12 Runway 32 arrivals do nothing

Runway 14 Arrivals

4.3.3 Figure 13 shows the CAS boundaries in solid black lines and the runway 14 arrival tracks of all arrivals across the 92-day period are shown in red. This traffic flow is slightly more complex because some arrivals are instructed to route to overhead the airport before fanning back out for the approach. The majority of arrivals join final approach from the west side over Skipton and Silsden than from the east side where the airspace is more restricted.

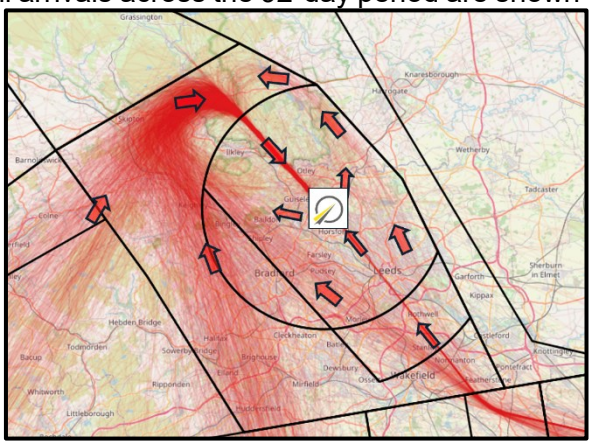


Figure 13 Runway 14 arrivals do nothing

4.3.4 There is a greater concentration of flights at lower altitude, once aircraft are positioned onto the ILS, prior to this point all arrivals are vectored by ATC. Some arrivals to arrive from the north but the vast majority arrive from the southeast and southwest.

	Arrivals 'Do nothing'
All: Safety	There are no safety concerns with the current arrangements at LBA.
Communities: Noise impact on health and quality of life	No change. Arrivals being vectored to join the runway 14 final approach overfly many areas of population, including Bradford, Halifax, Keighley, Burnley and Skipton. The vectoring creates dispersion across these areas. Arrivals being vectored to join the runway 32 final approach also overfly many areas of population, including Huddersfield, Wakefield, Pontefract and Castleford. The vectoring creates dispersion across these areas.

	Aircraft tracks converge as they turn to join final approach which results in greater concentration the closer aircraft get to final approach. Along final approach there is the greatest concentration as aircraft are lined up with the runway and are descending to land.
Communities: Air quality	No change
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	From a procedural perspective, all arrivals plan to the LBA (airfield overhead) from which point they would fly back out to final approach. This results in an inefficient flight profile from a planning perspective. However, in reality, most arrivals do not fly to overhead the airfield but are positioned direct towards final approach which demonstrates arrivals are handled quite efficiently
Wider society: Capacity/ resilience	No change
Wider society: Tranquillity	No change. Arrivals being vectored to join the runway 14 final approach overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. The vectoring creates dispersion across these areas. Small sections of the Yorkshire Dales National Park and the Nidderdale AONB are also under the final approach (the section of flight when aircraft are lined up with the runway and are descending to land), where there is greater concentration. Arrivals being vectored to join runway 32 final approach do not overfly any AONBs or National Parks.
Wider society: Biodiversity	The runway 32 'do nothing' arrivals do not directly overfly any SSSI/SPA/SAC/Ramsar sites/National Parks below c.3000ft although the final approach is adjacent to the Leeds - Liverpool canal SSSI. The runway 14 'do nothing' arrivals overly the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA along with the Yorkshire Dales National Park as they are turning to join final approach.
General aviation: Access	No impact to Controlled airspace (CAS). This would remain as currently published in the AIP.
General aviation/ commercial airlines: Economic impact from increased effective capacity	No change
Commercial airlines: Training costs	As the baseline is already in operation, there are no training costs anticipated.
Commercial airlines: Other costs	As the baseline is already in operation, there are no other costs anticipated.
Airport/ Air navigation service provider: Infrastructure costs	As the baseline is already in operation, there are no infrastructure costs anticipated.
Airport/ Air navigation service provider: Operational costs	As the baseline is already in operation, there are no operational costs anticipated.
Airport/ Air Navigation service provider: deployment costs	As the baseline is already in operation, there are no deployment costs anticipated.

All: Interdependencies conflicts and trade-offs	The DPE identified that the baseline is not a viable option to be integrated into the future MTMA airspace. The baseline is shown in this IOA for comparison purposes.
All: AMS	Doing nothing will not align with the AMS. It will not enable any environmental benefits or maximise benefits from NERL's re-design of the MTMA. No change and therefore no ACP submission will not enable any reduction in the volume of controlled airspace.

5. INITIAL OPTIONS APPRAISAL: DO SOMETHING

5.1 RWY 32 Southeast B (32SEB)

Figure 14 RWY32SEB

	32SEB
Description	After take off, this option swathe turns right to the north of Otley before heading south east over the east Leeds area. This positions aircraft towards the new BATLI waypoint.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn is expected to change the shape of the LAeq contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 S&W options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. Aircraft are expected to be higher over the densely populated area of Leeds compared to the 'do nothing' overflight of Bradford. As the route turns right rather than left, it will introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing' however before reaching Leeds, this mainly occurs over less densely populated areas.

	Beyond Leeds there is potential overflight of Rothwell, Normanton and Featherstone depending on where the route is positioned within the option swathe. These areas are overflown in the 'do nothing'. The right turn occurs at around the same distance as the left turn in the 'do nothing' and therefore there's no change to cumulative impacts along final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 42.4nm which is an increase of 1.4nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of a right turn departure removes overflight of the South Pennine Moors however introduces new overflight of the Nidderdale AONB compared to the 'do nothing'
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and Trench Meadows SSSI however, depending on where the route is positioned within the swathe and aircraft climb performance, there could be concentrated overflight of the Eccup Reservoir SSSI which is not overflown in the do nothing.
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3. This

	may require a trade-off or refinement of the option, due to the departure swathe having potential interdependencies with a proposed network hold.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.2 RW 32 Southeast C (32SEC)

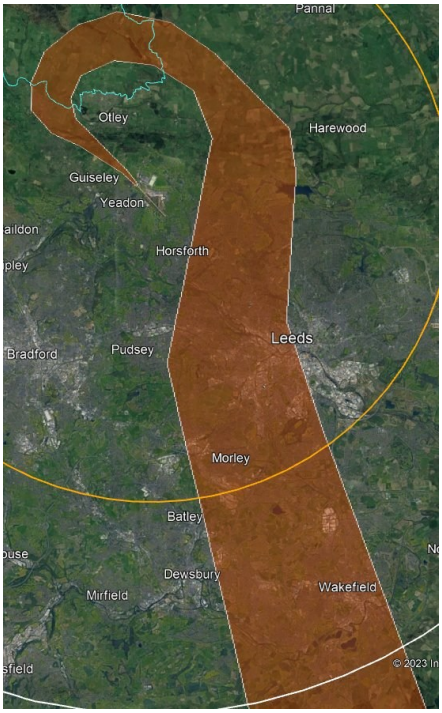


Figure 15 RWY32SEC

	32SEC
Description	After take-off, this option swathe turns right to the north of Otley before heading towards the southwest over the west Leeds area. It then turns slightly left to had south and position aircraft to the west of the new BATLI/MAMUL waypoints.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 S&W options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the ‘do nothing’ swathe. Aircraft are expected to be higher over

	the densely populated area of Leeds compared to the 'do nothing' overflight of Bradford. As the option turns right rather than left, it will introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing' however before reaching Leeds, this mainly occurs over less densely populated areas. Beyond Leeds there is potential overflight of Morley, Wakefield and Horbury depending on where the route is positioned within the option swathe. These areas are overflown in the 'do nothing'. The right turn occurs at around the same distance as the left turn in the 'do nothing' and therefore there's no change to cumulative impacts along the Runway 14 final approach. However, at higher altitudes, the route turns to the south and crosses the Runway 32 final approach which would result in some cumulative noise impacts for communities in the north-west Leeds area.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 43nm which is an increase of 2nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of a right turn departure removes overflight of the South Pennine Moors however introduces new overflight of the Nidderdale AONB compared to the 'do nothing'.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and Trench Meadows SSSI however, depending on where the route is positioned within the swathe and aircraft climb performance, there could be concentrated overflight of the Eccup Reservoir SSSI and/or Breary Marsh SSSI which are not overflown in the do nothing.
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service	This option is not expected to change LBA's operational costs.

provider: Operational costs	
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.3 RWY 32 Southeast D (32SED)

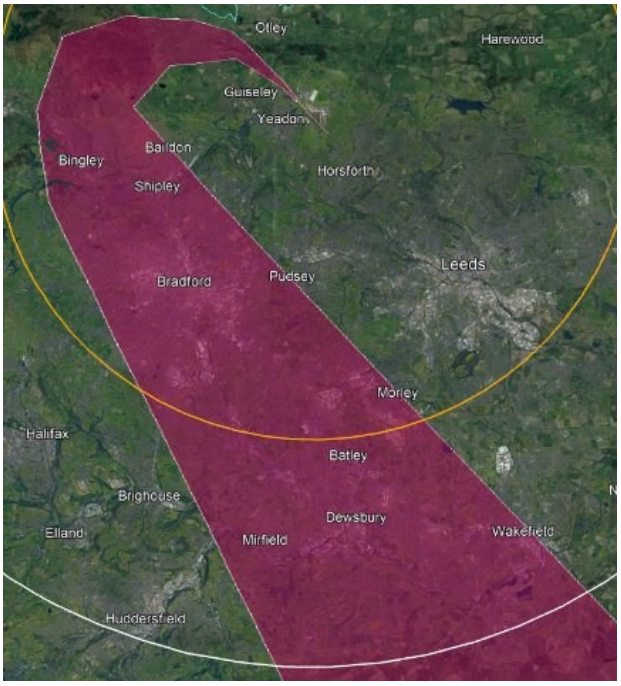


Figure 16 RWY32SED

	32SED
Description	After take-off this option swathe turns left between Menston and Burley in Wharfdale before heading south-southeast towards the new MAMUL waypoint
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The initial turn is in a similar area to the 'do nothing' and therefore the influence on the L_{Aeq} contour is expected to be similar to the 'do nothing' (see Appendix A). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe which will benefit communities now outside of the option area, however for some areas of Bradford, Pudsey, Morley, Batley, Dewsbury, west Wakefield and Horbury, there may be increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the swathe. As the turn occurs at around the same distance as the 'do nothing', there's no change to cumulative impacts along the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society:	The indicative departure route has a track length of 40.6nm which is a decrease of 0.4nm compared to the do nothing. This suggests this option could have positive benefits to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.

Greenhouse gas impact	
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. A route positioned within this option swathe would continue to overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. Depending on where the route is positioned within the swathe, there could be concentrated overflight of Trench Meadows SSSI, which is overflown in the do nothing, and Bingley South Bog SSSI which is not overflown in the do nothing.
General aviation: Access	Potential for need to increase CTR to the west or lower CTA 2 in order to contain PBN SID in accordance with CAA CAS containment policy, even if replicating existing SID but depends on SID configuration to achieve desired centreline within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, however additional CAS would be required. The option potentially benefits fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight.

At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.4 RWY 32 Southeast E (32SEE)

Figure 17 RWY32SEE

	32SEE
Description	After take off this option swathe turns left between Menston and Burley in Wharfdale before heading east towards the new BATLI waypoint
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The initial turn is in a similar area to the 'do nothing' and therefore the influence on the L_{Aeq} contour is expected to be similar to the 'do nothing' (see Appendix A). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe which will benefit communities now outside of the option area, however for some areas of Bradford, Pudsey, Morley, Batley, Rothwell, Dewsbury, Wakefield, Normanton and Featherston, there may be increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the swathe. Parts of Bingley, Leeds, Kippax Castleford, Knottingley and South Elmsail are not overflown in the 'do nothing' could experience overflight in future if the route is positioned over those areas. As the turn occurs at around the same distance as the 'do nothing', there's no change to cumulative impacts along the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).

General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 48.5nm which is an increase of 7.5nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. A route positioned within this option swathe would continue to overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. Depending on where the route is positioned within the swathe, there could be concentrated overflight of Trench Meadows SSSI, which is overflown in the do nothing, and Bingley South Bog SSSI which is not overflown in the do nothing.
General aviation: Access	Potential for need to increase CTR to the west or lower CTA 2 in order to contain PBN SID in accordance with CAA CAS containment policy, even if replicating existing SID but depends on SID configuration to achieve desired centreline within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3. This may require a trade-off or refinement of the option, due to the departure swathe having potential interdependencies with a proposed network hold.

All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures; however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.5 RWY 32 Southeast F (32SEF)

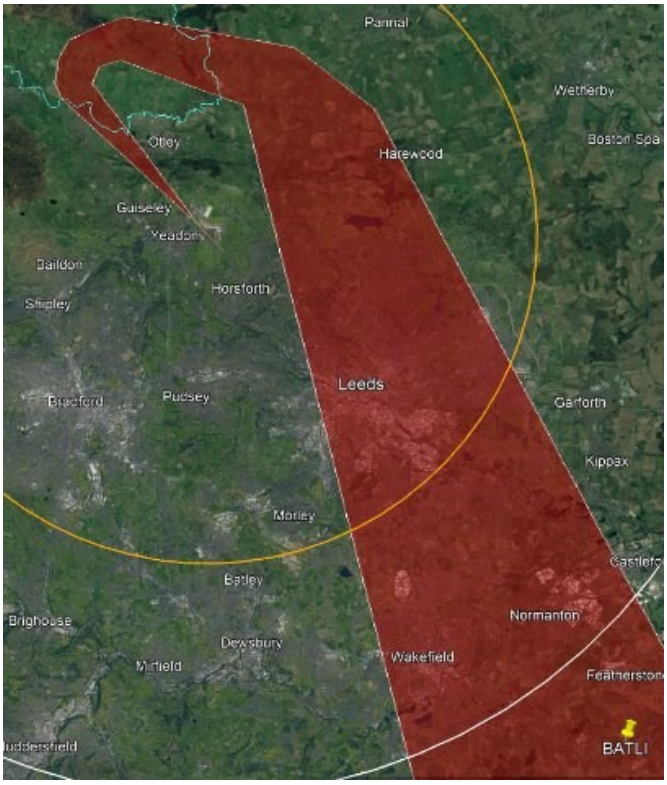


Figure 18 RWY32SEF

	32SEF
Description	After take-off, this option swathe flies straight ahead for 4.5nm before turning right and heading south over the east Leeds area. This positions aircraft towards the new BATLI waypoint.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other signficant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on	The introduction of the straight-ahead section to 4.5nm followed by a right turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential

health and quality of life	to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 S&W options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. Aircraft are expected to be higher over the densely populated area of Leeds compared to the 'do nothing' overflight of Bradford. As the option turns right rather than left, it will introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing' however before reaching Leeds, this mainly occurs over less densely populated areas. Beyond Leeds there is potential overflight of Rothwell, Wakefield, Normanton Featherstone and Hemsworth, depending on where the route is positioned within the option swathe. These areas are overflown in the 'do nothing'. This option flies straight ahead for 4.5nm before turning right which means that the western part of Otley and the eastern part of Burley in Wharfedale will see cumulative overflight from these Runway 32 departures and the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 43.7nm which is an increase of 2.7nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of a right turn departure removes overflight of the South Pennine Moors however introduces new overflight of the Nidderdale AONB compared to the 'do nothing'.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and Trench Meadows SSSI however the route will instead overfly West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA which is not overflown in the do nothing. Beyond this, depending on where the route is positioned within the swathe and aircraft climb performance, there could also be concentrated overflight of Great Almscliff Crag SSSI, the Eccup Reservoir SSSI and/or Breary Marsh SSSI.
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines:	No other airline costs are foreseen with this option.

Other costs	
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3. This may require a trade-off or refinement of the option, due to the departure swathe having potential interdependencies with a proposed network hold.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.6 RWY 32 Southeast G (32SEG)

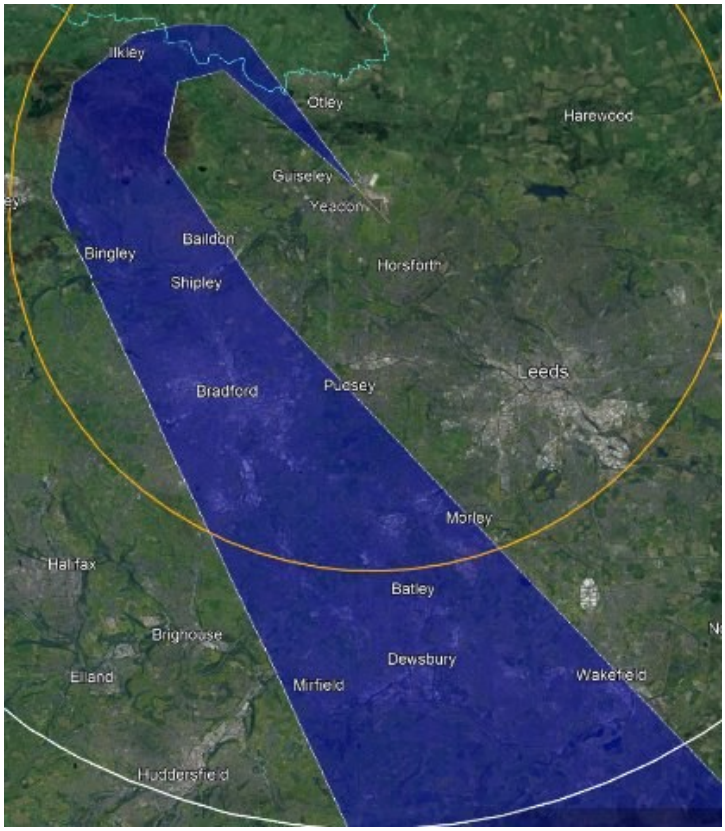


Figure 19 RWY32SEG

	32SEG
Description	After take-off, this option swathe flies straight ahead for 4.5nm before turning left and heading south-southeast over Bradford. This positions aircraft towards the new MAMUL waypoint.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of the straight-ahead section to 4.5nm followed by a left turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 S&W options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe however detailed noise modelling would be required as this option turns over the densely populated area of Ilkley which would be new overflight at relatively low altitudes. Depending on route position within the swathe, new parts of Bingley and Baildon may also be overflown. Beyond the first turn, there will be benefits for communities now outside of the option area, however for some areas of Shipley, Bradford, Pudsey, Morley, Batley,

	Dewsbury, Wakefield, and Horbury, there may be increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the swathe. Western parts of Bradford, and Mirfield, not overflown in the 'do nothing', could experience overflight in future if the route is positioned over those areas. This option flies straight ahead for 4.5nm before turning left which means that the western part of Otley and the eastern part of Burley in Wharfedale will see cumulative overflight from these Runway 32 departures and the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 43.1nm which is an increase of 2.1nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of the straight-ahead departure before turning left results in new overflight of the Nidderdale AONB along with continued overflight of the South Pennine Moors (at slightly higher altitudes than the 'do nothing' and also over some areas of the Moors that are not overflown in the 'do nothing'). The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however this could be over parts that are not overflown in the do nothing. Due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. Aircraft are expected to be higher than they are today. Depending on where the route is positioned within the swathe, there could be concentrated overflight of Trench Meadows SSSI, which is overflown in the do nothing, and Bingley South Bog SSSI which is not overflown in the do nothing.
General aviation: Access	Potential for need to increase CTR to the west or NW or lower CTA 2 or 3 in order to contain PBN SID in accordance with CAA CAS containment policy, even if replicating existing SID but depends on SID configuration to achieve desired centreline within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.

Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.7 RWY 32 South & West A (32S&WA)

Figure 20 RWY32S&WA

	32S&WA
Description	After take-off, this option swathe turns right to the north of Otley before heading towards the south west over Bradford towards the POL and NELSA waypoints.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 SE options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. As the option turns right rather than left, it benefits the populated area of Keighley and parts of Bingley, but it will introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing'. Before reaching the northern parts Leeds, this mainly occurs over less densely populated areas. For the populated areas of Leeds, Horsforth, Pudsey, Baildon, Shipley, Bradford, and Halifax there is the potential for new overflight compared to the S&W 'do nothing' depending on where the route is positioned within the option swathe. Finally, depending on where the route is positioned within the swathe, the areas of Haworth, Todmorden, Hebden Bridge and Sowerby Bridge may see overflight at an increased frequency compared to the 'do nothing' but this is also expected to occur at a higher altitude. The right turn occurs at around the same distance as the left turn in the 'do nothing' and therefore there's no change to cumulative impacts along the Runway 14 final

	approach. However, at higher altitudes, the option turns to the south and crosses the Runway 32 final approach which could result in some cumulative noise impacts for communities in Horsforth and Headingly in the north-west Leeds area. These areas are not overflown by Runway 32 S&W departures in the 'do nothing'.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 33.1nm which is an increase of 13.3nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of a right turn departure removes overflight of the area of the South Pennine Moors to the south of Ilkley however introduces new overflight of the Nidderdale AONB compared to the 'do nothing'. Beyond Bradford, a route positioned within this option swathe would continue to overfly the South Pennine Moors but at higher altitudes than the 'do nothing'. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI. Depending on where the route is positioned within the swathe and aircraft climb performance, there could be concentrated overflight of the Eccup Reservoir SSSI and/or Breary Marsh SSSI which are not overflown in the do nothing
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further

provider: deployment costs	exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there is the potential for this option to share interdependencies with Manchester Airport however this occurs at the very extremity of the swathe at c.6000ft - 7000ft. Whether there is a potential conflict / trade off will require exploration in Stage 3. Integration with the network airspace above 7,000ft will also be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.8 RWY32 South & West C (32S&WC)

Figure 21 RWY32S&WC

	32S&WC
Description	After take-off this option swathe turns left between Menston and Burley in Wharfdale before heading southwest towards the POL waypoint.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The initial turn is in a similar area to the 'do nothing' and therefore the influence on the L_{Aeq} contour is expected to be similar to the 'do nothing' (see Appendix A). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling.

	It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe which will benefit communities now outside of the option area, however for some areas such as Keighley, Haworth and Todmorden there may be increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the swathe. As the turn occurs at around the same distance as the 'do nothing', there's no change to cumulative impacts along the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 19.6nm which is an decrease of 0.2nm compared to the do nothing. This suggests this option could have positive benefits to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. A route positioned within this option swathe would continue to overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however this could be over parts that are not overflown in the do nothing. Due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. The swathe removes overflight the Bingley South Bog SSSI
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the

	shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there is the potential for this option to share interdependencies with Manchester Airport however this occurs at the very extremity of the swathe at c.6000ft - 7000ft. Whether there is a potential conflict / trade off will require exploration in Stage 3. Integration with the network airspace above 7,000ft will also be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, within the existing volumes of CAS. The option potentially benefits fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.9 RWY 32 South & West D (32S&WD)

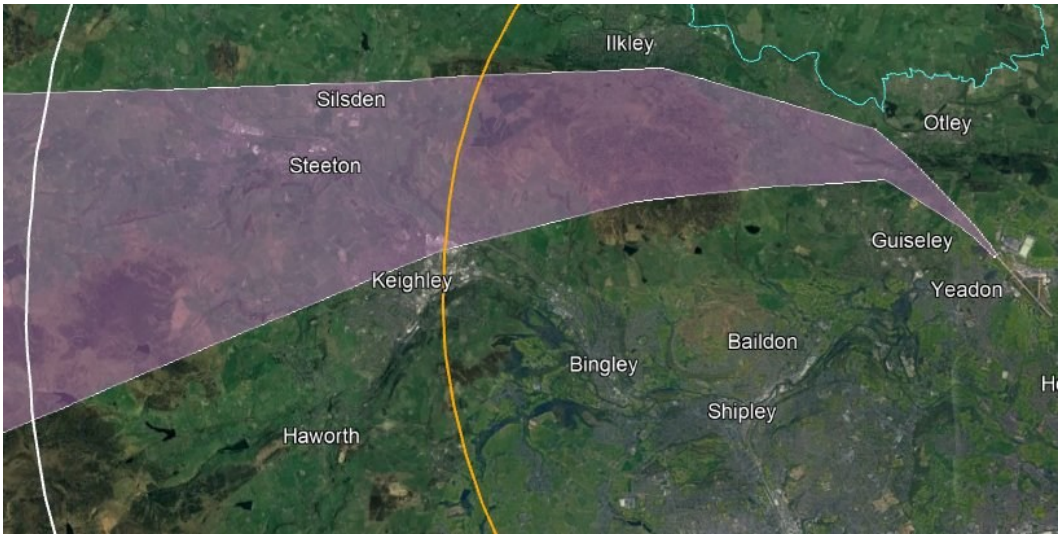


Figure 22 RWY32S&WD

	32S&WD
Description	After take-off this option swathe turns left between Menston and Burley in Wharfdale before heading west towards the NELSA waypoint.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The initial turn is in a similar area to the 'do nothing' and therefore the influence on the L_{Aeq} contour is expected to be similar to the 'do nothing' (see Appendix A). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe which will benefit communities now outside of the option area, however the option introduces potential overflight for areas currently outside of the 'do nothing' swathe, including Silsden and Steeton. The

	northern parts of Keighley may also be overflown on a more frequent basis than in the 'do nothing' but this depends on where the route is positioned within the swathe. As the turn occurs at around the same distance as the 'do nothing', there's no change to cumulative impacts along the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 19nm which is an decrease of 0.8nm compared to the do nothing. This suggests this option could have positive benefits to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. A route positioned within this option swathe would continue to overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however this could be over parts that are not overflown in the do nothing. Due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. The swathe removes overflight the Bingley South Bog SSSI
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.

conflicts and trade-offs	
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, within the existing volumes of CAS. The option potentially benefits fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.10 RWY 32 South & West F (32S&WF)

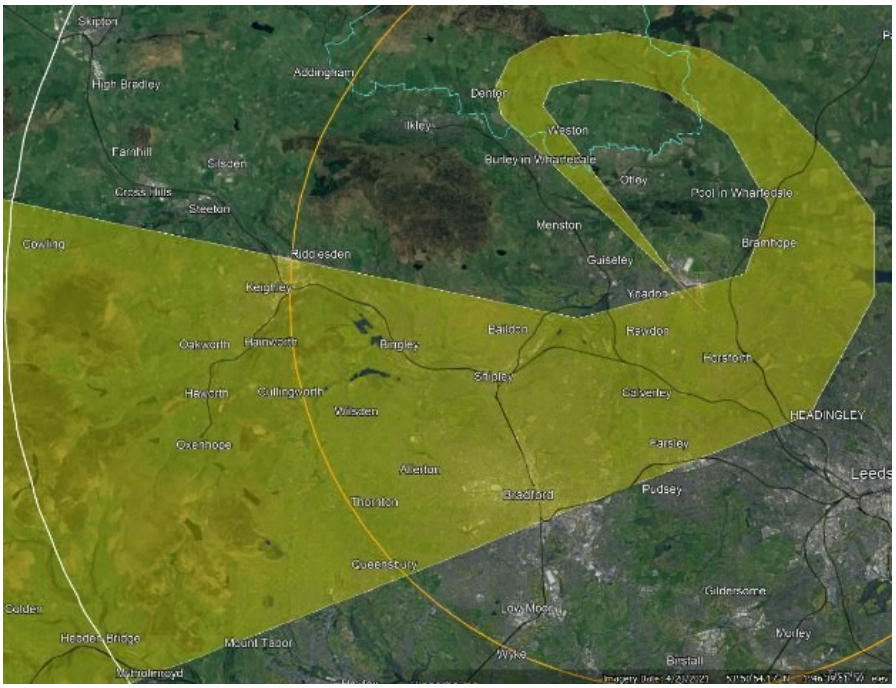


Figure 23 RWY32S&WF

	32S&WF
Description	After take-off, this option swathe flies straight ahead for 4.5nm before wrapping around to the right and heading west over the areas to the north of Bradford. This positions aircraft towards POL and/or NELSA
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of the straight-ahead section to 4.5nm followed by a right turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 SE options which also overfly this

	area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. As the option turns right rather than left, it benefits the populated area of Keighley and parts of Bingley, but it will introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing'. Before reaching the northern parts Leeds, this mainly occurs over less densely populated areas. For the populated areas of Leeds, Horsforth, Baildon, Shipley, and Bradford, there is the potential for new overflight compared to the S&W 'do nothing' depending on where the route is positioned within the option swathe. Finally, depending on where the route is positioned within the swathe, the areas of Keighley, Haworth, and Hebden Bridge may see overflight at an increased frequency compared to the 'do nothing' but this is also expected to occur at higher altitudes compared to today. This option flies straight ahead for 4.5nm before turning right which means that the western part of Otley and the eastern part of Burley in Wharfedale will see cumulative overflight from these Runway 32 departures and the Runway 14 final approach. At higher altitudes, the option turns to the south and crosses the Runway 32 final approach which could result in some cumulative noise impacts for communities in Horsforth and Headingly in the north-west Leeds area. These areas are not overflown by Runway 32 S&W departures in the 'do nothing'.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 34.7nm which is an increase of 14.9nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of a right turn departure removes overflight of the area of the South Pennine Moors to the south of Illkey however introduces new overflight of the Nidderdale AONB compared to the 'do nothing'. Beyond Bradford, a route positioned within this option swathe would continue to overfly the South Pennine Moors but at higher altitudes than the 'do nothing'. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI. Depending on where the route is positioned within the swathe and aircraft climb performance, there could be concentrated overflight of the Eccup Reservoir SSSI and/or Breary Marsh SSSI which are not overflown in the do nothing
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines:	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.

Economic impact from increased effective capacity	
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.11 RWY 32 South & West G (32S&WG)

Figure 24 RWY32S&WG

	32S&WG
Description	After take-off, this option swathe flies straight ahead for 4.5nm before turning left and heading south-west over Keighley. This positions aircraft towards POL.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of the straight-ahead section to 4.5nm followed by a left turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 SE options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe however detailed noise modelling would be required as this option turns over the densely populated area of Ilkley which would be new overflight at relatively low altitudes. Beyond the first turn, there will be benefits for communities now outside of the option area, however for some areas of Keighley, Haworth, and Todmorden there may be increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the swathe. This option flies straight ahead for 4.5nm before turning left which means that the western part of Otley and the eastern part of Burley in Wharfedale will see cumulative overflight from these Runway 32 departures and the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).

General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 21.4nm which is an increase of 1.6nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of the straight-ahead departure before turning left results in new overflight of the Nidderdale AONB along with continued overflight of the South Pennine Moors (at slightly higher altitudes than the 'do nothing' and over some areas of the Moors that are not overflown in the 'do nothing'). The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however this could be over parts that are not overflown in the do nothing. Due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. Aircraft may be higher than the do nothing due the straight ahead section before turning over the SSSI/SAC/SPA. The swathe removes overflight the Bingley South Bog SSSI
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there is the potential for this option to share interdependencies with Manchester Airport however this occurs at the very extremity of the swathe at c.6000ft - 7000ft. Whether there is a potential conflict / trade off will require exploration in Stage 3. Integration with the network airspace above 7,000ft will also be required in Stage 3.

All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, within the existing volumes of CAS. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.12 RWY 32 South & West H (32S&WH)

Figure 25 32S&WH

	32S&WH
Description	After take-off, this option swathe flies straight ahead for 4.5nm before turning left and heading west. This positions aircraft towards NELSA.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of the straight ahead section to 4.5nm followed by a left turn is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the area of Menston but impact the populated area of Burley in Wharfedale (particularly if paired with one of the Runway 32 SE options which also overfly this area). At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe however detailed noise modelling would be required as this option turns over the densely populated area of Ilkley which would be new overflight at relatively low altitudes. Beyond the first turn, there will be benefits for communities now outside of the option area, however for some areas not currently overflown in the 'do nothing' would see overflight in future including Silsden, Kelbrook, and Colne. This option flies straight ahead for 4.5nm before turning left which means that the western part of Otley and the eastern part of Burley in Wharfedale will see cumulative overflight from these Runway 32 departures and the Runway 14 final approach.

Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 20.3nm which is an increase of 0.5nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. The introduction of the straight ahead departure before turning left results in new overflight of the Nidderdale AONB along with continued overflight of the South Pennine Moors (at slightly higher altitudes than the 'do nothing' and over some areas of the Moors that are not overflown in the 'do nothing'). The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option will continue to overfly the South Pennine Moors SSSI/SAC/SPA however this could be over parts that are not overflown in the do nothing. Due to the introduction of PBN the area of overflight may become smaller but with increased frequency of overflight. Aircraft may be higher than the do nothing due the straight ahead section before turning over the SSSI/SAC/SPA. The swathe removes overflight the Bingley South Bog SSSI
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.

conflicts and trade-offs	
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, within the existing volumes of CAS. The option potentially benefits fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.13 RWY32 New Option B (RW32NEWB)

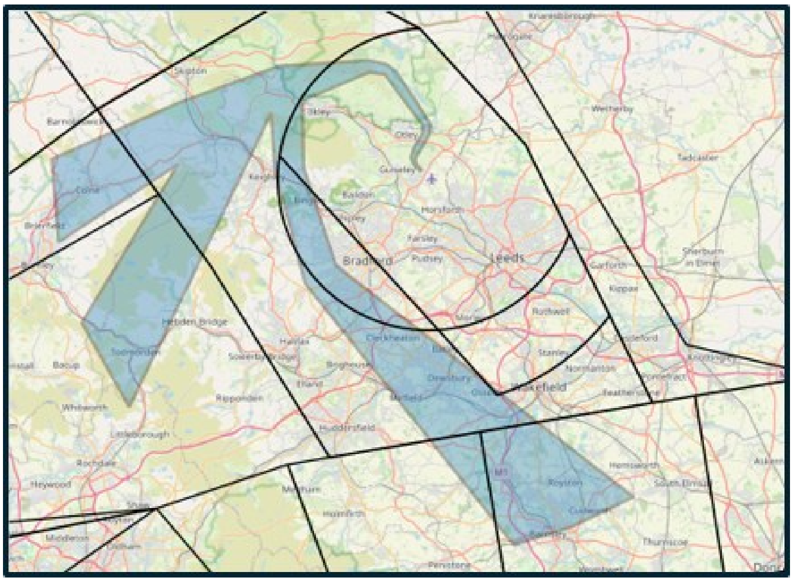


Figure 26 RW32NEB

	RW32 Combination Option B (RWY32NEWB)
Description	Within the stakeholder engagement this option has been described as a respite alternative. At this stage, the qualitative nature of the assessment and the number of potential other options this option could be combined with means that it is difficult to assess as a respite option. Therefore for the purposes of this IOA, it has been assessed as a permanent route and within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative. This option swathe is developed as a system with the potential for routes towards NELSA, POL and LAMIX. Immediately after take-off this system option swathe turns right before turning left and heading north. It then turns left and the routes split with the swathe to NELSA heading west-southwest, the swathe to POL heading in a south-westerly direction, and the swathe to LAMIX/MAMUL heading south and then turning towards the south-east.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full

	safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn almost immediately after departure is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the areas of Menston and Burley in Wharfedale. The south-eastern parts of Otley may fall within the scope of the contours but at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. There will be benefits for communities now outside of the option area, however there will be new overflight for areas not currently overflown in the 'do nothing'. For the earlier sections of the swathe this occurs over less densely populated areas before reaching Addingham and Silsden. The early turn to the right helps reduce cumulative overflight with the Runway 14 final approach.
Communities: Air quality	This option has a change to how aircraft will fly laterally below 1000ft. Whilst there are likely to be no increase in emissions in their totality, there will be a change in the location of emissions below 1000ft which could affect local air quality however this change does not occur within an AQMA or within the vicinity of an AQMA.
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 33.9nm which is an increase of 3.5nm compared to the combined average runway 32 do nothing baseline of 30.4nm. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Depending on the route position within the swathe, this option could overfly the Yorkshire Dales National Park but otherwise the option would continue to avoid overflight of National Parks. This option results in new overflight of the Nidderdale AONB along with continued overflight of the South Pennine Moors (at higher altitudes than the 'do nothing' and also over some areas of the Moors that are not overflown in the 'do nothing'). The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI however it introduces overflight of West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA. Depending on aircraft climb performance, and route positioning within the swathe, a small area of the Yorkshire Dales National Park may also be overflown.
General aviation: Access	Option could require extension of CTR to the north or lowering of CTA 3
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes or any economic impacts to GA operations. Although this option is combined into a departure system, it uses swathes rather than defined routes, and without the specific route information it is not possible to undertake an assessment.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.

Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there is the potential for this option to share interdependencies with Manchester Airport however this occurs at the very extremity of the swathe at c.6000ft - 7000ft. Whether there is a potential conflict / trade off will require exploration in Stage 3. Integration with the network airspace above 7,000ft will also be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.14 RWY 32 New Option C (RWY32NEWC)

Figure 27 RW32NEWC

	RW32 Combination Option C (RWY32NEWC)
Description	Within the stakeholder engagement this option has been described as a respite alternative. At this stage, the qualitative nature of the assessment and the number of potential other options this option could be combined with means that it is difficult to assess as a respite option. Therefore, for the purposes of this IOA, it has been assessed as a permanent route and within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative or a potential night time system. This option swathe is developed as a system with the potential for routes towards NELSA, POL and LAMIX. Immediately after take-off this system option swathe turns right before wrapping around south and then heading towards the west. The swathe splits in the Calverley area with the swathe to NELSA heading west, the swathe to POL heading west-southwest, and the swathe to LAMIX/MAMUL heading south/south-east.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn almost immediately after departure is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit the areas of Menston and Burley in Wharfedale. The south-eastern parts of Otley may fall within the scope of the contours but at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. As the option turns right rather than left, there will be benefits for communities now outside of the option area, but it will

	introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing'. Before reaching the northern parts Horsforth, this mainly occurs over less densely populated areas. For the populated areas of Horsforth, Baildon, Shipley, northern Bradford and Pudsey, there is the potential for new overflight or increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the option swathe. The early turn to the right helps reduce cumulative overflight with the Runway 14 final approach. The option crosses the Runway 32 final approach which could result in some cumulative noise impacts for communities in Horsforth. These areas are not overflown by Runway 32 S&W departures in the 'do nothing'.
Communities: Air quality	This option has a change to how aircraft will fly laterally below 1000ft. Whilst there are likely to be no increase in emissions in their totality, there will be a change in the location of emissions below 1000ft which could affect local air quality however this change does not occur within an AQMA or within the vicinity of an AQMA.
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 32.7nm which is an increase of 2.3nm compared to the combined average runway 32 do nothing baseline of 30.4nm. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. Beyond Bradford, a route positioned within this option swathe would continue to overfly the South Pennine Moors but at higher altitudes than the 'do nothing'. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI. Depending on where the route is positioned within the swathe and aircraft climb performance, there could be concentrated overflight of Breary Marsh SSSI which is not overflown in the do nothing
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes or any economic impacts to GA operations. Although this option is combined into a departure system, it uses swathes rather than defined routes, and without the specific route information it is not possible to undertake an assessment.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.

Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3. This may require a trade-off or refinement of the option, due to the departure swathe having potential interdependencies with a proposed network hold.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.15 RWY 32 New Option D (RWY32NEWD)

Figure 28 RWY32NEWD

	RW32 Combination Option D (RWY32NEWD)
Description	Within the stakeholder engagement this option has been described as a respite alternative. At this stage, the qualitative nature of the assessment and the number of potential other options this option could be combined with means that it is difficult to assess as a respite option. Therefore, for the purposes of this IOA, it has been assessed as a permanent route and within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative or a potential nighttime system.

	This option swathe is developed as a system with the potential for routes towards NELSA, POL and LAMIX. After take off following a similar path to the 'do nothing' this system option swathe turns right before wrapping around south and then heading towards the west. The swathe splits in the Greengates area with the swathe to NELSA heading west, the swathe to POL heading west-southwest, and the swathe to LAMIX/MAMUL heading south/south-east.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn at around 2nm after departure is expected to change the shape of the L_{Aeq} contour (see Appendix A) with the potential to benefit some parts of Menston and Burley in Wharfedale. At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. As the option turns right rather than left, there will be benefits for communities now outside of the option area, but it will introduce overflight to areas that are not routinely overflown by Runway 32 departures in the 'do nothing'. Before reaching the northern parts Horsforth, this mainly occurs over less densely populated areas. For the populated areas of Horsforth, Baildon, Shipley, and Bradford, there is the potential for new overflight or increased frequency of overflight compared to the 'do nothing' depending on where the route is positioned within the option swathe. The early turn to the right helps reduce cumulative overflight with the Runway 14 final approach. The option crosses the Runway 32 final approach which could result in some cumulative noise impacts for communities in Horsforth. These areas are not overflown by Runway 32 S&W departures in the 'do nothing'.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 39.2nm which is an increase of 8.8nm compared to the combined average runway 32 do nothing baseline of 30.4nm. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks but this option results in new overflight of the Nidderdale AONB. Beyond Bradford, a route positioned within this option swathe would continue to overfly the South Pennine Moors but at higher altitudes than the 'do nothing'. The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.

Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI. Depending on where the route is positioned within the swathe and aircraft climb performance, there could be concentrated overflight of Breary Marsh SSSI which is not overflown in the do nothing
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes or any economic impacts to GA operations. Although this option is combined into a departure system, it uses swathes rather than defined routes, and without the specific route information it is not possible to undertake an assessment.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there is the potential for this option to share interdependencies with Manchester Airport however this occurs at the very extremity of the swathe at c.6000ft - 7000ft. Whether there is a potential conflict / trade off will require exploration in Stage 3. Integration with the network airspace above 7,000ft will also be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.16 RWY 32 New Option E

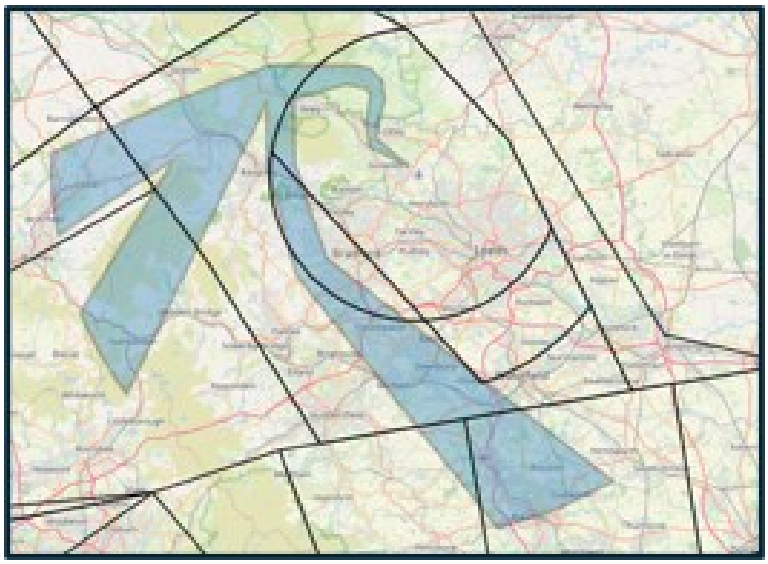


Figure 29 RWY32NEWE

	RW32 Combination Option E (RWY32NEWE)
Description	Within the stakeholder engagement this option has been described as a respite alternative. At this stage, the qualitative nature of the assessment and the number of potential other options this option could be combined with means that it is difficult to assess as a respite option. Therefore, for the purposes of this IOA, it has been assessed as a permanent route and within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative or a potential nighttime system. This option swathe is developed as a system with the potential for routes towards NELSA, POL and LAMIX. After take off (following a similar path to the 'do nothing') this system option swathe turns right before turning left over Askwith Moor and heading west. It then splits heading south-southwest towards NELSA, the swathe to POL heading southwest, and the swathe to LAMIX/MAMUL heading south/south-east.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a right turn at around 2nm after departure is expected to change the shape of the LAeq contour (see Appendix A) with the potential to benefit some parts of Menston and Burley in Wharfedale. At this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the ‘do nothing’ swathe. There will be benefits for communities now outside of the option area, however there will be new overflight for areas not currently overflown in the ‘do nothing’. For the earlier sections of the swathe this occurs over less densely populated areas before reaching Addingham and Silsden.

	The early turn to the right helps reduce cumulative overflight with the Runway 14 final approach.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 33nm which is an increase of 2.6nm compared to the combined average runway 32 do nothing baseline of 30.4nm. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of National Parks. This option results in new overflight of the Nidderdale AONB along with continued overflight of the South Pennine Moors (at higher altitudes than the 'do nothing' and also over some areas of the Moors that are not overflown in the 'do nothing'). The introduction of PBN departures would likely result in an overall reduction in area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	The proposed right turn removes overflight of the South Pennine Moors SSSI/SAC/SPA and the Bingley South Bog SSSI however it introduces overflight of West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA. Depending on aircraft climb performance, and route positioning within the swathe, a small area of the Yorkshire Dales National Park may also be overflown.
General aviation: Access	Option could require extension of CTR to the north or lowering of CTA 3
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes or any economic impacts to GA operations. Although this option is combined into a departure system, it uses swathes rather than defined routes, and without the specific route information it is not possible to undertake an assessment.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies	Based on the regions identified in ACOG's Masterplan Iteration 2, there is the potential for this option to share interdependencies with Manchester Airport however this occurs at the very extremity of the swathe at c.6000ft - 7000ft. Whether there is a

conflicts and trade-offs	potential conflict / trade off will require exploration in Stage 3. Integration with the network airspace above 7,000ft will also be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this option's alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.17 RWY 14 Southeast A (14SEA)

Figure 30 14SEA

	14SEA
Description	After take-off, this option swathe turns slightly right over the Leeds area before heading south. This positions aircraft to the west of the new waypoint BATLI with aircraft heading towards the new MAMUL waypoint.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The option swathe turns right before the centre of Leeds. This has the potential to slightly alter the shape of the LAeq contour however at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the ‘do nothing’ swathe however detailed noise modelling would be required as this option will introduce overflight to densely populated areas that are not routinely overflown by Runway 14 departures in the ‘do nothing’ including west

	Leeds, Tingley, Wakefield, and Horbury (depending on route position within the swathe). Beyond the first turn, there will be benefits for communities now outside of the option area including pats of east Leeds, Normanton and Pontefract. This option swathe turns away from final approach which will benefit cumulative overflight compared to the 'do nothing'.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 30.5nm which is a decrease of 0.7nm compared to the do nothing. This suggests this option could have positive benefits to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	There would be no change compared to the 'do nothing'; the option swathe does not overfly any AONB, National Parks or the South Pennine Moors below 7,000ft
Wider society: Biodiversity	Depending on the position of the route within the swathe, this option could overfly the Leeds - Liverpool canal below 3000ft This is not currently overflown in the SE do nothing.
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3. This may require a trade-off or refinement of the option, due to the departure swathe having potential interdependencies with a proposed network hold.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures within the existing volumes of CAS. The

option potentially offers benefits to fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight.
At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.18 RWY 14 Southeast B (14SEB)

Figure 31 14SEB

	14SEB
Description	After take-off, this option swathe is positioned straight ahead towards the south east in the direction of the new BATLI waypoint.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option swathe broadly follows the same route as today however depending on where the route is positioned, there is the possibility for a track adjustment to the north which could slightly alter the shape of the LAeq contour. Without a detailed design at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the ‘do nothing’ swathe however detailed noise modelling would be required as, depending on where the route is positioned within the swathe, there could be overflight of new areas (such as north Leeds) or increased overflight of areas already overflown in the 'do nothing'.

	Changes to cumulative noise impacts will depend on where the route is located within the swathe, but it has the potential to have similar cumulative impacts as the 'do nothing'.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 31.2nm which is the same as to the do nothing. This suggests this option would have similar fuel burn and GHG emissions performance to the do nothing. It is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	There would be no change compared to the 'do nothing'; the option swathe does not overfly any AONB, National Parks or the South Pennine Moors below 7,000ft
Wider society: Biodiversity	This option does not overfly any SSSI/SPA/SAC/Ramsar site/National Parks below c.3000ft and so offers the same performance as the do nothing.
General aviation: Access	Option could require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures, however additional CAS would be required. The option offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this options alignment with

the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.19 RWY 14 South & West C (14S&WC)

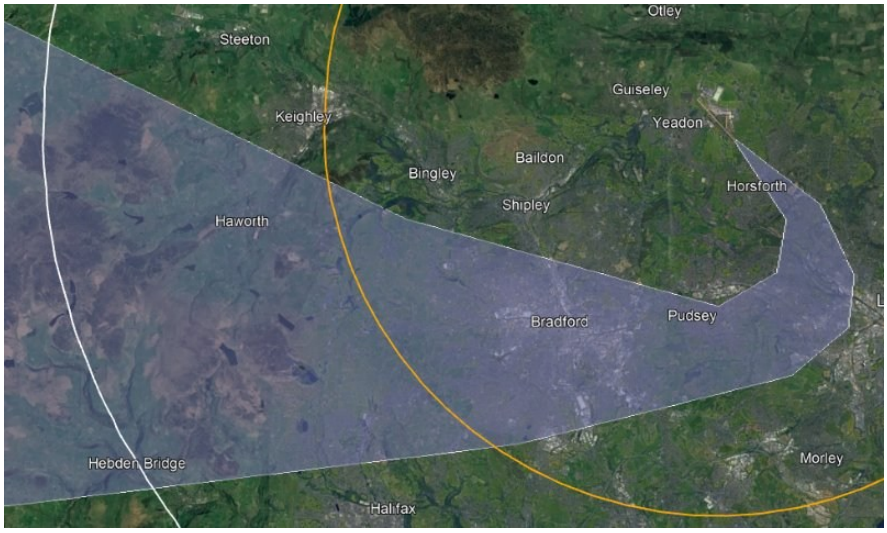


Figure 32 14S&WC

	14S&WC
Description	After take-off, this option swathe turns right before the centre of Leeds, before heading west over Bradford. This positions aircraft towards the POL and/or NELSA waypoints (depending on where the route is positioned within the swathe).
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The option swathe follows a similar path to the 'do nothing' before turning in a broadly similar area. Depending on the route within the swathe there is the potential to slightly alter the shape of the L_{Aeq} contour however at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe however detailed noise modelling would be required as this option could introduce overflight to densely populated areas that are not routinely overflown by Runway 14 departures in the 'do nothing' including areas west of Leeds and north of Holbeck and it could also increase the frequency of overflight over areas already overflown by runway 14 departures depending on route position within the swathe. This option swathe turns away from final approach in a similar area to the 'do nothing' so cumulative impacts would be similar to today.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines:	The indicative departure route has a track length of 22.2nm which is the same as to the do nothing. This suggests this option would have similar fuel burn and GHG emissions performance to the do nothing. It is important to note that the exact

Fuel-burn Wider society: Greenhouse gas impact	impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. A route positioned within this option swathe would overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction of the area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option offers the same performance as the do nothing; it will continue to overfly the Leeds - Liverpool canal SSSI.
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and contribute to systemisation of departures within the existing volumes of CAS. The option offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.20 RWY 14 South & West D (14S&WD)

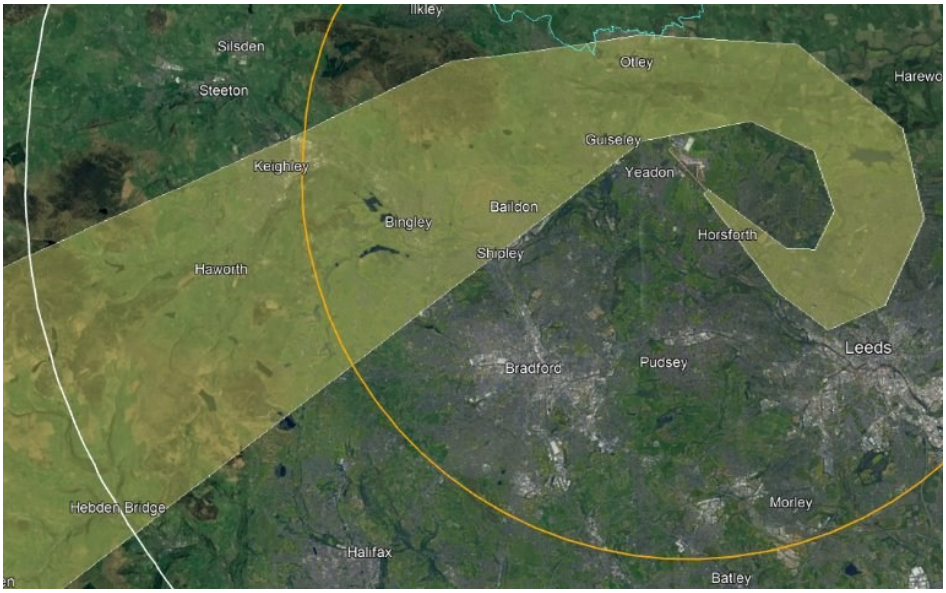


Figure 33 14S&WD

	14S&WD
Description	After take-off, this option swathe turns left and wraps around to the north and then west over Otley. Beyond Otley, the swathe heads in a south-westerly direction. This positions aircraft towards the POL waypoint.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a left turn could slightly alter the shape of the LAeq contour (see Appendix A) but at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. As the option turns left rather than right, it will introduce overflight to areas that are not routinely overflown by Runway 14 departures in the 'do nothing' however beyond Headingley and Alwoodley this mainly occurs over less densely populated areas until reaching Otley and Keighley. The left turn occurs at around the same distance as the right turn in the 'do nothing' and therefore there's no change to cumulative impacts along the Runway 32 final approach. However, at higher altitudes, the route crosses the Runway 14 final approach which would result in some cumulative noise impacts for communities in the Otley area.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).

General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 29.9nm which is an increase of 7.7nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. A route positioned within this option swathe would overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction of the area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Due to the left hand wrap around turn, this option results in some areas of the Moors not currently overflown, such as the section to the south of Ilkley, to see overflight.
Wider society: Biodiversity	This option will avoid overflight of the Leeds - Liverpool canal SSSI but it will introduce overflight of the Eccup Reservoir SSSI which is not overflown in the do nothing. Depending on where the route is positioned within the swathe, and aircraft climb performance, there could be concentrated overflight of the South Pennine Moors SSSI/SAC/SPA.
General aviation: Access	Option could require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending. Both depend on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel

burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight.
At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.21 RWY 14 South & West E (14S&WE)

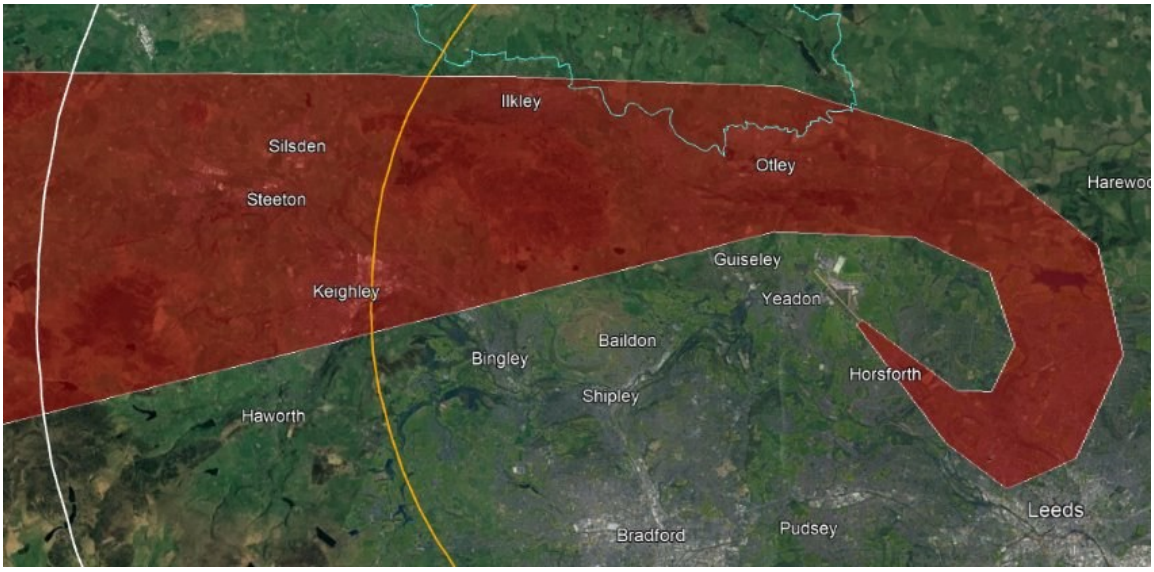


Figure 34: RWY14S&WE

	14S&WE
Description	After take-off, this option swathe turns left and wraps around to the north and then west over Otley. Beyond Otley, the swathe heads in a westerly direction. This positions aircraft towards the NELSA waypoint.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	The introduction of a left turn could slightly alter the shape of the LAeq contour (see Appendix A) but at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the ‘do nothing’ swathe. As the option turns left rather than right, it will introduce overflight to areas that are not routinely overflown by Runway 14 departures in the ‘do nothing’ however beyond Headingley and Alwoodley this mainly occurs over less densely populated areas until reaching Otley, Ilkley and Keighley. The left turn occurs at around the same distance as the right turn in the ‘do nothing’ and therefore there’s no change to cumulative impacts along the Runway 32 final

	approach. However, at higher altitudes, the route crosses the Runway 14 final approach which would result in some cumulative noise impacts for communities in the Otley area and
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 30.2nm which is an increase of 8nm compared to the do nothing. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight National Parks. A route positioned within this option swathe would overfly Nidderdale AONB and the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction of the area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Due to the left hand wrap around turn, this option results in some areas of the Moors not currently overflown, such as the section to the south of Ilkley, to see overflight.
Wider society: Biodiversity	This option will avoid overflight of the Leeds - Liverpool canal SSSI but it will introduce overflight of the Eccup Reservoir SSSI which is not overflown in the do nothing. Depending on aircraft climb performance, there could be concentrated overflight of the South Pennine Moors SSSI/SAC/SPA.
General aviation: Access	Option could require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending. Both depend on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.

conflicts and trade-offs	
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.22 RWY 14 New Option A (RWY14NEWA)

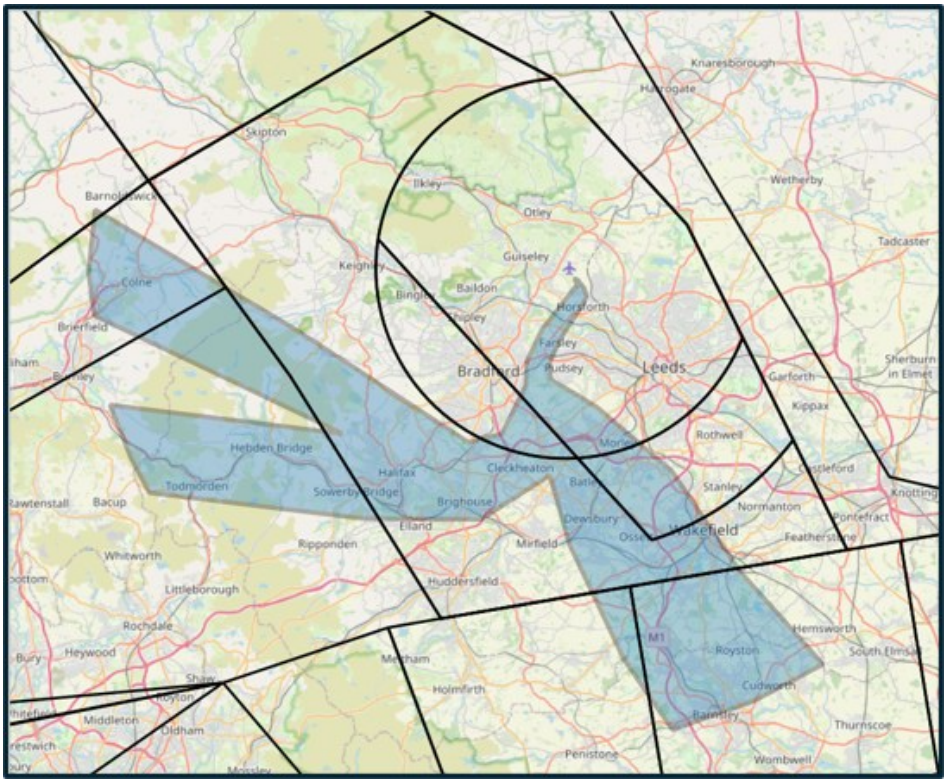


Figure 35 14NEWA

	RW14 Combination Option A (RWY14NEWA)
	Within the stakeholder engagement this option has been described as either a permanent or respite route. For the purposes of this IOA it has been assessed as a permanent route; within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative.
Description	This option swathe is developed as a system with the potential for routes towards NELSA, POL and LAMIX. Immediately after take-off this system option swathe turns right in a south westerly direction towards Pudsey. Beyond Pudsey, the routes split in the Birkenshaw area with the swathe to LAMIX heading in a south easterly direction, the swathe to POL turning right and heading in a westerly direction, and the swathe to NELSA also turning right, before then turning right again and heading in a north westerly direction. (Note the NELSA swathe beyond Birkenshaw may be one

	continuous turn to the northwest depending on the route developed within the swathe).
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option involves the southeast traffic and the south and southwest traffic all turning right almost immediately after departure. This could alter the shape of the LAeq contour shown in Appendix A but at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe however detailed noise modelling would be required as there is new overflight of populated areas at low altitudes such as parts of Horsforth and Farsley. Beyond the area to the west of Pudsey, there could be increased frequency of overflight for areas such as Halifax, Wyke and Brighouse depending on where the route is positioned. Also depending on where the route is positioned, Dewsbury, Batley and Morley and parts of Wakefield may see new overflight that does not occur in the 'do nothing' The early turn after departure benefits cumulative overflight along the runway 32 final approach, compared to the 'do nothing'.
Communities: Air quality	This option has a change to how aircraft will fly laterally below 1000ft. Whilst there are likely to be no increase in emissions in their totality, there will be a change in the location of emissions below 1000ft which could affect local air quality however this change does not occur within an AQMA or within the vicinity of an AQMA.
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 27.1nm which is a decrease of 0.4nm compared to the combined average do nothing. This suggests this option could have positive benefits to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight of AONBs and National Parks. Routes positioned within this option swathe have the potential to overfly the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction of the area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Detailed noise modelling would be required to understand the overall benefits/impacts to the South Pennine Moors.
Wider society: Biodiversity	This option avoids overflight of the Leeds - Liverpool canal SSSI and does not overfly any SSSI/SPA/SAC/Ramsar site/National Parks below c.3000ft.
General aviation: Access	No impact to Controlled airspace
General aviation/ commercial airlines:	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes or any economic impacts to GA operations. Although this option is combined into a departure system, it uses swathes rather than defined routes, and without the specific route information it is not possible to undertake an assessment.

Economic impact from increased effective capacity	
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially offers benefits to fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.23 RWY 14 New Option B (RWY14NEWB)

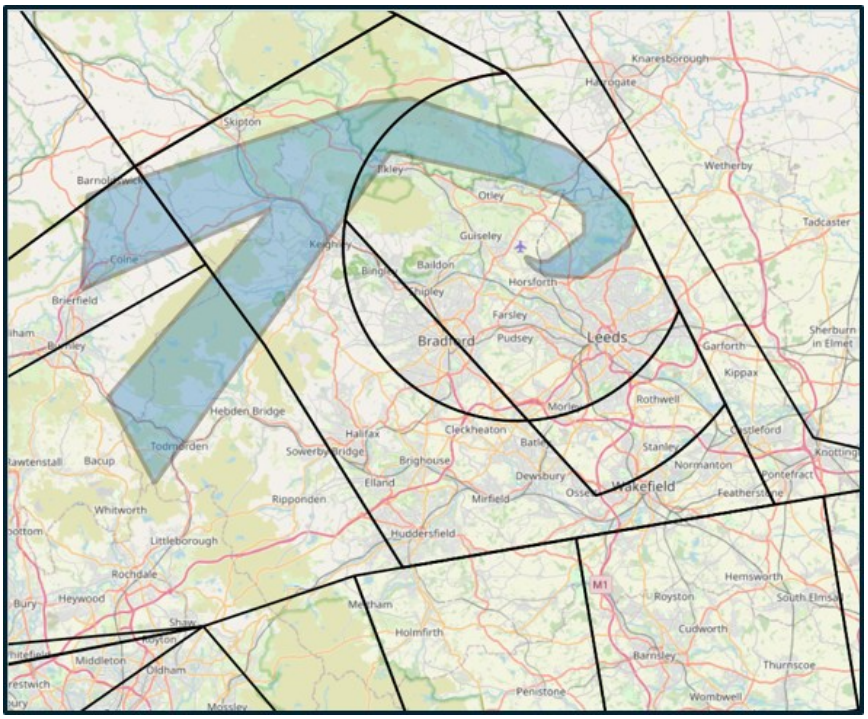


Figure 36 14NEWB

	RW14 Combination Option B (RWY14NEWB)
Description	Within the stakeholder engagement this option has been described as a potential nighttime respite route for south and west departures due to track length. At this stage, the qualitative nature of the assessment and the number of potential other options this option could be combined with means that it is difficult to assess only for nighttime use. For this IOA it has been assessed as a permanent route; within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative.
All: Safety	The initial assessment has identified potential viability issues with designing a route within the swathe that meets IFP design criteria. This will require further investigation as part of the detailed design development in Stage 3 should this option progress. No other significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option involves the south and southwest traffic all turning left almost immediately after departure. This could alter the shape of the L_{Aeq} contour shown in Appendix A but at this stage it is not possible to predict this any further, or to understand the number of people who would potentially benefit or be impacted, without detailed noise modelling. It is expected that introducing a systemised PBN departure route will overfly fewer people overall than the 'do nothing' swathe. As the option turns left rather than right, it will introduce overflight to areas that are not routinely overflown by Runway 14 departures in the 'do nothing' however this mainly occurs over less densely

	populated areas until reaching Addingham and Silsden. The early turn after departure benefits cumulative overflight along the runway 32 final approach, compared to the 'do nothing'.
Communities: Air quality	This option has a change to how aircraft will fly laterally below 1000ft. Whilst there are likely to be no increase in emissions in their totality, there will be a change in the location of emissions below 1000ft which could affect local air quality however this change does not occur within an AQMA or within the vicinity of an AQMA.
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	The indicative departure route has a track length of 31.4nm which is an increase of 4.7nm compared to the combined average runway 14 do nothing baseline of 26.7nm. This suggests this option could have negative impacts to fuel burn and GHG emissions however it is important to note that the exact impacts can only be determined with detailed route design and full quantified analysis.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity. Modernisation of the airspace will remove LBA's dependency on RNAV substitution (VOR rationalisation)
Wider society: Tranquillity	Departures would continue to avoid overflight National Parks. Routes positioned within this option swathe would overfly Nidderdale AONB and the South Pennine Moors. The introduction of PBN departures would likely result in an overall reduction of the area of the Moors being overflown compared to the 'do nothing' but the area that remains overflown would likely see an increase in frequency of overflight. Due to the left-hand wrap around turn, this option potentially results in some areas of the Moors not currently overflown, such as the section to the south of Ilkley, to see overflight.
Wider society: Biodiversity	This option will avoid overflight of the Leeds - Liverpool canal SSSI but will introduce overflight of the Eccup Reservoir SSSI which is not overflown in the do nothing. Depending on where the route is positioned within the swathe, and aircraft climb performance, there could be concentrated overflight of Great Almscliff Crag SSSI and West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA
General aviation: Access	Option likely to require extension of CTR to the east as SID will need to be at least 2nm from the edge of CAS. Could also require lowering of part of Yorkshire CTA 10 depending on SID positioning within the swathe
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes or any economic impacts to GA operations. Although this option is combined into a departure system, it uses swathes rather than defined routes, and without the specific route information it is not possible to undertake an assessment.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the

provider: deployment costs	shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option would require further investigation to establish if it could meet IFP design (safety) criteria. It would contribute to systemisation of departures, however additional CAS would be required. The option potentially impacts fuel burn/greenhouse gas emission performance compared to the 'do nothing'. Detailed quantitative noise assessment is required to determine this options benefit and/or impact to adverse noise effects and wider overflight. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.24 Arrivals Option 1 (A1)

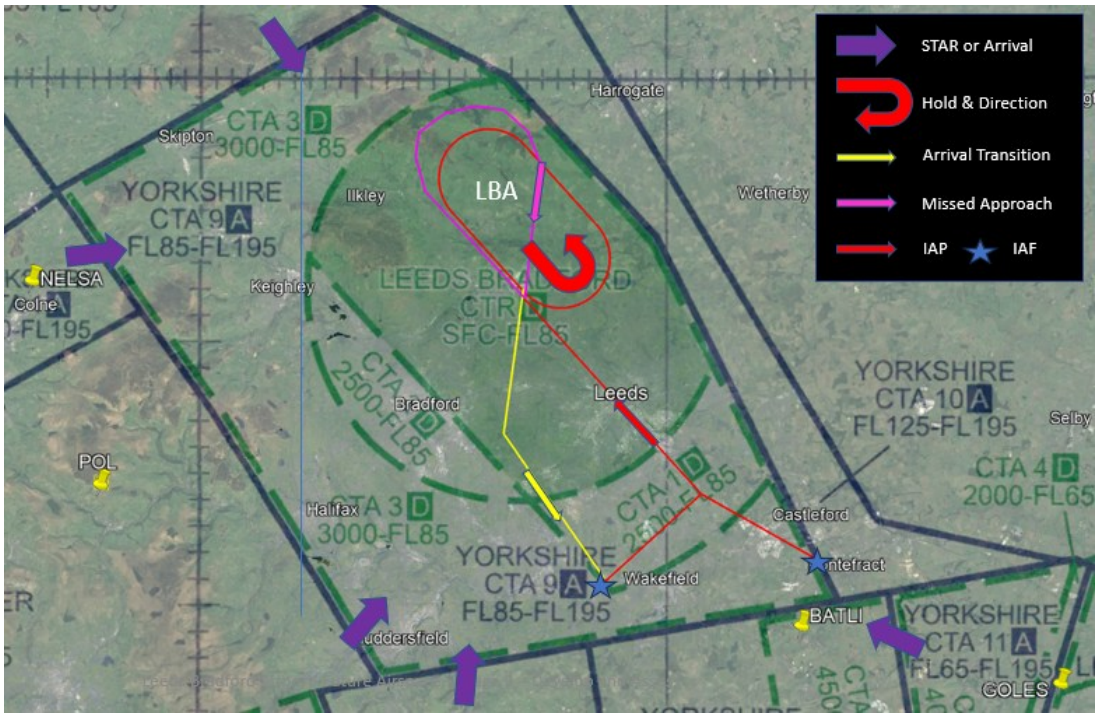


Figure 38 Runway 32 arrival system 1

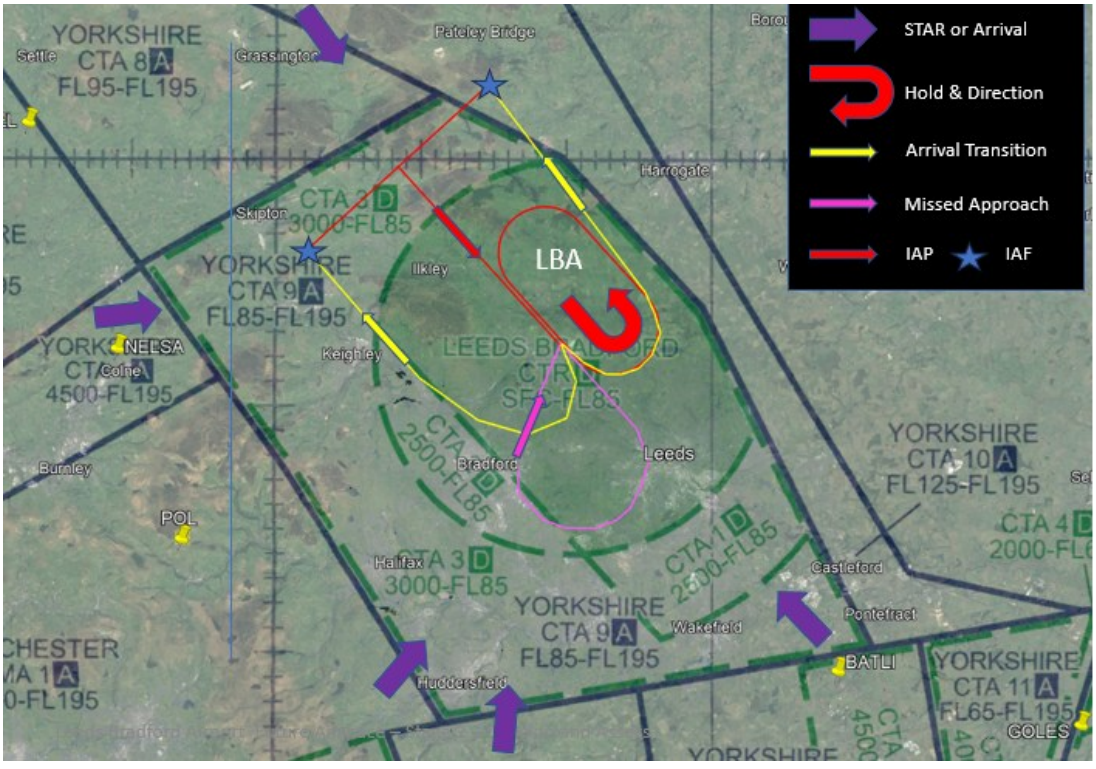


Figure 37 Runway 14 arrival system 1

IOA group and category	System 1
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option is not expected to impact the L_{Aeq} contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	Arrivals would be unlikely to fly to the overhead before being positioned onto final approach therefore it is unlikely there is significant change to track miles flown by LBA arrivals in this option compared to the baseline
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	Arrivals are expected to continue to overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. Introduction of a hybrid system of PBN arrivals and vectoring may result in changes to dispersion patterns and concentration over some areas but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken. Once aircraft are established on final approach there will be no change for overflight of the Yorkshire Dales National Park and the Nidderdale AONB. For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: Biodiversity	Overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and the Yorkshire Dales National Park is expected to be broadly similar to the do nothing. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to understand the scale of any benefits and/or impacts at this stage. No change for Runway 32.
General aviation: Access	The RWY32 approaches as illustrated in the option would likely require increases to the size CTR, CTA1 and CTA3 The RWY14 approaches as illustrated in the option would likely require increases to the size CTR and CTA3
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.

Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.25 Arrivals Option 6 (A6)

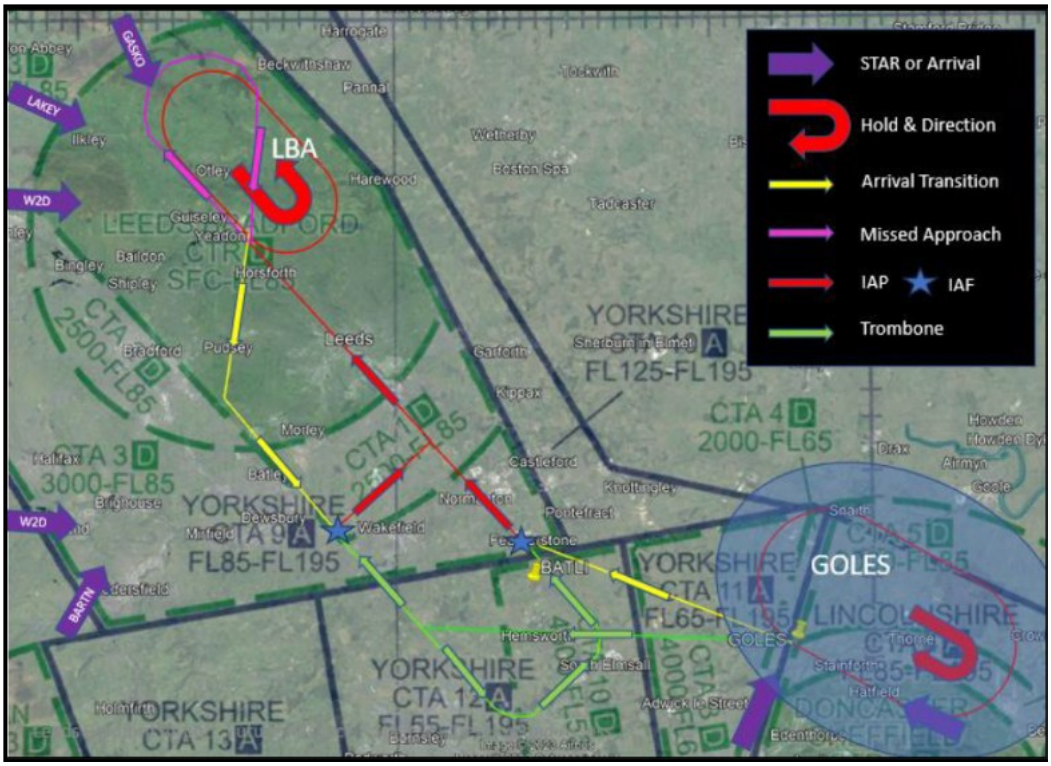


Figure 40 Runway 32 arrival system 6

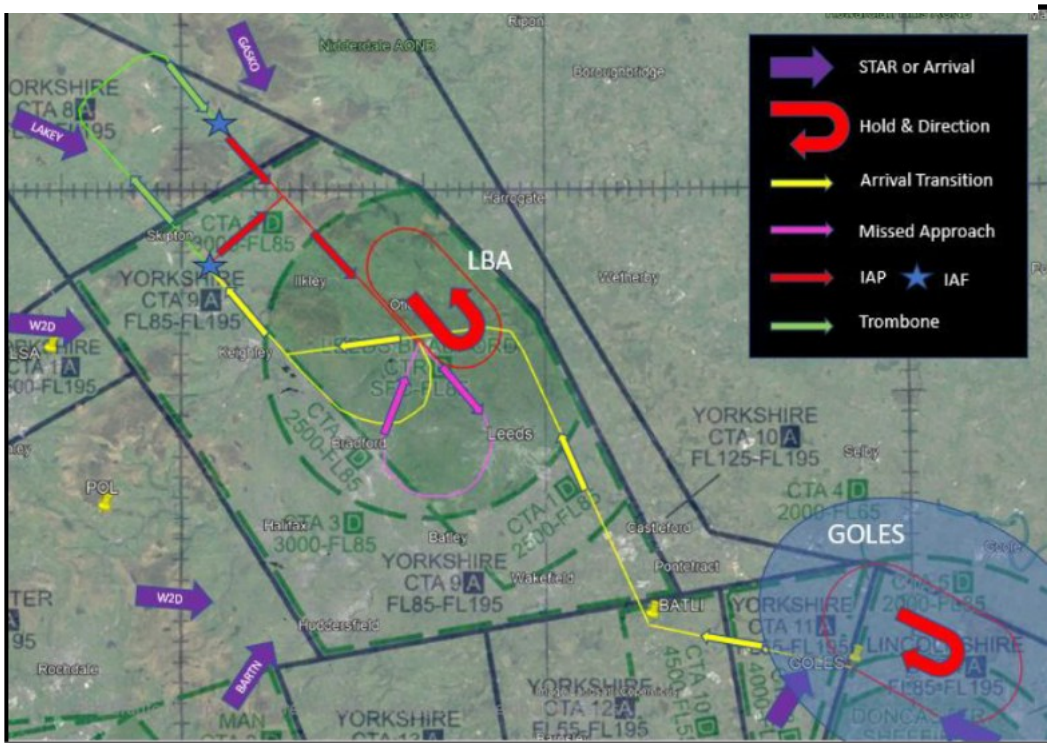


Figure 39 Runway 14 arrival system 6

	System 6
Description	Two holds LBA/GOLES

All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option is not expected to impact the LAeq contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	This option assumes only arrivals from the SE would flight plan to the GOLES hold and the remainder would continue to flight plan to the LBA hold therefore it is unlikely there is significant change to track miles flown by LBA arrivals in this option compared to the baseline.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	Arrivals are expected to continue to overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. Introduction of a hybrid system of PBN arrivals and vectoring may result in changes to dispersion patterns and concentration over some areas but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken. Once aircraft are established on final approach there will be no change for overflight of the Yorkshire Dales National Park and the Nidderdale AONB. For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: Biodiversity	Overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and the Yorkshire Dales National Park is expected to be broadly similar to the do nothing. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to understand the scale of any benefits and/or impacts at this stage. No change for Runway 32.
General aviation: Access	The RWY32 approaches as illustrated in the option would require considerable increases to the size CTR, CTA1 and CTA3 and/or creation of new CTAs The RWY14 approaches as illustrated in the option would require considerable increases to the size CTR and CTA3 and/or creation of new CTAs
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.

Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.26 Arrivals Option 7 (A7)

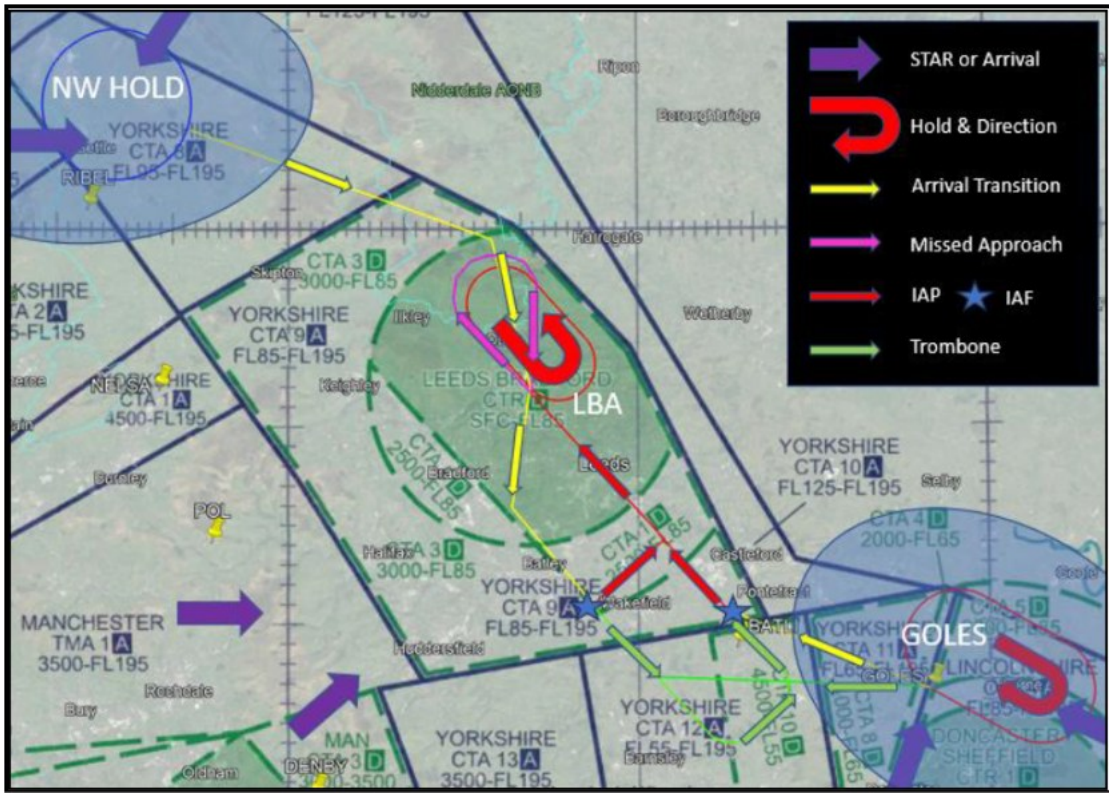


Figure 42 Runway 32 arrival system 7

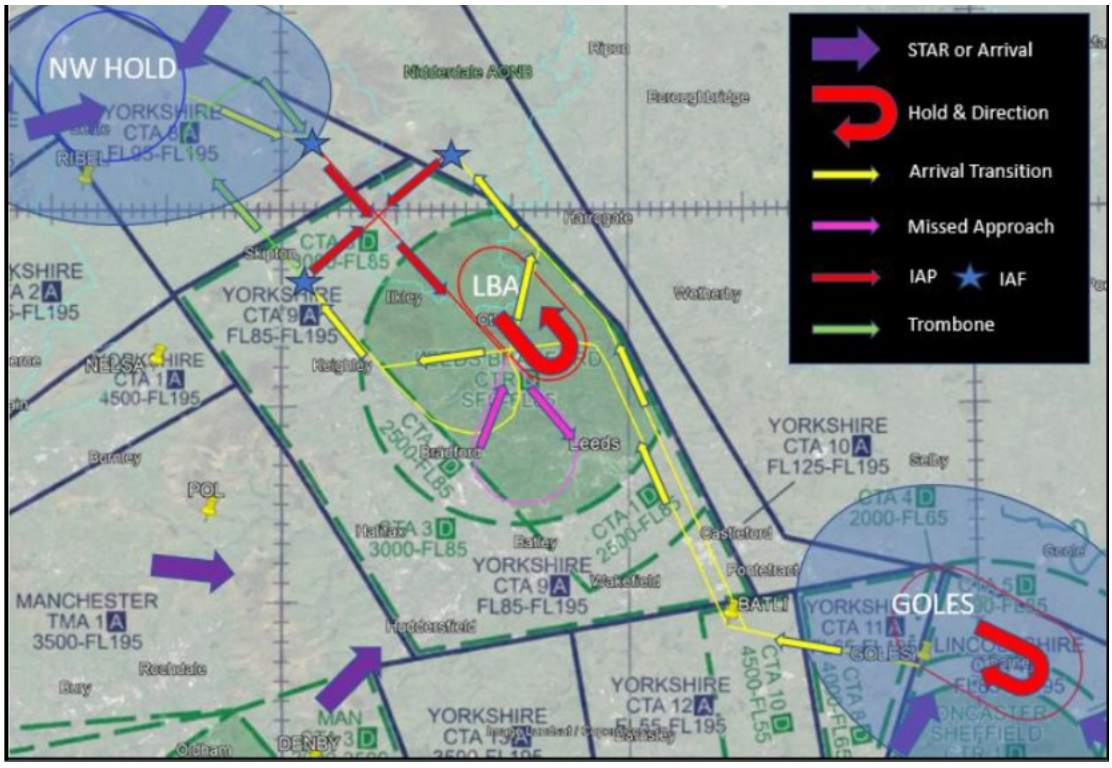


Figure 41 Runway 14 arrival system 7

	System 7
Description	Three holds NW/LBA/GOLES
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option is not expected to impact the LAeq contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunties for reduced overflight of densly populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	This option assumes arrivals from the SE would flight plan to the GOLES hold, arrivals from the North would flight plan to the NW hold and arrivals from the SW would continue to flight plan to the LBA. Given the extremely low number of arrivals from the north, it is unlikely there is significant change to track miles flown by LBA arrivals in this option compared to the baseline.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	Arrivals are expected to continue to overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. Introduction of a hybrid system of PBN arrivals and vectoring may result in changes to dispersion patterns and concentration over some areas but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken. Once aircraft are established on final approach there will be no change for overflight of the Yorkshire Dales National Park and the Nidderdale AONB. For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: Biodiversity	Overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and the Yorkshire Dales National Park is expected to be broadly similar to the do nothing. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to understand the scale of any benefits and/or impacts at this stage. No change for Runway 32
General aviation: Access	The RWY32 approaches as illustrated in the option would require considerable increases to the size CTR, CTA1 and CTA3 and/or creation of new CTAs The RWY14 approaches as illustrated in the option would require considerable increases to the size CTR and CTA3 and/or creation of new CTAs
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.

Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.27 Arrivals Option 8 (A8)

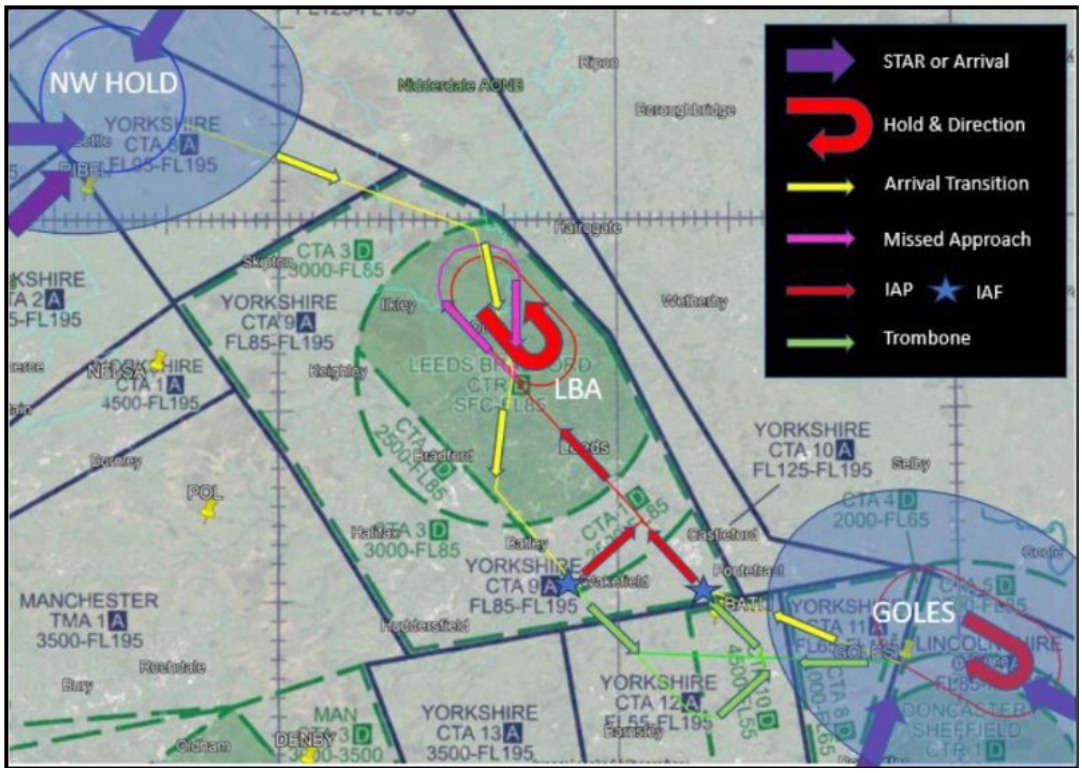


Figure 44 Runway 32 arrivals system 8

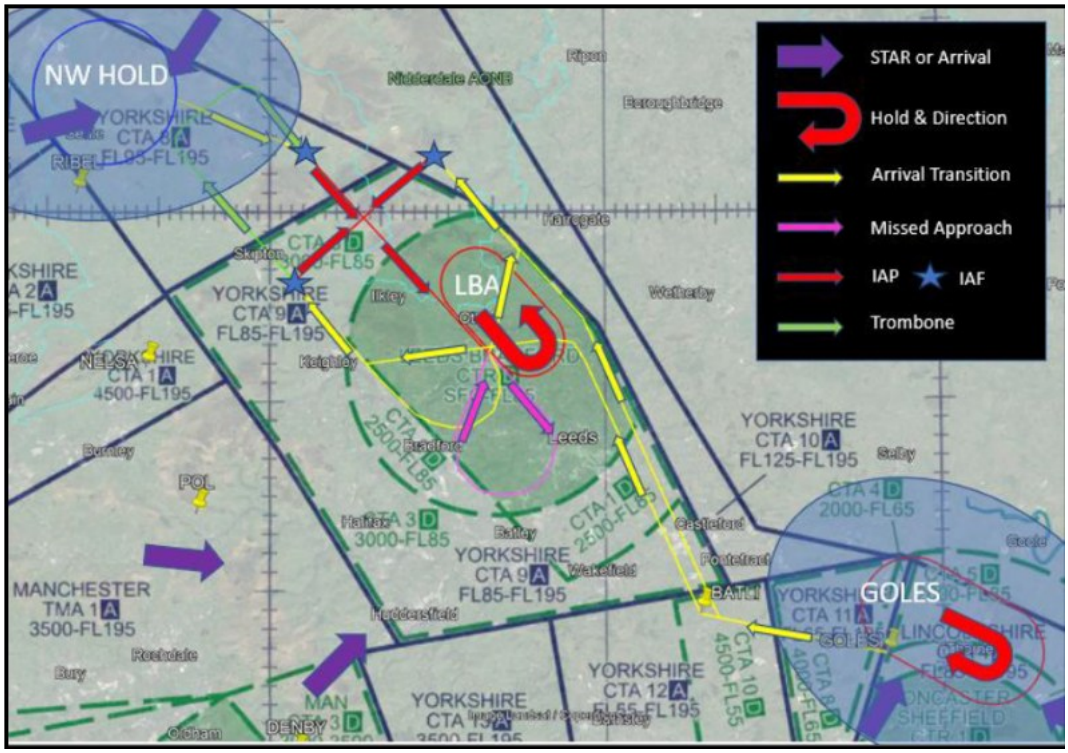


Figure 43 Runway 14 arrivals system 8

	System 8
Description	Two holds NW/GOLES

All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option is not expected to impact the LAeq contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	This option assumes all arrivals would flight plan via either the NW hold or GOLES which would result in an increased fuel uplift and associated co2 emissions
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	Arrivals are expected to continue to overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. Introduction of a hybrid system of PBN arrivals and vectoring may result in changes to dispersion patterns and concentration over some areas but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken. Once aircraft are established on final approach there will be no change for overflight of the Yorkshire Dales National Park and the Nidderdale AONB. For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: Biodiversity	Overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and the Yorkshire Dales National Park is expected to be broadly similar to the do nothing. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to understand the scale of any benefits and/or impacts at this stage. No change for Runway 32
General aviation: Access	The RWY32 approaches as illustrated in the option would require considerable increases to the size CTR, CTA1 and CTA3 and/or creation of new CTAs The RWY14 approaches as illustrated in the option would require considerable increases to the size CTR and CTA3 and/or creation of new CTAs
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.

Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts however it could increase fuel burn/greenhouse gas emissions compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.28 Arrivals Option 9 (A9)

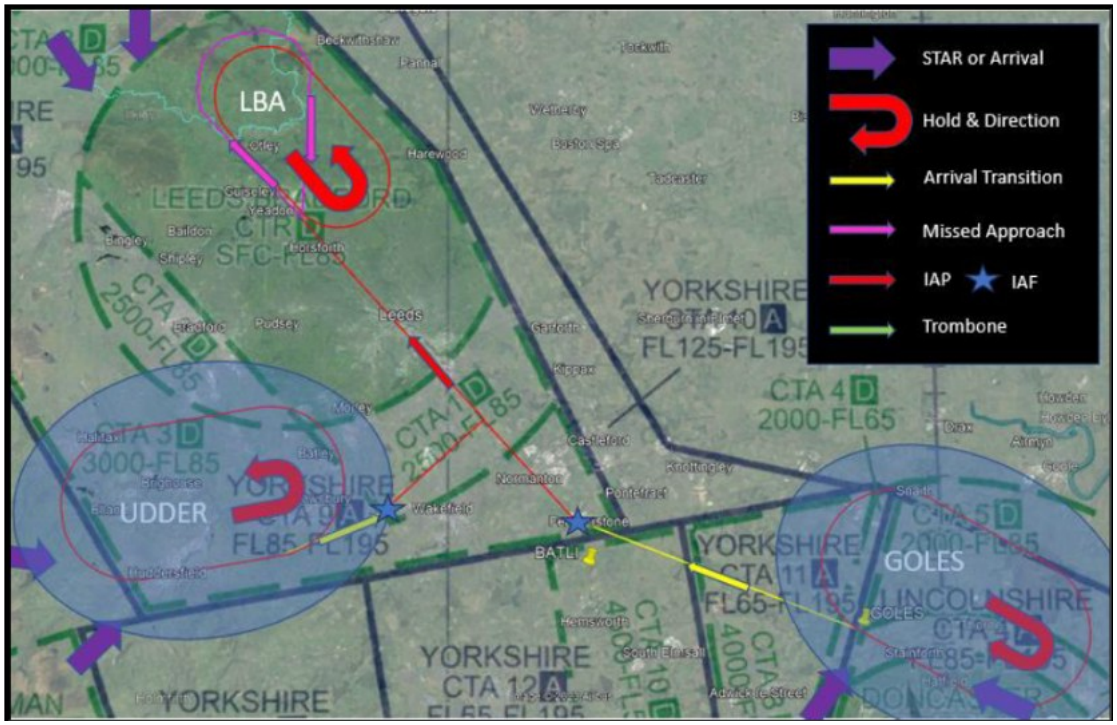


Figure 46 Runway 32 arrivals system 9

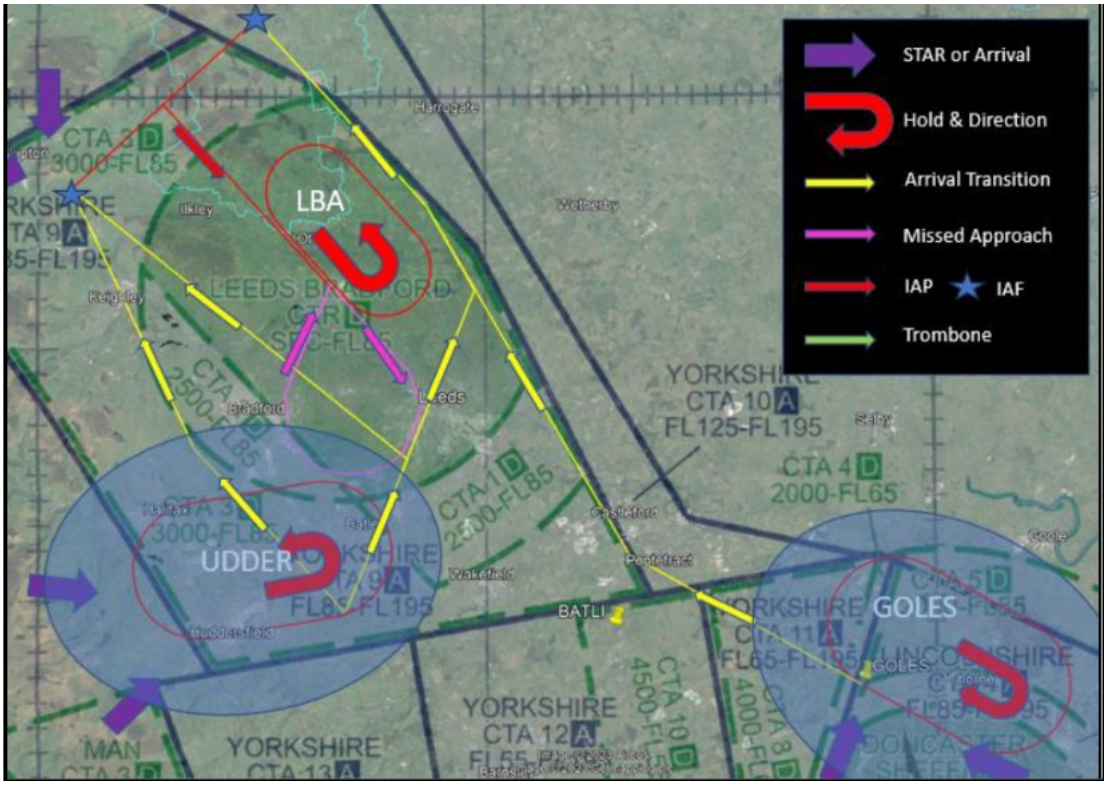


Figure 45 Runway 14 arrivals system 9

	System 9
Description	Two holds UDDER/GOLES

All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option is not expected to impact the LAeq contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	This option assumes arrivals from the SE would flight plan to GOLES, arrivals from the SW to UDDER and arrivals from the north continue to flight plan to LBA. There could be a small reduction in fuel uplift for arrivals from the SW compared to the baseline.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	Arrivals are expected to continue to overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. Introduction of a hybrid system of PBN arrivals and vectoring may result in changes to dispersion patterns and concentration over some areas but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken. Once aircraft are established on final approach there will be no change for overflight of the Yorkshire Dales National Park and the Nidderdale AONB. For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: Biodiversity	Overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and the Yorkshire Dales National Park is expected to be broadly similar to the do nothing. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to understand the scale of any benefits and/or impacts at this stage. No change for Runway 32
General aviation: Access	The RWY32 approaches as illustrated in the option would likely require increases to the size CTR, CTA1 and CTA3 The RWY14 approaches as illustrated in the option would likely require increases to the size CTR and CTA3
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.

Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it could decrease fuel burn/greenhouse gas emissions compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.29 Arrivals Option 10 (A10)

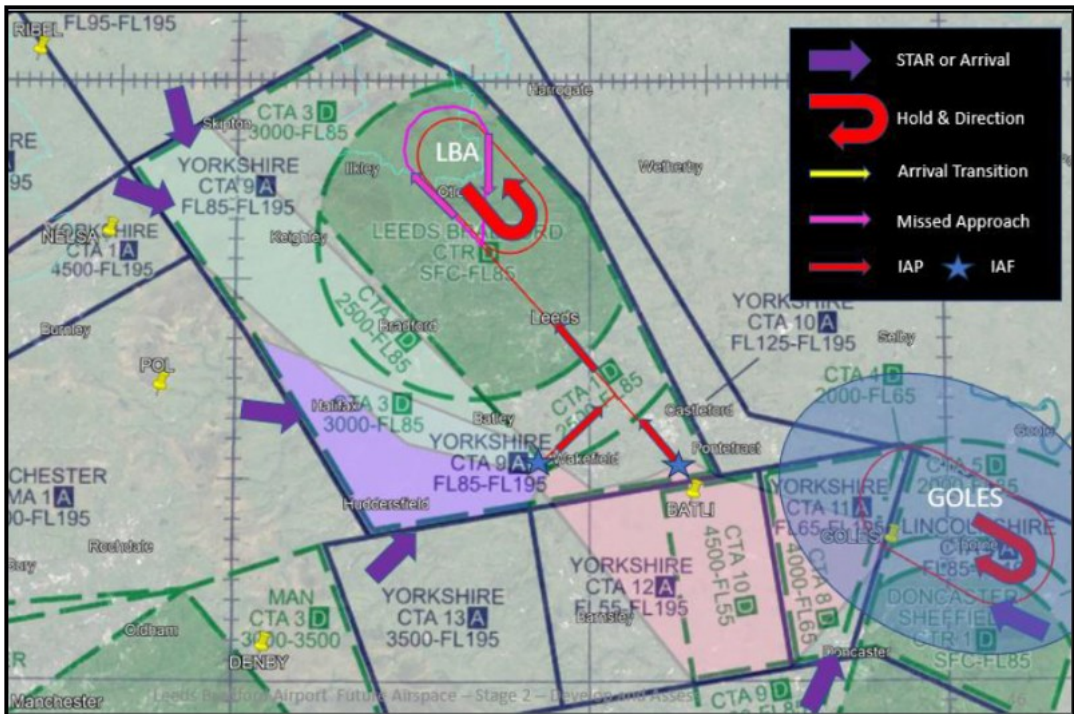


Figure 48 Runway 32 arrival system 10

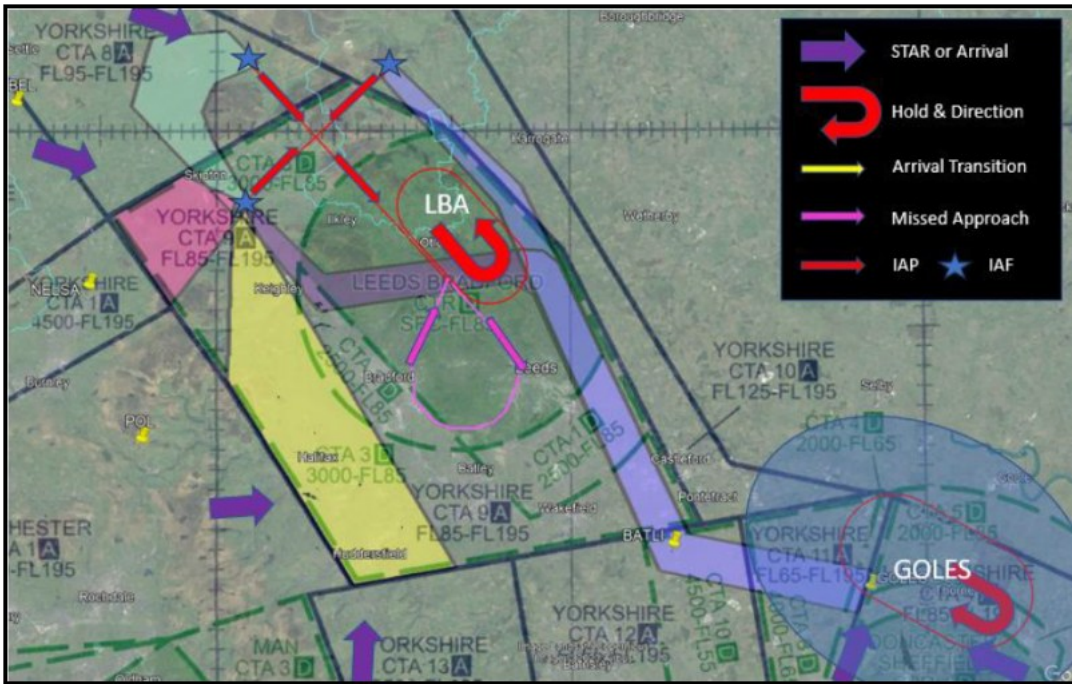


Figure 47 Runway 14 arrival system 10

	System 10
Description	One hold GOLES for arrivals from the South and East only.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.

Communities: Noise impact on health and quality of life	This option is not expected to impact the LAeq contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	This option assumes only arrivals from the SE would flight plan to the GOLES hold and the remainder would continue to flight plan to the LBA hold therefore it is unlikely there is significant change to track miles flown by LBA arrivals in this option compared to the baseline.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	Arrivals are expected to continue to overfly the South Pennine Moors, Yorkshire Dales National Park and the Nidderdale AONB below 7000ft. Introduction of a hybrid system of PBN arrivals and vectoring may result in changes to dispersion patterns and concentration over some areas but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken. Once aircraft are established on final approach there will be no change for overflight of the Yorkshire Dales National Park and the Nidderdale AONB. For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: Biodiversity	Overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and the Yorkshire Dales National Park is expected to be broadly similar to the do nothing. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to understand the scale of any benefits and/or impacts at this stage. No change for Runway 32
General aviation: Access	The RWY32 approaches as illustrated in the option would require considerable increases to the size CTR, CTA1 and CTA3 and/or creation of new CTAs The RWY14 approaches as illustrated in the option would require considerable increases to the size CTR and CTA3 and/or creation of new CTAs
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.

Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.30 Arrivals Option 11

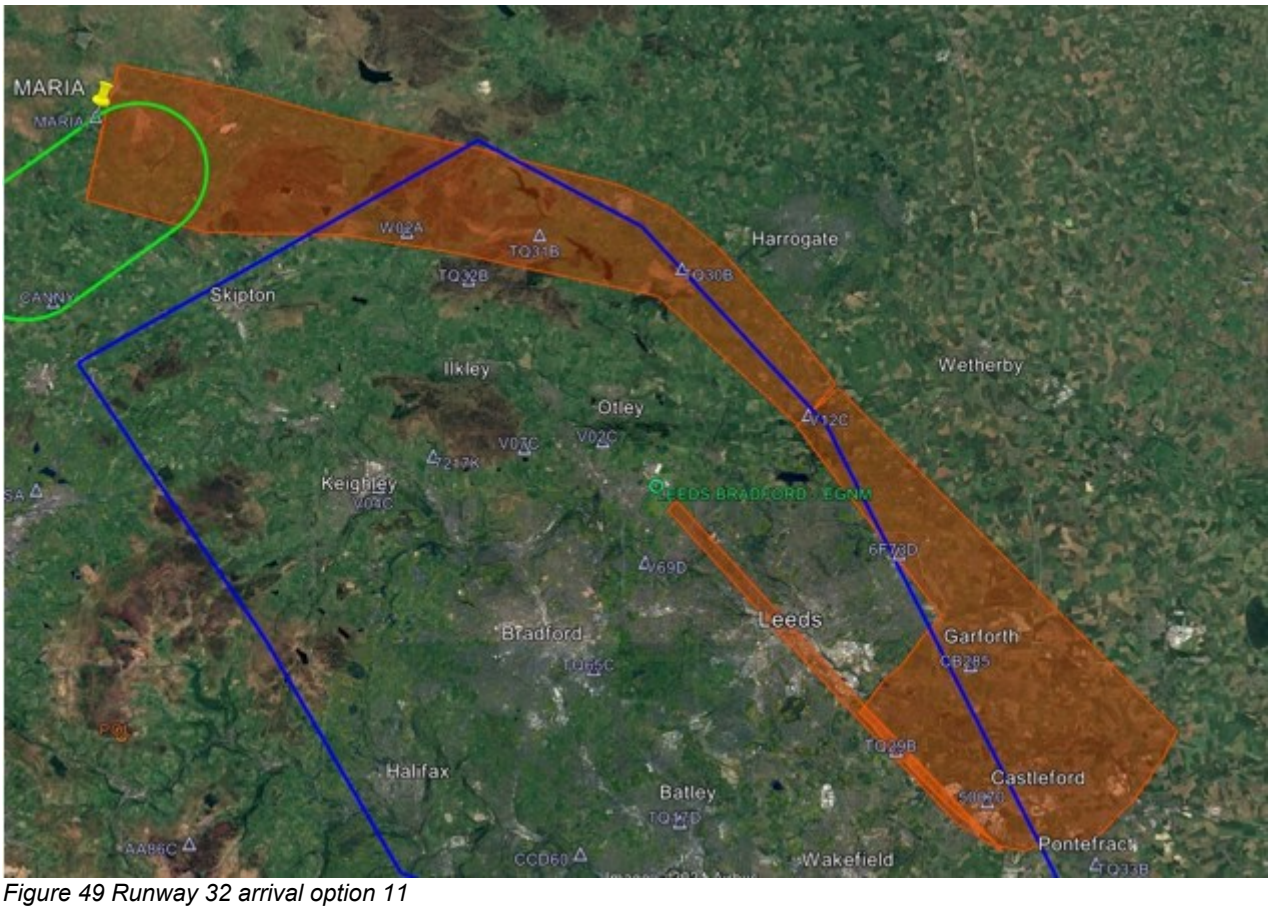


Figure 49 Runway 32 arrival option 11

System 11

Description	This option would be used in combination with other options developed. At this stage it would not be proportionate to combine it with every option and so it has been assessed independently The orange swath indicates the proposed area that the transition may encompass. The blue line indicates the current boundary of controlled airspace.
All: **Safety**	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: **Noise impact on health and quality of life**	This option is not expected to impact the LAeq contours, as the scope of these contours only extends along final approach where there is no change compared to the 'do nothing'. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: **Air quality**	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines: **Fuel-burn** **Wider society:** **Greenhouse gas impact**	This option assumes all arrivals would flight plan via either the NW hold or GOLES which would result in an increased fuel uplift and associated CO_2 emissions.
Wider society: **Capacity/ resilience**	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: **Tranquillity**	This option only applies to Runway 32. There is expected to be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs.
Wider society: **Biodiversity**	This option only applies to Runway 32. There is expected to be no change for Runway 32; the option will continue to avoid overflight of SSSI/SPA/SAC/Ramsar sites/National Parks below c.3000ft with the final approach remaining adjacent to the Leeds-Liverpool canal SSSI
General aviation: **Access**	The RWY32 approaches as illustrated in the option would require considerable increases to the size CTR, CTA1 and CTA3 and/or creation of new CTAs The RWY14 approaches as illustrated in the option would require considerable increases to the size CTR and CTA3 and/or creation of new CTAs
General aviation/ commercial airlines: **Economic impact from increased effective capacity**	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.

Commercial airlines: Training costs	Flight procedures are updated or introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required on a business-as-usual basis. This option is not anticipated to require any additional training costs for commercial airlines.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts however it could increase fuel burn/greenhouse gas emissions compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.31 RNP- AR RWY 14 (AR14)

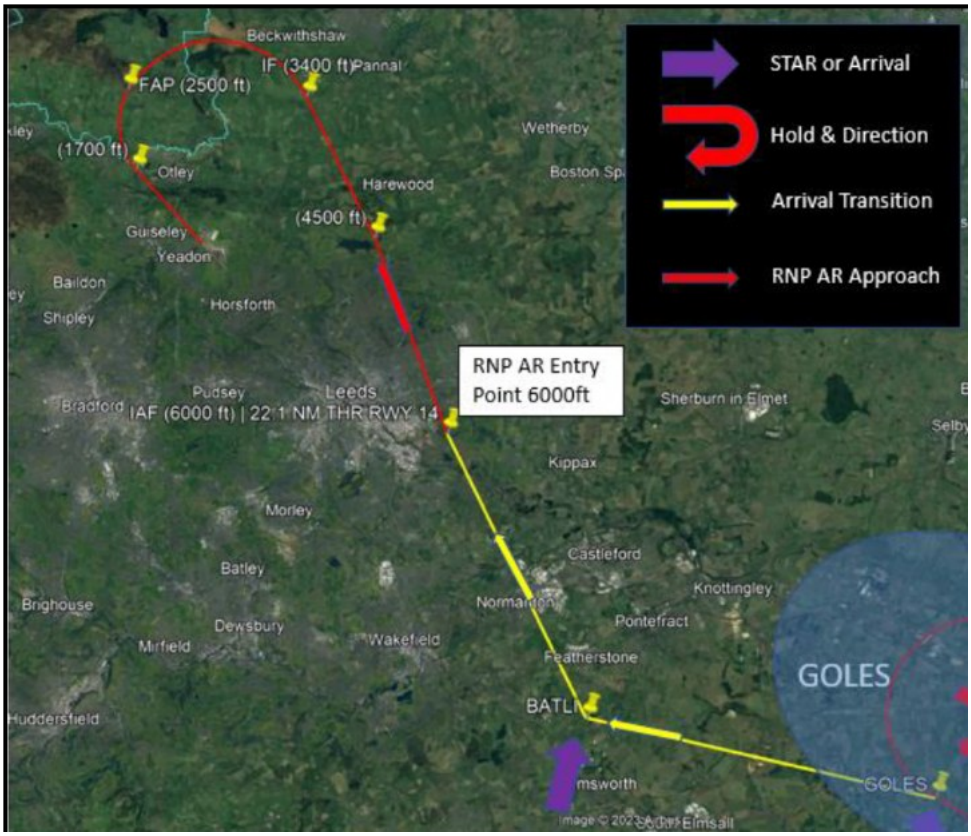


Figure 50 Runway 14 RNP-AR

	RNP AR RW14
Description	Downwind left with early turn to intercept the centreline about 3.5nm final.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	This option has the potential to impact the shape and therefore the population within the LAeq contours however without a detailed PBN design, expected RNP AR fleet equipage, and detailed noise modelling it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).
General aviation/ commercial airlines:	This option could enable a reduction in track miles flown for RNP-AR approved operators, resulting in a reduction on fuel burn and CO_2 emissions

Fuel-burn Wider society: Greenhouse gas impact	
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	The RNP approach may reduce overflight of the South Pennine Moors and Yorkshire Dales National Park, but will result in increased frequency and concentrated overflight of the Nidderdale AONB below 7000ft. Introduction of a hybrid system of an RNP arrival and vectoring may result in changes to dispersion patterns and concentration over some of the broader areas before joining final approach but the benefits/impacts of this can only be assessed once a route is defined and quantitative assessment is undertaken.
Wider society: Biodiversity	This option could reduce overflight of the West Nidderdale, Barden and Blubberhouses Moors SSSI/SAC/SPA and avoid the Yorkshire Dales National Park however it may introduce new overflight ovr the Great Almscliff Crag SSSI which is not overflown in the do nothing.
General aviation: Access	The RWY 14 approach as illustrated in the option would require extension of CTR to the east.
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	An RNP-AR route may require aircraft fleet upgrades and additional training costs for airlines although RNP-AR is unlikely to be mandatory as other non-AR procedures will exist.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it could decrease fuel burn/greenhouse gas emissions compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

5.32 RNP-AR RWY 32 (AR32)

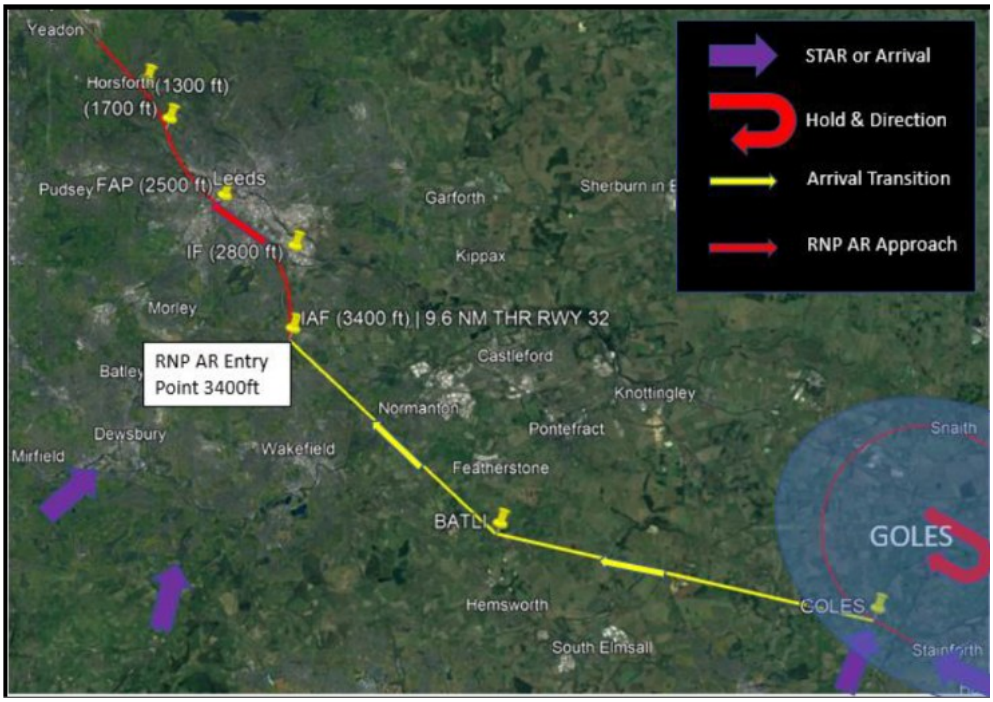


Figure 51 Runway 32 RNP-AR

	RNP AR RW32
Description	Within the stakeholder engagement this option has been described as a nighttime respite alternative. At this stage, the qualitative nature of the assessment and the number of potential other options this option could be combined with means that it is difficult to assess as a respite option. Therefore for the purposes of this IOA, it has been assessed as a permanent route and within the detailed design development and integration undertaken at Stage 3, there will be an assessment to understand the suitability for this option to be a respite alternative. It is an offset approach intended to avoid central Leeds residential districts, Headingly and Hyde Park Districts.
All: Safety	No significant safety issues have been identified however this is subject to a full safety case being developed as part of later stages of the airspace change process. The safety case will be required to cover, IFP validation, ATCO training, the introduction of new procedures/amendment of existing procedures, CAS containment, Letters of Agreement (LoA) updates, and the interface between NERL and LBA.
Communities: Noise impact on health and quality of life	Due to modal split and fleet equipage for RNP-AR approaches, this option has less influence on the LAeq contours although there is still the potential for an impact to the shape and therefore the population within the LAeq contours. Without a detailed PBN design and detailed noise modelling it is not possible to identify specific areas at this stage. The introduction of PBN arrivals is expected to offer opportunities for reduced overflight of densely populated areas. For the areas living under the PBN arrivals, there may however be increased frequency of overflight. Without a detailed PBN design and a greater understanding of the scale of vectoring expected to different waypoints within the design, it is not possible to identify specific areas at this stage or understand the scale of any benefits and/or impacts.
Communities: Air quality	This option has no change to how aircraft fly below 1,000ft compared to the baseline and so there are no anticipated changes to local air quality (positive or negative).

General aviation/ commercial airlines: Fuel-burn Wider society: Greenhouse gas impact	This option is not expected to enable any CO2 reductions as the RNPAR flight path is not to enable shorter approaches but to enable the final approach to avoid certain populations.
Wider society: Capacity/ resilience	Without a system-wide design it is not yet possible to determine benefits and/or impacts to capacity.
Wider society: Tranquillity	For Runway 32 arrivals, there will be no change compared to the 'do nothing' as arrivals will continue to avoid overflight of National Parks and AONBs below 7,000ft.
Wider society: Biodiversity	Depending on the detailed design of the route, this option has the potential to overfly the Leeds - Liverpool Canal SSSI below 3000ft.
General aviation: Access	The RWY 32 approach as illustrated in the option could require extension of CTR to the south
General aviation/ commercial airlines: Economic impact from increased effective capacity	Without a system-wide design it is not yet possible to determine wider economic impacts such as through reduced delays through systemisation and deconflicted routes, or any economic impacts to GA operations.
Commercial airlines: Training costs	An RNP-AR route may require aircraft fleet upgrades and additional training costs for airlines although RNP-AR is unlikely to be mandatory as other non-AR procedures will exist.
Commercial airlines: Other costs	No other airline costs are foreseen with this option.
Airport/ Air navigation service provider: Infrastructure costs	This option is not expected to change LBA's infrastructure, beyond the initial deployment phase which will require some systems engineering amendments.
Airport/ Air navigation service provider: Operational costs	This option is not expected to change LBA's operational costs.
Airport/ Air Navigation service provider: deployment costs	This option is expected to require air traffic controller training for the controllers and assistants located at LBA. The scale and nature of this training requires further exploration as part of the Stage 3 Full Options Appraisal, when appraising the shortlist of options and once further information is known about the network above 7000ft and interdependencies with adjacent airports and NERL.
All: Interdependencies conflicts and trade-offs	Based on the regions identified in ACOG's Masterplan Iteration 2, there are no areas of this option which overlap with other airport's below 7,000ft. Integration with the network airspace above 7,000ft will be required in Stage 3.
All: AMS	This option is expected to maintain safety levels (subject to a safety case) and offer systemisation of arrivals but it would require increases to CAS. The option is not expected to change adverse noise impacts and it offers similar fuel burn/greenhouse gas emission performance compared to the 'do nothing'. At this stage it is difficult to draw an overall conclusion on this options alignment with the AMS as further quantitative work would be needed in Stage 3 to establish the option's overall performance.

6. INITIAL OPTIONS APPRAISAL CONCLUSION

6.1 Conclusion, identifying a preferred option, and next steps

6.1.1 The Initial Options Appraisal is the first in three phases of assessment undertaken throughout the airspace change process. As part of the IOA, LBA have taken a qualitative approach to assessing most categories with the use of indicative quantitative information where available to do so.

6.1.2 Although within the CAP1616 process there is the opportunity to shortlist options as part of the conclusion to the IOA, LBA have decided to take all of the options assessed as part of this IOA through to Stage 3.

6.1.3 This is for two main reasons; the Government's Air Navigation Guidance 2017 (ANG2017) Altitude Based Priorities, and due to the next steps of the process being likely to influence the overall system design for LBA.

6.1.4 With regards to the altitude-based priorities, within the current ANG2017[7] the altitude-based priorities say '*in the airspace from the ground to below 4,000 feet the government's environmental priority is to limit and, where possible, reduce the total adverse effects on people'*. At this stage, the qualitative nature of the noise assessments means that we do not have definitive information about the option's performance with regards to adverse noise impacts. This is something that we will be able to test quantitatively in stage 3 as part of the process of shortlisting options within the FOA.

6.1.5 In addition to this, at the start of Stage 3 there is the requirement to bring together the component options into systems (made up of Runway 14 and runway 32 arrivals and departures) and work with the other airports in the MTMA and NATS NERL (who are responsible for the network airspace above 7,000ft) to integrate the options into the wider airspace.

6.1.6 There are many requirements that have to be considered when bringing components together into systems including ensuring there is safe separation between routes (for example between LBA's arrival and departure routes and between routes from other airports), other ATC and operational safety considerations, instrument flight procedure (IFP) design criteria, the categories of the assessments in the IOA such as noise, greenhouse gas emissions, and CAS access, the design principles and the statement of need. As noted in the IOA, we will also consider the suitability of some of the options to offer respite alternatives.

6.1.7 As an outcome of this process, options are often rationalised and refined before being taken to a Full Options Appraisal (FOA). All refinements will be documented as part of the design evolution.

6.1.8 The FOA is where a more detailed assessment is required to be undertaken. At this stage, there will be quantified evidence of the benefits/and or impacts of the airspace change

[7] Note that a revised version of the ANG is currently being consulted on, however the ANG2017 remains current for decision making purposes at the time of writing this document.

proposal, including assessments such as the primary and secondary noise metrics, fuel burn and greenhouse gas emissions, and impacts to CAS volumes. It is at this stage where LBA believe it will be appropriate to shortlist options and identify a preferred option ahead of undertaking a consultation.

6.2 Evidence to collect as part of Stage 3 FOA

6.2.1 Throughout this IOA, we have highlighted where we plan to undertake further detailed appraisal as part the FOA, in order to further assess the benefits and impacts of an option.

6.2.2 This is particularly the case with the primary noise metric data, where at Stage 3 we will fully quantify the noise contours associated with each option to CAP2091 standards, allowing us to quantify the benefits and impacts.

6.2.3 We also plan to collect the following data and undertake the additional assessments as part of our Full Options Appraisal assessment and following this assessment we will outline the options that we intend to take to consultation:

- 20 year modal split average for LBA
- Quantify the baseline year (pre-implementation and 10 years post implementation, including 10 year traffic forecast)
- Quantitative noise contours, including population counts and size (km2)
- Quantitative overflight contours, including population, AONBs, National Parks, Candidate Quiet Areas, Country Parks, Gardens and Designated Landscapes, and Historic buildings.
- WebTAG assessment
- Detailed fuel burn and equivalent CO2 emissions data
- Further information around interdependencies with the upper network and neighbouring airports
- ATC deployment / training costs
- Quantitative capacity information
- Quantified CAS requirements

Habitats regulation assessment

6.2.4 This IOA is written in accordance with edition 4 of CAP1616. In October 2023 the CAA published Edition 5 of CAP1616 and as part of this there was a new requirement in Stage 2 to undertake an early screening assessment for the Habitats Regulation Assessment (HRA).

6.2.5 This is a data gap in Stage 2 and as part of the work in Stage 3, once the options are refined to integrate with the wider MTMA designs and routes have been designed within the option swathes, LBA will assess the options against the early screening criteria questions outlined in CAP1616i (page 33), to understand the next steps in terms of the Habitats Regulatory Assessment and whether discussions with the CAA are required if the possibility of significant effects have been identified. This will then inform the scale of the assessment required as part of the FOA.

6.3 Impacted audiences

6.3.1 CAP1616 (page 180) states that 'at the 'Develop and assess' gateway, the IOA must set out impacted audiences as this information will be a key feature in developing the consultation strategy required during Step 3A and at the 'Consult' gateway'.

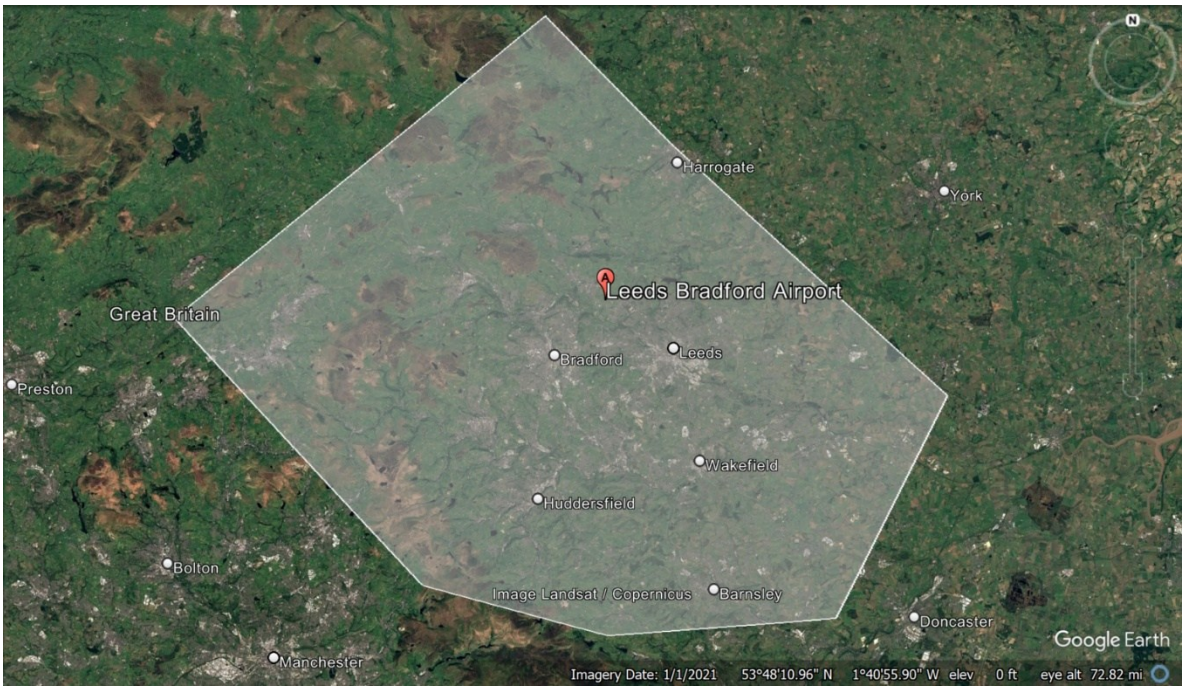


Figure 52 LBA impacted audiences

6.3.2 The following map has been generated based on what happens at LBA today, and the options that have been taken through from this IOA. Owing to the variety of the options, the map covers a wide area. We expect that the impacted audiences will be refined as we progress through the early stages of Stage 3 and we understand more about the options, such as through quantified noise and CAS assessments.

7. GLOSSARY

Acronym	Term	Description
ACOG	Airspace Change Organising Group	Established in 2019 at the request of the Department for Transport and Civil Aviation Authority to coordinate the delivery of key elements of the UK's Airspace Modernisation Strategy.
ACP	Airspace Change Proposal	To carry out any permanent change to the published airspace, the Civil Aviation Authority (CAA) requires the change sponsor to carry out an airspace change proposal in accordance with CAP1616.
ADS-B	Automatic Dependent Surveillance Broadcast	A means by which aircraft can automatically transmit and/or receive data such as identification, position, and additional data, as appropriate in a broadcast mode via a data link.
AIP	Aeronautical Information Publication	A publication which contains details of regulations, procedures and other information pertinent to the operation of aircraft in the particular country to which it relates.
AMS	Airspace Modernisation Strategy	UK Government has tasked the aviation industry to modernise airspace in the whole of the UK. The long-term strategy of the CAA and the UK Government is called the Airspace Modernisation Strategy (AMS). Its CAA document reference number is CAP1711.
AMSL	Above Mean Sea Level	
ANSP	Air Navigation Service Provider	An organisation that provides the service of managing the aircraft in flight or on the manoeuvring area of an airport and which is the legitimate holder of that responsibility.
AONB	Area of Outstanding Natural Beauty	
ATC	Air traffic control	The ground-based personnel and equipment concerned with controlling and monitoring air traffic within a particular area.
ATZ	Aerodrome Traffic Zone	An airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.
CAA	Civil Aviation Authority	The UK Regulator for aviation matters
CAP1616	Civil Aviation Publication 1616	The airspace change process regulated by the CAA
	Capacity	A term used to describe how many aircraft can be accommodated within an airspace area without compromising safety or generating excessive delay
CAS	Controlled Airspace	Generic term for the airspace in which an air traffic control service is provided as standard; note that there are different sub classifications of airspace that define the particular air traffic services available in defined classes of controlled airspace.
-	Centreline	The nominal track for a published route
-	Concentration	Refers to a density of aircraft flight paths over a given location, this generally refers to high density where tracks are not spread out; this is the opposite of dispersal
CCO	Continuous Climb Operations	An aircraft operating technique facilitated by the airspace and procedure design and assisted by appropriate ATC procedures, allowing the execution of a flight profile optimised to the performance of aircraft, leading to significant economy of fuel and environmental benefits in terms of noise and emissions reduction
CDO	Continuous Descent Operations	An aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight to the extent permitted by the safe operation of the aircraft and compliance with published procedures and ATC instructions
-	Conventional navigation	The historic navigation standard where aircraft fly with reference to ground-based radio navigation aids
-	Conventional route	Routes defined to the conventional navigation standard, i.e. using ground-based radio navigation beacons to determine their position.

Acronym	Term	Description
CTA	Control Area	Controlled airspace extending upwards from a specified limit above the earth. Control Areas are situated above the Aerodrome Traffic Zone (ATZ) and afford protection over a larger area to a specified upper limit.
CTR	Control Zone	Controlled airspace extending upwards from the surface of the earth to a specified upper limit. Aerodrome Control Zones afford protection to aircraft within the immediate vicinity of aerodromes
db	Decibels	A unit used to measure the intensity of a sound (or the power level) of an electrical signal by comparing it with a given level on a logarithmic scale.
DER	Declared End of Runway	
-	Dispersal	Refers to the density of aircraft flight paths over a given location, this generally refers to lower density – tracks that are spread out; this is opposite of Concentration
DPE	Design Principle Evaluation	An evaluation of each option against each design principle which forms part of Stage 2A of the CAP1616 process
-	Easterlies	When a runway is operating such that aircraft are taking off and landing in an easterly direction
-	Final Approach	The final part of an arrival flight path that is directly lined up with the runway
FL	Flight Level	The Altitude above sea-level in 100 feet units measured according to a standard atmosphere. A flight level is an indication of pressure, not of altitude. Only above the transition level (which depends on the local QNH but is typically 4000 feet above sea level) are flight levels used to indicate altitude; below the transition level feet are used.
FLARM	Flight Alarm	FLARM (an acronym based on 'flight alarm') is the proprietary name for an electronic device which is in use as a means of alerting pilots of small aircraft, particularly gliders, to potential collisions with other aircraft which **are similarly equipped.**
FUA	Flexible Use Airspace	Airspace which is not solely designated for a single purpose, but can be allocated flexibly according to need, or switched entirely on/off according to a schedule or agreed process.
-	Flight-path	The track flown by aircraft when following a route, or when being directed by air traffic control
ft	Feet	The standard measure for vertical distances used in air traffic control
FASI	Future Airspace Implementation Strategy	Under the Government's Airspace Modernisation Strategy (AMS, ref 15) airports in the UK are required to update their airspace and routes in a coordinated way.
GA	General Aviation	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights, balloons, and private corporate jet flights.
IFP	Instrument Flight Procedures	A published procedure used by aircraft flying in accordance with the instrument flight rules, which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.
ILS	Instrument Landing System	An ILS operates as a ground-based instrument approach system that provides precision lateral and vertical guidance to an aircraft approaching and landing on a runway, using a combination of radio signals to enable a safe landing even during poor weather.
IOA	Initial Options Appraisal	A qualitative appraisal of an option against a baseline 'do nothing' scenario, as required at Step 2B of CAP1616
L_{Aeq}		The most common international measure of noise, meaning, 'equivalent continuous sound level'. This is a measurement of sound energy over a period of time.

Acronym	Term	Description
$L_{Aeq\ 16h}$		The A-weighted Leq measured over the 16 busiest daytime hours (0700-2300) is the normal time-period used to develop the Airport Noise Contours for day-time operations.
$L_{Aeq\ 8h}$		The A-weighted Leq measured over the 8 night-time hours (2300-0700) is the normal time-period used to develop the Airport Noise Contours for night-time operations.
-	Lower Airspace	Airspace in the general vicinity of the airport containing arrival and departure routes below 7,000ft. Airports have the primary accountability for the design of this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency
NAP	Noise Abatement Procedures	Noise abatement procedures are designed to minimise exposure of residential areas to aircraft noise, while ensuring safety of flight operations
NATS NERL		NATS NERL - The UK's licenced air traffic service provider for the en route airspace (upper network) that connects airports with each other, and with the airspace of neighbouring states.
nm	Nautical Mile	Aviation measures distances in nautical miles. One nautical mile (nm) is 1,852 metres. One road mile ('statute mile') is 1,609 metres, making a nautical mile about 15% longer than a statute mile.
-	Network Airspace / Upper network	En route airspace above 7,000ft in which NATS has accountability for safe and efficient air traffic services for aircraft travelling between the UK airports and the airspace of neighbouring states.
NTK	Noise Track Keeping	A system that monitors and records radar data to monitor aircraft operations and report statistics focused around noise.
PANS OPS	Procedures for Air Navigation Services Aircraft Operations	PANS-OPS is contained in an ICAO Document 8168 which sets out the design criteria and rules for instrument flight procedures which include approach and departure procedures.
PBN	Performance Based Navigation	Referred to as PBN; a generic term for modern standards for aircraft navigation capabilities including satellite navigation (as opposed to 'conventional' navigation standards)
RMA	Radar Manoeuvring Area	An ATC operational area articulated as a volume of airspace by the ANSP. It facilitates the close-in radar vectoring by ATC that is required to take the aircraft safely from a holding stack and established onto final approach.
RNAV / RNAV 1	aRea NaVigation	This is a generic term for a particular specification of Performance Based Navigation. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline of the route 95% or more of the time. In practice the accuracy is much greater than this.
RNP-RF	Required Navigation Performance – Radius to fix	An advanced navigation specification under the PBN umbrella. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline 95% or more of the time, with additional self-monitoring criteria. In practice the accuracy is much greater than this. The RF means Radius to Fix, where airspace designers can set extremely specific curved paths to a greater accuracy than RNAV1.
RNP-AR	Required Navigation Performance – Authorisation required	An advanced navigation specification under the PBN umbrella. 'Authorisation required' refers to aircraft and operators complying with specific airworthiness and operational requirements. RNP-AR allow airspace designers to set extremely specific curved paths to a greater accuracy than RNAV1, these can be designed before and after the Final Approach Fix.
-	Separation	Aircraft under Air Traffic Control are kept apart by standard separation distances, as agreed by international safety standards. Participating aircraft are kept apart by at least 3nm or 5nm lateral separation (depending on the air traffic control operation), or 1,000ft vertical separation.
SID	Standard Instrument Departure	Usually abbreviated to SID; this is a route for departures to follow straight after take-off.
	Tactical Intervention	Air traffic control methods that involve controllers directing aircraft for specific reasons at that particular moment (see Vector)

Acronym	Term	Description
TMA	Terminal Manoeuvring Area (Terminal Airspace)	An aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of traffic.
TMZ	Transponder Mandatory Zone	Airspace of defined dimensions where the carriage and operation of transponder equipment is mandatory.
VFR	Visual Flight Rules	Visual Flight Rules (VFR) are the rules that govern the operation of aircraft in Visual Meteorological Conditions (VMC) (conditions in which flight solely by visual reference is possible)
VMC	Visual Meteorological Conditions	Visual meteorological conditions (VMC) are the meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima
VSA	VFR Significant Area	A volume of airspace which has been identified as being particularly important to VFR operations. A VSA might take the form of a route, a zone, or an area chosen for its particular importance to GA users. These areas do not have any official status but are intended to highlight the importance of a particular area so that future airspace development plans can take account of the GA activity.
-	Vector / vectoring	An air traffic control method that involves directing aircraft off the established route structure or off their own navigation – ATC instruct the pilot to fly on a compass heading and at a specific altitude. In a busy tactical environment, these can change quickly. This is done for safety and for efficiency.
-	Westerly operation	When a runway is operating such that aircraft are taking off and landing in a westerly direction

8. APPENDIX A: 2030 NOISE MODELLING

8.1.1 The following figures show the daytime and nighttime L_{Aeq} contours for the ‘do nothing’ scenario in 2030. As noted in section 3.2, the number of arrivals and departures from LBA is not expected to increase between 2030 and 2036 and hence these 2030 contours reflect the expected ‘year of implementation plus 10 year’ scenario.

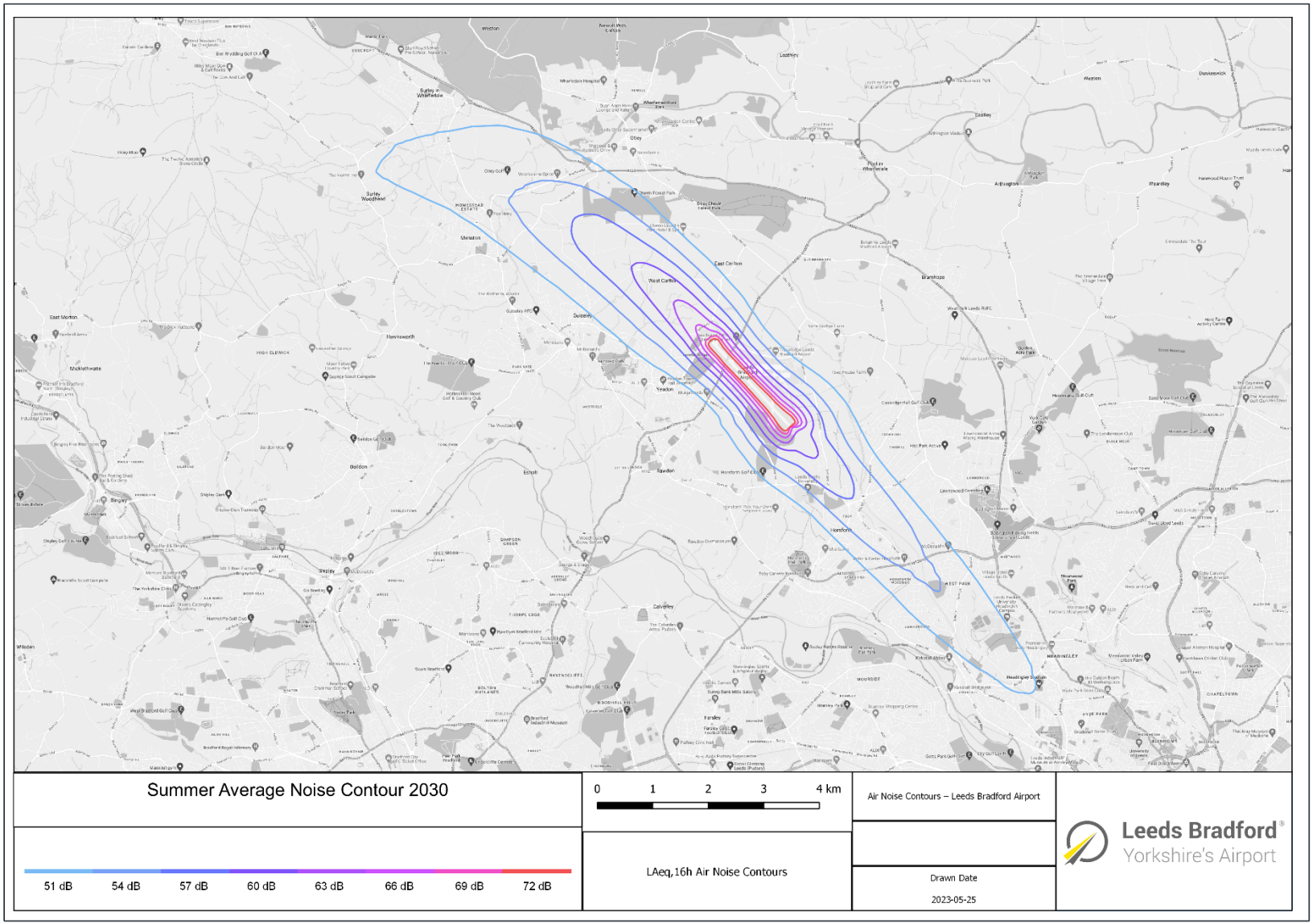


Figure 53 Leeds Bradford Airport 'Do nothing' Average Summer Day L_{Aeq16h}, 2030

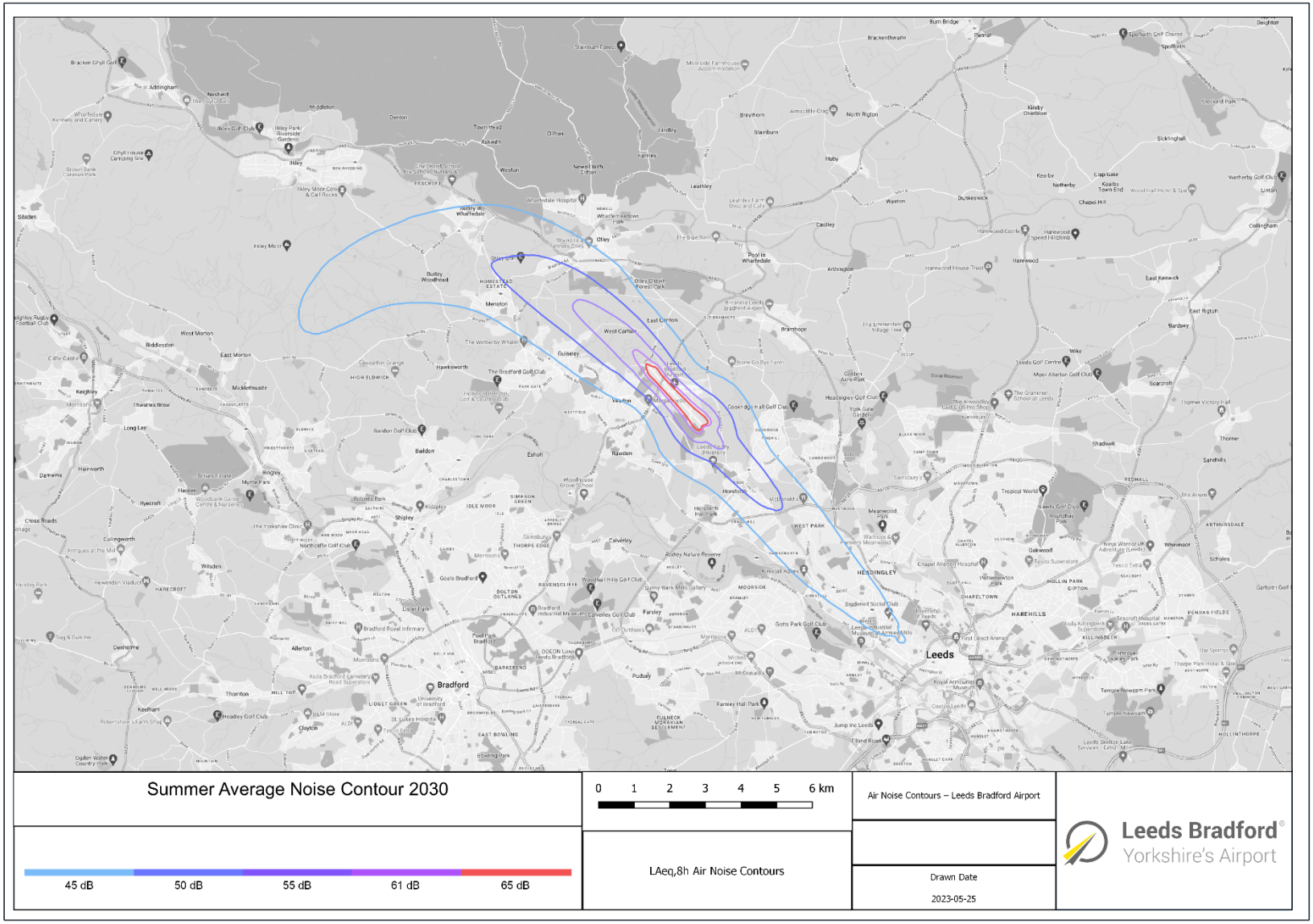


Figure 54 Leeds Bradford Airport 'Do nothing' Average Summer Night L_{Aeq8h}, 2030

8.1.2 Compared to the 2018 noise contours that are shown in the Stage 2A document, the population and dwellings affected by noise equal to or greater than the 51dB (day) and 45dB (night) contours decreases by 2030 due to the change in fleet mix to aircraft with quieter engines. For more information about changes to fleet mix, please see section 3.2.

Table 7 Indicative $L_{Aeq16hr}$ (daytime) contour data 2030

Noise Level (dB)	Population	Dwellings
≥ 51 LOAEL	35600	14700
≥ 54	10200	4550
≥ 57	1800	700
≥ 60	100	50
≥ 63	<100	<50
≥ 66	0	0
≥ 69	0	0

Table 8 Indicative L_{Aeq8hr} (nighttime) contour data 2030

Noise Level (dB)	Population	Dwellings
≥ 45 LOAEL	86300	35000
≥ 48	25200	11000
≥ 51	5200	2250
≥ 54	800	300
≥ 55	300	100
≥ 58	<100	<50
≥ 61	0	0