Airspace Change Proposal: Step 2a

Options Development and Design Principle Evaluation

Leeds Bradford Airport FASI(N)

19 May 2023

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Executive Summary

Many air routes and air traffic management practices are not utilising the modern technologies available, and aircraft continue to use flightpaths that are outdated. Those flightpaths often constrain aircraft climb performance such that more time is taken for them to reach their optimum cruising altitude. This creates inefficiencies and results in greater fuel burn and more emissions. Flightpaths may not presently be optimised to reduce noise impacts or designed to offer relief from noise. This inefficient use of airspace causes unnecessary delays for passengers and significant air traffic control workload to manage bad weather or other forms of disruption. It also has excessive impacts on the environment and those living near our airports. The outdated design is also, crucially, constraining the number of flights that the airspace can safely accommodate.

Airspace is a crucial part of the UK's infrastructure. It must be maintained and enhanced to provide more choice and value for consumers, through the capacity for airlines to add new flights, reduced flight delays and enhanced global connections that can help boost the UK economy, while continuing to improve safety standards. Unlocking the benefits of modernisation will make journeys faster and more environmentally friendly. Better airspace design can help with the management of noise impacts and improve access for other airspace users, including the Ministry of Defence and General Aviation, for whom airspace is a key resource.

Demand for air travel has grown strongly in recent decades, and the Government expects that demand will continue to rise significantly between now and 2050. Growth in demand for air travel means increasing pressure on our airspace. The strategic case for airspace modernisation and the resultant benefits were set out by the Department for Transport in 2017. Those benefits include more choice and value for consumers, through the capacity for airlines to add new flights, reduced flight delays and enhanced global connections that can help to boost the UK economy, while continuing to improve high safety standards. Unlocking the benefits of modernisation will make journeys faster and more environmentally friendly. Better airspace design can manage noise impacts and improve access for other airspace users.

UK airspace is some of the most complex in the world, yet its design dates to the 1950s and 1960s. The Government has set out its support and objectives for the modernisation of UK airspace.

Modernisation of relevant airspace structures, systems and processes can also further improve the flexible use of airspace, whereby airspace is considered as a shared resource and is allocated for specific periods of time to users, such as the military and general aviation.

Implementing new airspace design will affect overflown communities in different ways, for example in terms of facilitating an increased number of flights at some airports or changing the flightpaths that are used. Reducing noise impacts could itself be a driver for a new design. Those who are affected by airspace change must therefore be involved in the decision-making process, and fully informed of the pros and cons of such a transformation.

Leeds Bradford Airport passed the CAA CAP 1616 Stage 1 Gateway in March 2022 and commenced Stage 2 activities. A Comprehensive List of Options were developed through internal workshops and targeted

stakeholder engagement in accordance with the CAP1616 process. These options were assessed against the Design Principles we developed during Stage 1 of this ACP process.

Workshops were held on the 5th July 2022 which introduced the list of Design Options to the stakeholders and our assessment of the Design Options against the Design Principles they helped us develop. Following these workshops stakeholders were invited to take part in an online survey which ran from the 13th July 2022 to the 26th August 2022. This survey asked whether the stakeholders felt we had applied the Design Principles correctly and consistently to each of our Design Options. It provided an opportunity to comment on areas where they felt this may not have been the case.

An update was sent to stakeholders on 28th July 2022 to provide additional context to the Design Options and address some of the questions raised.

Following a period of reflection, and in response to some stakeholder feedback, a series of additional departure Design Options were conceived along with a revised array of arrival system Design Options. These Design Options were shared with the same set of stakeholders over the period 31st March 2023 to 28th April 2023 through a presentation sent out via email. The presentation was accompanied by an online survey and again sought feedback on whether stakeholders felt we had applied the Design Principles correctly and consistently to each of our Design Options. Ultimately, the feedback from the two surveys shaped the final Design Principle Evaluation that is summarised in this report.

This report forms part of the Stage 2 submission and details the Comprehensive List of Design Options that we have developed for this Airspace Change Proposal and the Design Principle Evaluation.

In total, forty departure swathes were conceived of which twenty-four will progress to Step 2b for Initial Options Appraisal. In terms of the arrivals, following a period of reflection post-initial Stage 2 engagement it was determined that the original array of arrival Design Options was not sufficiently detailed enough to evaluate, nor did they meet the needs of the Airport or the en-route ATS provider. These systems were therefore re-developed for further consideration by stakeholders and the original eight Design Options were removed from consideration in favour of five new arrival systems. All five arrival Design Options will progress to Step 2b for the Initial Options Appraisal.

Stage 2 involved targeted stakeholder engagement at the representative level and we would like to thank these representative stakeholders for their time, consideration, and valuable input. We look forward to continuing the work with them to improve our system of flight procedures and airspace configuration.

Abbreviations

ACOG	Airspace Change Organising Group
ACP	Airspace Change Proposal
AMS	Airspace Modernisation Strategy
ANSP	Air Navigation Service Provider
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
ATM	Air Traffic Management
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CTA	Control Areas
CTR	Control Zones
DFT	Department for Transport
DME	Distance Measuring Equipment
DO	Design Option
DP	Design Principle
DPE	Design Principle Evaluation
DSA	Doncaster Sheffield Airport
FAS	Future Airspace Strategy
FASI-S	Future Airspace Implementation South
FASI-N	Future Airspace Implementation North
GA	General Aviation
GNSS	Global Navigation Satellite Systems
hPA	Hectopascals
IAP	Instrument Approach Procedure
IFP	Instrument Flight Procedure
ICAO	International Civil Aviation Organisation
IOA	Initial Options Appraisal
NAP	Noise Abatement Procedures
NERL	National Air Traffic Services En-Route Limited
NP	National Park

NPR	Noise Preferential Route
NTMS	Noise and Track Monitoring System
PBN	Performance-Based Navigation
RNAV	Area Navigation
RW	Runway (when followed by runway designator numbers e.g. RW32)
SID	Standard Instrument Departures
STAR	Standard Arrival
UK	United Kingdom

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1. CAP1616 Airspace Change Proposal Process

1.1. Overview

1.1.1. One of the aims of the Airspace Modernisation Strategy (AMS) is to make airspace more efficient – saving time and fuel and reducing emissions. Key to achieving this is improving the accuracy of where aircraft fly by using the Performance Based Navigation (PBN) capability of aircraft which places much greater reliance on satellite navigation (SatNav); some ground-based navigation aids will be retained for resilience and contingency purposes.

1.1.2. The UK airspace Air Traffic Management (ATM) structures require modernisation to accommodate increasing demand for commercial air travel whilst safely accommodating increasing demands for airspace access from other users. The AMS sets out a shared objective between the Civil Aviation Authority (CAA) and the Department for Transport (DfT) for modernising airspace which is to deliver quicker, quieter, and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace.

1.2. Where are LBA in the process?

1.2.1. CAA regulations contained within CAP1616 define the ACP process. The ACP is designed to be transparent, comprehensible, and proportionate. It is aligned to the Government's Policy on managing airspace.

1.2.2. The 7-stage process contains 14 ‘Steps’ and 4 ‘Gateways’. At each Gateway, the Change Sponsor must satisfy the CAA that it has followed the process fully. Failure to do so results in the needF to conduct further work until such time as the CAA is satisfied.

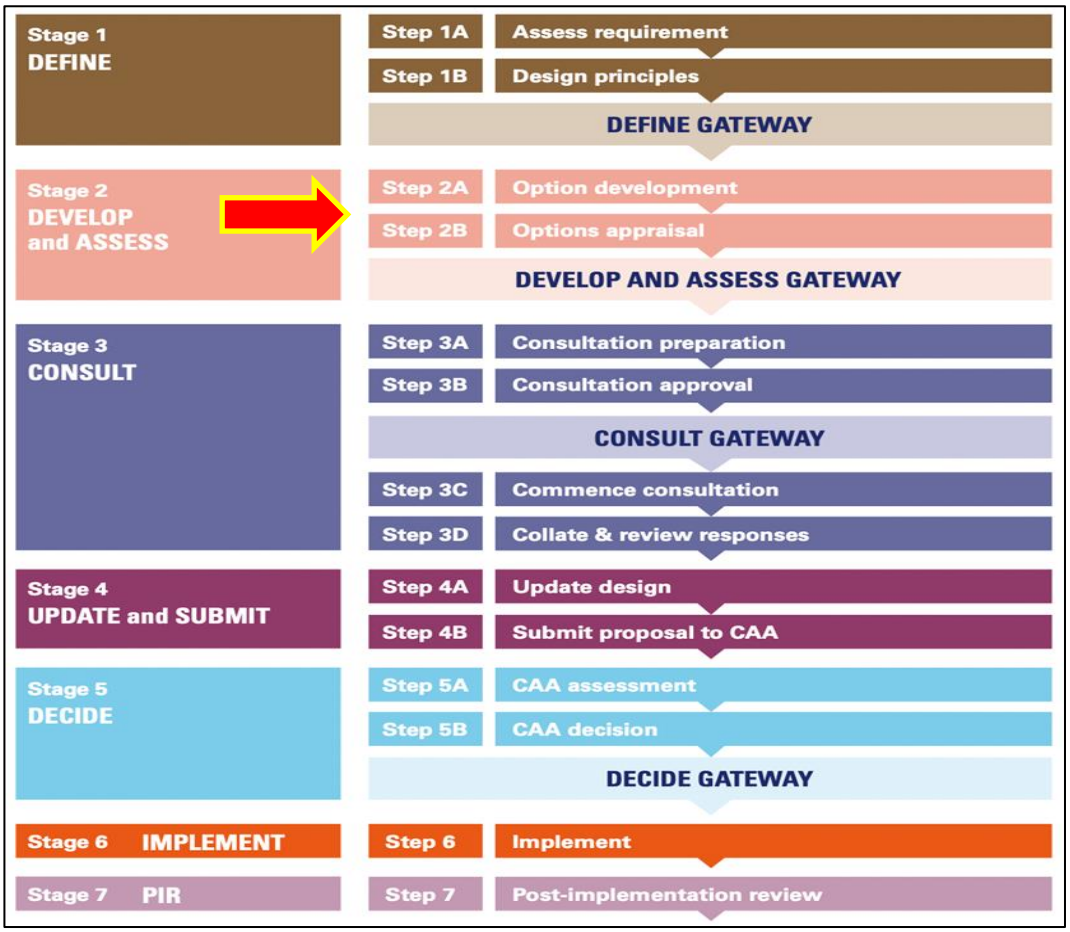


Figure 1: CAP1616 Process

1.2.3. Leeds Bradford Airport (LBA) passed the CAA CAP 1616 Stage 1 Gateway in March 2022 and commenced Stage 2 activities. A Comprehensive List of Design Options (DOs) were developed through internal workshops and stakeholder engagement. These DOs were assessed against the Design Principles (DPs) developed during Stage 1 of this ACP process.

1.2.4. Workshops were held on the 5th July 2022 which introduced the list of DOs to the stakeholders and explained our assessment of the DOs against the design principles they helped us develop. Following these workshops stakeholders were invited to take part in an online survey which ran from the 13th July 2022 to the 26th August 2022. This survey asked whether the stakeholders felt we had applied the DPs correctly and consistently to each of our DOs. It provided an opportunity to comment on areas they felt this may not have been the case.

1.2.5. An update was sent to stakeholders on 28th July 2022 to provide additional context to the DOs and address some of the questions raised.

1.2.6. Following a period of reflection and in response to some stakeholder feedback, a series of additional departure DOs were conceived along with a revised array of arrival system DOs. These were shared with the same set of stakeholders over the period 31st March 2023 to 28th April 2023 through a presentation which was sent out via email. The presentation was accompanied by an online survey and sought feedback on whether stakeholders felt we had applied the DPs correctly and consistently to each of our DOs.

1.2.7. This report forms part of the Stage 2 submission (Step 2A) and details the Comprehensive List of DOs that we have developed for this ACP and the Design Principle Evaluation (DPE).

1.2.8. The feedback from the stakeholders will be made available via the ACP Portal. The Initial Options Appraisal (IOA) is intended to fulfil the requirements of Step 2B and completes the steps within Stage 2 of the process.

1.3. LBA's Design Principles

1.3.1. LBA's DPs as agreed in Stage 1 of the process are shown below. The documentation that supports these was associated to Stage 1 of the process and can be found on the ACP Portal.

DP #	Design Principle
1	**Importance of Safety** – The airspace design and its operation must maintain or where possible, enhance current levels of safety.
2	**Noise** - The design should limit, and where practicable reduce, the number of people overflown, the impact of noise to stakeholders on the ground and where possible periods of built-in respite should be considered.
3	**Tranquillity** - Where practical, route designs should limit effects upon noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education and AONB's.
4	**Emissions and Air Quality** – The proposed design should minimise CO^2 emissions per flight.
5	**Airspace Dimensions** – The volume and classification of controlled airspace required for LBA should be the minimum necessary to deliver an efficient airspace design, considering the needs of all airspace users.
6	**Airspace Complexity** – The airspace design should seek to reduce complexity and bottlenecks in controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.
7	**Technical Requirements** – The design shall be fully compliant with PANS-OPS and UK CAA criteria to meet the technical capability requirements of aircraft using the airport.
8	**Systemisation** – The new procedures will integrate with the en-route network, as per the FASI(N) programme. If required, the arrival transitions shall integrate with the Instrument Approach Procedures (IAPs), deconflict with the departure procedures, reducing the requirement for tactical coordination.
9	**Operational Cost** – Provided it does not have an adverse impact of community disturbance, procedures should be designed to optimise fuel efficiency.
10	**AMS Realisation** – This ACP must serve to further, and not conflict with, the realisation of the AMS.
11	**PBN** – The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.

Table 1: LBA's Design Principles

2. UK Airspace Change Masterplan Iteration 2

2.1. The DfT and the CAA are co-sponsors of UK airspace modernisation. In 2018, they commissioned NATS (En Route) plc (NERL) to create an Airspace Change Masterplan. NERL was required to set up a separate and impartial unit, the Airspace Change Organising Group (ACOG), to develop the Masterplan.

2.2. The purpose of the Masterplan is to set out a single coordinated implementation plan to deliver the objectives of airspace modernisation. It is intended to identify which UK airspace design changes need to be developed in coordination to achieve the range of benefits that modernisation can deliver, and when.

2.3. Before the Masterplan can be implemented, the CAA must decide whether to formally accept the Masterplan into its AMS[1], having consulted the Secretary of State.

2.4. ACOG proposed an iterative approach to the development of the Masterplan, which recognises that different information and levels of detail will be available at different points as the Plan develops. Each iteration must be accepted separately, except Iteration 1, which has already been assessed and published. Once the Masterplan is accepted into the AMS, together with the CAA's general duties in Section 70 of the Transport Act 2000, the Masterplan forms the basis against which individual airspace change decisions are made by the CAA.

2.5. Iteration 2 of the UK Masterplan has now been accepted into the AMS[2]. CAA Airspace Regulation has a requirement to assure that the Stage 2 Develop & Assess Gateway submissions for airspace changes under the Masterplan programme are in accordance with this iteration of the Masterplan.

2.6. To enable Airspace Regulation to undertake this activity, seven indicators have been defined as per the following table and submissions will be reviewed by Airspace Regulation against these. The documentation associated to Stage 2 of the LBA ACP is intended to meet these criteria.

CAA Indicator	LBA Response
Has the change sponsor identified, or otherwise can Airspace Regulation identify, the regional cluster within which the ACP sits?	**Yes, this ACP is part of the Manchester Terminal Manoeuvring Area (MTMA) Regional Cluster.**
Has the change sponsor identified all adjacent airspace change proposals as identified under the Masterplan programme for the regional cluster in which the ACP sits and has highlighted the potential for conflicts in the Design Options?	**Yes, MTMA (NERL), Manchester and Liverpool.**

[1] See https://www.caa.co.uk/commercial-industry/airspace/airspace-modernisation/airspace-modernisation-strategy/
[2] See CAP2132A https://publicapps.caa.co.uk/docs/33/CAP2312A%20Masterplan%20assessment%20and%20acceptance.pdf

CAA Indicator	LBA Response
Has the change sponsor evidenced that the comprehensive list has identified all viable options, noting that the Masterplan is a high-level coordinated implementation plan of a series of individual airspace design changes that need to be developed in coordination to achieve the range of benefits that modernisation can deliver?	**Yes, this document identifies all viable options that have been the subject of various coordination meetings with ACOG, NERL and the MTMA Team.**
Evidence that the change sponsor's Design Options developed at Stage 2 are the product of co-ordination with other change sponsors of interdependent ACPs carried out under the Masterplan programme. A key indicator will be that change sponsor has engaged with ACOG and the change sponsors of interdependent ACPs, as part of the Masterplan programme, in developing its comprehensive list of options and undertaking its DPE and subsequent IOA.	**The Design Options have been developed in coordination with other change sponsors through various coordination meetings with ACOG, NERL and the MTMA Team.**
Evidence that the change sponsor's DPE includes an assessment of how the different Design Options respond to the relevant AMS Design Principle (i.e. achieve network optimisation). This can only be based on available evidence and assumptions about the outcome of integrating different ACPs, as there are various risks and unknowns until, at least, the change sponsor has carried out the Full Options Appraisal (i.e. the quantitative work) during Stage 3. Additionally, evidence that the change DPE and IOA include a qualitative (high-level) assessment of how the Design Options perform against the vision and parameters/strategic objectives of the AMS.	**Bilateral meetings with the NERL MTMA Team have been held at various points through the development process to ensure network optimisation has been considered.**
Evidence that the change sponsor has justified, based on available evidence, why certain Design Options have been discounted, noting that the Design Option may need to be re-introduced after "integration" occurs in Stage 3 for masterplan reasons.	**This report details the reasons why certain Design Options have been discounted**

CAA Indicator	LBA Response
Are the change sponsor's proposed next steps/timelines consistent with those set out by ACOG in Iteration 2 for the regional cluster within which the ACP sits?	**The timeline has been coordinated with ACOG.**

Table 2: Seven Masterplan Indicators

3. The Baseline - LBA's Existing Airspace Arrangements

3.1. Current Situation

3.1.1. LBA is in Yeadon, 7 miles (11 km) northwest of Leeds City Centre, and about 9 miles (14 km) northeast of Bradford City Centre. It serves Leeds, Bradford and the wider Yorkshire region which include York, Harrogate, and Wakefield, and is the largest airport in Yorkshire. LBA is situated in an elevated position, 208 metres above mean sea level, making it the highest in England.

3.1.2. Operators using LBA include EasyJet, Ryanair, TUI Airways, KLM and Jet2 where it is headquartered. The airport operates flights to domestic and European destinations catering for approximately 4 million passengers per annum.

3.2. Runways and Modal Split

3.2.1. LBA has a single runway with two ends known as '14' and '32'; these are given their names as their true bearing is rounded to two figures, e.g., Runway 14 has a true bearing of 137.74 degrees.

3.2.2. Aircraft normally land and take off heading into the wind, thus the wind direction at the time of an aircraft approach or departure usually determines which runway is chosen. The prevailing wind direction at LBA is from the South-West, therefore crosswinds are routinely a factor and neither runway is often favoured by the wind. There is a 'Selective Runway Procedure' in place as part of the Section 106 Agreement with the Local Planning Authority (LPA), This Procedure is intended to mitigate the noise impact on the more densely populated area to the South-East of the Airport. *'Aircraft will use Runway 14 for landing and Runway 32 for take-off, whenever this is possible, having regard to wind, cloud base, approach aid limitations and aircraft performance and requirements.'* The S106 agreement is outside of the scope of the CAP1616 process and there are no plans to request changes to it as part of this process, except that it may be necessary to modify the description of the Noise Preferential Routes (NPRs) which are also a matter for the LPA, in the event that they cannot adequately contain the preferred routes following the next stage of the consultation process. It is necessary within the CAP 1616 process to confirm with the LPAs whether the NPRs may be varied because, if not the extant NPRs effectively become hard design criteria that greatly limit the options that can be considered. The following two charts show runway usage, per month, at LBA throughout 2022 with data taken from the Airport's NTMS. These show that RW32 was used the most for both arrivals and departures.

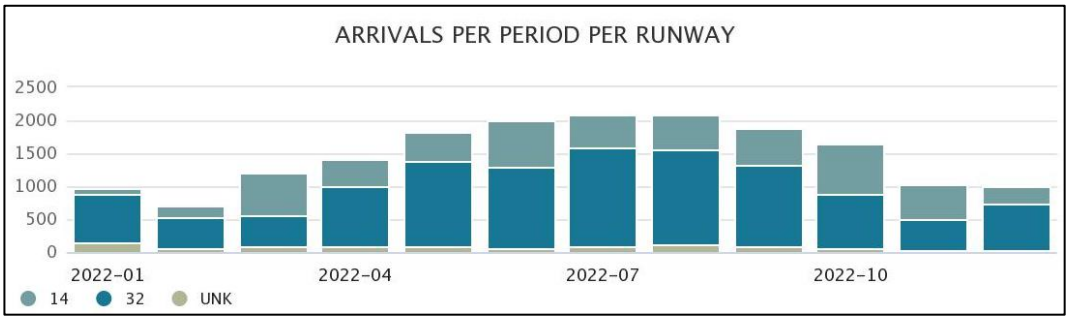


Figure 2: Runway usage data from LBA for 2022 - Arrivals

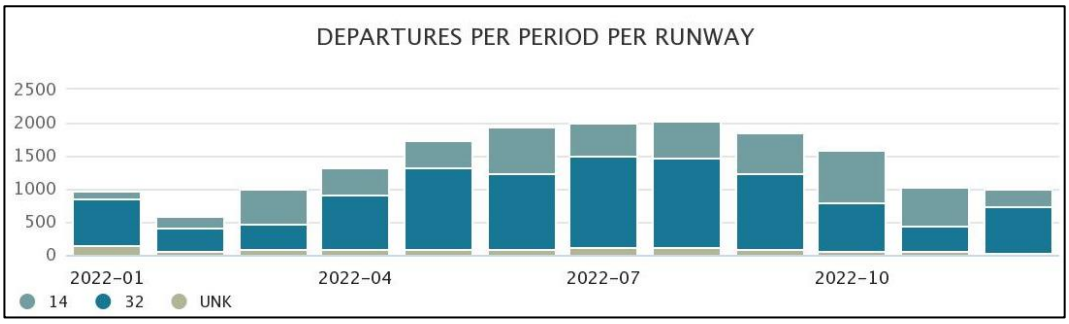


Figure 3: Runway usage data from LBA for 2022 - Departures

3.3. Controlled Airspace Configuration

3.3.1. LBA has a Control Zone (CTR) that extends from the surface to Flight Level (FL) 85 (8,500ft), it has three associated Control Areas (CTAs) and are all classified as Class D airspace (controlled airspace or CAS).

- CTA 1 extends from 2,500ft to FL85 (south of the Airport),
- CTA 2 (due west of the Airport) has the same vertical extent as CTA 1, and
- CTA 3 which surrounds the Airport from the South, through West to the North, extends from 3,000ft to FL85.

3.3.2. Another form of CAS, the Yorkshire CTA, sits above and extends to FL195; this is classified as Class A airspace.

3.3.3. The LBA and Yorkshire CTAs sit adjacent to the MTMA which is the subject of another ACP (ACP-2019-77), an ACP which encompasses the LBA region and is inextricably linked. It is part of a regional cluster of ACPs[3] all associated with the Future Airspace Implementation (North) (FASI(N) initiative.

3.3.4. Aircraft typically pass through the MTMA on the way in and the way out of LBA and it is critical that this interface (the locations and altitudes at which aircraft are transferred from one agency to the other) is designed in a coordinated fashion. Accordingly, these ACPs are running in tandem. More detail on the FASI(N) MTMA ACP, sponsored by NATS, can be found on the Airspace Change Portal.

[3] Includes Liverpool, Manchester, Leeds Bradford and MTMA ACPs.

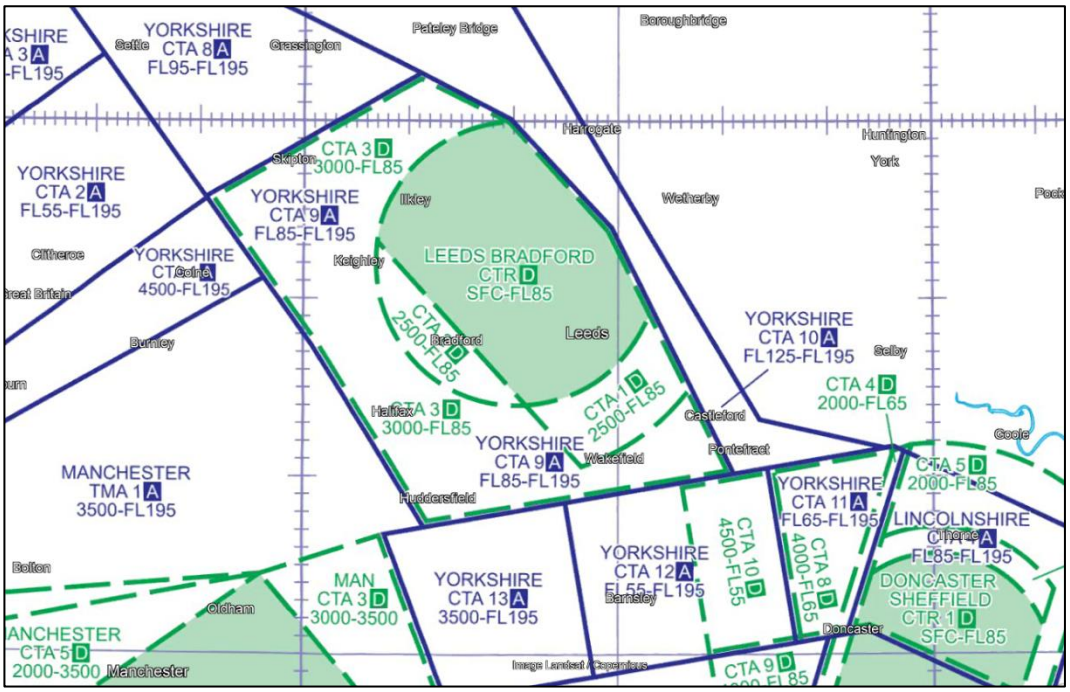


Figure 4: Airspace Configuration

3.3.5. The airspace immediately east of the CTR consists of uncontrolled airspace (Class G) from the surface up to FL125 (12,500ft). The Yorkshire CTA (Class A airspace) then extends from FL125 to FL195.

3.3.6. This absence of CAS due east of LBA at the lower levels is problematic as it gives the air traffic controllers (ATCOs) very little room for manoeuvre in order to keep aircraft from straying into uncontrolled airspace.

3.3.7. Accordingly, the departure procedures are all designed to keep aircraft in CAS and as such these are not able to turn right off RW32 or left off RW14. This constraint is equally pertinent in relation to arrivals as there is very little room to vector inbound aircraft to the east of the Airport or to hold them in that area.

3.3.8. The Class G airspace over the Vale of York is relatively busy and contains the activities of multiple General Aviation (GA) airfields, RAF Leeming and Teesside International Airport along with military fast jets and helicopters from Lincolnshire and further south.

3.3.9. When the DOs were first being developed for this ACP, Doncaster Sheffield Airport (DSA) was still a going concern and accordingly the DOs that were developed assumed LBA would need to deconflict their activities with those of DSA. By the time the second round of DO conception was underway, DSA had closed and as such consideration was given to some options that might utilise some airspace adjacent to airspace previously used by DSA. Whilst the airspace surrounding DSA has been suspended, it is unclear whether this is the final outcome.

3.3.10. It should be noted that LBA utilised some of DSA's delegated airspace for some arrivals into LBA as part of a local agreement between the two airports. The suspension of this airspace has resulted in changes to how LBA manages the descent of the inbounds from the East, but it has had no significant impact on the operation.

3.3.11. The existing departure procedures utilise a number of reporting points and conventional navigation aids. These are depicted at Figure 5 and listed below:

- GASKO is utilised by aircraft routing to the NE,
- NELSA, POL and MCT are utilised by aircraft routing S or W, and
- DOPEK, LAMIX and GAM are utilised by aircraft routing to the SE.

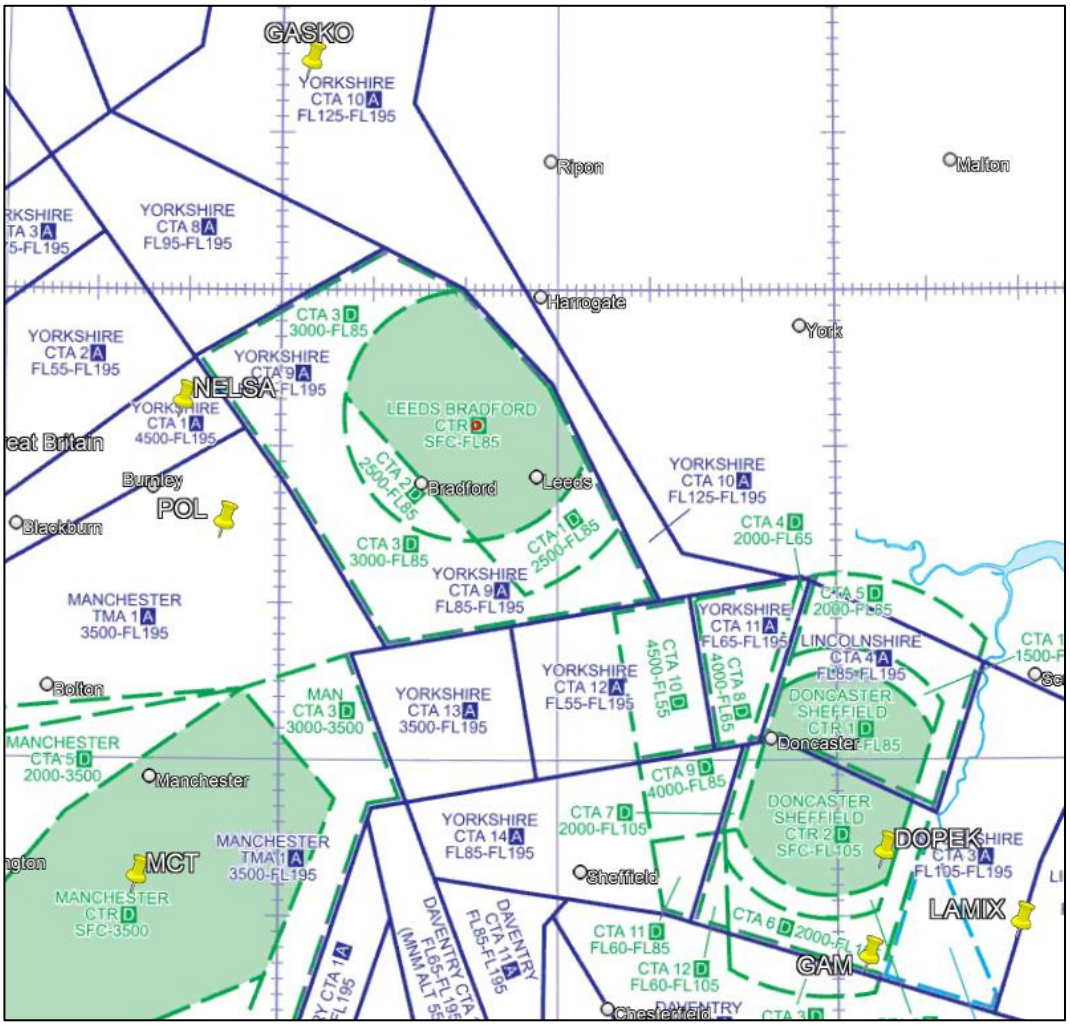


Figure 5: Relevant Reporting Points

3.4. Common Transition Altitude

3.4.1. One of the proposals associated with the MTMA ACP is the consolidation of the Transition Altitude (TA) in the MTMA from 5,000ft to 6,000ft for consistency.

3.4.2. Aircraft can use different vertical references when flying. 'Altitude' means the distance an aircraft is above mean sea level using a local or regional pressure setting; 'height' means the distance above the ground; a 'Flight Level' (FL) is the vertical distance of an aircraft above the assumed mean sea level pressure of 1013.25 hPa (hectopascals), and is the standard reference for aircraft at higher levels, in hundreds of feet, i.e., with 1013.25 hPa set, an aircraft flying at 9,000ft is referred to being at 'FL90'.

3.4.3. In order to maintain separation, ATCOs need to use common vertical references for the aircraft under their control, and those in the local vicinity; to do this they use altitudes and flight levels. The Transition Altitude (TA) is the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes. Above the TA, aircraft fly with reference to FLs.

3.4.4. Currently the TA differs depending on the volume of airspace an aircraft is flying in thereby increasing complexity. One of the proposals of the MTMA ACP is to consolidate these differing TAs by establishing a common TA of 6,000ft across the entire MTMA region.

3.4.5. NATS has stated in its ACP documentation that the consolidation of the TA will have the following benefits:

- Progresses CAA policy to consolidate the TA within UK CAS;
- Consolidates the TA within the MTMA and surrounding airspace;
- Reduces the possibility of (vertical) infringement into CAS in this region due to a common TA;
- Simplifies the airspace picture:
  - reduces operational confusion; and
  - reduces pilot and controller workload.
- Enables higher Standard Instrument Departure (SID) endpoints to be considered within the airport ACPs enabling the associated benefits, such as:
  - improved continuous climb operations; and
  - reduction in fuel burn leading to a reduction in greenhouse gas emissions.

3.4.6. Consolidation of the TA will not constrain the DOs being considered or alter the patterns of flights (IFR, VFR or SVFR) using the airspace. It is likely to result in the SIDs needing to extend to FL80 (vice FL70) and the Standard Arrivals (STARs) being limited to FL90 (vice FL80) in the descent.

3.5. Adjacent Aerodromes

3.5.1. LBA's neighbours include the following:

- **Doncaster Sheffield Airport (DSA)** – At the time of writing, this Airport has ceased operations and the CAS delegated to it has been suspended. The CAA are conducting an ACP to permanently disestablish the CAS previously delegated to DSA.
- **Leeds East Airport (formerly RAF Church Fenton)** – Due east of LBA and situated within Class G airspace. LBA Air Traffic Control (ATC) occasionally handle inbounds to this airport, but this causes minimal extra workload.
- **Sherburn-in-Elmet** – Due east of LBA and situated in Class G airspace, a relatively busy GA hub.
- **RAF Leeming** – Situated in Class G airspace to the NE of LBA. Minimal interaction between the two aerodromes and their associated traffic.
- **Teesside International Airport** – Situated within Class D airspace to the North-East of RAF Leeming.
- **Manchester Airport** – Situated to the SW of LBA requiring the most coordination with LBA traffic than any of its other neighbours.

3.6. Arrivals to LBA

3.6.1. Inbound aircraft to LBA largely follow the routings depicted in the UK Aeronautical Information Publication (AIP). LBA does not have designed and published Standard Arrival Routes (STARs) or Arrival Transitions. Aircraft that are inbound from the Route Network are typically issued tactical headings prior to transfer from Scottish Control to LBA radar descending to an agreed level through a 'gate'.

3.6.2. Figure 6, taken from the UK AIP, details the routings off the various routes on the Network. The AIP also states: *'Aircraft likely to be issued tactical headings prior to transfer from Scottish Control to EGNM RAD'.*

Approach from	Via	Route
NW	L612 N57	CALDA - POL - LBA POL - LBA
N	P18	GASKO - LBA
E	Y70	GOLES - BATLI - LBA
S	N57/T420 N601	TNT - DENBY - LBA EMBOR - TNT - DENBY - LBA
SW	N864	REXAM - BARTN - POL - LBA
W	L10/L975	WAL - BARTN - POL - LBA

Figure 6: Standard Inbound Routes into LBA - UK AIP

3.6.3. Figure 7 gives an idea of how that gate system looks. The orange arrows show traffic leaving the Route Network and generally heading towards a gate (pink lines) in the descent to FL80 (8,000ft). Aircraft are then either vectored by Leeds Radar to 10nm finals on the extended centreline of the runway in use or they are sent to the LBA hold (overhead the Airport) until such time as it is possible to accommodate their approach.

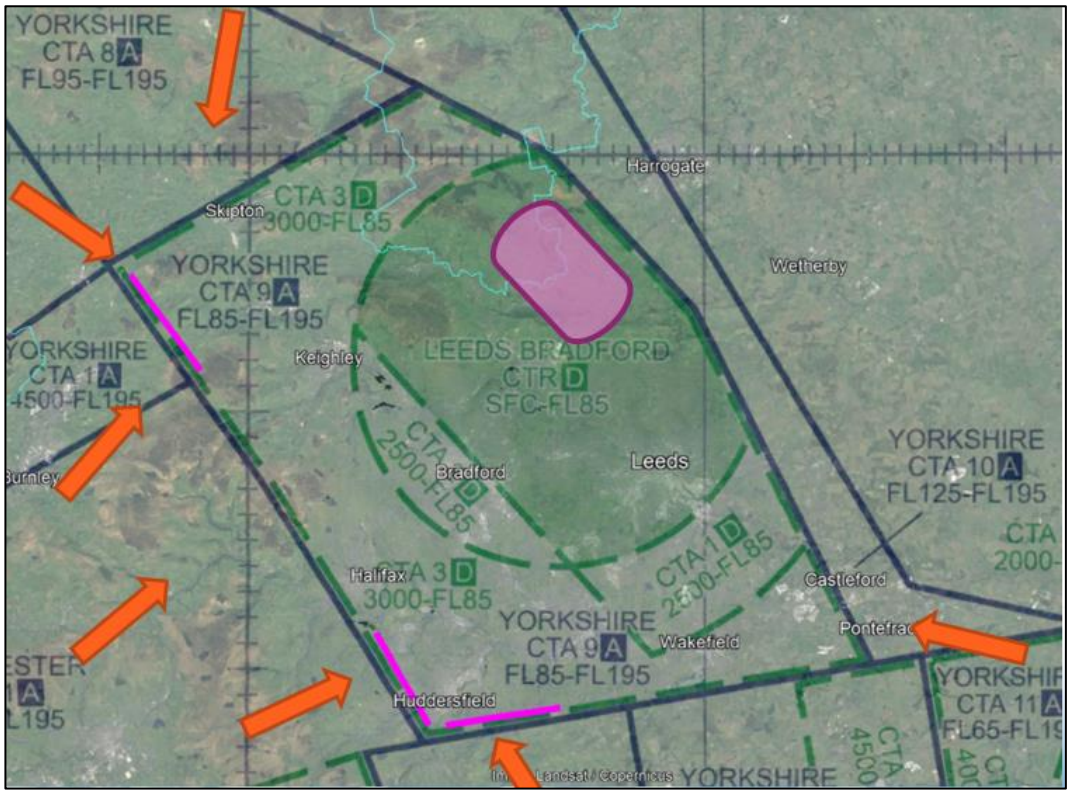


Figure 7: Baseline Gate and Single Hold System

3.6.4. Arrivals to LBA are predominantly from the south, east and west with only a small number arriving from the north and north-west. Using actual track data from LBA's Noise and Track Monitoring System (NTMS), the existing baseline of arrival swathes can be determined. A sample was taken for the week commencing 1st August 2022 and this can be seen at Figure 8.

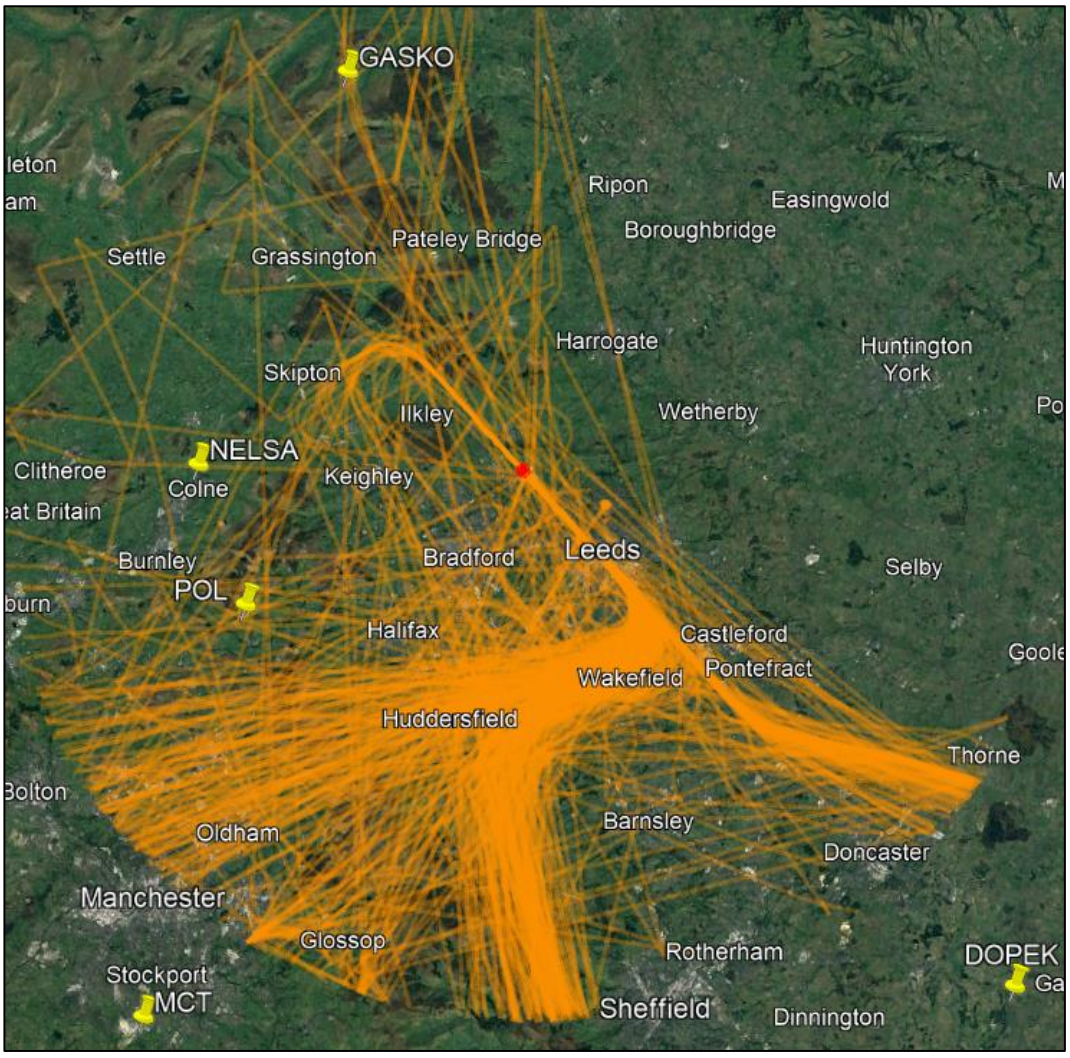


Figure 8: Arrivals to LBA - NTMS Track Data for the period 1-8 Aug 2022

3.6.5. Trends for RW32 can be clearly seen and these have been translated into swathes to establish a baseline. Arrivals from the North-West are not evident and there are very few from the North-East making it difficult to identify swathes from those directions. The hold is not visible on the sample as it wasn't used during this time period. The swathes considered as the baseline are shown in red in Figure 9 starting from the edge of the LBA delegated airspace.

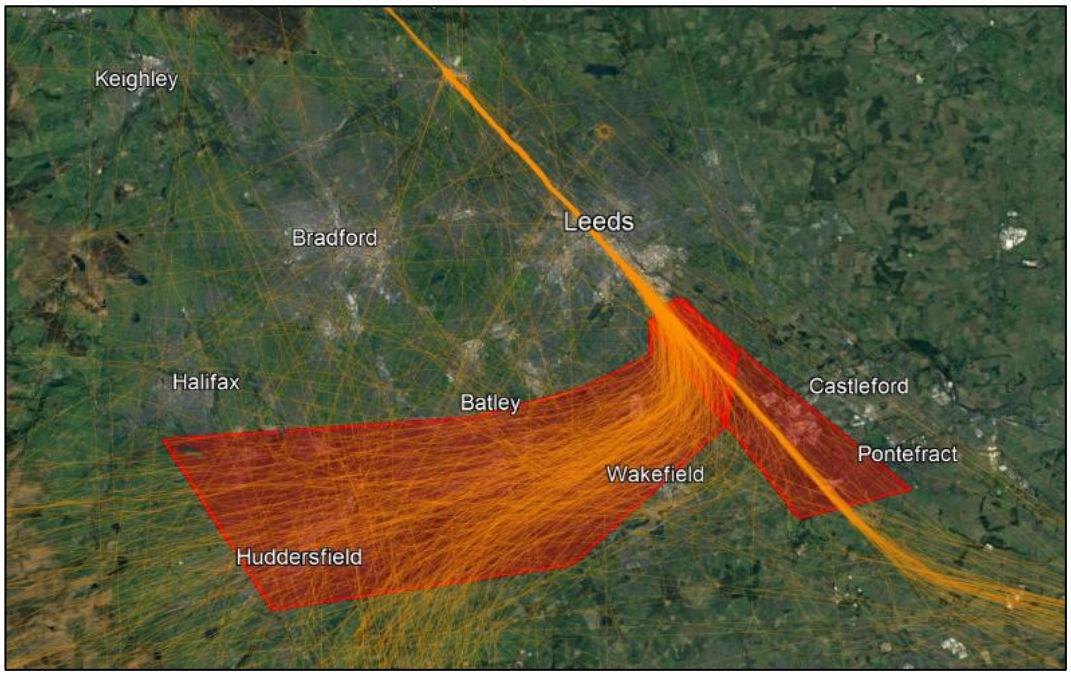


Figure 9: Baseline Arrival Swathes Runway 32 with NTMS Data for the period 1-8 August 2022

3.6.6. The same exercise was followed for RW14 arrivals using a NTMS sample from October 2022. From this data sample, arrivals swathes can be identified as a baseline and the hold is clearly visible as it was used a little during this timeframe. As before, there are very few arrivals from the North-East or North-West making it difficult to identify a pattern. See Figure 10 for the track data and Figure 11 shows the baseline swathes identified in red starting from the edge of the LBA delegated airspace.

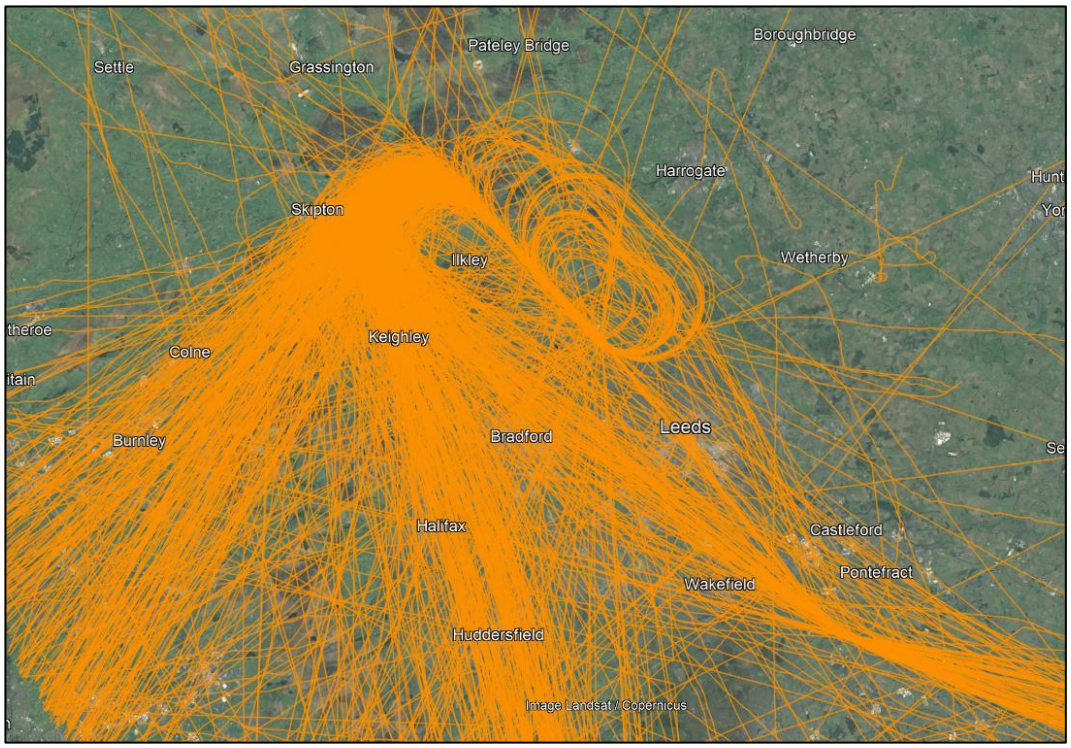


Figure 10: Arrivals to RW14 at LBA - NTMS Track Data from October 2022

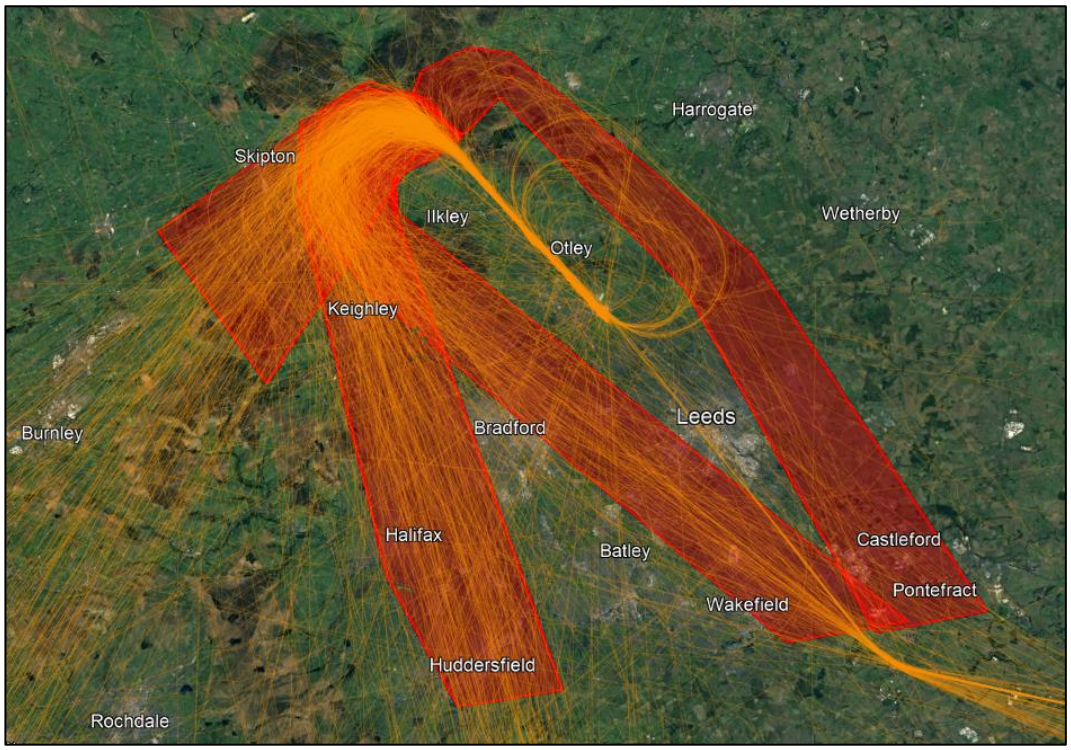


Figure 11: Baseline Arrival Swathes RW14 with NTMS Data for October 2022

3.7. Departures from LBA

3.7.1. LBA has Noise Preferential Routings (NPRs) to supplement the 'Selective Runway Procedure'. These are to be found in the UK AIP and are listed as follows:

a) *Runway 14 – After take-off maintain runway heading to 'I LBF' DME 2 before setting course (or 'I LF' DME 2 when Runway 32 is being used for landing traffic);*

b) *Runway 32 – Climb straight ahead. At 1181 FT QNH (500 FT QFE) or I-LF D0.5, whichever is the later, turn left to track 311° MAG. At 'I LF' DME 2.1 *535340N 0014258W reduce to minimum safe power settings and turn left to make good a track of 272° MAG. Maintain this track until 'I LF' DME 3.5 *535405N 0014521W before setting course*

c) *Turbo-prop: After take-off make good a track of 311° MAG and at DME 2.1 turn onto course.*

Note: The above routeings are compatible with normal ATC practice. In individual cases they may be varied owing to operational circumstances. The use of the Noise Preferential Routeings specified above is supplementary to the noise abatement take-off techniques as used by piston engined, turbo-prop and turbo-jet aircraft.

3.7.2. The NPRs can be visualised in Figure 12 and Figure 13. It should be noted that these are flown using conventional navigation (vice satellite navigation) and as such, they are not flown as accurately as the thin lines depicted, particularly where a turn is involved.

Figure 12: NPR RW14 against Google Earth

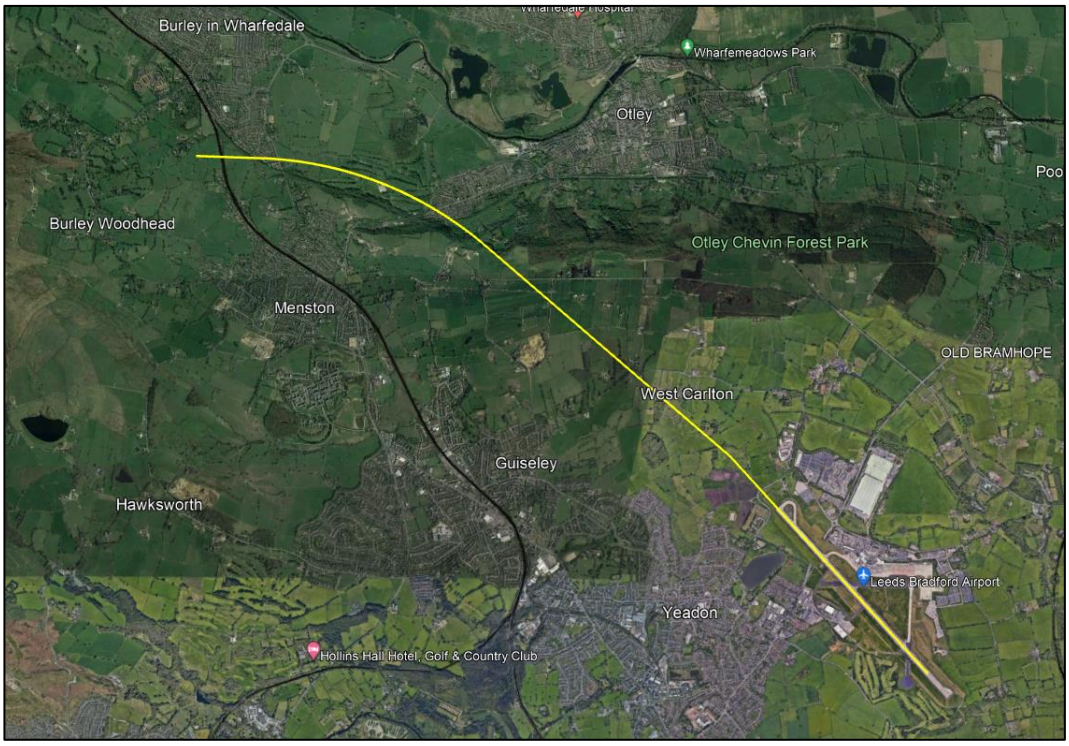


Figure 13: NPR RW32 against Google Earth

3.7.3. LBA has two SIDs off each runway. These are depicted Figure 14 and Figure 15 and consist of the NELSA/POLEHILL (for West and South-Westbound traffic depending on runway in use) and the DOPEK/LAMIX (for South-East and Eastbound traffic).

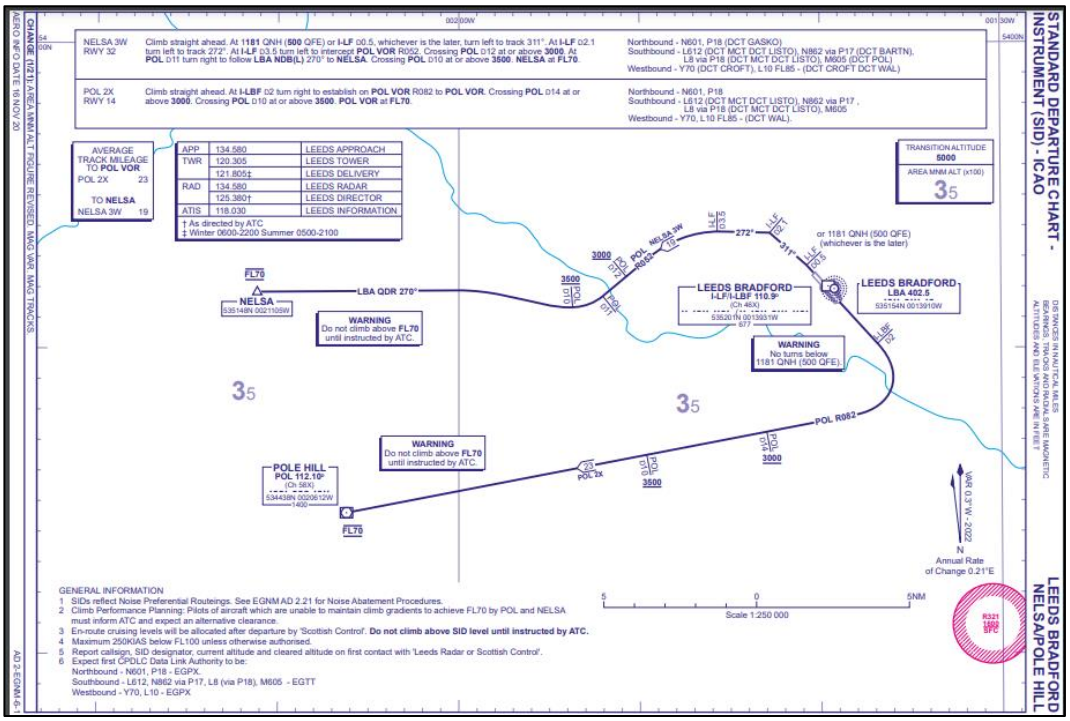


Figure 14: NELSA/POLEHILL SID

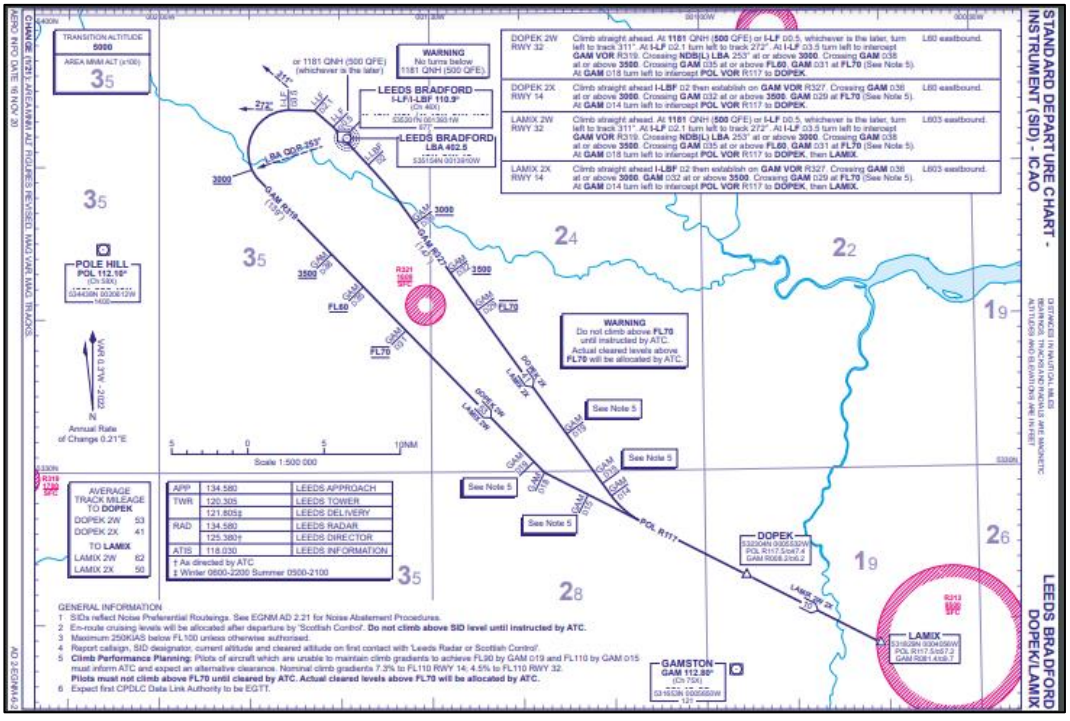


Figure 15: DOPEK/LAMIX SID

3.7.4. These SIDs do not cater for every departure direction and as conventional navigational means is the basis for these departures, the actual flight path varies from flight to flight particularly once best efforts have been made to adhere to the NPRs. Satellite navigational could be expected to be far more consistent and repeatable.

3.7.5. Using actual track data from LBA's Noise and Track Monitoring System (NTMS), the existing baseline of departure swathes can be determined. A sample was taken from the week

commencing 1st August 2022. Figure 16 shows all the departures from that week against a Google Earth background. LBA is in the red circle on the graphic.

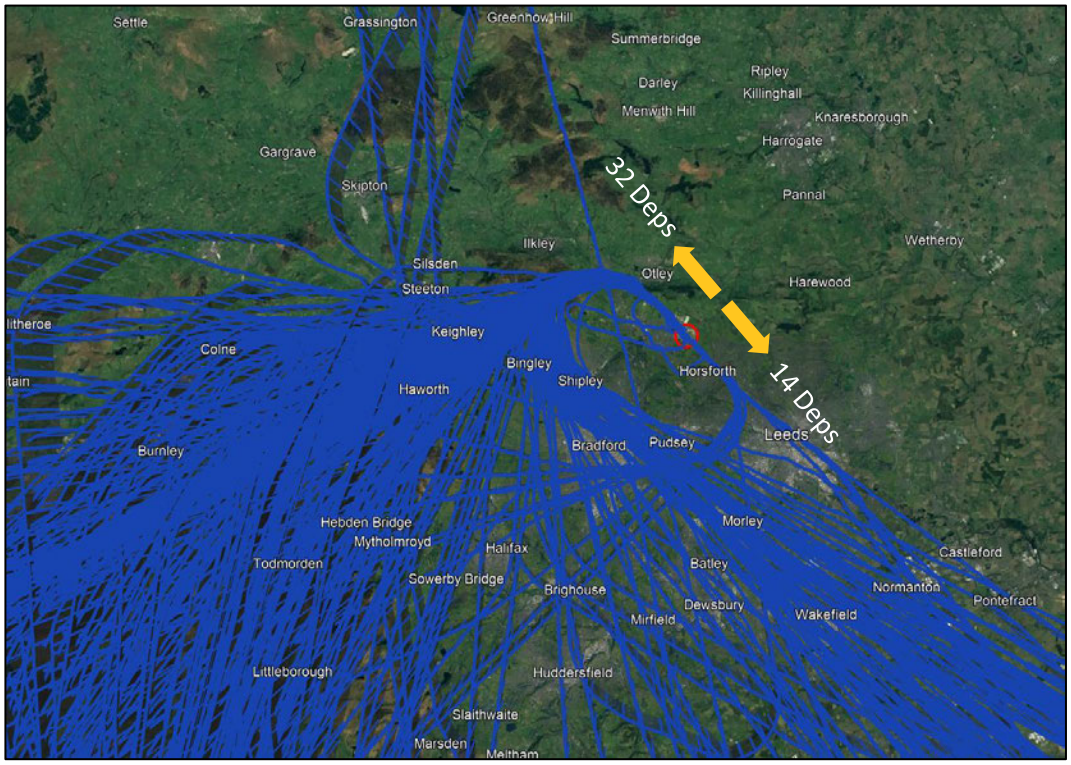


Figure 16: LBA Departure Tracks from NTMS week commencing 1 August 2023

3.7.6. To establish the baseline, swathes were drawn around the tracks where they appeared most densely concentrated. Figure 17 and Figure 18 show the baseline as established for comparison with the options. There were no flights departing to the North-West off RW14 in the sample data. However, in consultation with LBA ATC, it was established that the swathe would look as depicted in the orange-coloured swathe if there had been departures routing in that direction.

3.7.7. These baseline swathes were then used by our Acoustic Consultants (Noise Specialists) to compare against the option swathes whilst conducting their qualitative impact assessment.

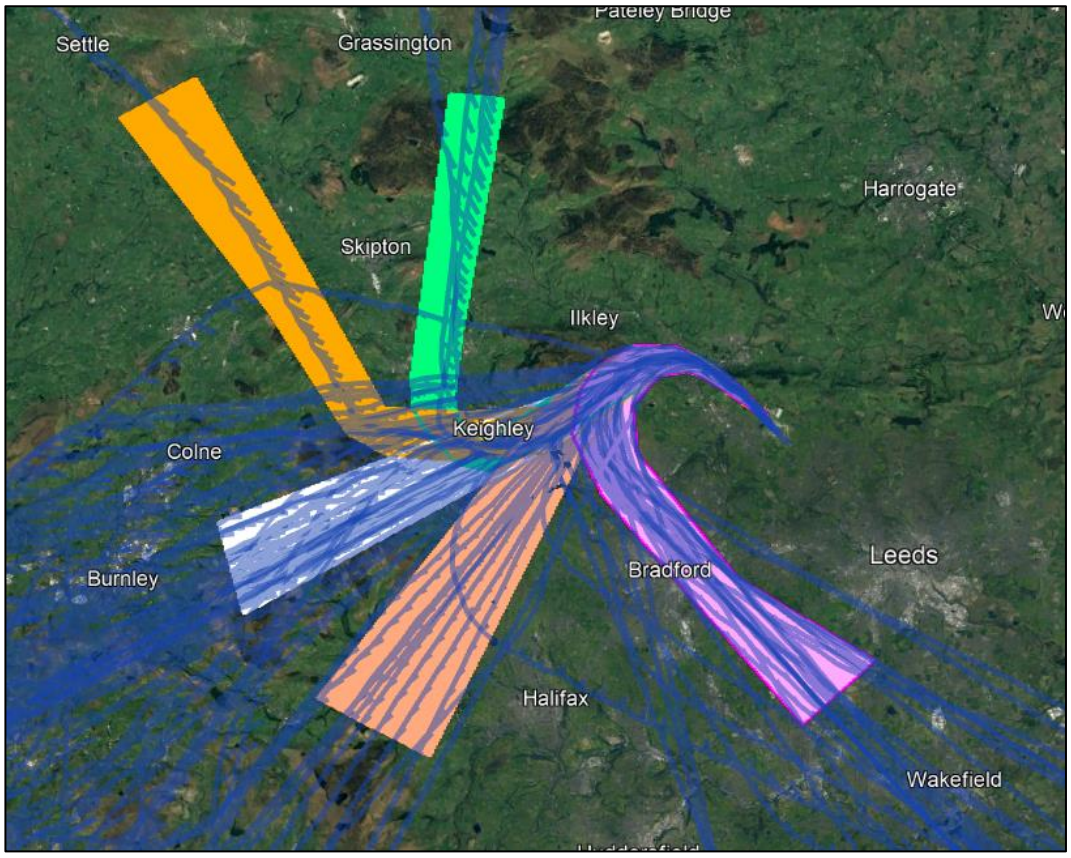


Figure 17: Runway 32 Baseline Swathes with NTMS Track Data

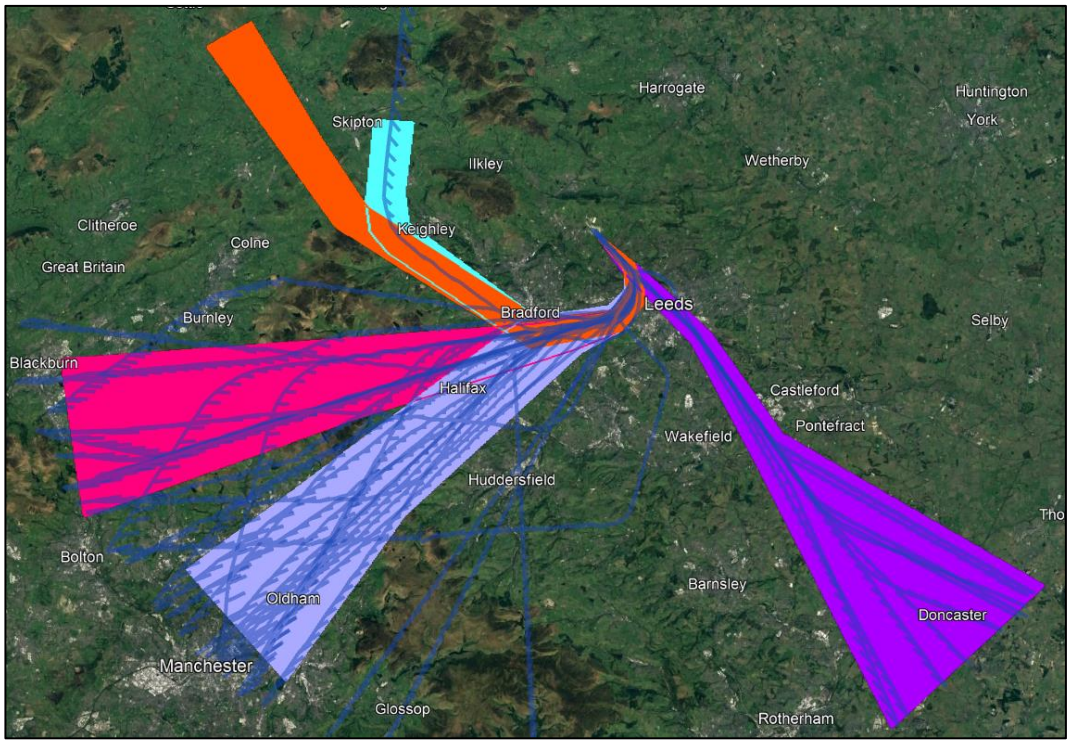


Figure 18: Runway 14 Baseline Swathes with NTMS Track Data

3.8. Existing Noise Environment

3.8.1. Airport Operators in the UK are obliged to review and revise (if necessary) their Noise Action Plan every 5 years or sooner where a major development occurs. The last Action Plan with meaningful data and contours contained within it was produced in 2017, based upon data collected in 2016. The data collection in 2021 was skewed significantly by COVID-19 as it impacted the number of aircraft movements as might be expected. Accordingly, the 2022 Noise Action Plan and the noise contours contained therein is not a helpful benchmark to use as a baseline. **There is therefore no option other than to use the data and contours developed from 2016 data as the baseline.**

3.8.2. The following table shows the estimated number of people and dwellings experiencing average noise levels above 54 decibels (dB) during the average summer day in 2016; this is the average noise level produced by aircraft over the 16-hour daytime period (07:00 to 23:00) for the 92-day "summer", defined as 16th June to 15th September inclusive.

Noise Level (dB)	Number of Dwellings	Number of People
≥ 54	5,650	11,500
≥ 57	1,650	3,600
≥ 60	400	900
≥ 63	100	300
≥ 66	<50	<100
≥ 69	0	0

Table 3: Estimated total number of people and dwellings above various noise levels, LAeq 16h in the vicinity of LBA

3.8.3. The following chart shows where these noise contours lie in relation to the Airport. The outer contour is the 54dB contour as referred to in Table 3.

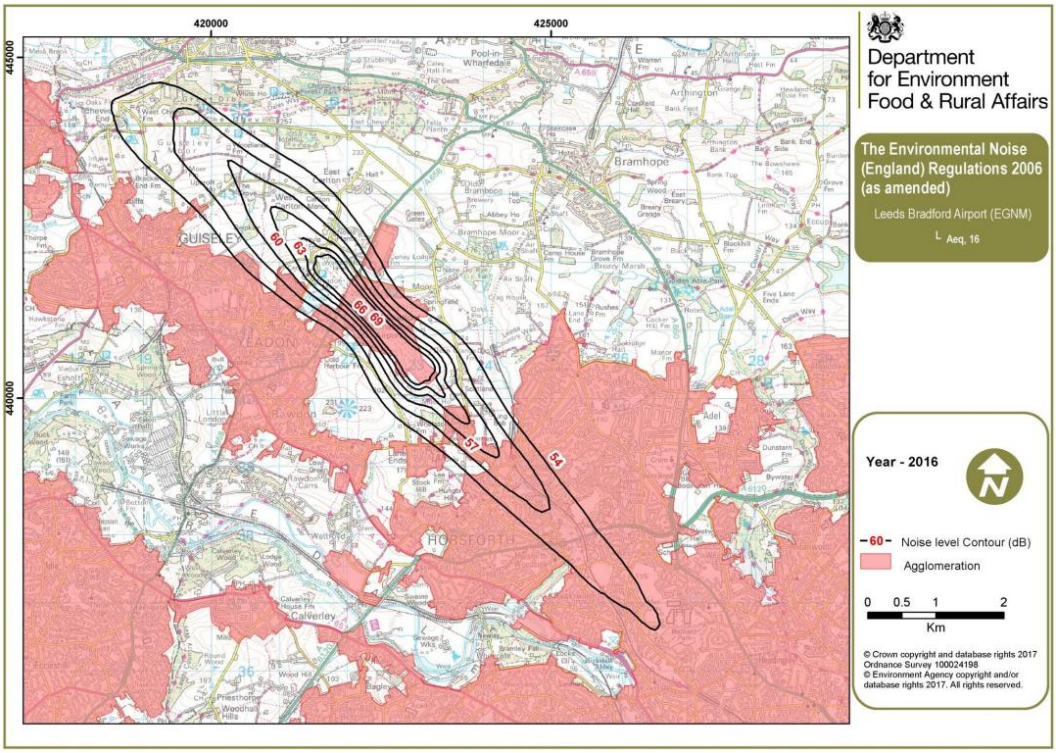


Figure 19: 2016 LBA Average Summer Day LAeq 16h

3.8.4. The next table shows the estimated number of people and dwellings experiencing average noise levels above 48 decibels (dB) during the average summer night in 2016; this is the average noise level produced by aircraft over the 8-hour night-time period (23:00 to 07:00).

Noise Level (dB)	Number of Dwellings	Number of People
≥ 48	5,650	11,400
≥ 51	1,500	3,400
≥ 54	300	800
≥ 57	50	200
≥ 60	<50	<100
≥ 63	0	0
≥ 66	0	0

Table 4: Estimated total number of people and dwellings above various noise levels, LAeq 8h in the vicinity of LBA

3.8.5. The following chart shows where these noise contours lie in relation to the Airport. The outer contour is the 48dB contour as referred to in Table 4.

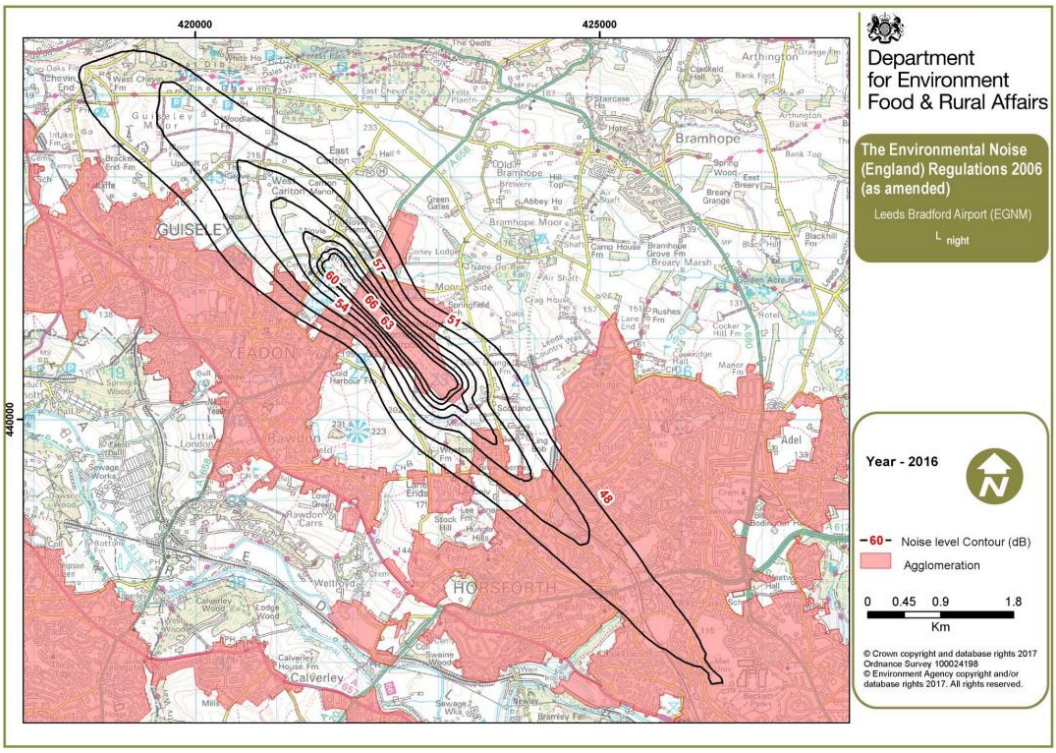


Figure 20: 2016 LBA Average Summer Night LAeq 8h

3.9. Continuous Climb and Continuous Descent Performance

3.9.1. Continuous Climb and Descent Operations (CCOs and CDOs) are aircraft operating techniques enabled by airspace design, instrument procedure design and facilitated by ATC. CCO and CDO allow aircraft to follow a flexible, optimum flight path that delivers major environmental and economic benefits - reduced fuel burn, emissions, noise and fuel costs - without any adverse effect on safety.

3.9.2. CCO and CDO operations allow arriving or departing aircraft to descend or climb continuously, to the greatest extent possible. Aircraft conducting CCO employ optimum climb engine thrust and climb speeds until reaching their cruising levels. With CDO, aircraft employ the minimum engine thrust necessary, ideally from top of descent and in a low drag configuration, prior to the final approach. Employment of these techniques reduces the need for intermediate level-offs and results in time being spent at more fuel-efficient higher cruising levels, resulting in significantly reducing fuel burn and lowering emissions and fuel costs. CDOs also reduce the noise impact as there is less requirement to increase power to maintain an altitude.

3.9.3. LBA's current ability to achieve continuous climb rests firmly on the traffic levels within the MTMA. RW32 departures fare better as they route further to the North however RW14 departures can frequently be held underneath or in the vicinity of arrivals into Manchester.

3.9.4. Continuous descent is also frequently impacted by Manchester traffic, be it aircraft on the ROSUN arrival, or departures carrying out a 'turn and burn' after departure, LBA arrivals can remain stuck above them and causes aircraft to be high on the approach profile.

3.9.5. When DSA was operating, this used to affect LBA SE inbounds resulting in a stepped descent from FL90, through FL70, FL60 then 3000ft. Not only is it challenging from an energy

management perspective, if it was not executed exactly right by ATCOs, aircraft were levelling off before being given the next descent clearance, increasing noise and fuel burn.

3.10. LBA Strategic Development Plan – "Route to 2030"

3.10.1. The 'Route to 2030' is the Strategic Development Plan (SDP) for LBA, produced in line with the requirements set out in the Aviation Policy Framework. The Framework reiterated the need for UK airports to produce 'masterplans'; a document which enables airports to communicate their development strategies to key stakeholders and the public.

3.10.2. The SDP provides an update on investment and growth at LBA since 2005 and sets out a high-level strategy for the development of the airport through to 2030. Underpinning the SDP is a clear understanding of the role of the airport in the Leeds City Region (LCR), which has been developed carefully with key stakeholders. This process has ensured that the SDP is aligned with and supports the development and growth of the LCR economy and in turn has fostered a much wider understanding of the importance of a successful airport to the region. LBA contributes £336m to the local economy every year and delivers over 2,350 direct jobs, with considerably more relying indirectly on the success of the Airport. LBA has in recent years, outstripped the percentage growth of many other UK airports. It exceeded 3.6 million passengers per annum (mppa) in 2016/17 representing a 27% increase in numbers since 2005. The SDP stated:

> 'We estimate that LBA had a total net economic footprint in the Leeds City Region of around £107 million of GVA … a total net tourism impact in the Leeds City Region of around £29 million of GVA … and in terms of other wider business benefits, supports around £200 million in GVA through increased productivity associated with business connectivity.'
>
> 'In total, we estimate that LBA currently supports around £336 million in GVA in the Leeds City Region and around 5,200 jobs. By 2030, if the airport grows in line with the Master Plan forecasts, these impacts are projected to grow to around £724 million at 2015 prices and around 10,100 jobs.'

3.10.3. The Government believes that aviation needs to grow, delivering the benefits essential to our economic well-being, whilst respecting the environment and protecting quality of life.

3.10.4. Leeds City Region Economic Plan 2016-2036, LCR LEP, 2016 stated:

> 'Leeds Bradford International Airport connects the City Region internationally. A better-connected airport will help to promote business growth in our key sectors and other industries, and to attract more investment'

4. Options Development

4.1. Development Process

4.1.1. The DOs presented in this document were conceived with no pre-conceptions; they were intended to establish the art of the possible without trying to 'solutionise' from the outset. Ultimately this long list of DOs will be trimmed down based upon the extent each DO meets the agreed DPs and how each fare in the Initial Options Appraisal (IOA).

4.1.2. All the DOs are presented against Google Earth, Google Maps and En-Route Chart backgrounds for context.

4.2. Departures

4.2.1. In the case of the departures, the DOs are depicted as swathes i.e. areas within which a final departure nominal track might ultimately be designed. A climb gradient of 6% has been assumed as it is a realistic and reasonable gradient. The Google Earth based figures in this Section contain a line within the swathe that indicates roughly when aircraft would reach 7,000ft if they climbed on a 6% climb gradient. This orange line does not depict a nominal track of a flight path as this might be anywhere within the depicted swathe.

4.2.2. There is a requirement to depart in a variety of directions off each runway, namely North-West, North-East, South-East, West and South. Accordingly, each direction of departure has been considered in turn with a variety of options.

4.2.3. **The 'Do Nothing' Option from each runway to a given direction is the 'Baseline' as described in the previous section.**

4.3. Runway 32 – North-West

4.3.1. Two DOs were conceived to facilitate a departure to the North-West off RW32. Option A (32NWA) follows the NPR to the South of Ilkley before turning right to track towards the Skipton area. Option B (32NWB) was not presented at the initial Stakeholder Focus Group for discussion but was conceived due to a request from stakeholders. Option B is simply a straight ahead climb on runway track to 4.5nm prior to a right-turn towards RIBEL. Option A (32NWA) has greater similarity to the baseline although it is still very different as the existing track goes further West before turning North-West.

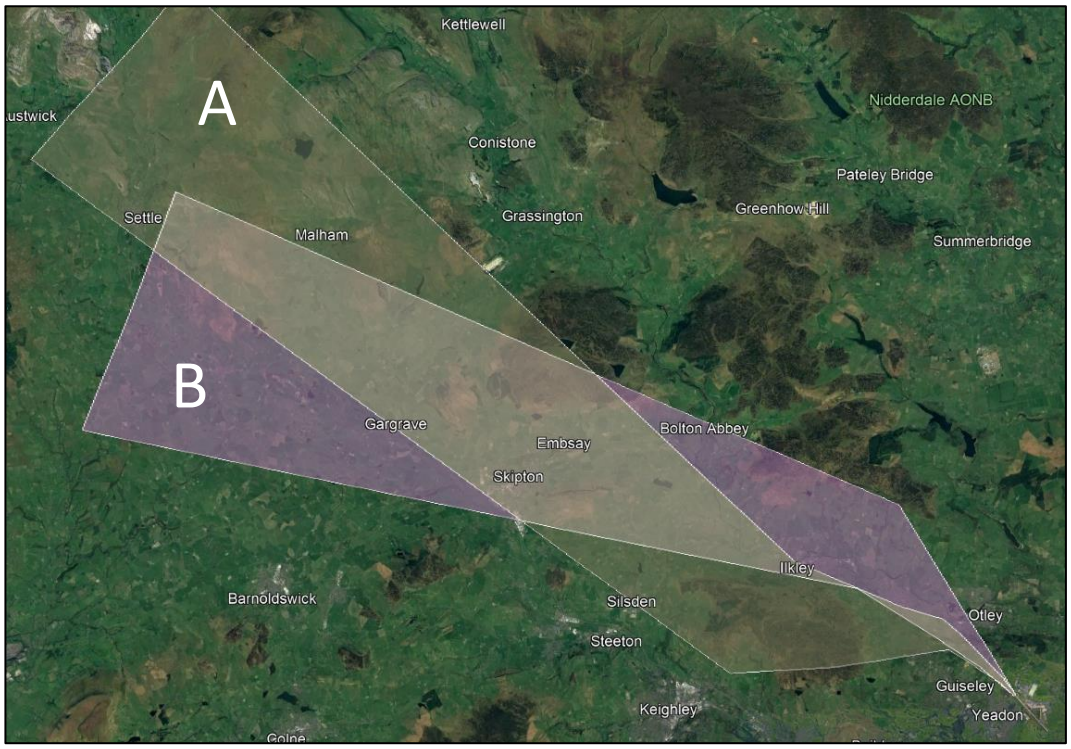


Figure 21: RW32 North-West Options (Google Earth)

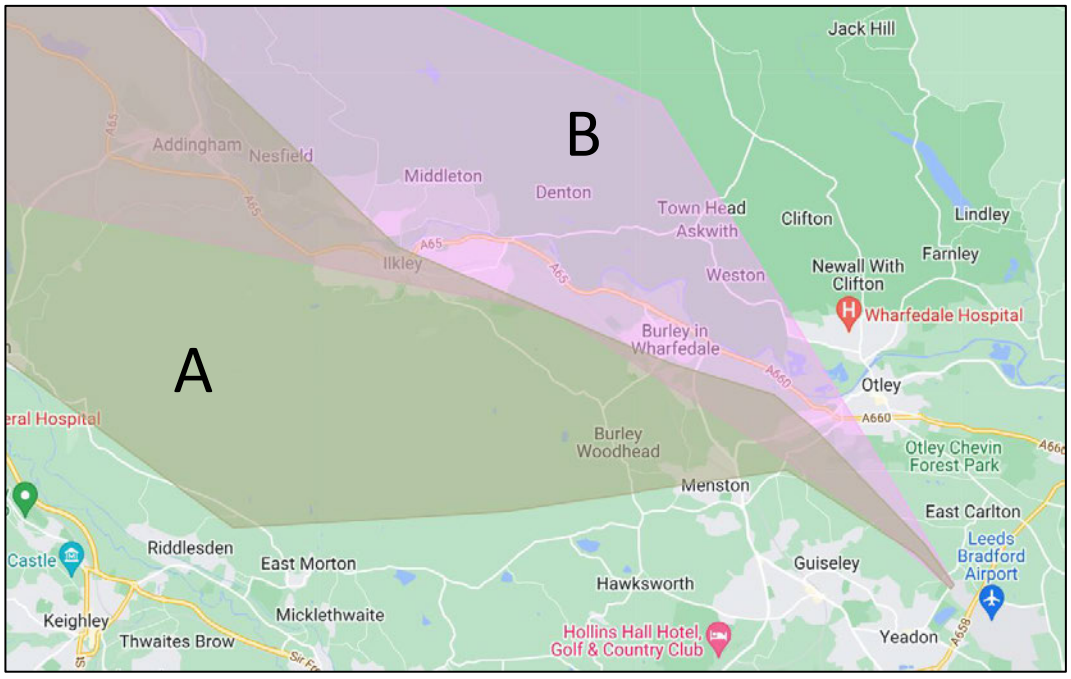


Figure 22: RW32 North-West Options (Google Maps)

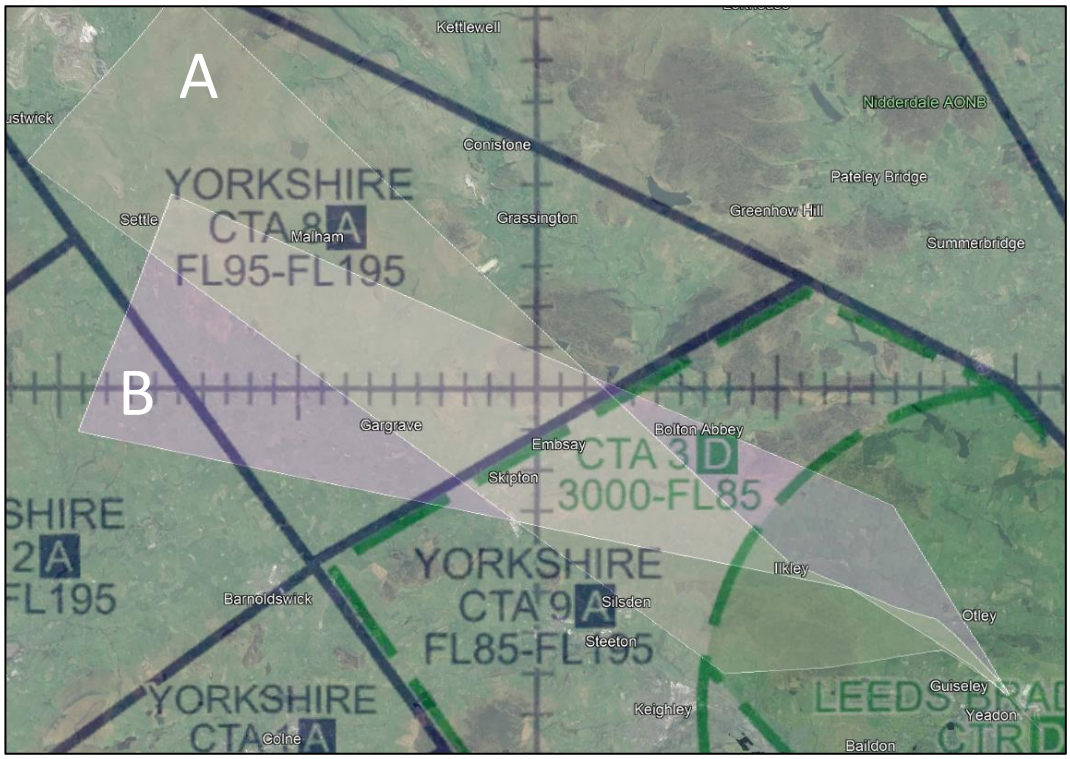


Figure 23: RW32 North-West Options (En-Route Chart)

4.4. Runway 32 – North-East

4.4.1. Departures to the North-East turn after adherence to the NPR towards the reporting point called GASKO (as depicted in Figure 24) on P18 (name of a Route on the Route Network).

Figure 24: Position of Reporting Point GASKO in relation to LBA

4.4.2. Five DOs were conceived for North-Easterly departures off RW32. These DOs are presented as a fan of options in the figures below with Option D (32NED) being the most challenging due to the lack of CAS containment to the North-East of LBA. All the other DOs are contained within the existing airspace configuration laterally although it is likely that DOs B (32NEB) and C (32NEC) would fall vertically outside the existing CAS as the base of the airspace in Yorkshire CTA 10 is FL125 (12,500ft). Option A (32NEA) seeks to follow the NPR whilst Option B (32NEB) is essentially a straight-ahead routing initially with a right-turn abeam Ilkley. Option E (32NEE) is most like the baseline.

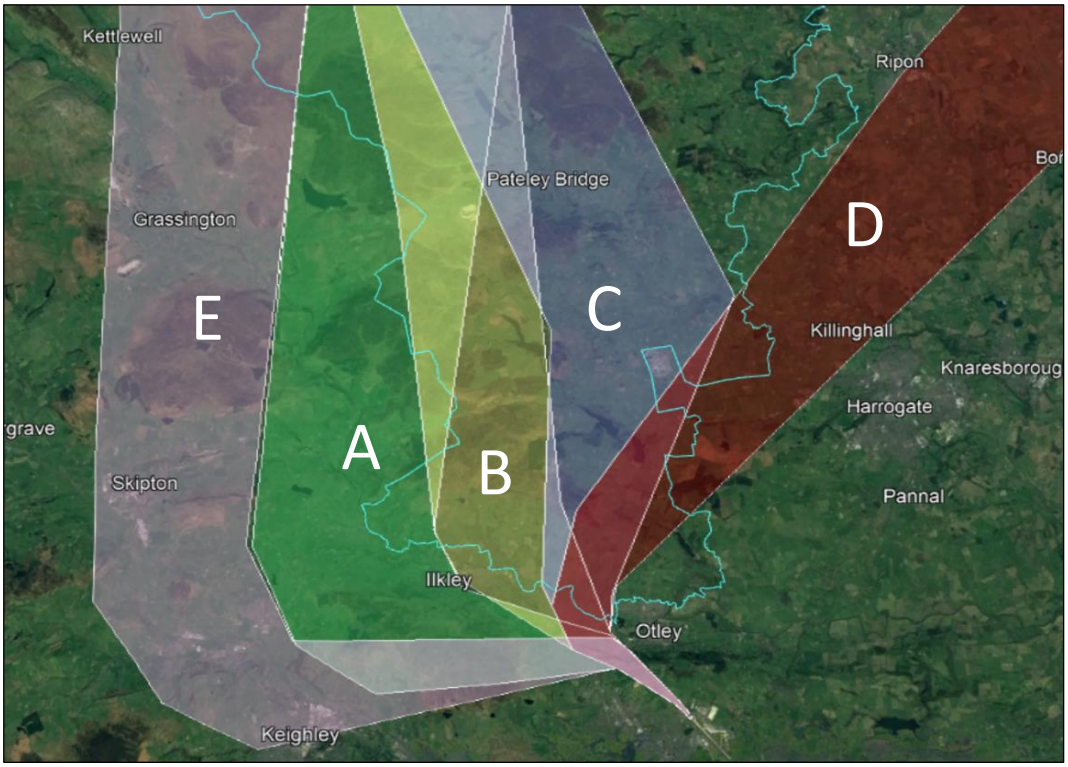


Figure 25: RW32 North-East Options (Google Earth)

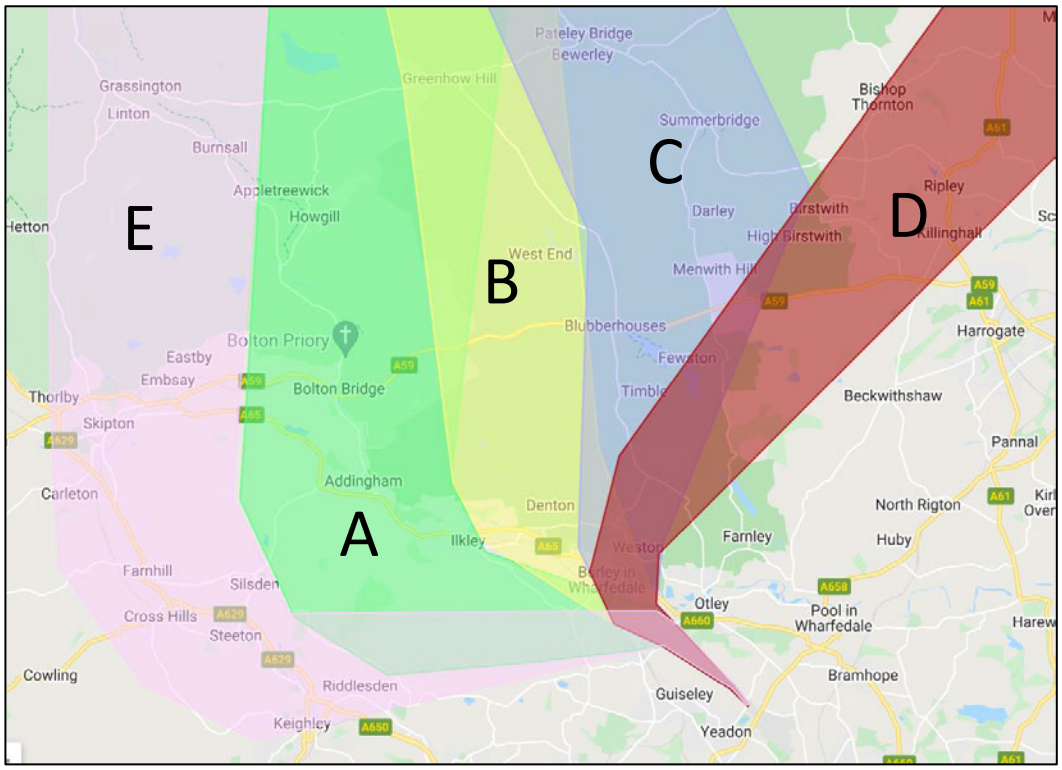


Figure 26: RW32 North-East Options (Google Maps)

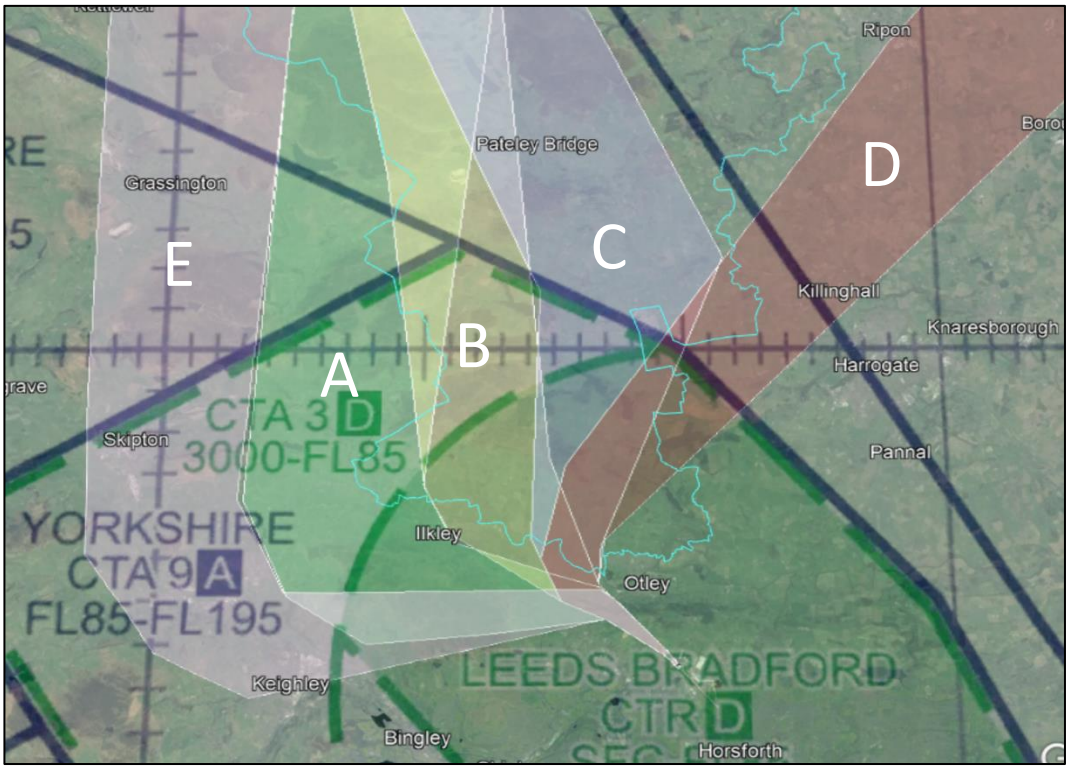


Figure 27: RW32 North-East Options (En-Route Chart)

4.6. Runway 32 – South-East

4.6.1. Existing departures to the South-East off RW32 turn left once they have adhered to the NPRs and route towards DOPEK and LAMIX.

4.6.2. Seven DOs were conceived to facilitate a South-Easterly departure off RW32. Three with a left turn adhering to the NPR (32SED, 32SEE and 32SEG) and four with a right turn (32SEA, 32SEB, 32SEC and 32SEF). The departures with the right turn route around the North of Otley and would almost certainly require additional CAS to contain the procedures. These then proceed to fly over Central Leeds in the case of Options B, C and F. The left turns result in flight over Shipley, Bingley and Bradford (and Ilkley in the case of Option G). Option E (32SEE) is most similar to the baseline. Options F and G remain on runway track until circa 4.5nm.

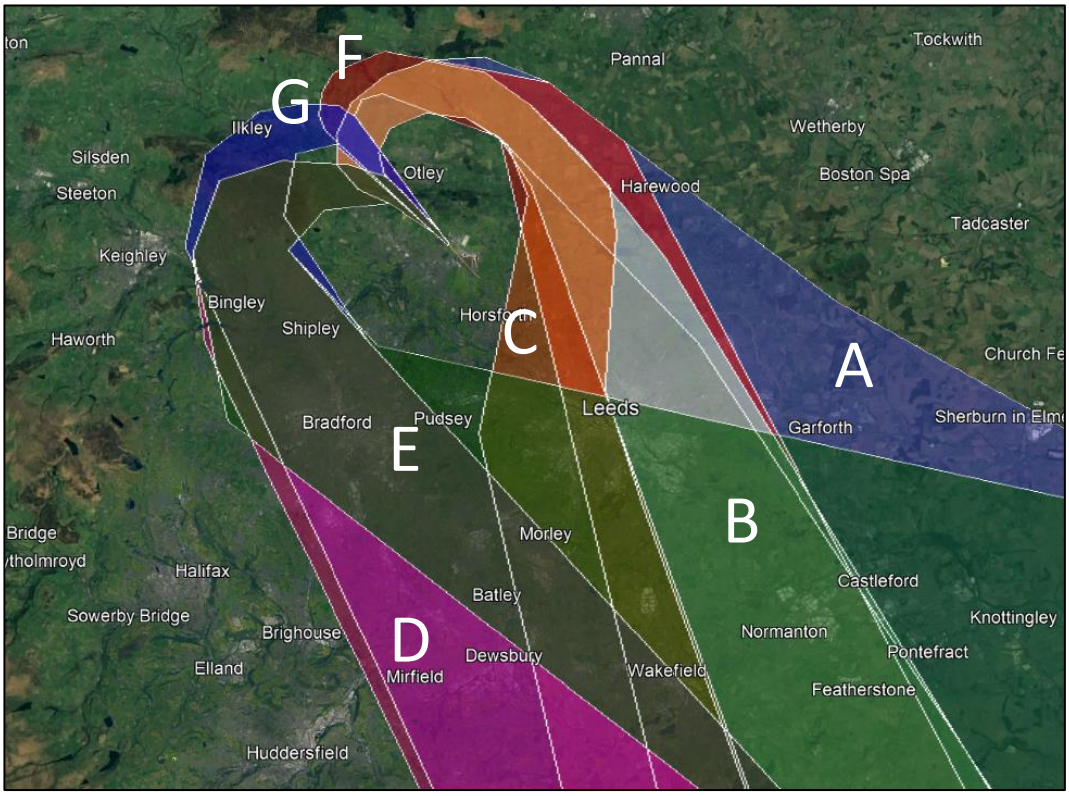


Figure 28: RW32 South-East Options (Google Earth)

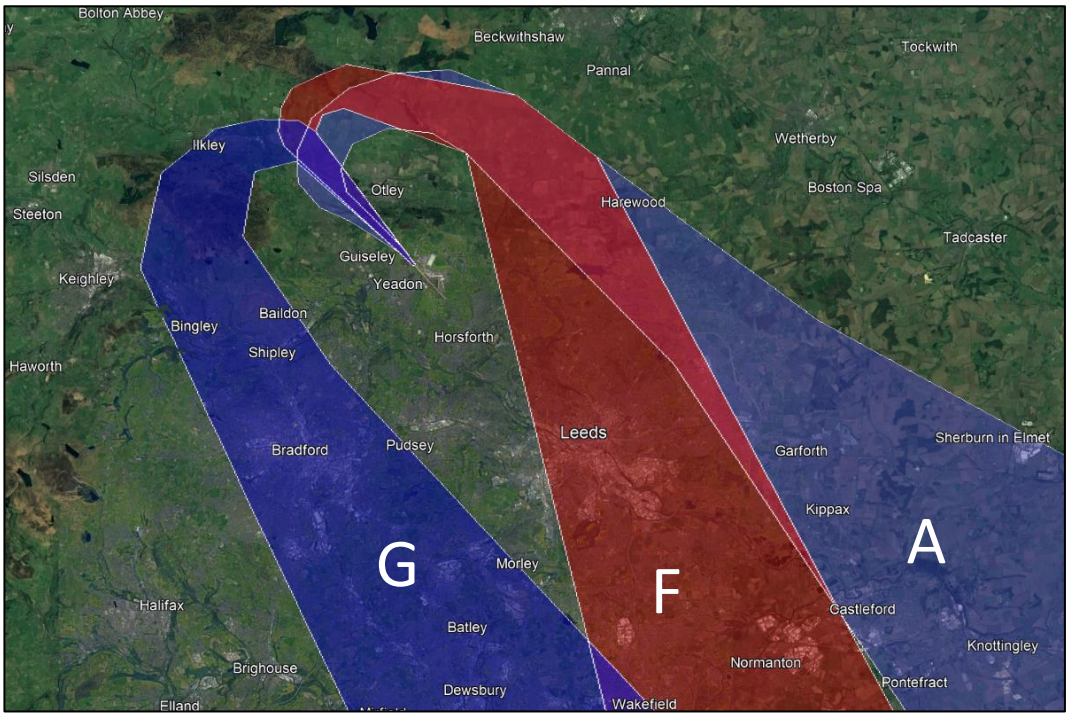


Figure 29: RW32 South-East Options A, F and G (Google Earth)

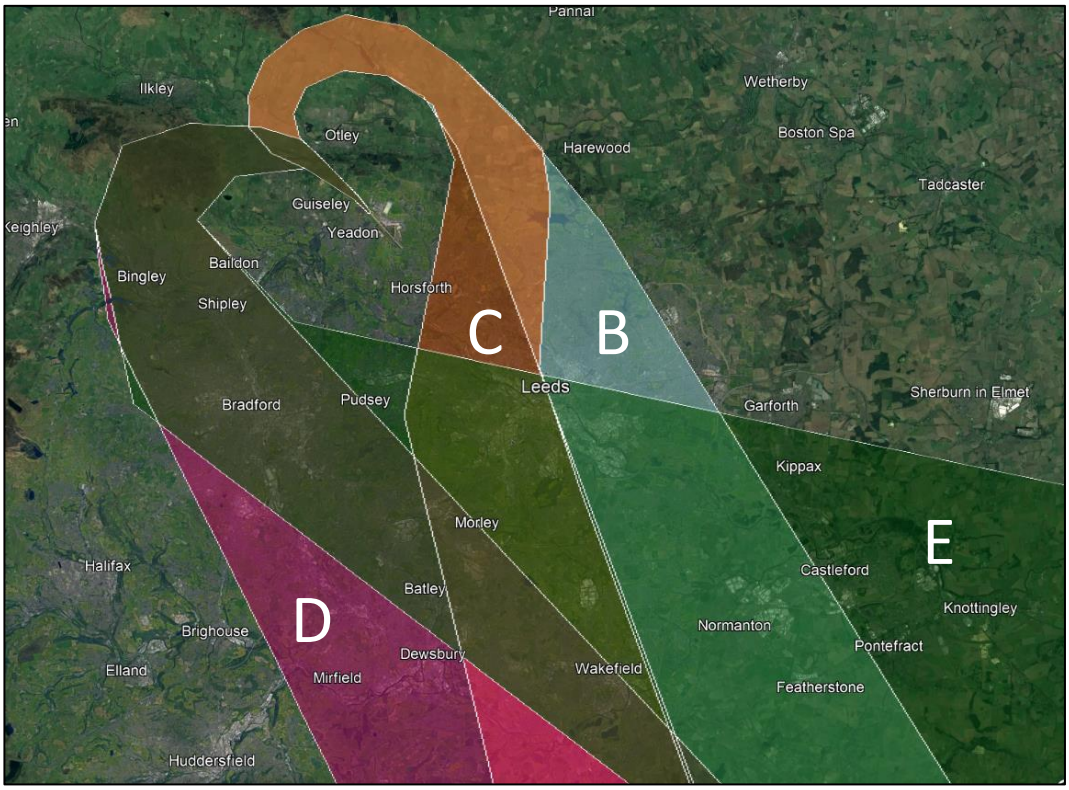


Figure 30: RW32 South-East Options B, C, D and E (Google Earth)

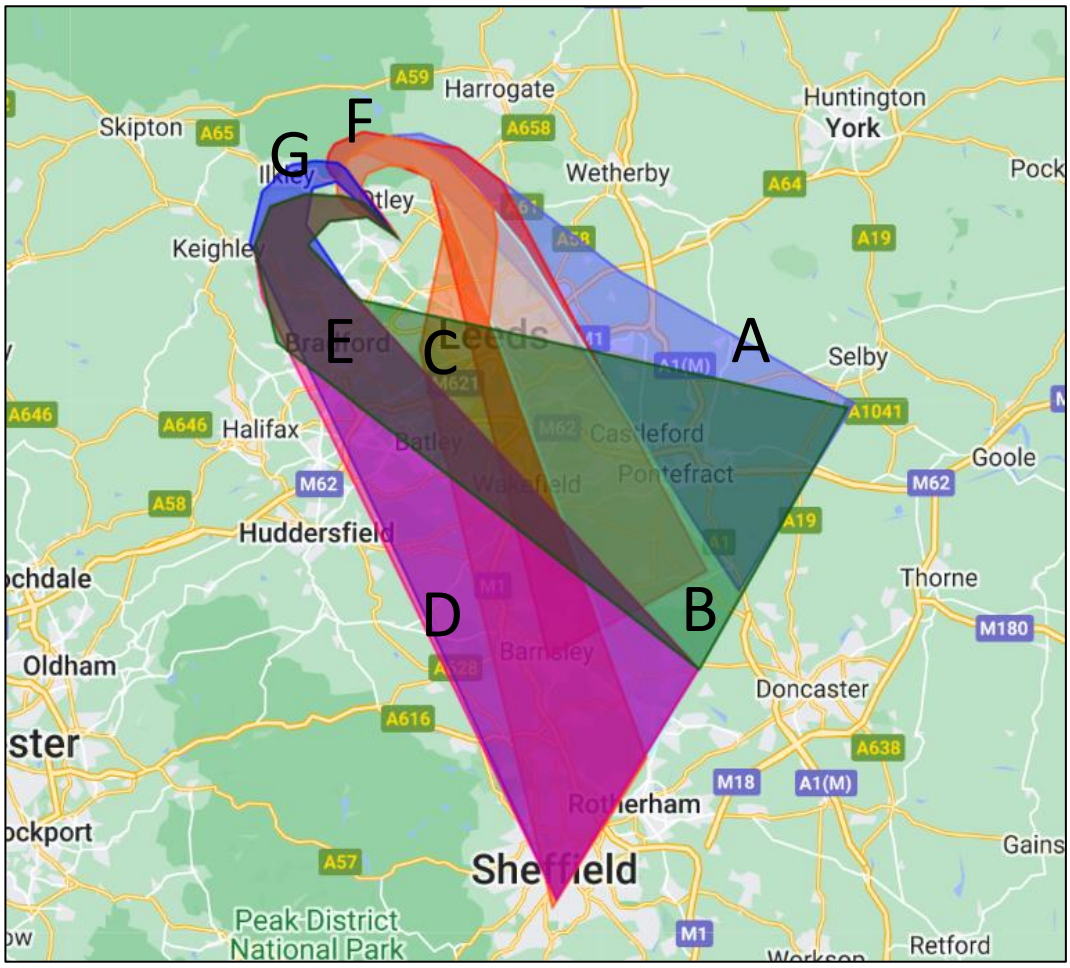


Figure 31: RW32 South-East Options (Google Maps)

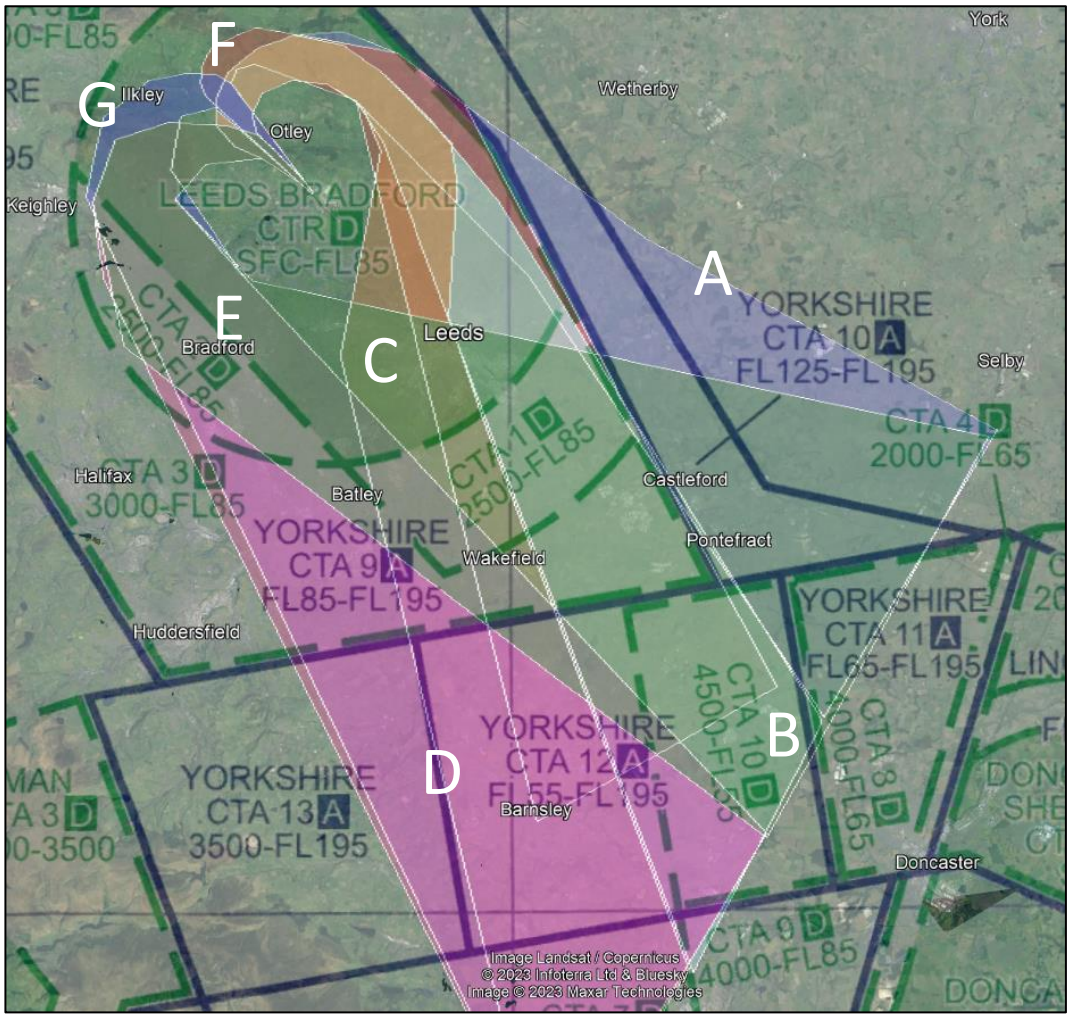


Figure 32: Runway 32 South-East Options (En-Route Chart)

4.8. Runway 32 – South & West

4.8.1. Eight DOs were developed to facilitate a departure to the South and West off RW32. Option A (32S&WA) and Option F (32S&WF) involve a right turn and a wraparound to the South of the Airport whilst the other six DOs involve left turns. Option B (32S&WB) is most like the baseline. Options F, G and H (32S&WF, 32S&WG and 32S&WH) all remain on runway track to circa 4.5nm.

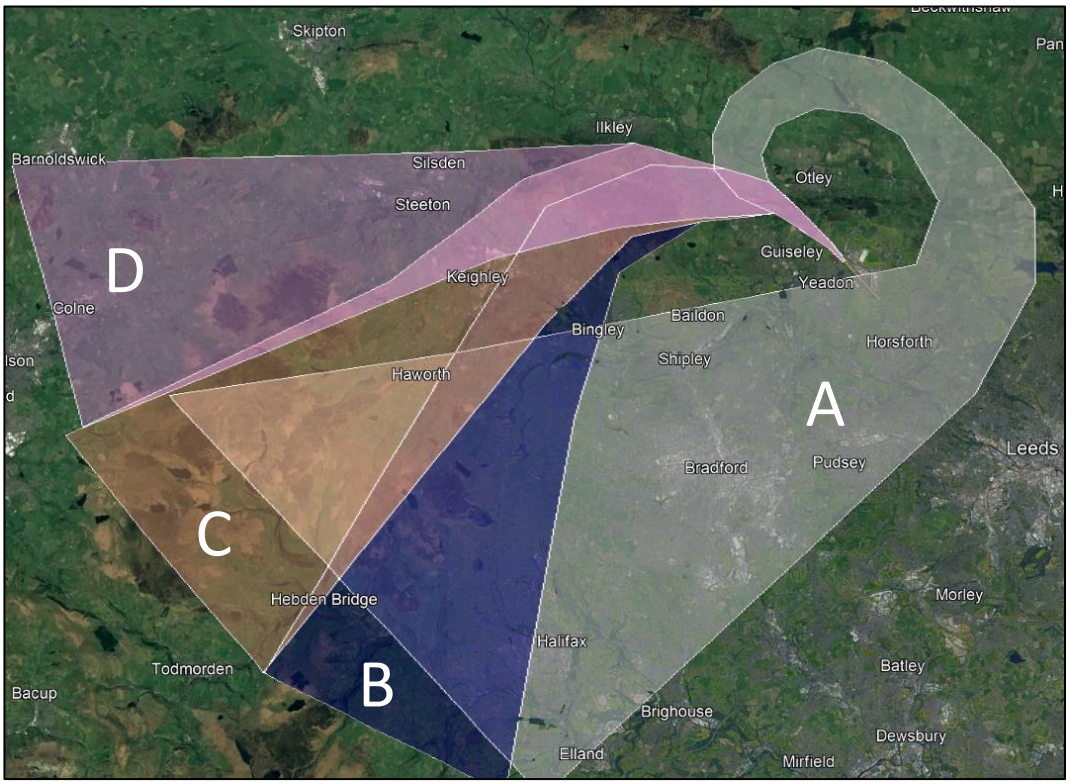


Figure 33: RW32 South & West Options A-D (Google Earth)

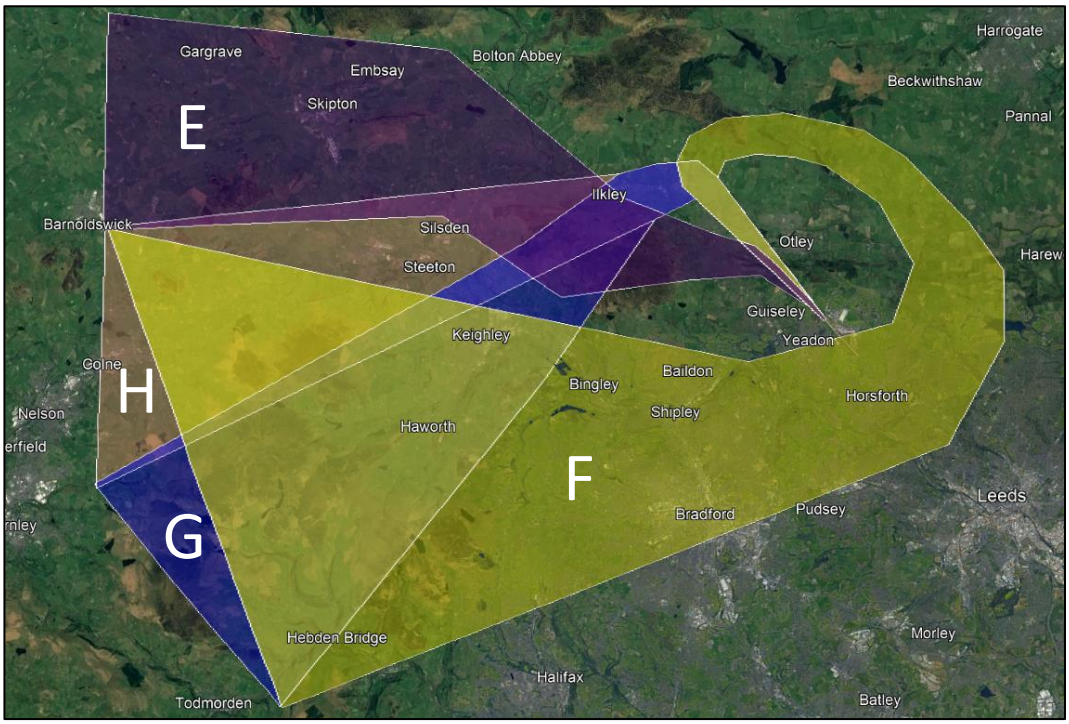


Figure 34: RW32 South & West Options E-H (Google Earth)

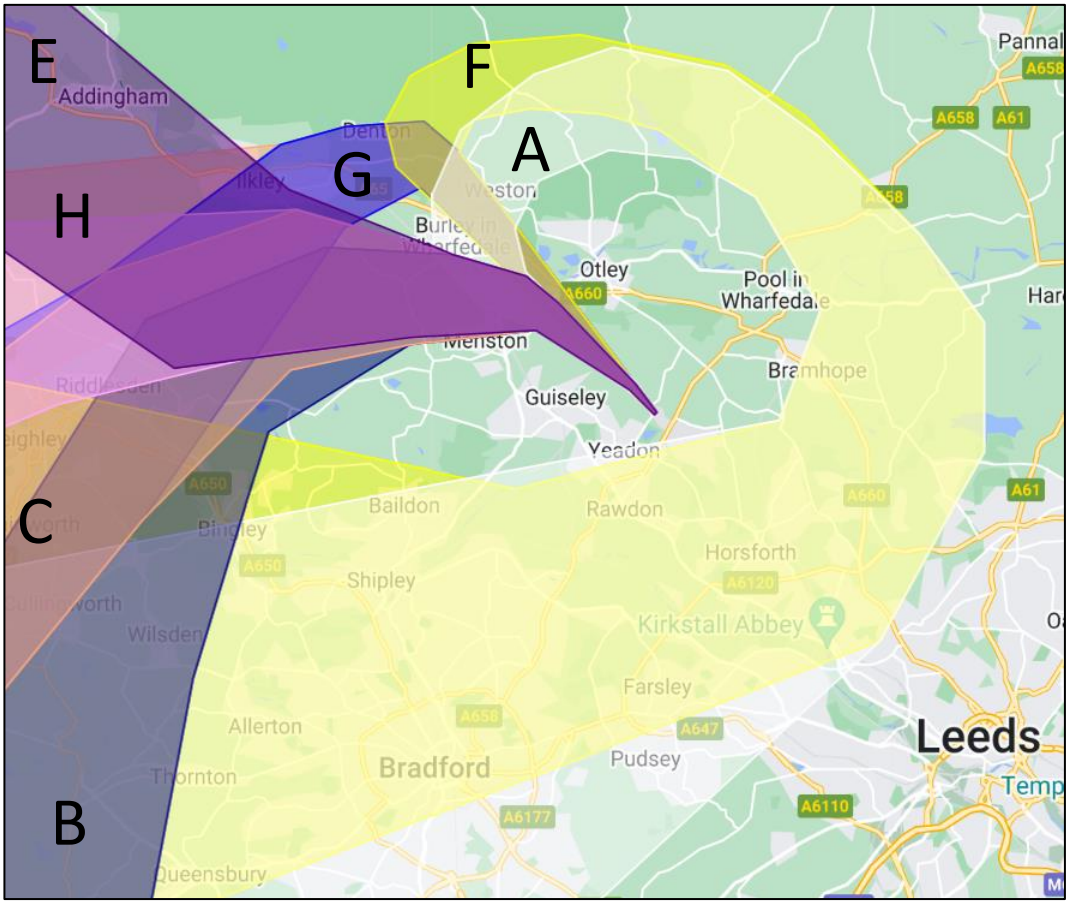


Figure 35: RW32 South & West Options (Google Maps)

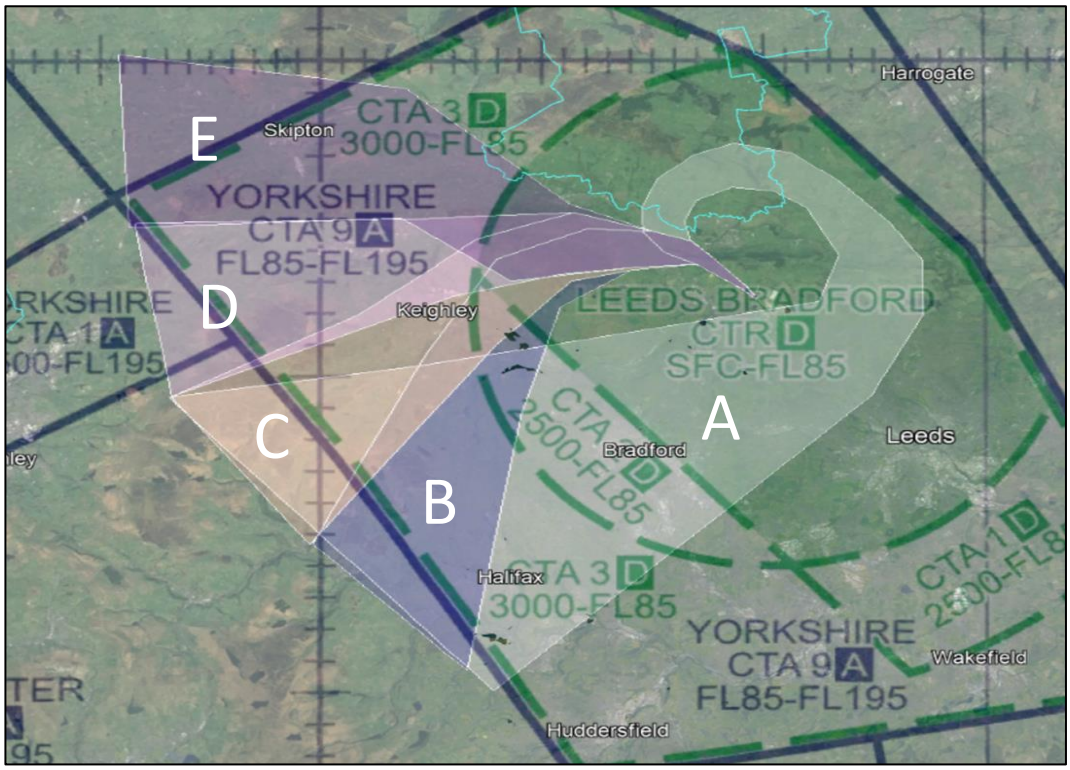


Figure 36: RW32 South & West Options A-E (En-Route Chart)

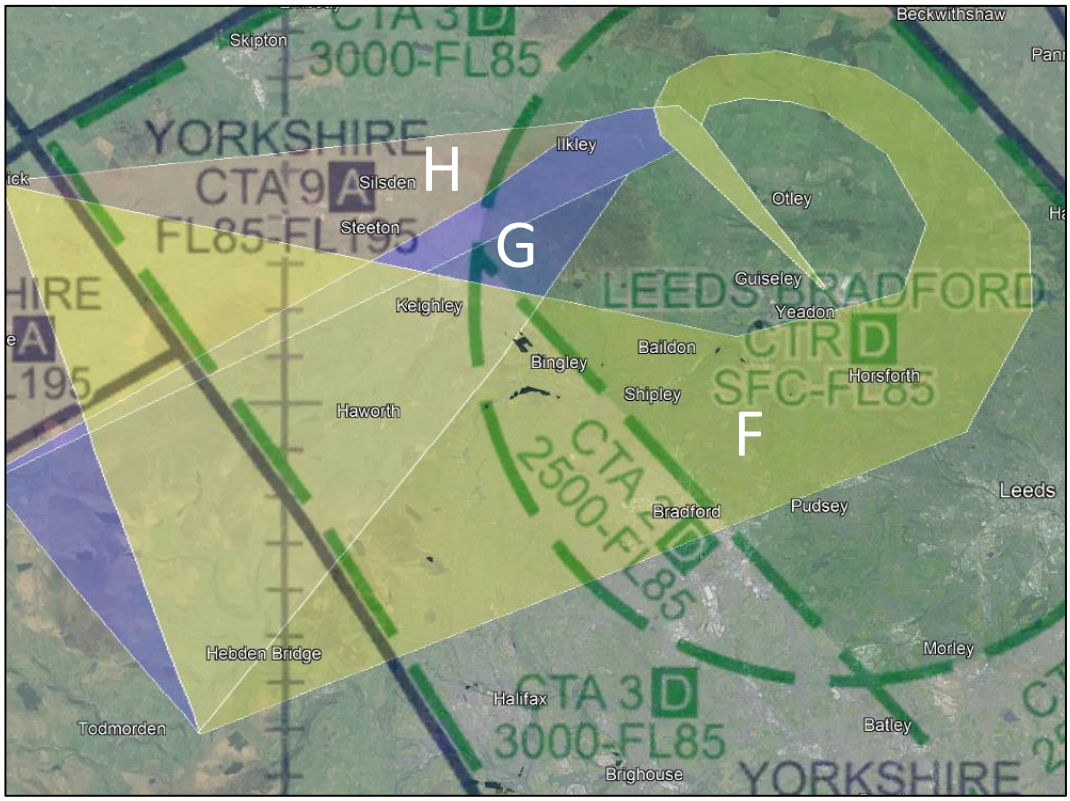


Figure 37: RW32 South & West Options F-H (En-Route Chart)

4.9. Runway 14 – North-West

4.9.1. Four DOs were conceived to facilitate departures to the North-West off RW14, two right-hand turnouts (14NWB and 14NWD) and two left-hand turnouts that may require additional CAS (14NWA and 14NWC). Option D (14NWD) is most like the baseline.

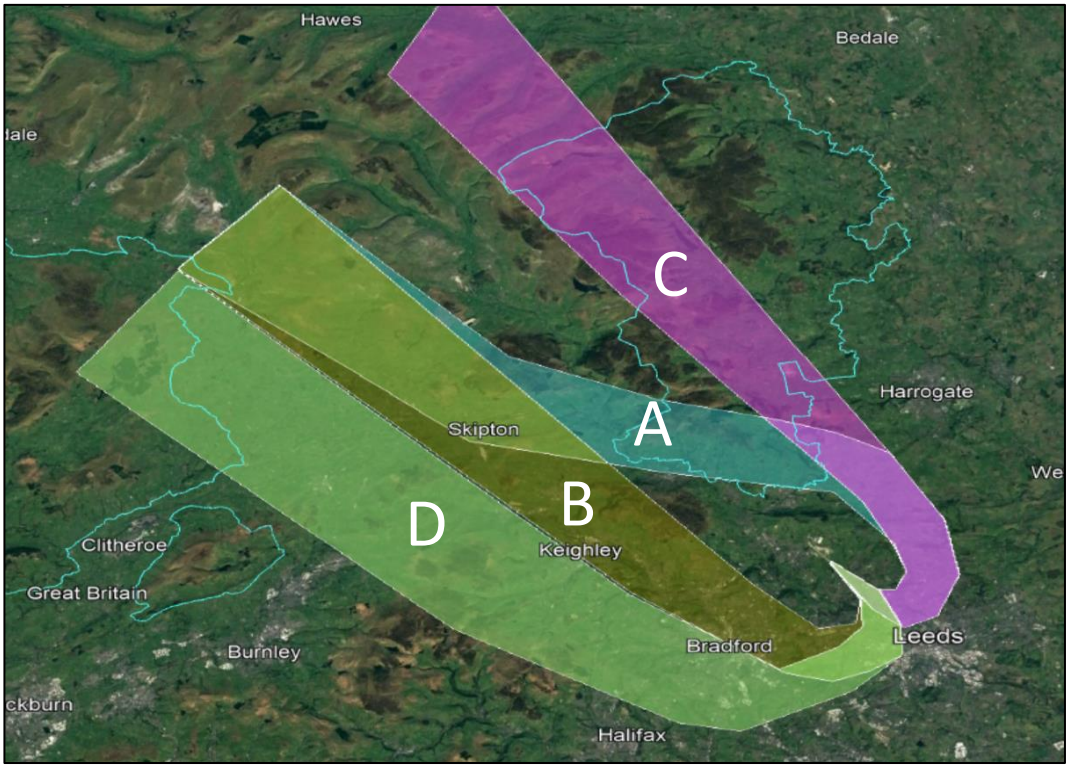


Figure 38: RW14 North-West Options (Google Earth)

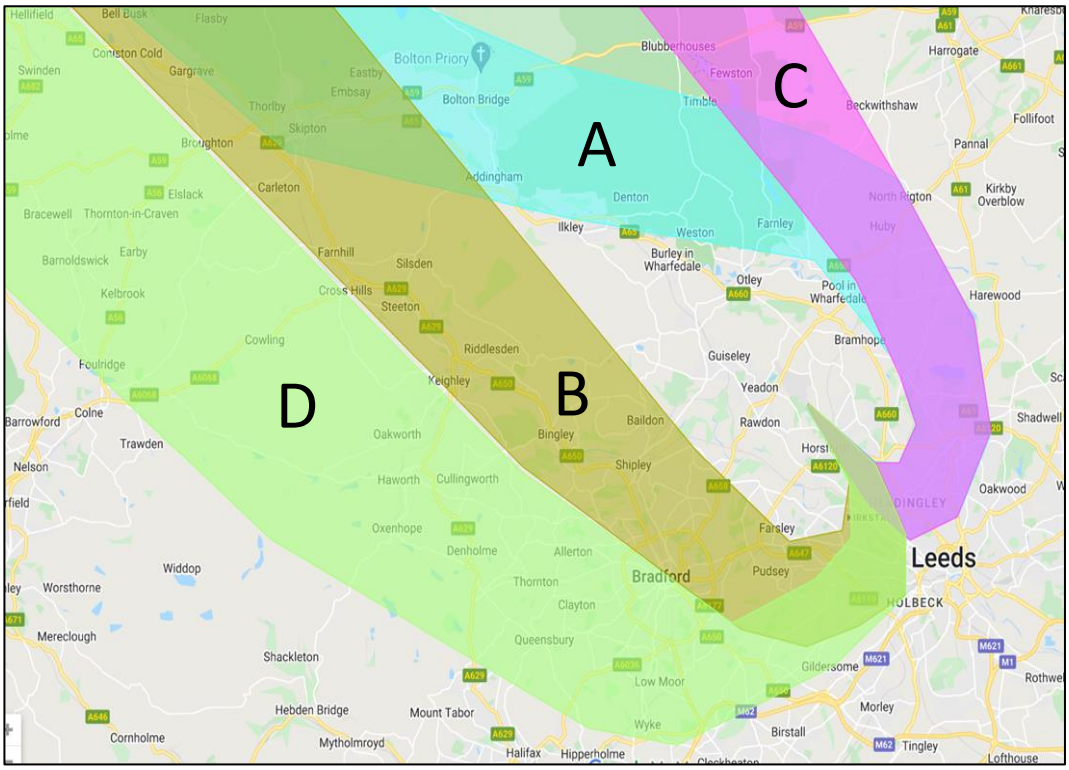


Figure 39: RW14 North-West Options (Google Maps)

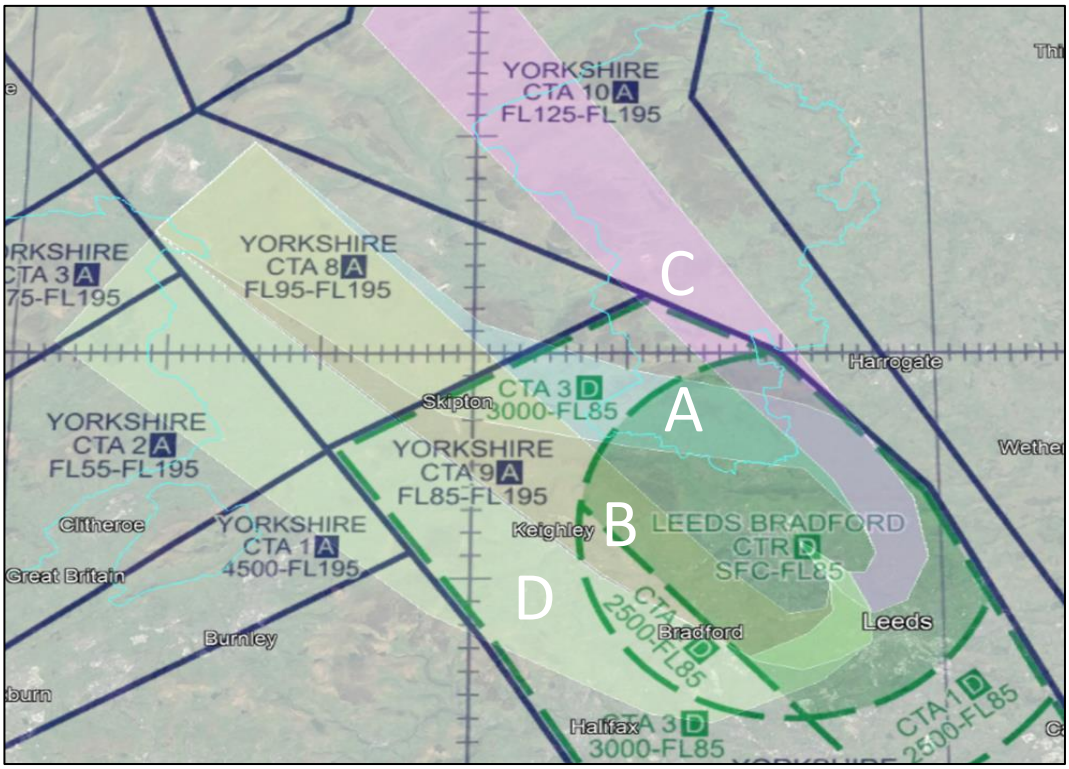


Figure 40: RW14 North-West Options (En-Route Chart)

4.11. Runway 14 – North-East

4.11.1. Five DOs were developed to meet the needs of a departure to the North-East off RW14. Three involving a left-hand turn out and possibly a requirement for additional CAS (14NEA, 14NEB and 14NEC) and two with a right-hand turnout (14NED and 14NEE). Notably, Option A is significantly different and cuts across the Class G uncontrolled airspace area known as the Vale of York Area of Intense Aerial Activity (AIAA). Option E (14NEE) is most like the baseline.

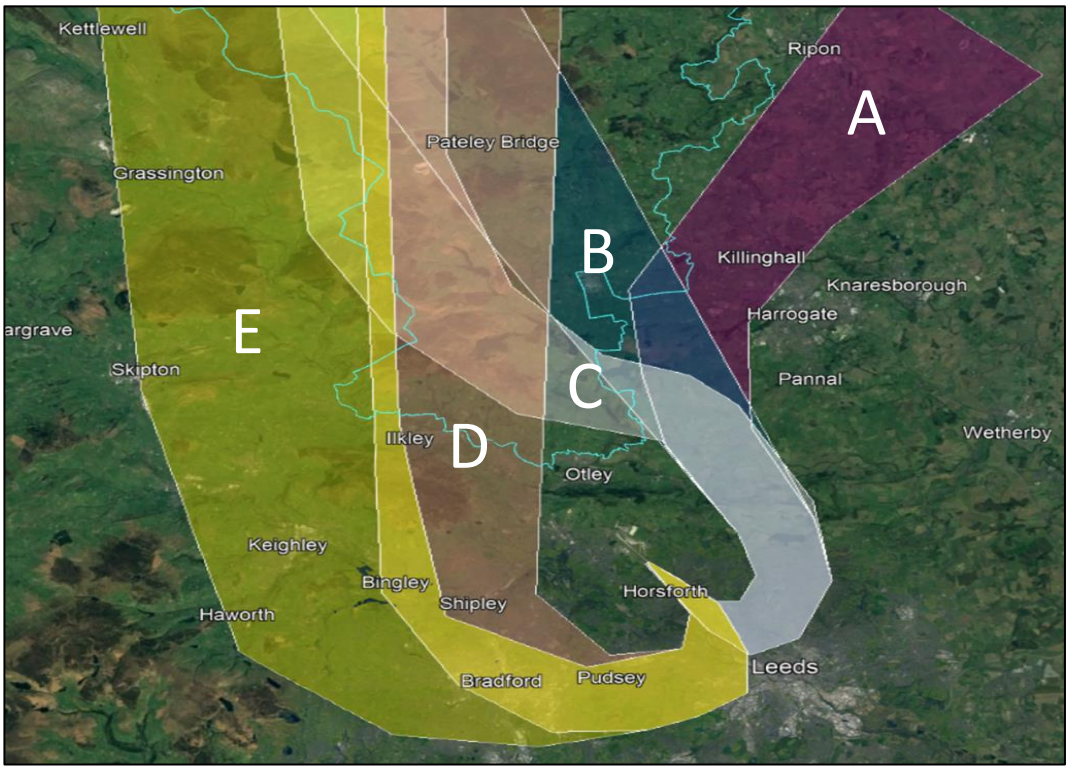


Figure 41: RW14 North-East Options (Google Earth)

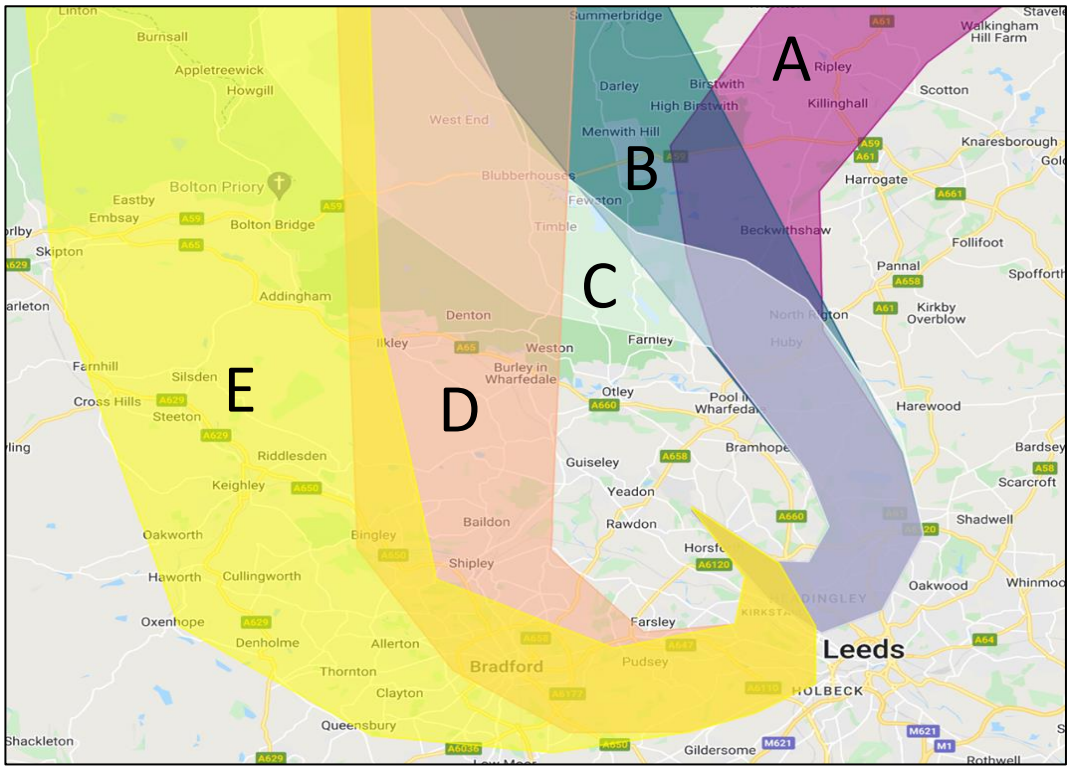


Figure 42: RW14 North-East Options (Google Maps)

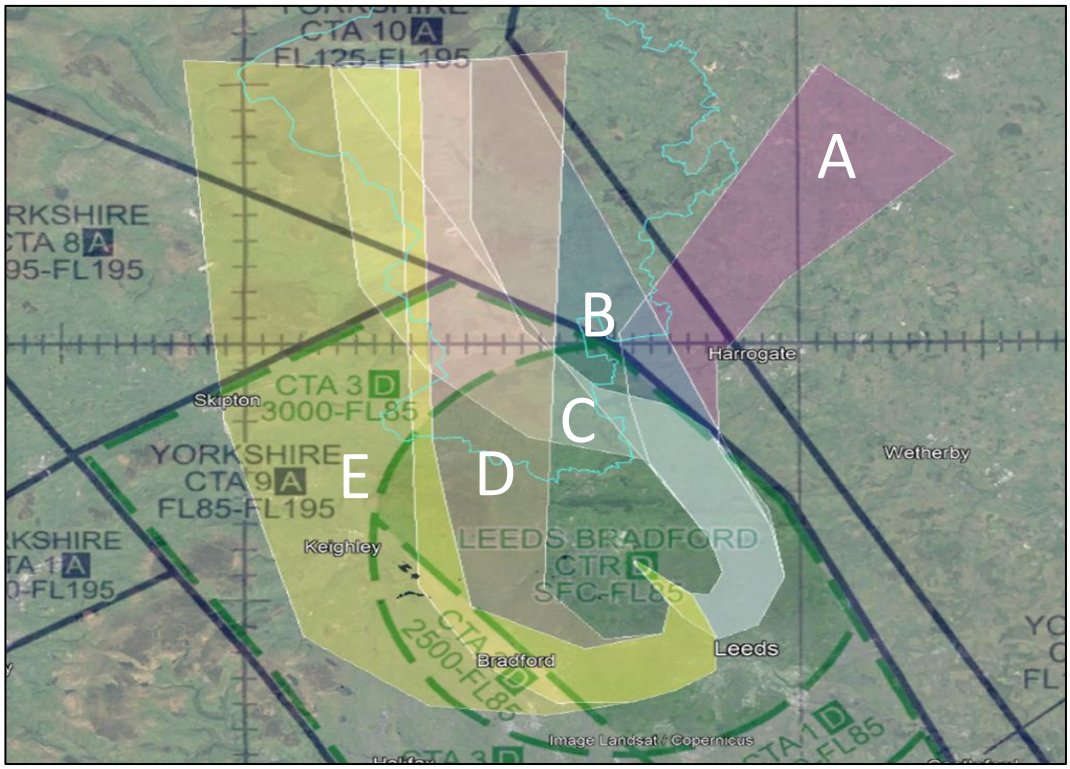


Figure 43: RW14 North-East Options (En-Route Chart)

4.13. Runway 14 – South-East

4.13.1. Four DOs (a fan of options) were conceived to enable aircraft to depart to the South-East off RW14. Option B (14SEB) being most like the baseline.

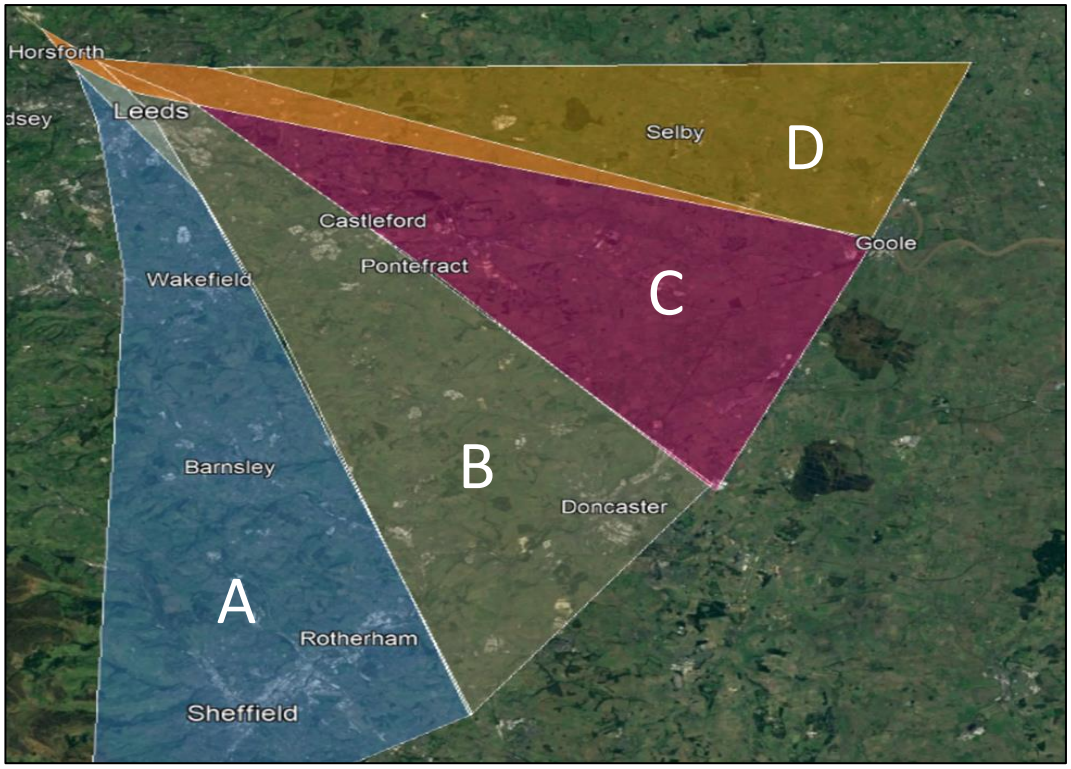


Figure 44: RW14 South-East Options (Google Earth)

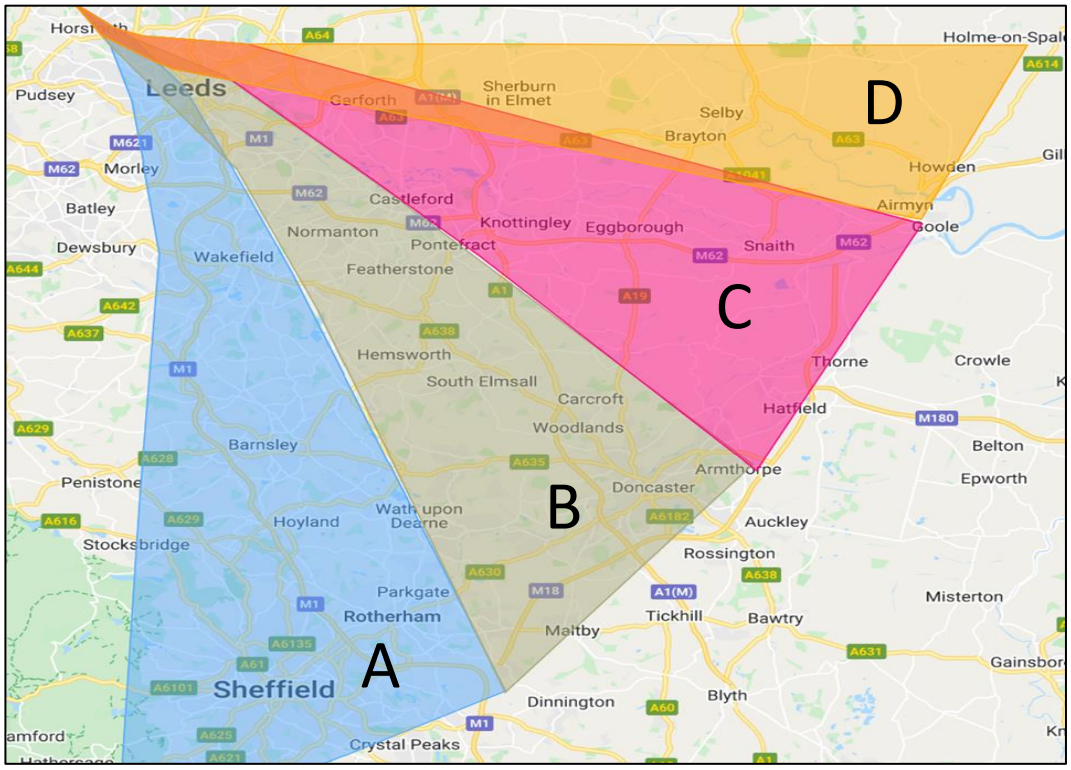


Figure 45: RW14 South-East Options (Google Maps)

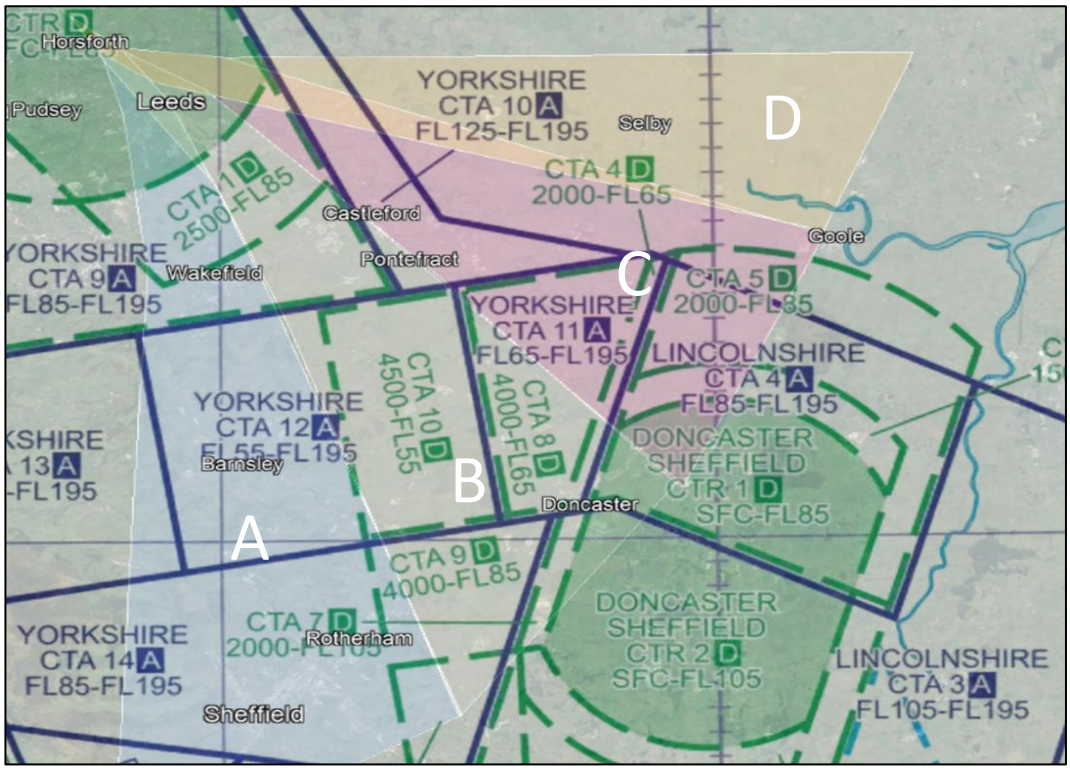


Figure 46: RW14 South-East Options (En-Route Chart)

4.15. Runway 14 – South & West

4.15.1. Five DOs have been developed for departures to the South and West from RW14. Two with a left-hand turn out and possibly needing additional CAS (14S&WD and 14S&WE) and three with a right-hand turnout (14S&WA, 14S&WB and 14S&WC). Option B (14S&WB) bears the greatest resemblance to the baseline.

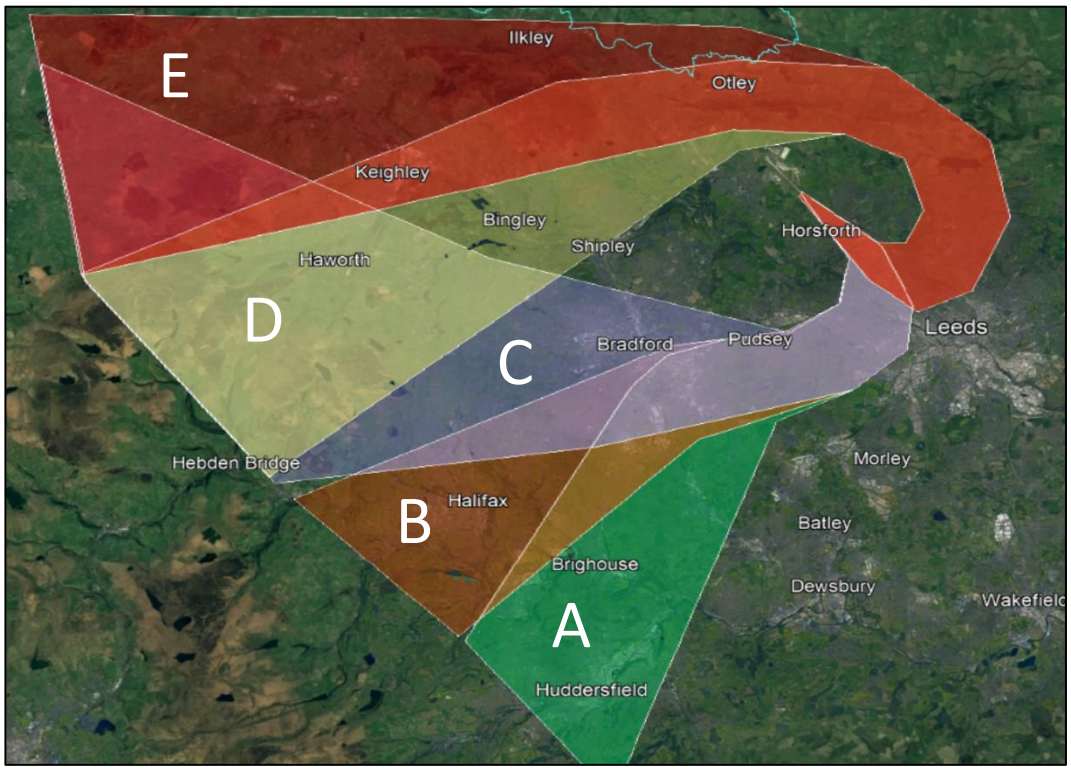


Figure 47: RW14 South & West Options (Google Earth)

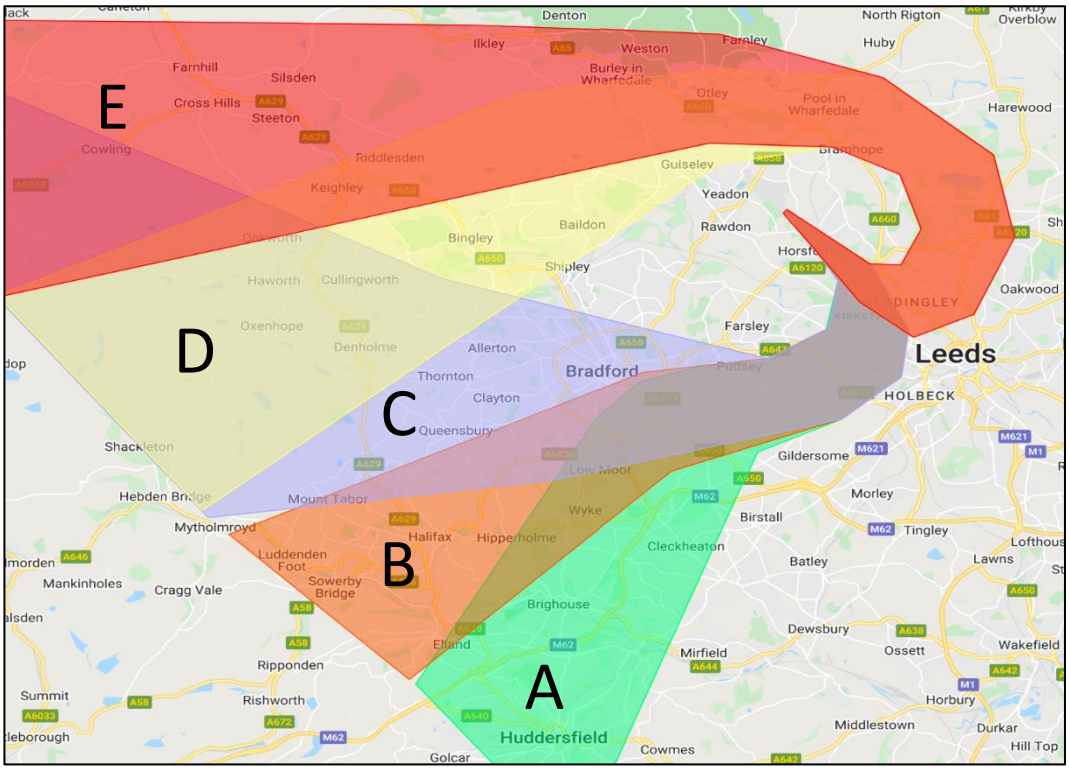


Figure 48: RW14 South & West Options (Google Maps)

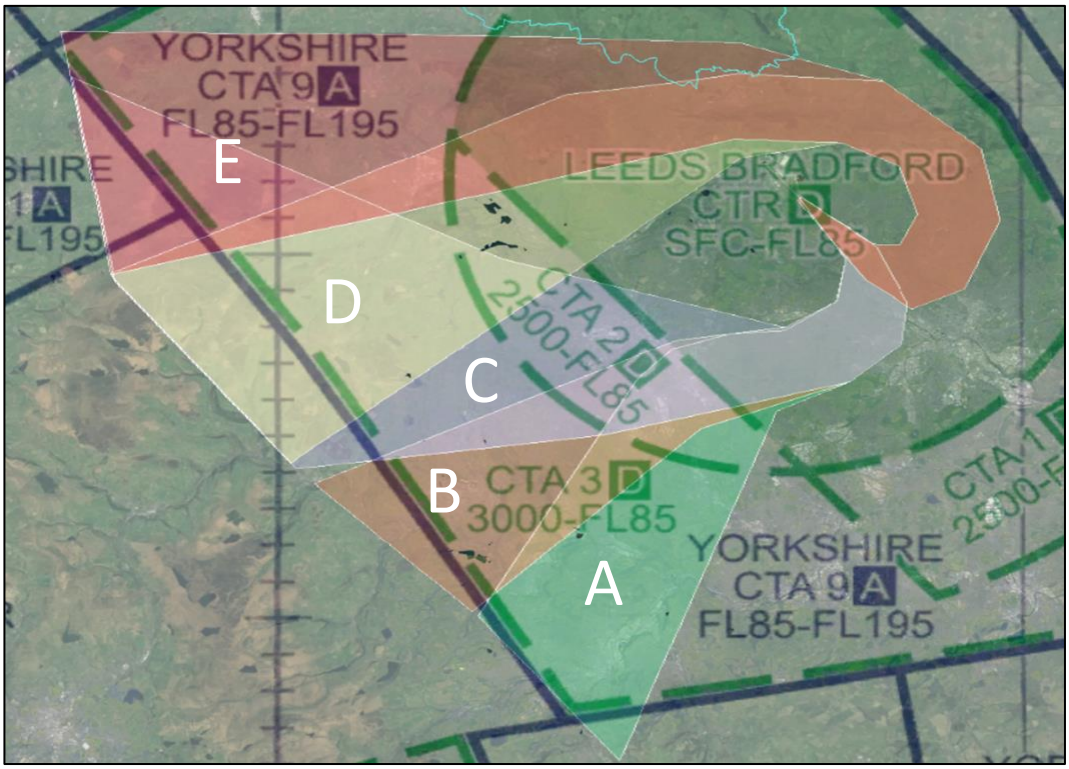


Figure 49: RW14 South & West Options (En-Route Chart)

4.17. Arrivals

4.17.1. In the case of the arrivals, the DOs are depicted as general directions of travel based on a variety of different hold and transition options. The lines depicting the Arrival Transitions and the Missed Approach Procedures are not intended to show definitive tracks over the ground. These are purely intended to provide an indication of how such a system would work. The final procedures would be refined through the consultation process should a given DO progress beyond Stage 2 of the process.

4.17.2. The arrival hold depictions are intended to give stakeholders an idea of how the system might work. These are drawn within blue circles/lozenges surrounding them as the number of holds and their final locations has not determined. It is the responsibility of the en-route ANSP to determine the location of these holds. LBA is a stakeholder in the NERL MTMA ACP and accordingly will have some input into this decision-making process.

4.17.3. The LBA hold already exists and this is depicted as it exists today. The LBA hold is also a Missed Approach hold and any future system will also require a Missed Approach hold. This may be the LBA hold, or it may be coincident with any one of the hold options presented as arrival holds.

4.19. Standard RNP T-Bars

4.19.1. States are required by the International Civil Aviation Organisation (ICAO) to develop implementation plans setting out the adoption of PBN within their airspace structure, including routes and, of relevance to this Section of the document, instrument approach procedures (IAPs). IAPs that utilise PBN typically have a centreline that extends from 10nm out to touchdown from an Intermediate Fix (IF). The centreline is typically extended with 5nm legs that end with an Initial Approach Fix (IAF). This is referred to as a T-Bar. Figure 50 shows how a standard T-Bar would look if it were to be implemented at LBA. The leg extensions would, in some cases, either fall outside the existing CAS or potentially result in aircraft routing outside CAS to get to them. Accordingly, there would need to be a change to the existing airspace configuration to accommodate a standard T-Bar.

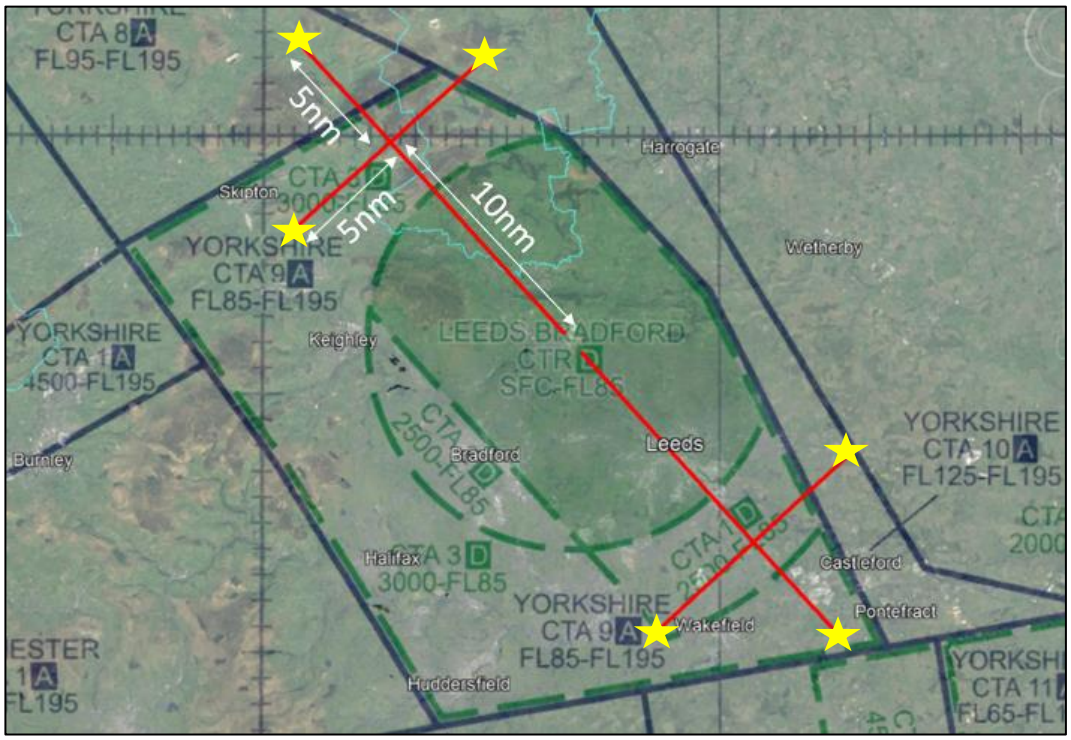


Figure 50: Standard T-Bar Configuration

4.19.2. These IAFs (depicted using yellow stars in Figure 50) enable an aircraft's Flight Management System (FMS) to navigate to that point in space. These waypoints can be coded in different ways including, amongst others, Flyover and Fly-By waypoints, the latter not requiring the aircraft to fly directly over the point. By way of an example, Figure 51 shows the track of an aircraft flying over the IAF (yellow star), flying by (rather than over) the IF (orange star) before establishing on final approach and flying over the Final Approach Fix (FAF) (pink star) to the runway.

Figure 51: PBN Approach

4.19.3. T-Bars can be amended by removing legs or changing the angle of the legs to create what is known as a Y-Bar. Y-Bars can be used when the 90-degree arrangement is not practicable. The angle cannot exceed 90-degrees as otherwise the turn onto the final approach track would be too severe, but it can be reduced. Creating a Y-Bar configuration at LBA would be counterproductive as the extensions would fall further outside of the existing CAS.

4.21. Amended RNP T-Bars

4.21.1. Another option for LBA, given the current airspace configuration, would be an amended T-Bar with only the western 90-degree legs added to the final approach track as depicted in Figure 52.

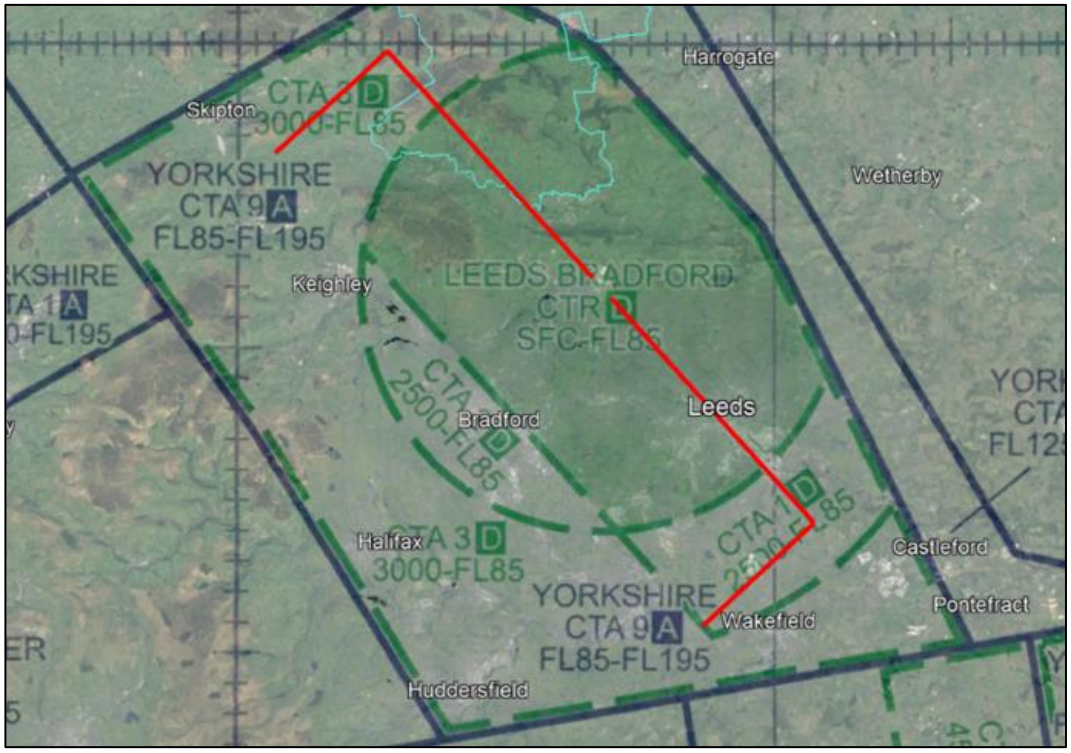


Figure 52: Amended T-Bar Configuration (no Eastern, Northern, or Southern legs)

4.22. Use of Arrival Transitions

4.22.1. Another consideration is the use of Arrival Transitions. A Transition essentially provides a systematic means to link from one route segment to another (i.e. link the STAR to the IAP). Arrival Transitions may be applied if the STAR does not terminate at the start of approach i.e. the Initial Approach Fix (IAF).

4.22.2. In the UK, all STARs terminate at the Holding Fix and the airspace designer then requires a mechanism to provide connectivity to an IAP, either through use of a tactical vectoring or some form of Transition. Transitions are an extension of the arrival procedure, providing aircraft with route connectivity to either the IF or Final Approach Segment. The navigation database cannot accommodate a STAR followed by another STAR, hence the requirement for an Arrival Transition. These Arrival Transitions provide a repeatable route of waypoints that aircraft will flyover to ultimately reach the T-Bar/Y-Bar configuration. Arrival Transitions provide a systemisation of the approach element reducing the need for controller input and making it more predictable and repeatable. The options below all include Arrival Transitions as they are in keeping with Design Principles 8 and 11.

4.22.3. Whilst Arrival Transitions are proposed, it is essential that the flexibility to vector aircraft off these is maintained for weather, fuel efficiency (more expeditious routing) and sequencing of traffic.

4.23. Arrival Option Evolution

4.23.1. The initial set of DOs (Options A-F) for the arrivals provided insufficient detail and were considered inadequate to be able to conduct a meaningful DPE and IOA against. Therefore, a second set of DOs (Options 1-5) were conceived and shared with stakeholders in March 2023. Both sets of DOs are presented for reasons of transparency.

4.24. Option A – Gate System with Single Hold

4.24.1. As described in the paragraph 3.6, Arrivals into LBA largely route into the LBA CTA via one of three gates from the Route Network and are then vectored onto final approach (within the Radar Manoeuvring Area (RMA)) or sent to the single hold which is situated immediately North and East of the Airport. This option would see this modus operandi remain with the addition of RNP approaches.

4.24.2. The RNP approaches would have IAFs at the ends of the T-Bar extensions (shown with yellow stars in Figure 53) and when able, controllers would release aircraft on own navigation to these. It is likely that a degree of tactical vectoring would still be required. An Arrival Transition could be designed to link the Hold to the approach procedure for each runway end. This would be particularly beneficial for the eventuality of Radio Communications Failure (RCF) as it would allow aircraft to conduct a single hold before following the Arrival Transition outbound before commencing the approach should it lose two-way communication with ATC.

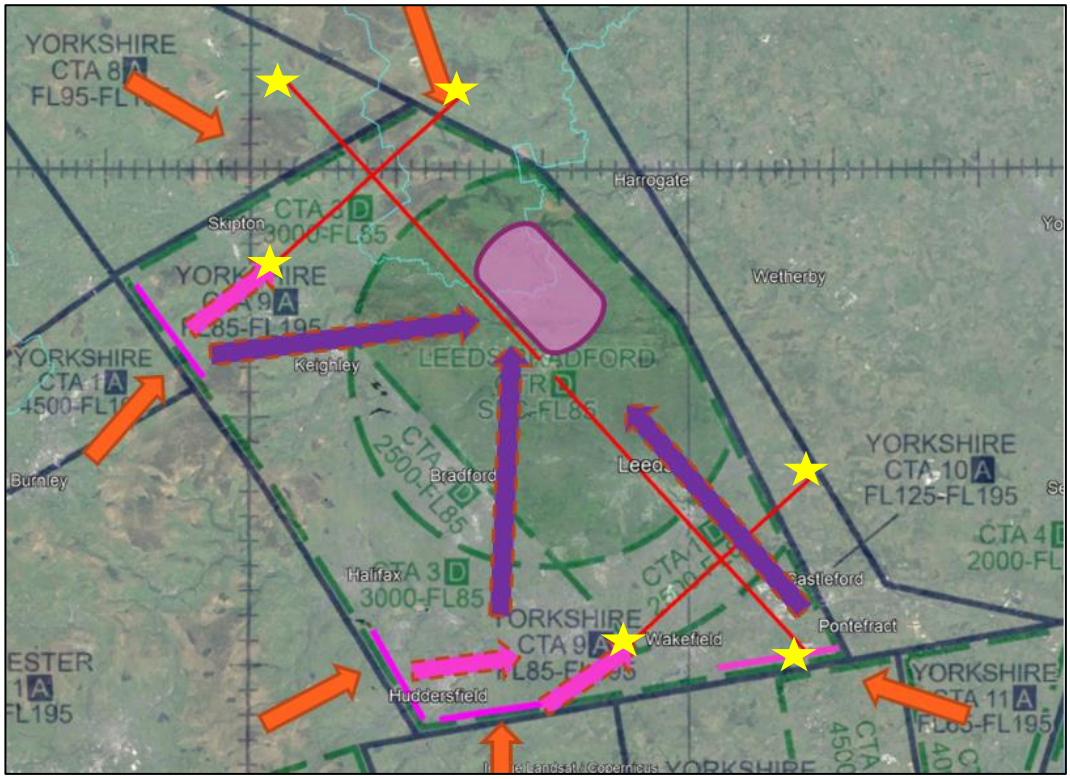


Figure 53: Option A - The Baseline (Gate System and a single hold adjacent the overhead)

4.26. Option B – North-West and South-East Holds with Gates

4.26.1. Option B retains a gate system but removes the hold in the immediate overhead of the Airport in favour of two holds positioned to the North-West and South-East. As with the existing situation, aircraft would enter LBA airspace and would either be vectored or, released on own navigation to an IAF. If there was a requirement to hold aircraft off due to there being multiple arrivals or departures, controllers would have the choice of two holds geographically displaced from the immediacy of the Airport. Arrival Transitions from the holds would also be included to add an element of systemisation and provide for the eventuality of RCF. This system evolved into Options 2, 3, 4 and 5 in the second round of DO development.

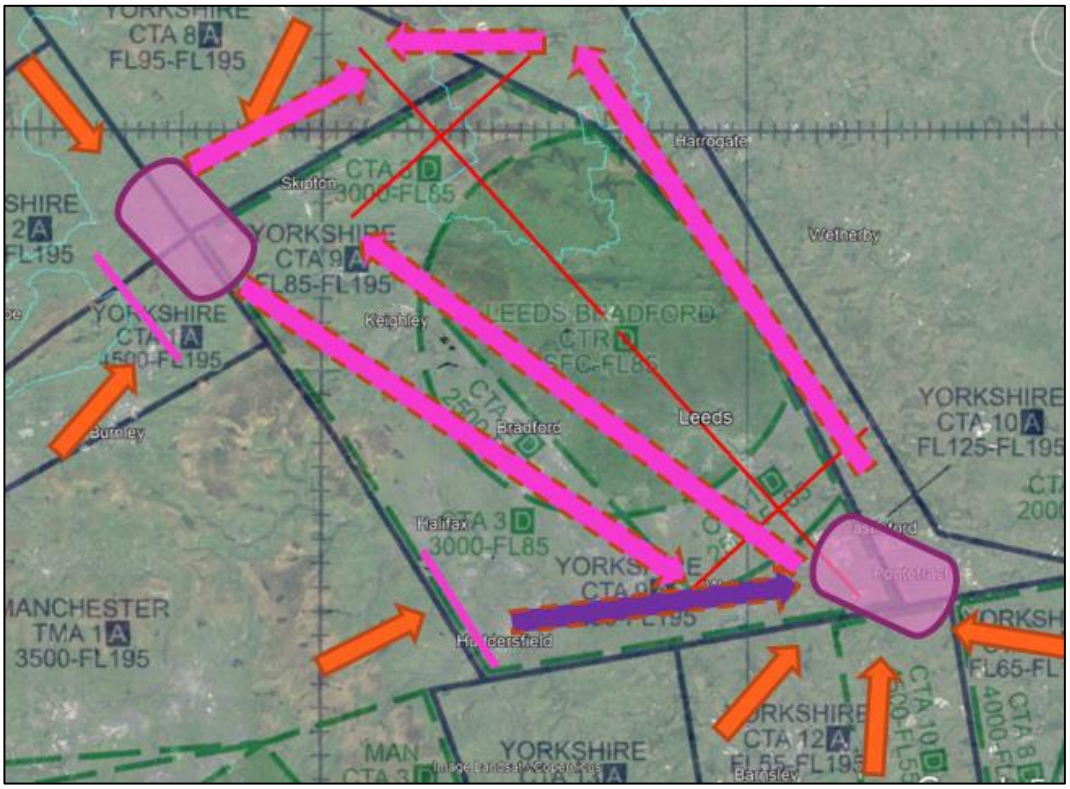


Figure 54: Option B with two holds (North-West and South-East)

4.28. Option C – North-West and South-West Holds

4.28.1. Option C is similar to Option B but with the removal of the gate system. Aircraft would be released off a STAR that went to an IAF at either of the two holds (one North-West and one South-West of the Airport). In this instance, Arrival Transitions would largely be utilised to transition from the IAFs to the final approach. The ability to vector aircraft for spacing would still be required to retain operational flexibility. Elements of this system can be seen in Options 2 and 5 in the second set of DOs.

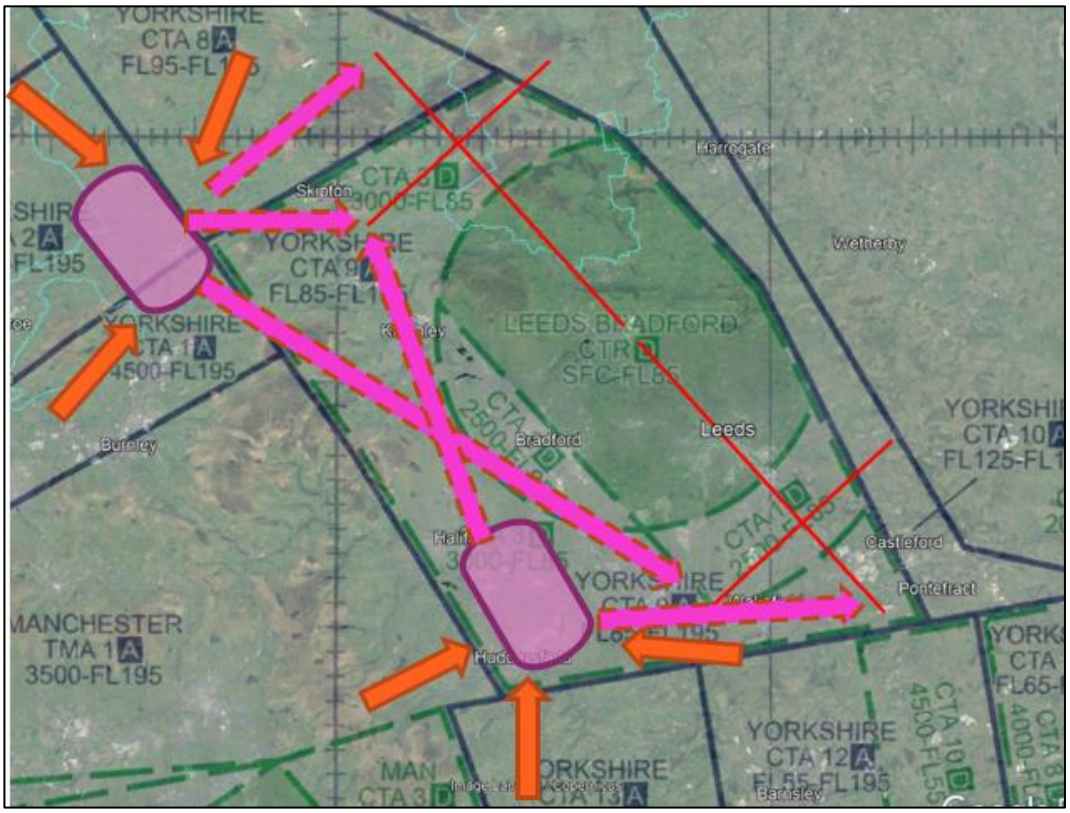


Figure 55: Option C with two holds (North-West and South-West)

4.30. Option D – Single Hold West

4.30.1. Option D utilises a single STAR linking to an IAF co-located with a single hold west of the Airport and equidistant from each final approach track. Arrival Transitions would then link the IAF to the final approach for each runway. The ability to vector aircraft for spacing would still be required to retain operational flexibility. This DO did not feature in the second set of arrival DOs as it would most likely significantly hamper continuous climbs for departing aircraft owing to the location of the hold.

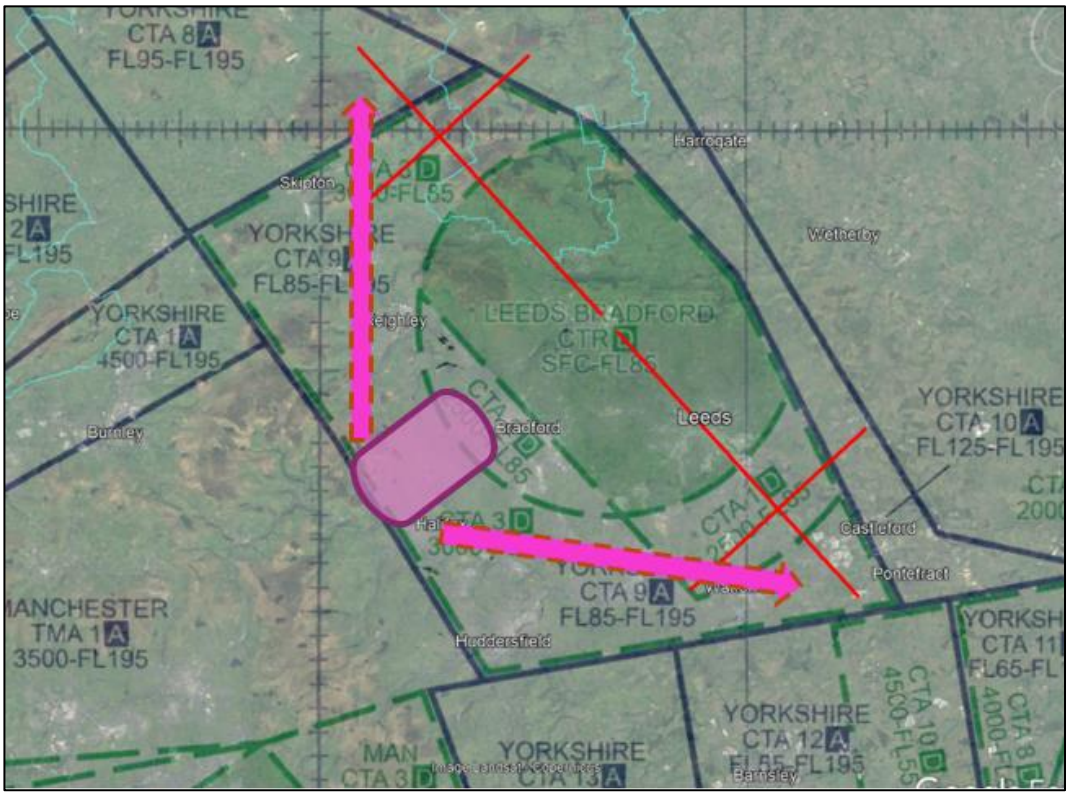


Figure 56: Option D with a single hold west of the Airport

4.32. Option E – Holds on Extended Centrelines

4.32.1. Option E retains a gate system and adds two holds on the extended centrelines to each runway dependant on runway in use. Arrival Transitions could be added to this construct however it is more likely that radar vectoring and own navigation to the IAFs would be the mode of operation. Option E did not feature in the second set of arrival DOs although the southern hold is similar in concept to the AIREY and GOLES holds considered in Options 2, 3, 4 and 5.

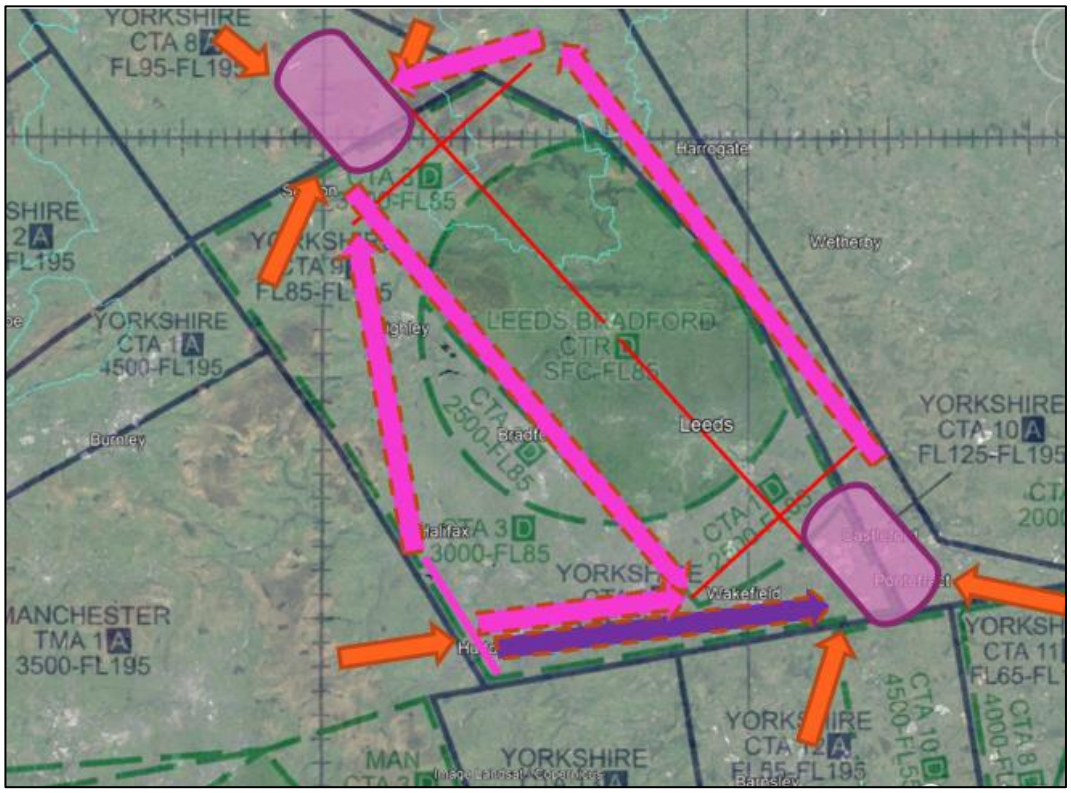


Figure 57: Option E with gates and holds on the extended centrelines

4.34. Option F – Point Merge

4.34.1. Point Merge utilises PBN procedures enabling controllers to sequence and merge arrivals without vectoring to simplify and enhance arrival operations, enable continuous descent operations, and maintain runway throughput.

4.34.2. Point Merge does this using sequencing legs by controllers clearing aircraft to turn, once traffic permits, to the Merge Point. From the exit point, aircraft join the final approach via a fixed path, a transition, requiring minimal controller intervention. Without a transition, connecting the merge point to the end of the runway, the benefit of sequencing aircraft in this manner is limited. See Figure 58.

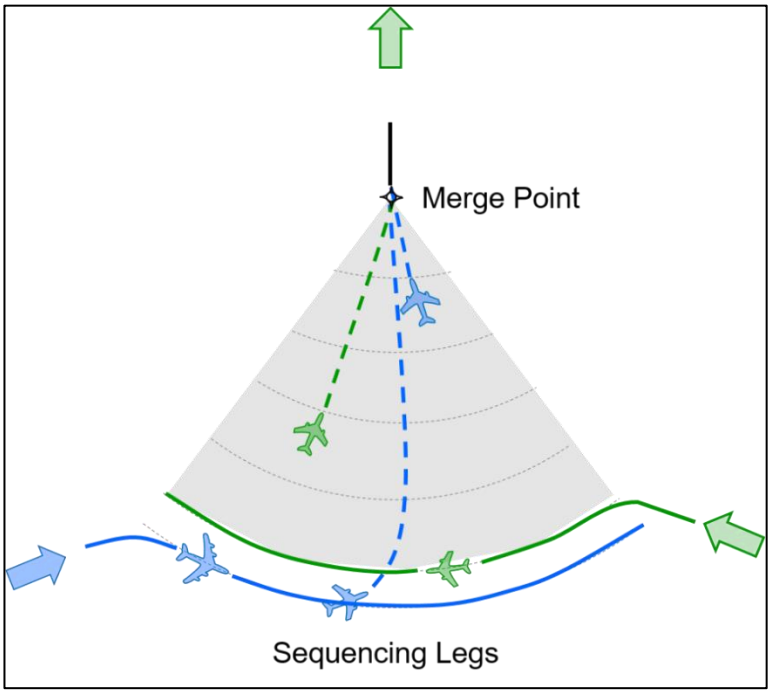


Figure 58: Point Merge (Source: Eurocontrol)

4.34.3. In the case of LBA, three options were developed to include Point Merge (Options F1-F3). It should be noted that a feature of these structures is the need to include radial holds at the entry points in order to provide safe contingency or extra delay absorption when the overall capacity of the structure is exceeded. These holds, albeit in 'Network Airspace', take up additional airspace resource.

4.34.4. Manchester, Liverpool, and East Midlands airports were provided, by NERL, with a set of indicative locations for optimised existing radial holds in conjunction with linear delay absorption structures such as Point Merge in the course of their Options Development[4]. LBA were not provided any indicative locations as it currently does not have any published holds at or above 7,000ft and therefore a new hold would need to be introduced.

4.34.5. Options F1-3 are a variation on a theme with the structures positioned east, west and south of the Airport.

[4] https://airspacechange.caa.co.uk/documents/download/5318

4.34.6. Point Merge was not a feature of the second set of arrival DOs due to the volume of airspace required to contain such procedures and the fact that there is insufficient traffic to justify such a system. It was also considered by NERL within the MTMA ACP and discounted for the same reasons.

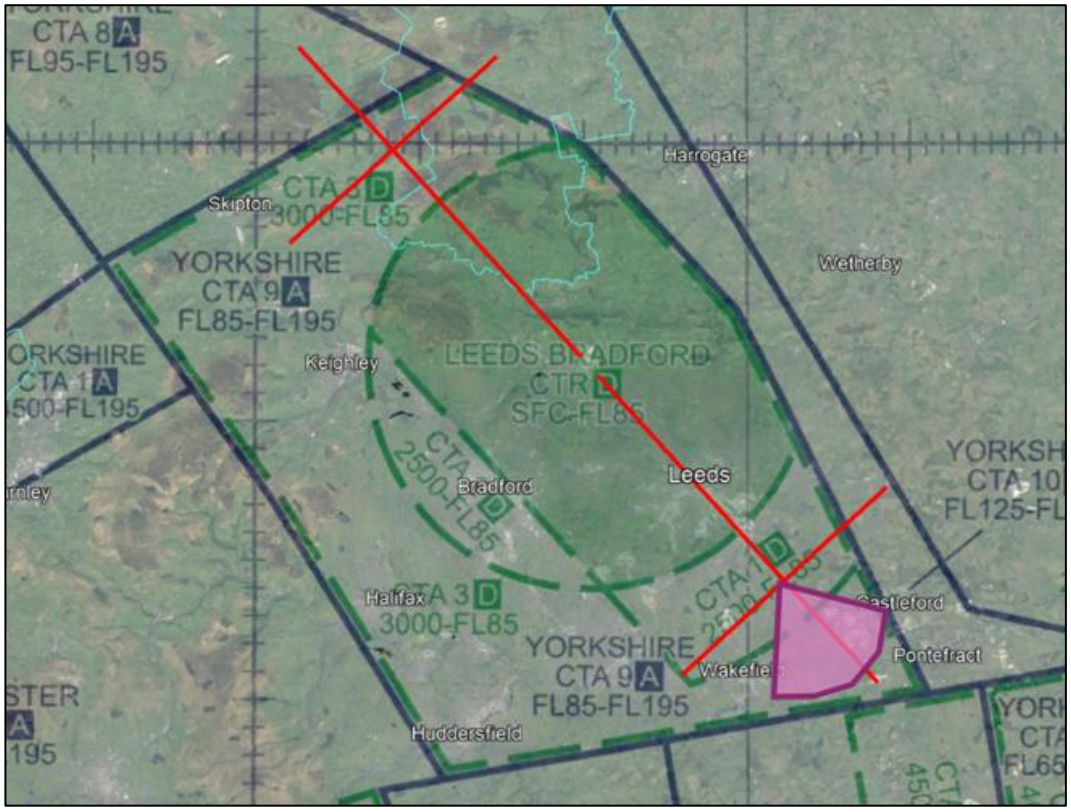


Figure 59: Option F1 Point Merge South

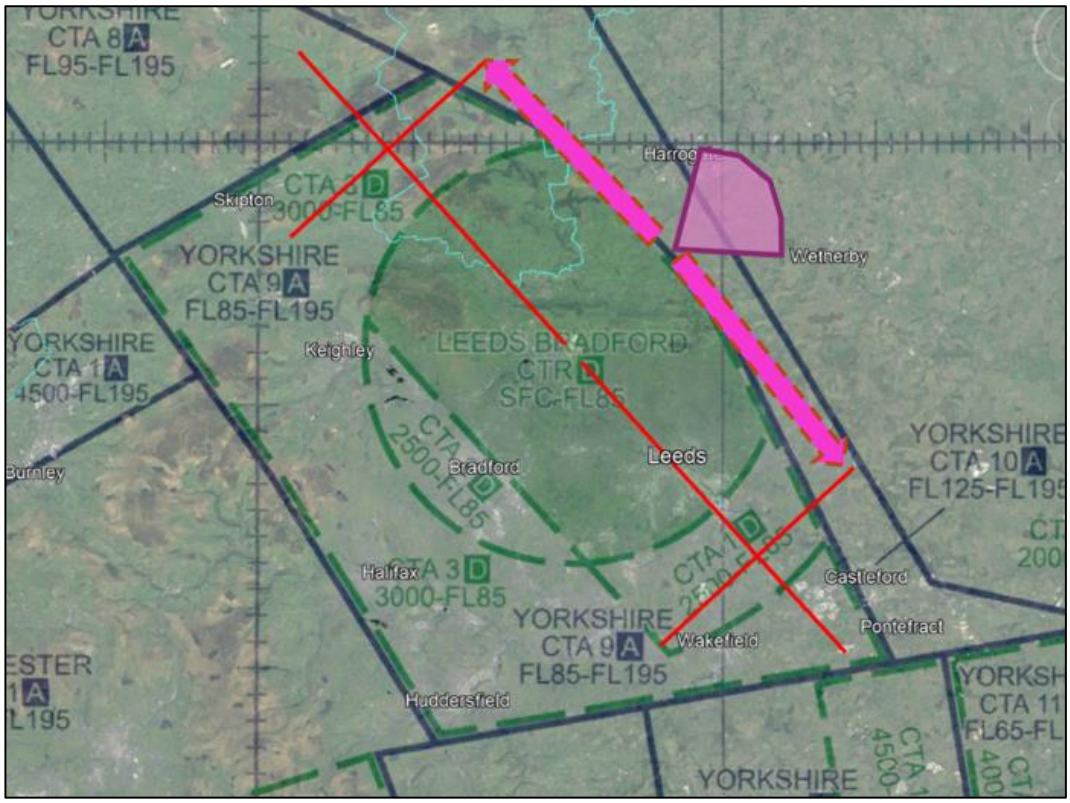


Figure 60: Option F2 Point Merge East

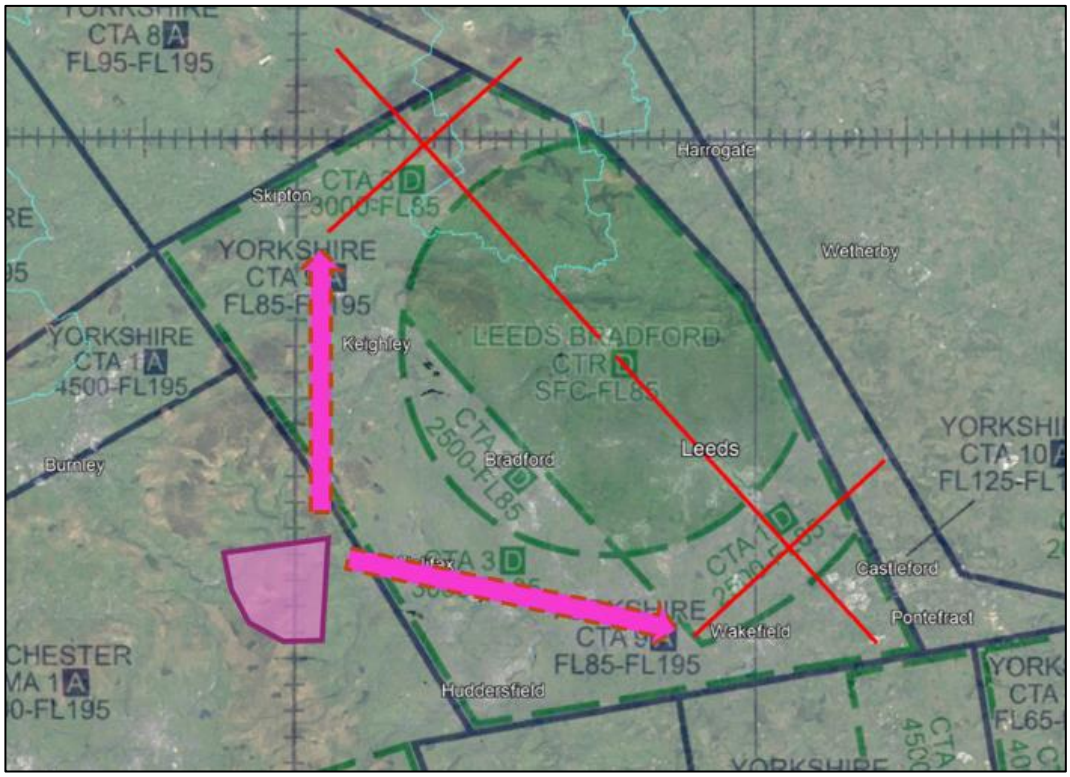


Figure 61: Option F3 Point Merge West

4.35. Evolution of Arrival Options

4.35.1. Following a period of reflection after the initial Stage 2 engagement, it was determined that the original array of arrival DOs was not sufficiently detailed enough to evaluate, nor did they meet the needs of the Airport or the en-route ATS provider (NERL). These DOs were therefore discounted/re-developed for further consideration by stakeholders. The re-developed DOs can be seen in the following paragraphs. Each DO has been considered for both runway operation modes and accordingly there are graphics showing the operation for RW32 and RW14.

4.35.2. No comments regarding the decision to reject the original set of Arrival DOs were made by stakeholders in the second round of engagement, accordingly it is determined that stakeholders were content with the decision evaluate the new DOs instead.

4.35.3. **Typically, the holds at the end of STARs have a lowest holding level of FL90 (roughly 9,000ft) whilst any holds that are also used as Missed Approach Holds have a lower base altitude, typically circa 5,000ft.**

4.36. Arrival Option 1 – One Hold – LBA

4.36.1. Arrival Option 1 (as shown in Figure 62 & Figure 63) is essentially a modernisation of the current construct with the addition of PBN. Instead of conventional approaches, the PBN approaches with their T/Y-Bar construct are fed into from the LBA with Arrival Transitions. Aircraft would still enter the LBA CTAs via the existing routes/gates towards the LBA and, tactically, would either be permitted to route directly for their approach (vectors or own navigation) or route via the LBA and the associated arrival transition.

4.36.2. **Note: The lines associated to the Arrival Transitions (yellow), Missed Approach Procedures (pink) and the holds (red lozenges) on the following graphics do not show definitive flight paths, they are purely an indication of the systems being proposed in these DOs.**

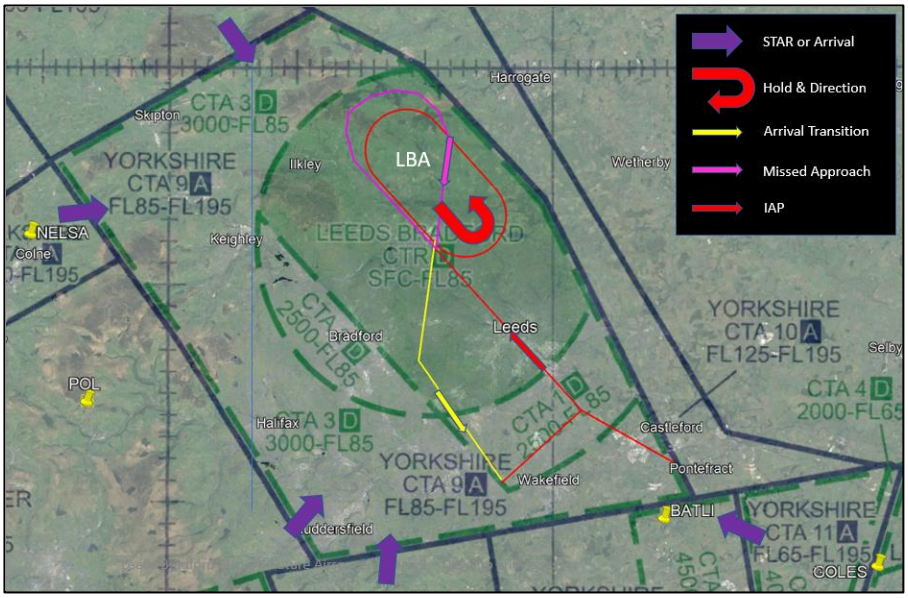


Figure 62: Arrival Option 1 - RW32 in use

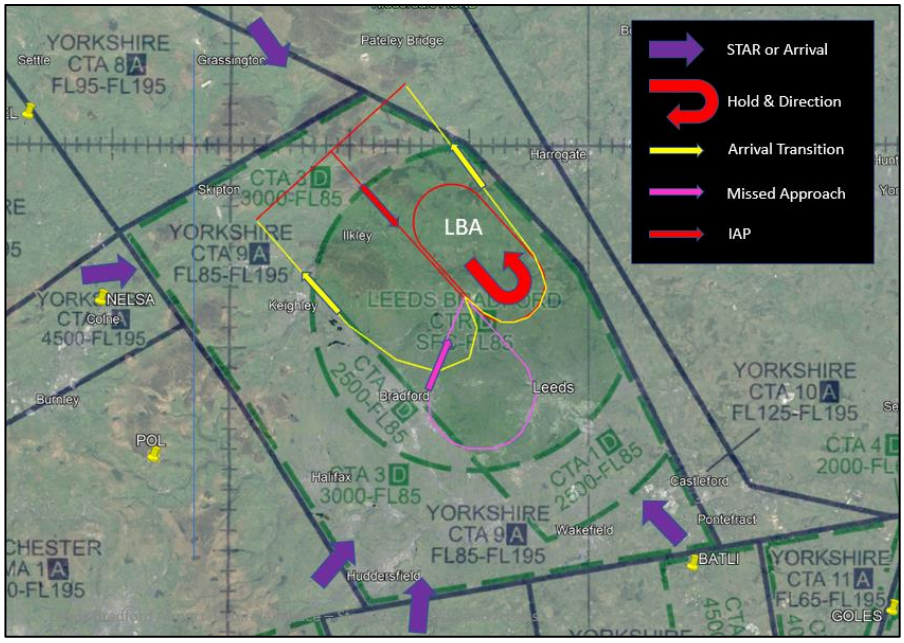


Figure 63: Arrival Option 1 - RW14 in use

4.37. Arrival Option 2 – Two Holds – NELSA/GOLES

4.37.1. Arrival Option 2 (as shown in Figure 64 & Figure 65) sees the creation of two new holds, one to the NW and one to the SE. The SE hold would be associated with the routing from the ESE, i.e. the reporting point known as GOLES. The NW hold would be associated with the routing from the WSW, i.e. the reporting point known as NELSA and is most likely intended as the Missed Approach Hold in this configuration.

Note: The holds may be sited somewhere within the blue circles/lozenges.

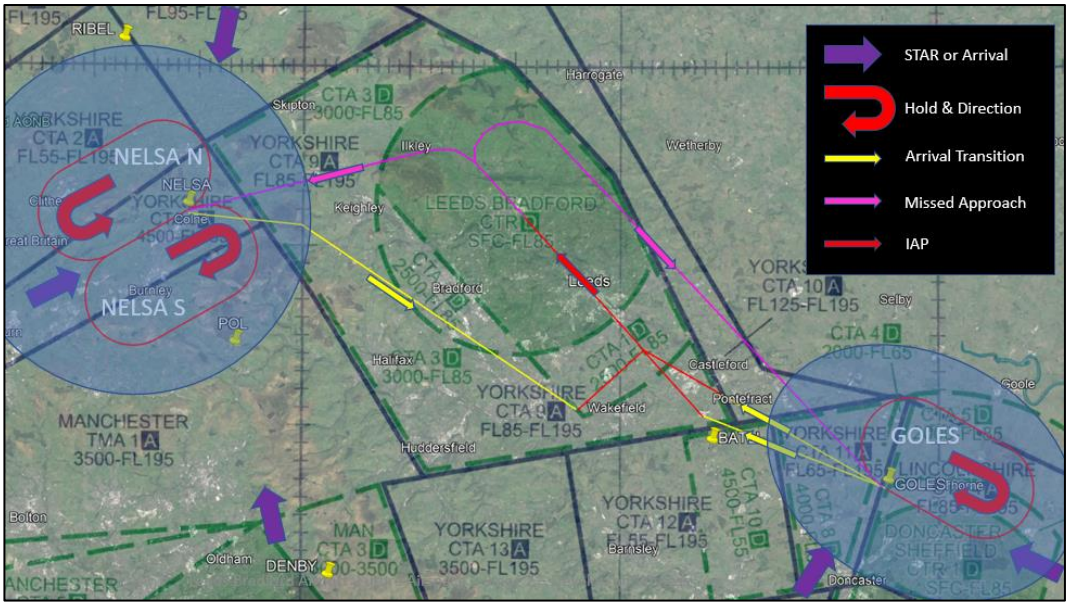


Figure 64: Arrival Option 2 - RW32 in use

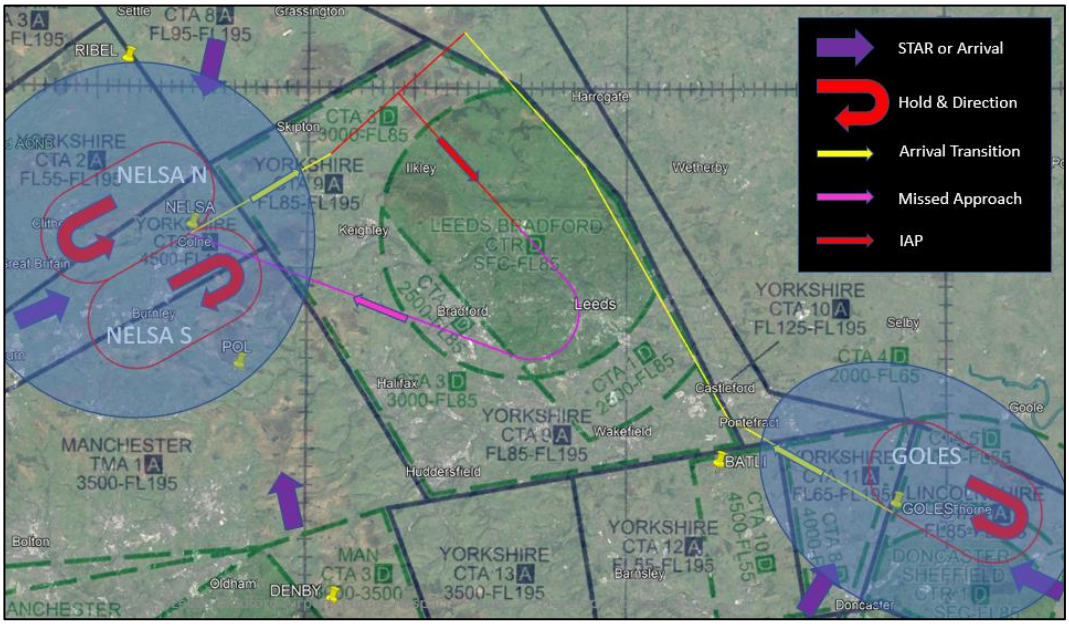


Figure 65: Arrival Option 2 - RW14 in use

4.39. Arrival Option 3 – Two Holds – 'AIREY' & 'WORTH'

4.39.1. Arrival Option 3 (as shown in Figure 66 & Figure 67) sees the creation of two new holds, one to the NW and one to the SE. The SE hold would be associated with the routing from the ESE, although unlike Option 2, the end of the STAR and the holding fix would be closer to the approach. The hold has been given the name 'AIREY' for ease of reference due to its proximity to the River Aire. The NW hold would be associated with the routing from the WSW and the RW14 T-Bar. It is closer to the Airport than NELSA and is referred to as 'WORTH' for ease of reference and its proximity to Haworth. The Missed Approach Hold in this configuration is dependent on runway in use as can be seen in the graphics.

Note: The holds may be sited somewhere within the blue circles/lozenges.

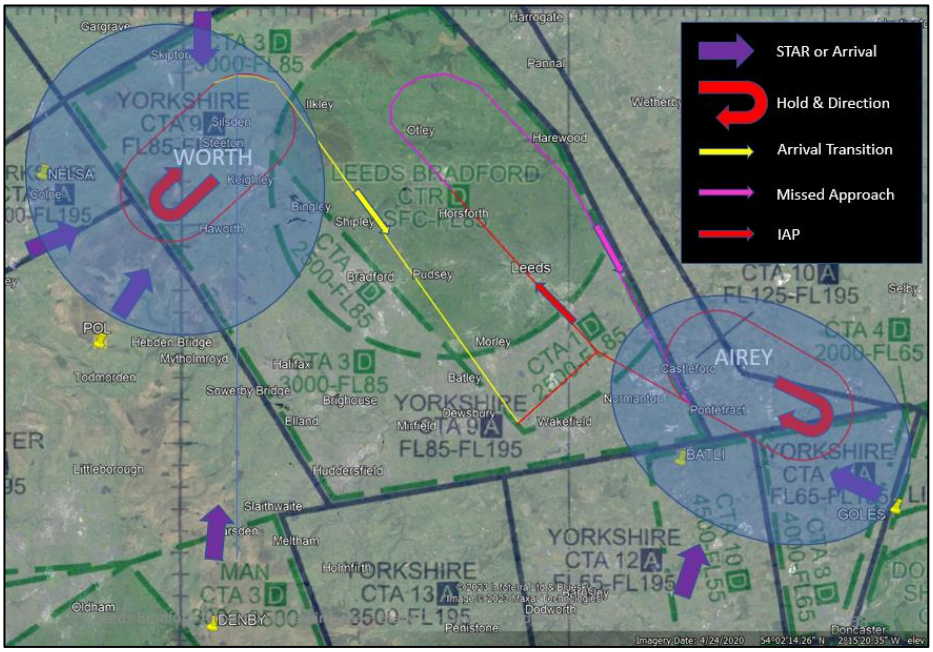


Figure 66: Arrival Option 3 - RW32 in use

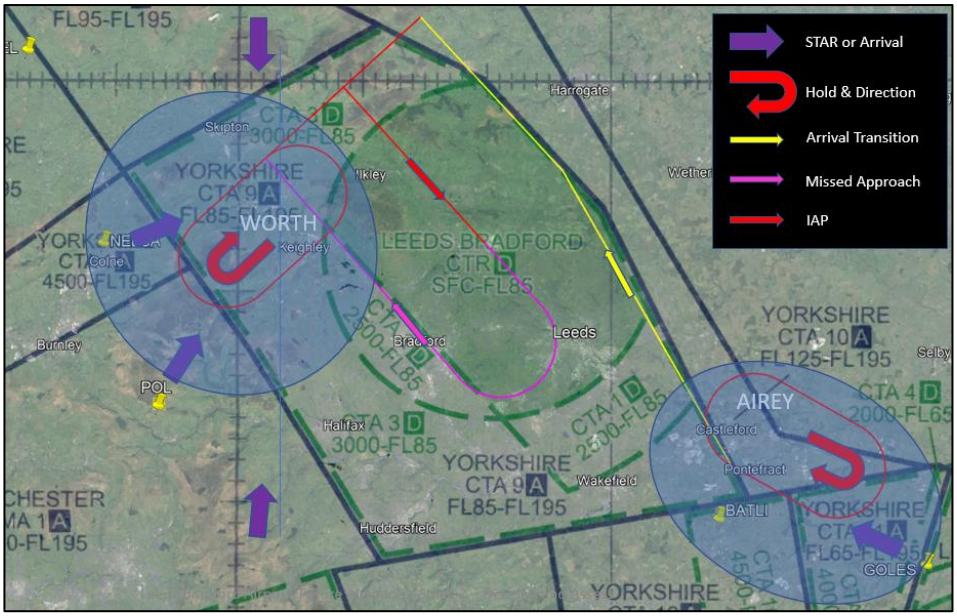


Figure 67: Arrival Option 3 - RW14 in use

4.40. Arrival Option 4 – Three Holds – 'AIREY', 'WORTH' and the LBA

Arrival Option 3 (as shown in Figure 68 & Figure 69) is a hybrid of Option 3 in that the 'AIREY' and 'WORTH' holds remain but are complemented with the LBA hold. Note: The 'AIREY' and 'WORTH' holds may be sited somewhere within the blue circles/lozenges. It is most likely that the LBA Hold would be the Missed Approach Hold in this configuration. Note: The holds may be sited somewhere within the blue circles/lozenges.

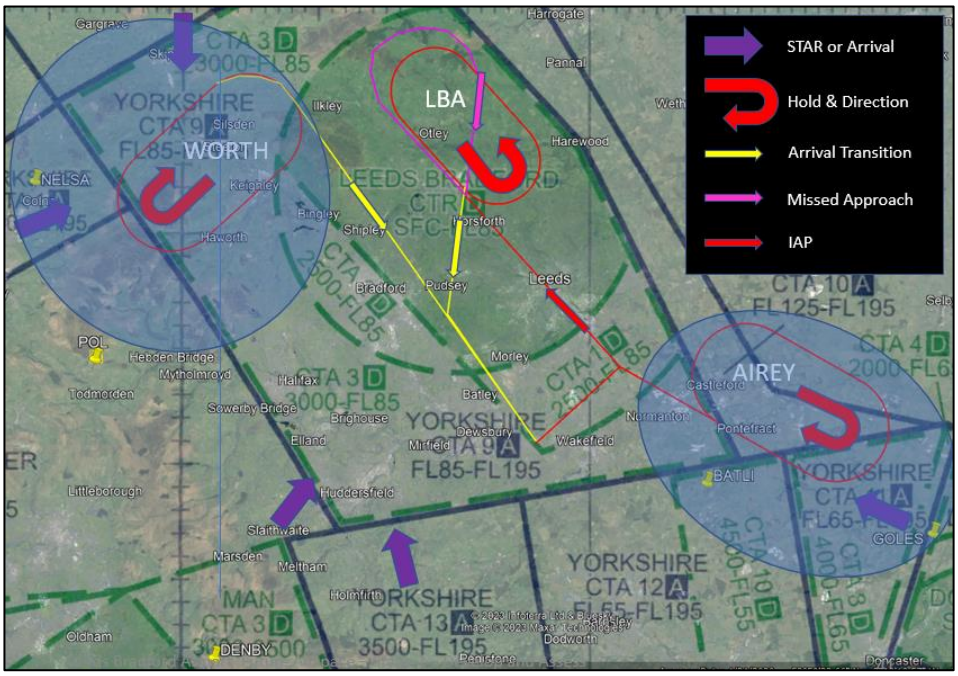


Figure 68: Arrival Option 4 - RW32 in use

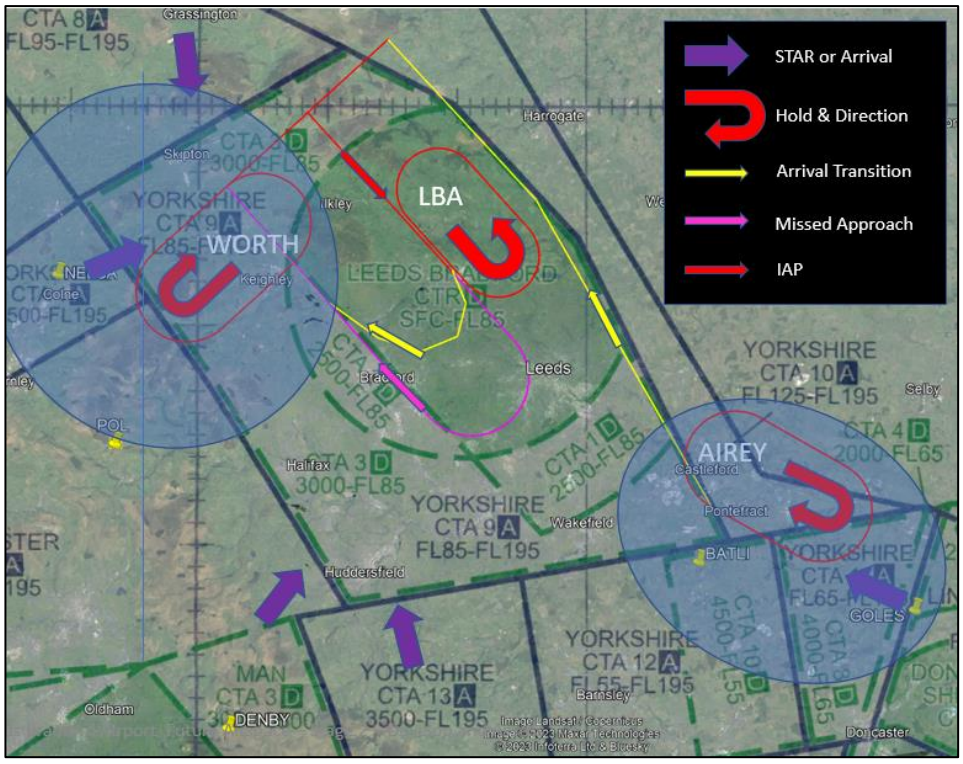


Figure 69: Arrival Option 4 - RW14 in use

4.41. Arrival Option 5 – Three Holds – NELSA, 'UDDER' & GOLES

4.41.1. Arrival Option 5 (as shown in Figure 70 & Figure 71) is a hybrid of Arrival Option 2 in that it sees the inclusion of the holds at NELSA and GOLES but with the addition of another hold to the SW of the Airport given the name 'UDDER' due to its proximity to Huddersfield. The hold at NELSA is the most likely hold to be associated with the Missed Approach in this configuration.

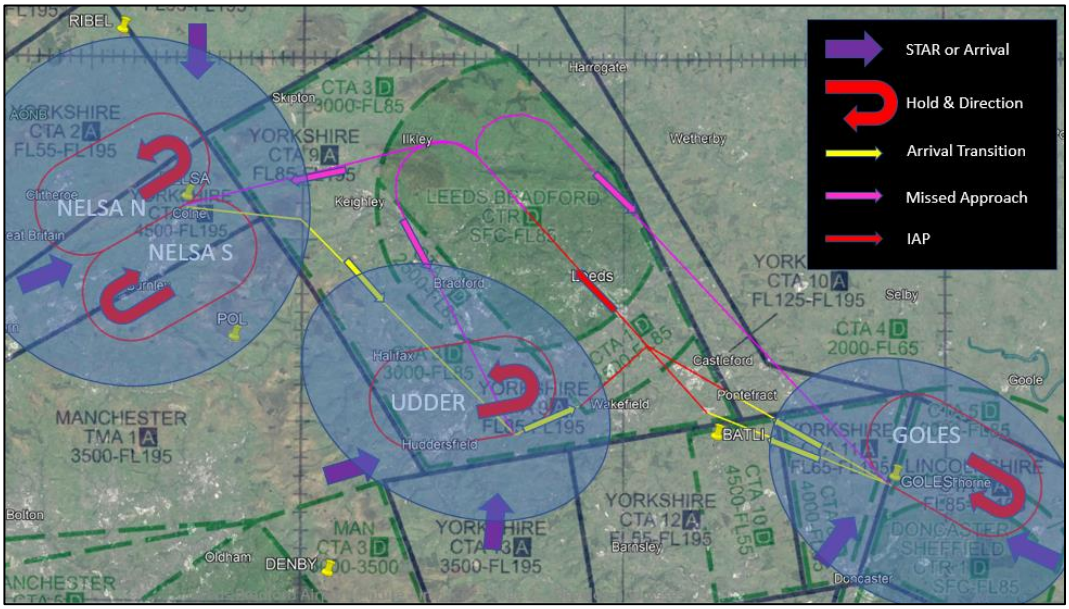


Figure 70: Arrival Option 5 - RW32 in use

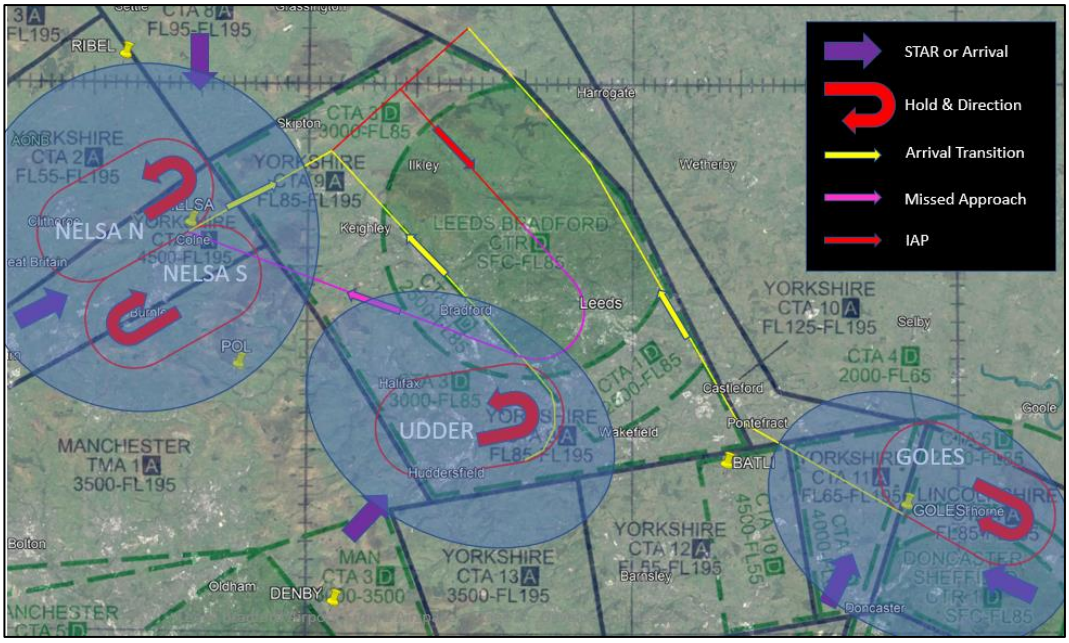


Figure 71: Arrival Option 5 - RW14 in use

5. Targeted Stakeholder Engagement

5.1. Stakeholder List

5.1.1. The CAA sets out the engagement expected in CAP1616 at Stages 1 and 2 as being targeted at the following:

- Directly affected local aviation stakeholders, including airspace users, air navigation service providers and airports;
- Relevant members of the National Air Traffic Management Advisory Committee (NATMAC);
- Relevant aviation/non-aviation national organisations, including those which represent areas/interests likely to be affected by potential impacts; and
- Elected representatives and/or environmental interest groups representing communities likely to be affected by potential impacts (such as noise or economic growth) associated with the change.

5.1.2. The Stakeholder List (See Annex A) was developed based upon the guidance in CAP1616 for targeted stakeholder at the representative level. The List evolved from that which was used in Stage 1 to invite stakeholders previously not included to participate.

5.1.3. The engagement process resulted in some responses from local residents who had discovered this process was underway. Whilst their interest in the process, and their feedback has been noted, these community stakeholders will get their opportunity to feed into the process at the appropriate time, i.e. during Stage 3. Some of the feedback indicated that the Airport was not following consultation 'best practice' and there was a feeling that the Airport was covertly bringing about change without due process. This is not the case; the CAP1616 process is being followed and community stakeholders can be assured that they will be consulted extensively during Stage 3.

5.2. Workshops

5.2.1. Two workshops were held on the 5th July 2022 (one for Technical stakeholders and another for Non-Technical stakeholders). These workshops introduced the list of DOs to the stakeholders and our assessment of the DOs against the DPs they helped us develop during Stage 1.

5.2.2. An update was sent to stakeholders on 28th July 2022 to provide additional context to the DOs and address some of the questions raised. This document can be viewed on the ACP Portal (CPJ-5692-PRE-017-LBA Future Airspace Stage 2A – Update).

5.3. July 2022 Update and Survey 1

5.3.1. Following these workshops, stakeholders were invited to take part in an online survey which ran from the 13th July 2022 to the 26th August 2022. This survey asked whether the stakeholders felt we had applied the DPs correctly and consistently to each of our DOs. It provided an opportunity to comment on areas they felt this may not have been the case.

The feedback, which shaped the evolution of our DPE, can be found in full within the 'Stakeholder Engagement Record' on the ACP Portal.

5.4. Bilateral Meetings with MTMA Team

5.4.1. Following a period of reflection and in response to some stakeholder feedback, a series of additional departure DOs were conceived along with a revised array of arrival system DOs. These were discussed in detail with the NERL MTMA ACP Project Team over a series of bilateral meetings. These meetings were essential given that the interface with the Route Network is fundamental to the operational viability of any future systems and procedures. The LBA Team also attended two Visualisation Simulations developed to understand how the whole MTMA might work with the new procedures.

5.5. March 2023 Update Brief and Survey 2

5.5.1. The revised array of DOs was shared with the same set of stakeholders over the period 31st March 2023 to 28th April 2023 through a presentation sent out via email. The presentation was accompanied by an online survey and again sought feedback on whether stakeholders felt we had applied the DPs correctly and consistently to each of our DOs.

5.5.2. The feedback, which shaped the final version of the DPE, can be found in full within the 'Stakeholder Engagement Record' on the ACP Portal.

6. Design Principle Evaluation

6.1. Evaluation Methodology

6.1.1. When conducting the DPE, a Red, Amber, Green (RAG) status for the various DPs (an entirely subjective assessment) was determined using the following definitions:

- Green – Based upon current circumstances/environment, the DO is most likely to meet the given DP;
- Amber – Based upon current circumstances/environment, the DO may not entirely meet the given DP;
- Red – Based upon current circumstances/environment, the DO is most unlikely to meet the given DP.

6.1.2. The initial DPE was conducted by our airspace consultants and then workshopped with stakeholders for verification resulting in amendments to the DPE in some areas. Following the conception of the additional DOs, our airspace consultants carried out a fresh DPE, based upon that done previously to ensure consistency and to ensure all the stakeholder feedback had been factored in. Following this, the DPE was sent out to stakeholders in March 2023 with the new DOs for feedback.

6.2. Summary of Evaluation

6.2.1. The following paragraphs look at each DO in isolation. The orange line in the middle of each swathe is not intended to show a flightpath, as procedures could be contained anywhere within the option swathes. The end of the orange line indicates the point at which aircraft could reasonably expect to climb 7,000ft vertically from LBA on a 6% glidepath.

6.2.2. Below each graphic is a table showing a summary of how each DO 'scored' when compared to each of the DPs using the Red, Amber, Green assessment detailed above.

6.2.3. **There are two rows, the first row shows how they were scored before stakeholder engagement and the row below this shows the final evaluation after two periods of engagement.**

6.2.4. The DPs are displayed overleaf again for ease of reference.

DP #	Design Principle
1	**Importance of Safety** – The airspace design and its operation must maintain or where possible, enhance current levels of safety.
2	**Noise** - The design should limit, and where practicable reduce, the number of people overflown, the impact of noise to stakeholders on the ground and where possible periods of built-in respite should be considered.
3	**Tranquillity** - Where practical, route designs should limit effects upon noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education and AONB's.
4	**Emissions and Air Quality** – The proposed design should minimise CO2 emissions per flight.
5	**Airspace Dimensions** – The volume and classification of controlled airspace required for LBA should be the minimum necessary to deliver an efficient airspace design, considering the needs of all airspace users.
6	**Airspace Complexity** – The airspace design should seek to reduce complexity and bottlenecks in controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.
7	**Technical Requirements** – The design shall be fully compliant with PANS-OPS and UK CAA criteria to meet the technical capability requirements of aircraft using the airport.
8	**Systemisation** – The new procedures will integrate with the en-route network, as per the FASI(N) programme. If required, the arrival transitions shall integrate with the Instrument Approach Procedures (IAPs), deconflict with the departure procedures, reducing the requirement for tactical coordination.
9	**Operational Cost** – Provided it does not have an adverse impact of community disturbance, procedures should be designed to optimise fuel efficiency.
10	**AMS Realisation** – This ACP must serve to further, and not conflict with, the realisation of the AMS.
11	**PBN** – The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.

Table 5: Design Principles

6.3. RW32 North-West – Option A (32NWA)

Figure 72: 32NWA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NWA was evaluated as green across all the DPs. DP1 and DP5 were amended to amber following comments from the gliding community due to the potential for wave flying in Nidderdale in Class G airspace. A departure contained within this swathe would likely require the lowering of the existing CAS hence the amendment of DP5 to amber.

DPs 2 and 3 were initially rated green as the initial portion of the swathe roughly follows the existing NPR (i.e. duplicates the existing route). As a swathe is broader than the final flightpath would be, the swathe encompasses a wider area and appears to affect more people in Menston, Burley-in-Wharfedale, Ben Rhydding and Ilkley, accordingly DP2 was amended to amber to reflect this. DP3 was amended to amber for Ilkley Moor, a place of valued tranquillity. Any future proposals contained within this swathe need to consider these aspects that have resulted in an amber evaluation.

6.4. RW 32 North-West Option B (32NWB)

Figure 73: 32NWB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NWB was evaluated as green across most DPs. DP2 was rated amber due to the potential noise impact on Ilkley. Following engagement, it has been noted that more communities are potentially impacted including the western side of Otley, Burley-in-Wharfedale, Ben Rhydding and Ilkley. DP3 was rated amber due to the potential impact on tranquillity within the Nidderdale AONB. DP1 and DP5 were amended to amber following comments from the gliding community due to the potential for wave flying in Nidderdale in Class G airspace. A departure contained within this swathe would likely require the lowering of the existing CAS hence the amendment of DP5 to amber. Any future proposals contained within this swathe need to consider these aspects that have resulted in an amber evaluation.

6.5. RW32 North-East Option A (32NEA)

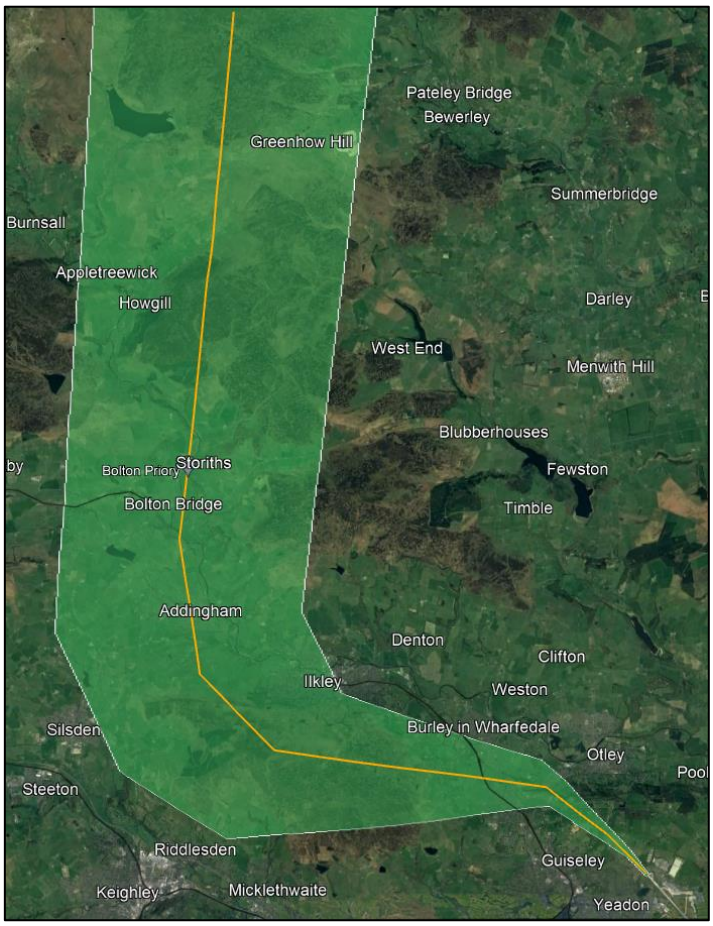


Figure 74: 32NEA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NEA was evaluated as green across all DPs. Following engagement, it has been noted that more communities are potentially impacted including the western side of Otley, Burley-in-Wharfedale, Ben Rhydding and Ilkley and as such, DP2 was re-evaluated as amber. DP3 was changed to amber due to the potential impact on tranquillity on Ilkley Moor. DP1 and DP5 were amended to amber following comments from the gliding community due to the potential for wave flying in Nidderdale in Class G airspace. A departure contained within this swathe would likely require the lowering of the existing CAS hence the amendment of DP5 to amber. Any future proposals contained within this swathe need to consider these aspects that have resulted in an amber evaluation.

6.6. RW32 North-East Option B (32NEB)

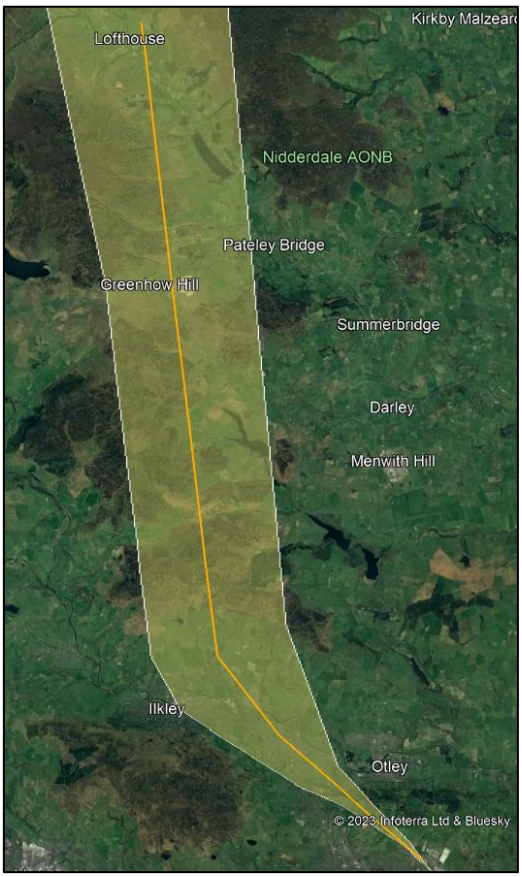


Figure 75: 32NEB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NEB was evaluated as green across most DPs. Following engagement, it has been noted that more communities are potentially impacted including the western side of Otley, Burley-in-Wharfedale, Ben Rhydding and Ilkley. DP2 was already considered to be amber. DP3 was changed to amber due to the potential impact on tranquillity within the Nidderdale AONB. DP1 and DP5 were amended to amber following comments from the gliding community due to the potential for wave flying in Nidderdale in Class G airspace. A departure contained within this swathe would likely require the lowering of the existing CAS hence the amendment of DP5 to amber. Any future proposals contained within this swathe need to consider these aspects that have resulted in an amber evaluation.

6.7. RW32 North-East Option C (32NEC)

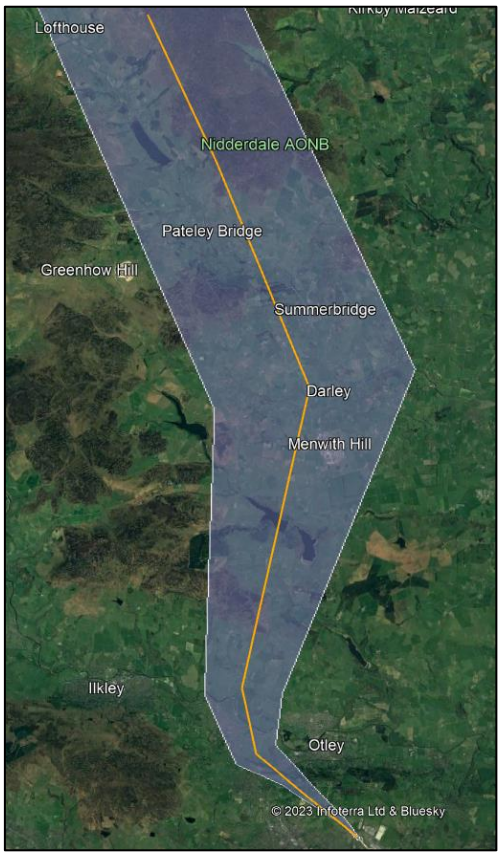


Figure 76: 32NEC Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NEC was evaluated as green across all DPs except DP1, 2 and 3. Following engagement, it has been noted that more communities are potentially impacted including the western side of Otley, Burley-in-Wharfedale and Askwith. DP2 was already considered to be amber. DP3 was changed to amber due to the potential impact on tranquillity within the Nidderdale AONB. DP1 and DP5 were amended to red following comments from the gliding community due to the potential for wave flying in Nidderdale in Class G airspace and due to the Vale of York Area of Intense Aerial Activity (AIAA). A departure contained within this swathe would likely require considerably more CAS hence the amendment of DP5 to red. The added complexity to the airspace was considered unnecessary and DP6 was amended to amber. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluations.

6.8. RW32 North-East Option D (32NED)

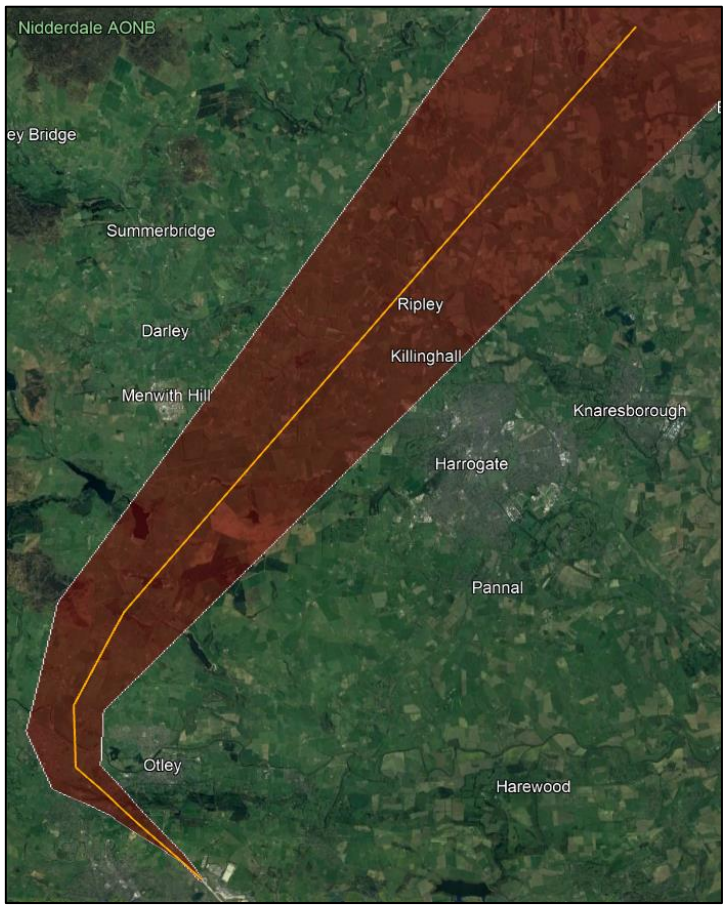


Figure 77: 32NED Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NED was evaluated as Red for DPs 1 and 5 due to the large amount of additional CAS required and the track across the Vale of York AIAA. Following engagement, it has been noted that more communities are potentially impacted including the western side of Otley, Burley-in-Wharfedale and Askwith. DP2 was re-graded as amber. DP3 was changed to amber due to the potential impact on tranquillity within the Nidderdale AONB. DP 4 and 9 were amended to red as the routing is not expeditious and does not take aircraft where they need to go. The added complexity to the airspace was considered vastly unnecessary and DP6 was amended to red. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluations.

6.9. RW32 North-East Option E (32NEE)

Figure 78: 32NEE Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32NEE was evaluated as green across all DPs. Following engagement, it has been noted that more communities are potentially impacted including the western side of Otley, Menston, Burley-in-Wharfedale and Keighley. DP2 was therefore reassessed to be amber. DP3 was changed to amber due to the potential impact on tranquillity on Ilkley Moor and the Yorkshire Dales NP. DP1 and DP5 were amended to amber following comments from the gliding community due to the potential for wave flying in Nidderdale in Class G airspace and due to the Vale of York Area of Intense Aerial Activity (AIAA). A departure contained within this swathe would likely require more CAS hence the amendment of DP5 to amber. In comparison to some of the other DOs for this direction of travel, this one has greater track miles and would burn more fuel, accordingly DP9 was changed to amber. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluations.

6.10. RW32 South-East Option A (32SEA)

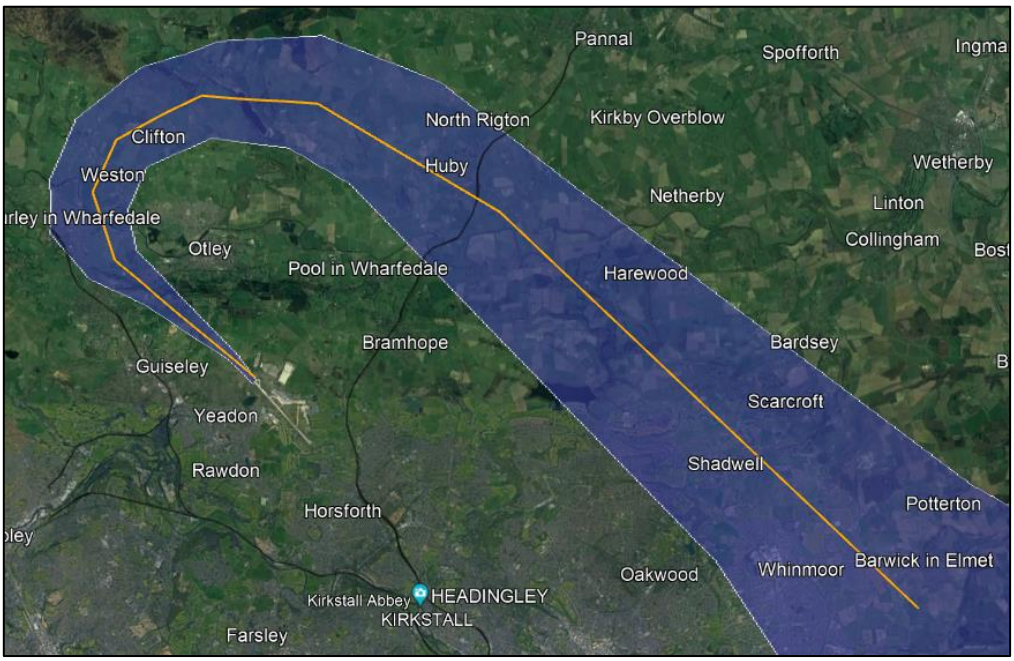


Figure 79: 32SEA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SEA was evaluated as amber for DP1, 2 and 3 and red for DP5. DP1 was graded amber owing to the potential for a lack of CAS containment and due to the potential conflict with traffic inbound from the East. DP2 had been graded amber as it would likely impact communities not currently impacted (such as Otley, Burley-in-Wharfedale and Huby). From a tranquillity perspective, the swathe incorporates the Nidderdale AONB, Lindley Wood Reservoir and Almscliffe Crag and as such was graded amber. The need for additional CAS resulted in DP5 being red. Post-engagement, it was accepted that the additional track miles of a right turn could increase emissions and operational costs changing DPs 4 and 9 to amber. A representative body felt that DP2 should be red as North-West Leeds would potentially be affected by inbounds and outbounds if RW32 were in use. This point is noted however, one of the reasons for adding a right-turn was to consider alternating the direction of departure to build in respite for different communities. DP6 was also amended following concerns of airspace complexity from the gliding community with the unknown future of the airspace previously delegated to DSA and the Upton corridor. DP1 was amended to red as this swathe flies directly towards the inbounds down L975 from the East. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluations.

6.11. RW32 South-East Option B (32SEB)

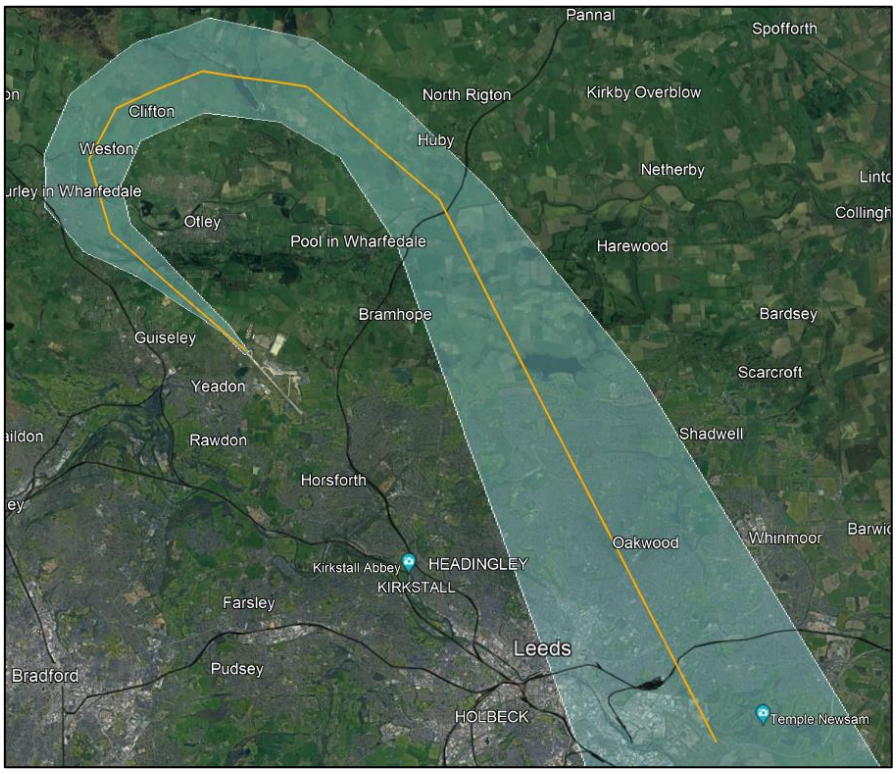


Figure 80: 32SEB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SEB was evaluated as amber for DP1, 2 and 3 and Red for DP5. DP1 was graded amber owing to the potential for a lack of CAS containment and due to the potential conflict with traffic inbound from the East. DP2 had been graded amber as it would likely impact communities not currently impacted (such as Otley, Burley-in-Wharfedale and Huby). From a tranquillity perspective, the swathe incorporates the Nidderdale AONB and Lindley Wood Reservoir and as such was graded amber. The need for additional CAS resulted in DP5 being red. Post-engagement it was accepted that the additional track miles of a right turn could increase emissions and operational costs changing DPs 4 and 9 to amber. A representative body felt that DP2 should be red as North-West Leeds would potentially be affected by inbounds and outbounds if RW32 were in use. This point is noted however, one of the reasons for adding a right-turn was to consider alternating the direction of departure to build in respite for different communities. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluations.

6.12. RW32 South-East Option C (32SEC)

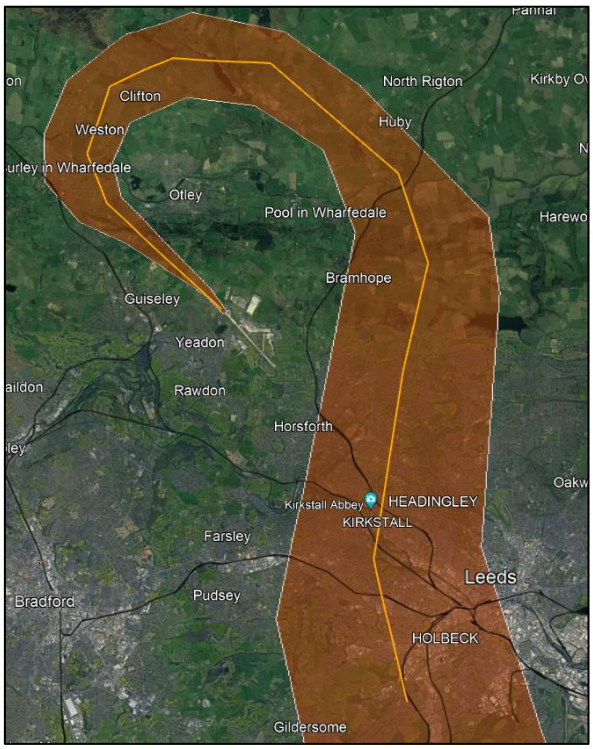


Figure 81: 32SEC Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SEC was evaluated as amber for DP1, 2 and 3 and Red for DP5. DP1 was graded amber owing to the potential for a lack of CAS containment and due to the potential conflict with traffic inbound from the East. DP2 had been graded amber as it would likely impact communities not currently impacted (such as Otley, Burley-in-Wharfedale and Huby). From a tranquillity perspective, the swathe incorporates the Nidderdale AONB and Lindley Wood Reservoir and as such was graded amber. The need for additional CAS resulted in DP5 being red.

Post-engagement it was accepted that the additional track miles of a right turn could increase emissions and operational costs changing DPs 4 and 9 to amber. A representative body felt that DP2 should be red as North-West Leeds would potentially be affected by inbounds and outbounds if RW32 were in use. This point is noted however, one of the reasons for adding a right-turn was to consider alternating the direction of departure to build in respite for different communities. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluations.

6.13. RW32 South-East Option D (32SED)

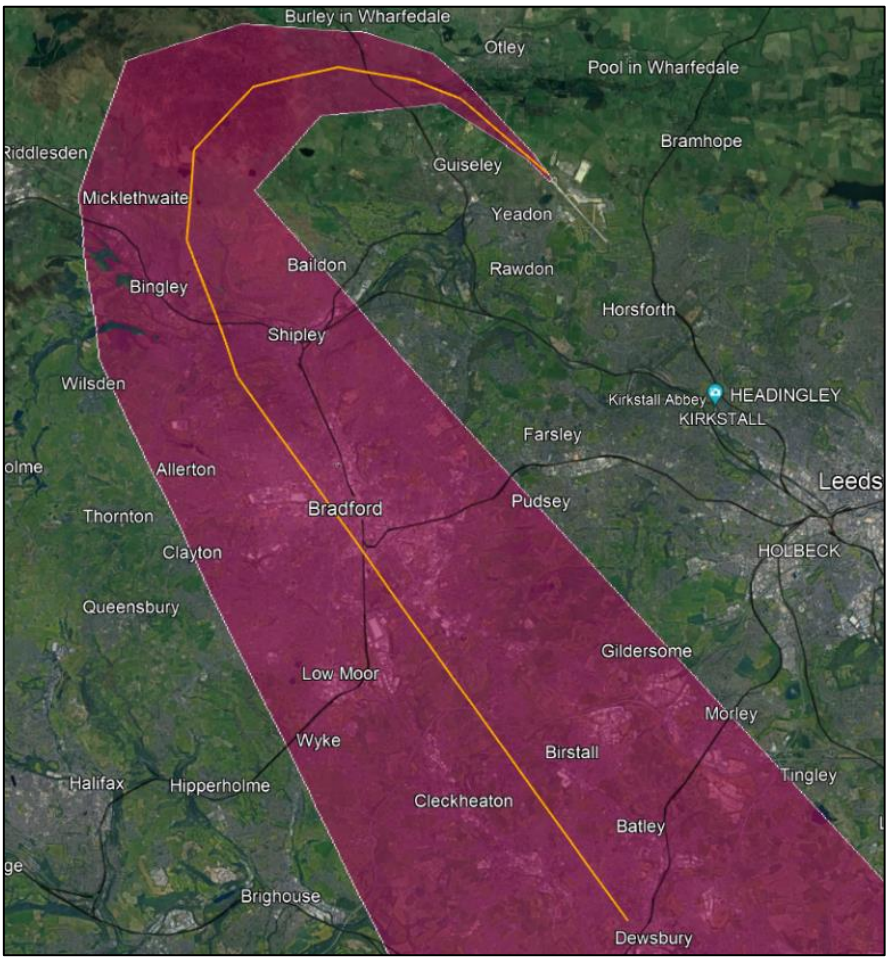


Figure 82: 32SED Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SED was evaluated as green across all DPs. Following engagement DP3 was reassessed as amber due to overflight of Ilkley Moor and the potential impact on tranquillity. It is noted that this swathe overflies a large populace in the Shipley and Bradford areas, but this is no change from today. A qualitative analysis of the numbers of people affected by aviation noise will be conducted during the IOA. Affecting different people (i.e. those not currently overflown), but less of them, may ultimately be preferable to continuing with the existing system. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluations.

6.14. RW32 South-East Option E (32SEE)

Figure 83: 32SEE Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SEE was evaluated as green across all DPs. Following engagement DP1 and 6 were amended to reflect the potential conflict with inbounds to RW32. DP3 was reassessed as amber due to overflight of Ilkley Moor and the potential impact on tranquillity. It is noted that this swathe overflies a large populace in the Shipley and Bradford areas, but this is no change from today. A qualitative analysis of the numbers of people affected by aviation noise will be conducted during the IOA. Affecting different people (i.e. those not currently overflown), but less of them, may ultimately be preferable to continuing with the existing system. DP1 was amended to red as this swathe flies directly towards the inbounds down L975 from the East and owing to the need for additional CAS, DP5 was amended to red. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluations.

6.15. RW32 South-East Option F (32SEF)

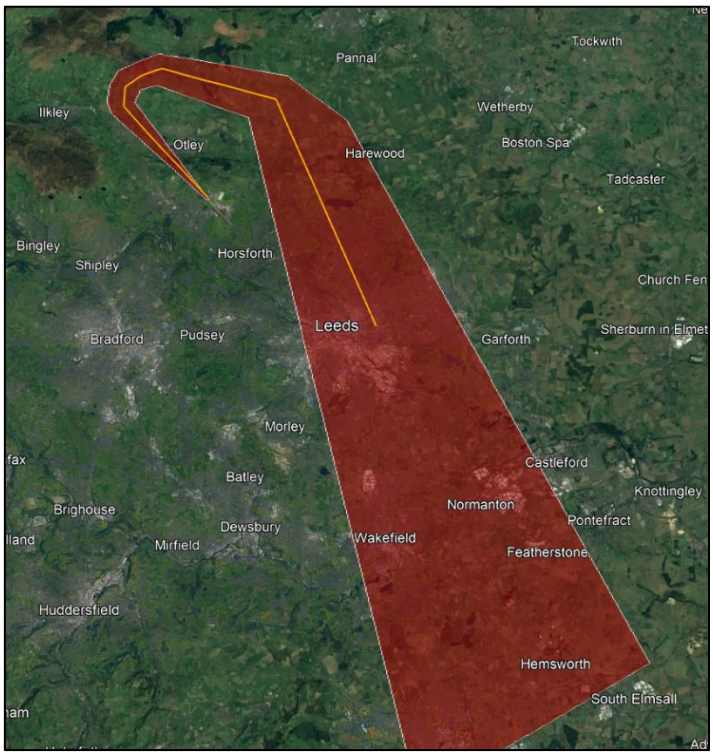


Figure 84: 32SEF Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SEF was evaluated as amber for DP1, 2 and 3 and Red for DP5. DP1 was graded amber owing to the potential for a lack of CAS containment and due to the potential conflict with traffic inbound from the East. DP2 had been graded amber as it would likely impact communities not currently impacted (such as Otley, Burley-in-Wharfedale and Huby). From a tranquillity perspective, the swathe incorporates the Nidderdale AONB and Lindley Wood Reservoir, and as such, was graded amber. The need for additional CAS resulted in DP5 being Red. Post-engagement it was accepted that the additional track miles of a right turn could increase emissions and operational costs changing DPs 4 and 9 to amber. DP6 was amended to amber owing to the potential complexity of the airspace around what was the DSA CTA. A representative body felt that DP2 should be Red as North-West Leeds would potentially be affected by inbounds and outbounds if RW32 were in use. This point is noted however, one of the reasons for adding a right-turn was to consider alternating the direction of departure to build in respite for different communities. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.16. RW32 South-East Option G (32SEG)

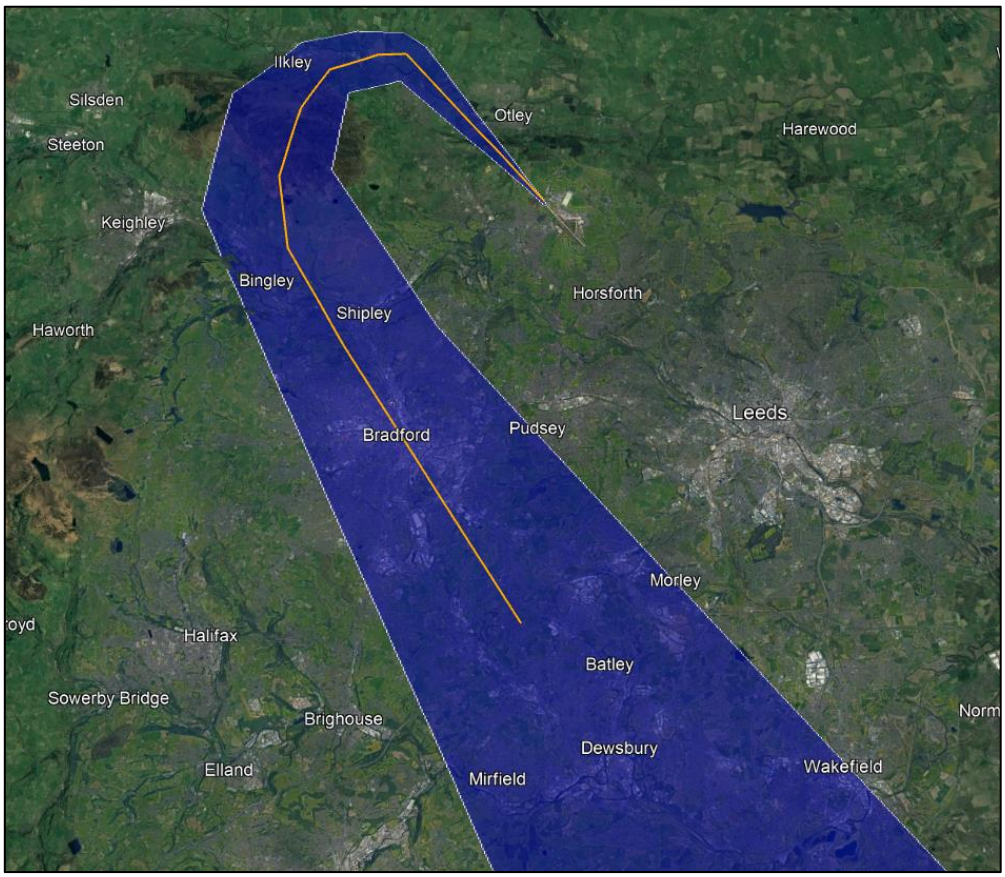


Figure 85: 32SEG Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32SEG was evaluated as Red for DP2 and amber for DP3 owing to the potential noise impact on towns such as Otley, Burley-in-Wharfedale and Ilkley and the tranquillity of Ilkley Moor. Post-engagement it was accepted that the additional track miles of a right turn could increase emissions and operational costs changing DPs 4 and 9 to amber. It is noted that this swathe overflies a large populace in the Shipley and Bradford areas, but this is no change from today. A qualitative analysis of the numbers of people affected by aviation noise will be conducted during the IOA. Affecting different people (i.e. those not currently overflown), but less of them, may ultimately be preferable to continuing with the existing system. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.17. RW32 South & West Option A (32S&WA)

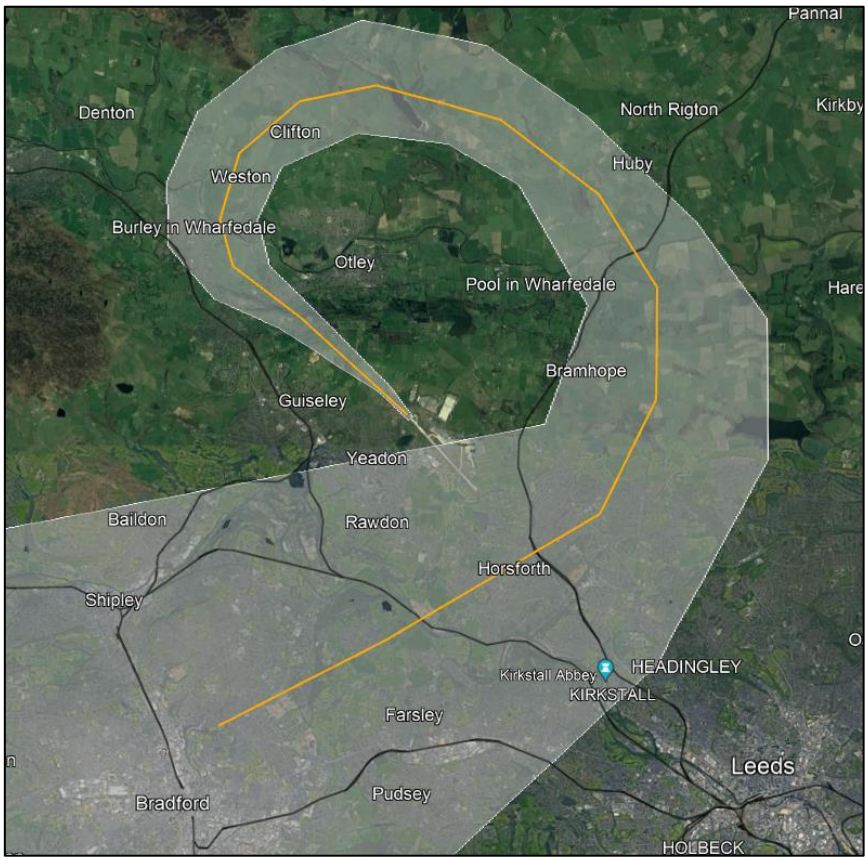


Figure 86: 32S&WA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WA was evaluated as Red for DP1 and 5 owing to lack of CAS containment. DP2 had been graded amber as it would likely impact communities not currently impacted (such as Otley, Burley-in-Wharfedale and Huby). From a tranquillity perspective, the swathe incorporates the Nidderdale AONB and Lindley Wood Reservoir and as such DP3 was graded amber. The additional track miles of a right turn wrap-around could increase emissions and operational costs setting DPs 4 and 9 as amber. A representative body felt that DP2 should be red as North-West Leeds would potentially be affected by inbounds and outbounds if RW32 were in use. This point is noted however, one of the reasons for adding a right-turn was to consider alternating the direction of departure to build in respite for different communities. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.18. RW32 South & West Option B (32S&WB)

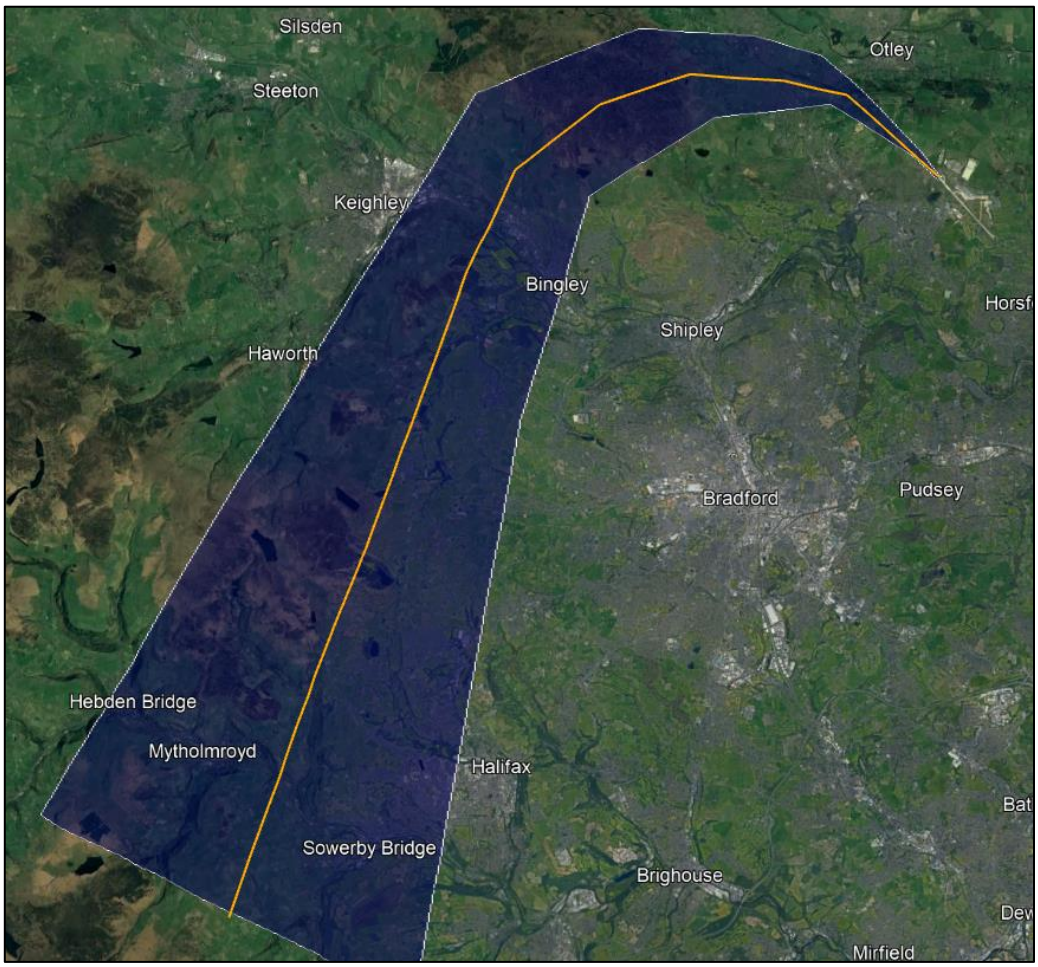


Figure 87: 32S&WB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WB was evaluated as green for all DPs. Post-engagement DP3 was amended to amber for consistency as it overflies Ilkley Moor. It is noted that this swathe overflies a large populace in areas such as Menston, Keighley and Bingley, but this is no change from today. A qualitative analysis of the numbers of people affected by aviation noise will be conducted during the IOA. Affecting different people (i.e. those not currently overflown), but less of them, may ultimately be preferable to continuing with the existing system. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.19. RW32 South & West Option C (32S&WC)

Figure 88: 32S&WC Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WC was evaluated as green for all DPs. Post-engagement DP3 was amended to amber for consistency as it overflies Ilkley Moor. It is noted that this swathe overflies a large populace in areas such as Menston and Keighley, but this is no change from today. A qualitative analysis of the numbers of people affected by aviation noise will be conducted during the IOA. Affecting different people (i.e. those not currently overflown), but less of them, may ultimately be preferable to continuing with the existing system. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.20. RW32 South & West Option D (32S&WD)

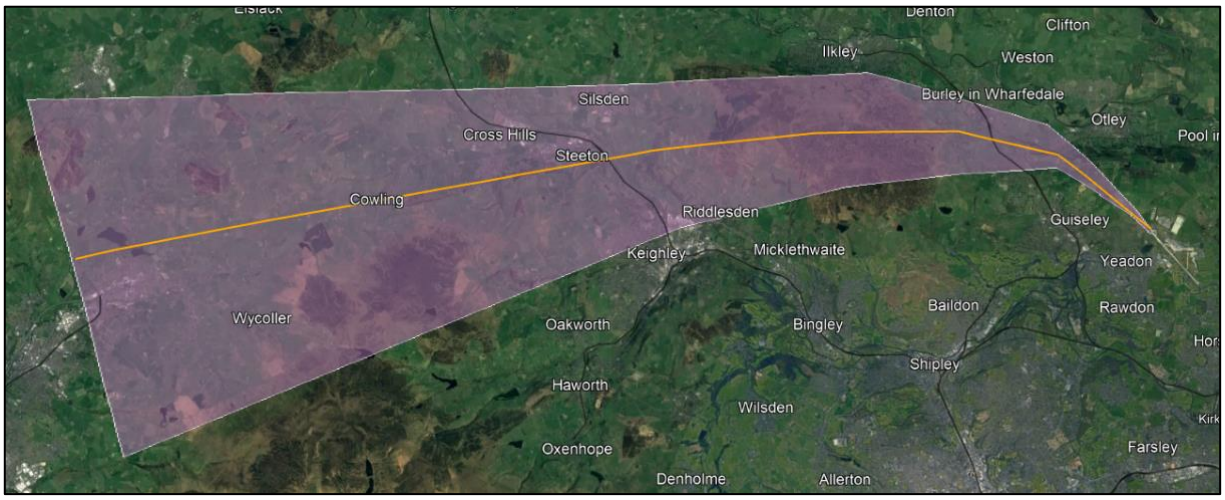


Figure 89: 32S&WD Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WD was evaluated as green for all DPs. Post-engagement DP3 was amended to amber for consistency as it overflies Ilkley Moor. It is noted that this swathe overflies a large populace in areas such as Menston, Burley-in-Wharfedale and Keighley but this is no change from today. A qualitative analysis of the numbers of people affected by aviation noise will be conducted during the IOA. Affecting different people (i.e. those not currently overflown), but less of them, may ultimately be preferable to continuing with the existing system. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.21. RW32 South & West Option E (32S&WE)

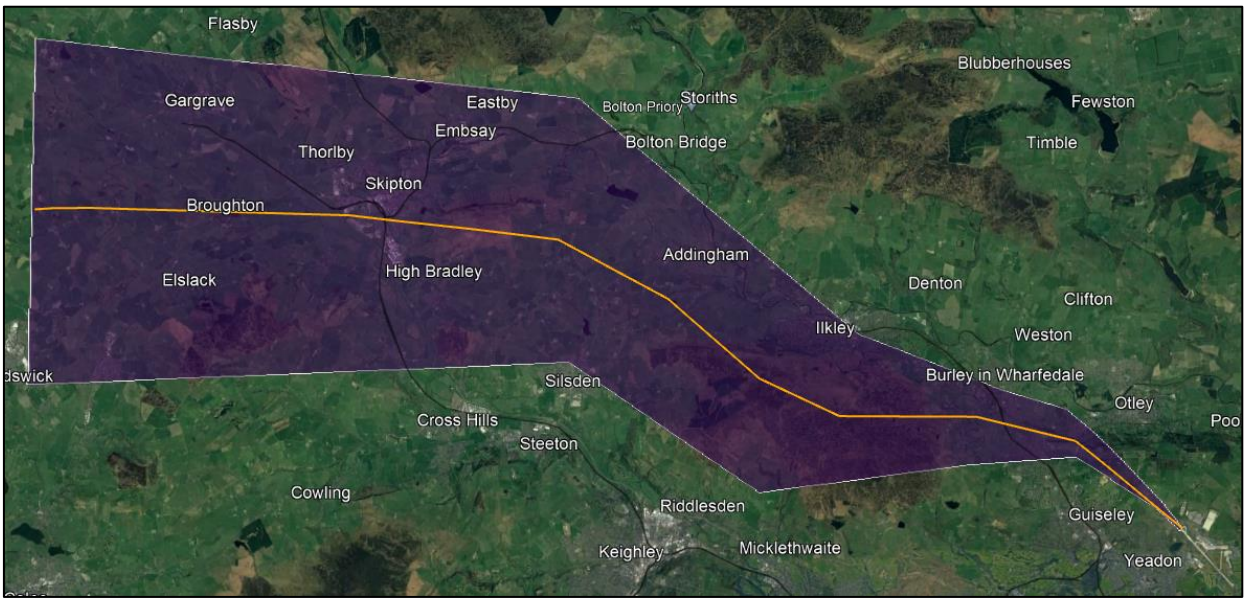


Figure 90: 32S&WE Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WE was evaluated as amber for several DPs. DP1 and 5 were due to the potential lack of CAS containment and the need for additional CAS. DP3 was assessed as amber due to Ilkley Moor. The additional track miles flown due to the swathe not pointing to the South-West sooner meant that DPs 4 and 9 were also considered to be amber. Post-engagement it is noted that this swathe has the potential to impact both Otley and Ilkley depending on which extremity of the swathe is followed and as such, DP2 has been reassessed as amber. DPs 4 and 9 were reassessed as red as compared with other DOs, it does not point in the right direction and will undoubtedly increase track miles, fuel burn and cost. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.22. RW32 South & West Option F (32S&WF)

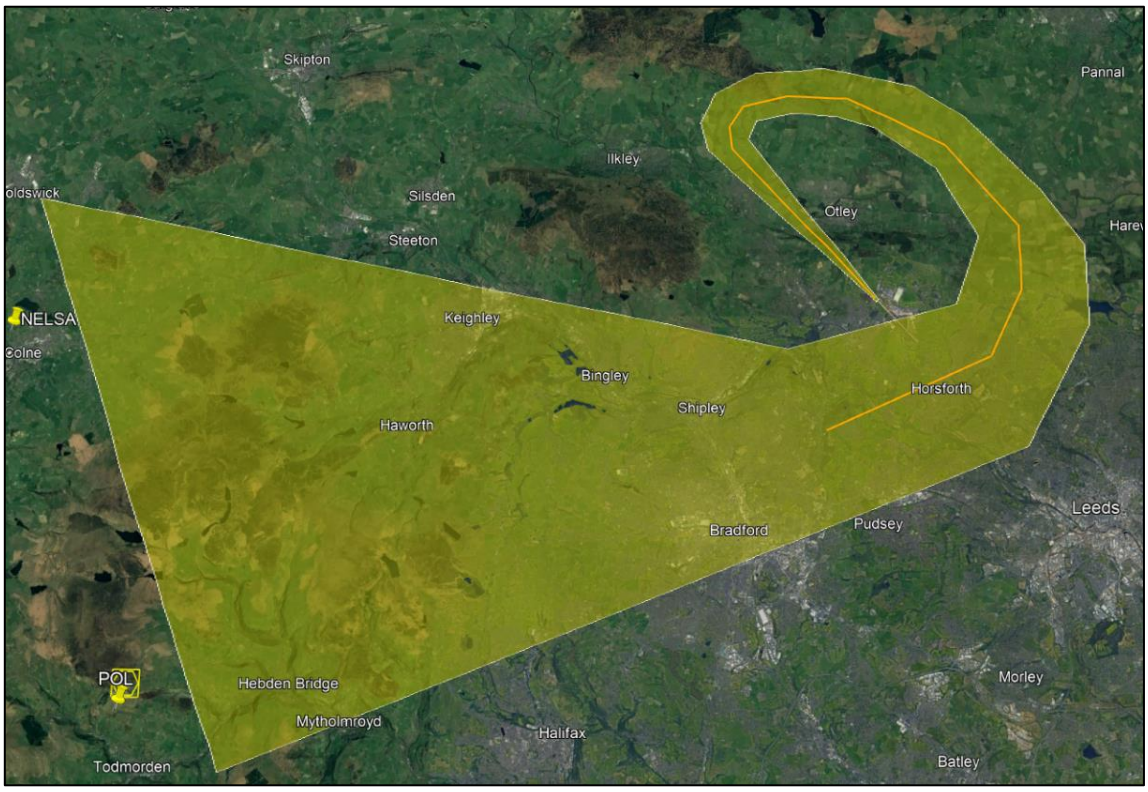


Figure 91: 32S&WF Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WF was evaluated as amber for several DPs. DP2 had been graded Amber as it would likely impact communities not currently impacted (such as Otley, Burley-in-Wharfedale and Huby). From a tranquillity perspective, the swathe incorporates the Nidderdale AONB and Lindley Wood Reservoir and as such DP3 was graded amber. The additional track miles of a right turn wrap-around could increase emissions and operational costs setting DPs 4 and 9 as amber. As this DO is broadly similar to 32S&WA (albeit the swathe goes straight ahead for longer immediately following departure), it was appropriate to amend DP1 to red due to the potential lack of CAS containment. A representative body felt that DP2 should be red as North-West Leeds would potentially be affected by inbounds and outbounds if RW32 were in use. This point is noted however, one of the reasons for adding a right-turn was to consider alternating the direction of departure to build in respite for different communities. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.23. RW32 South & West Option G (32S&WG)

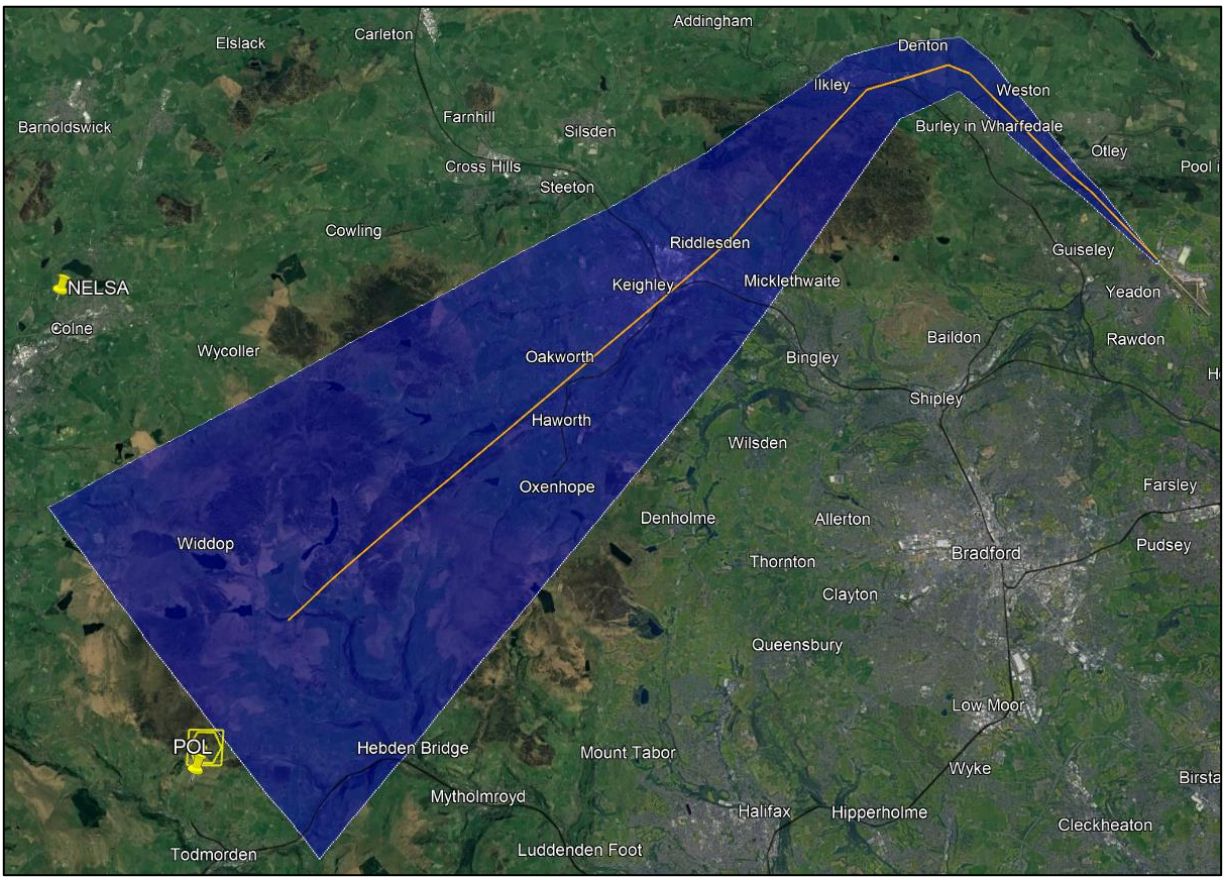


Figure 92: 32S&WG Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WG was evaluated as red for DP2 for overflight of Otley and Ilkley and DP3 was assessed as amber for Ilkley Moor. No changes to the assessment were deemed necessary post-engagement. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.24. RW32 South & West Option H (32S&WH)

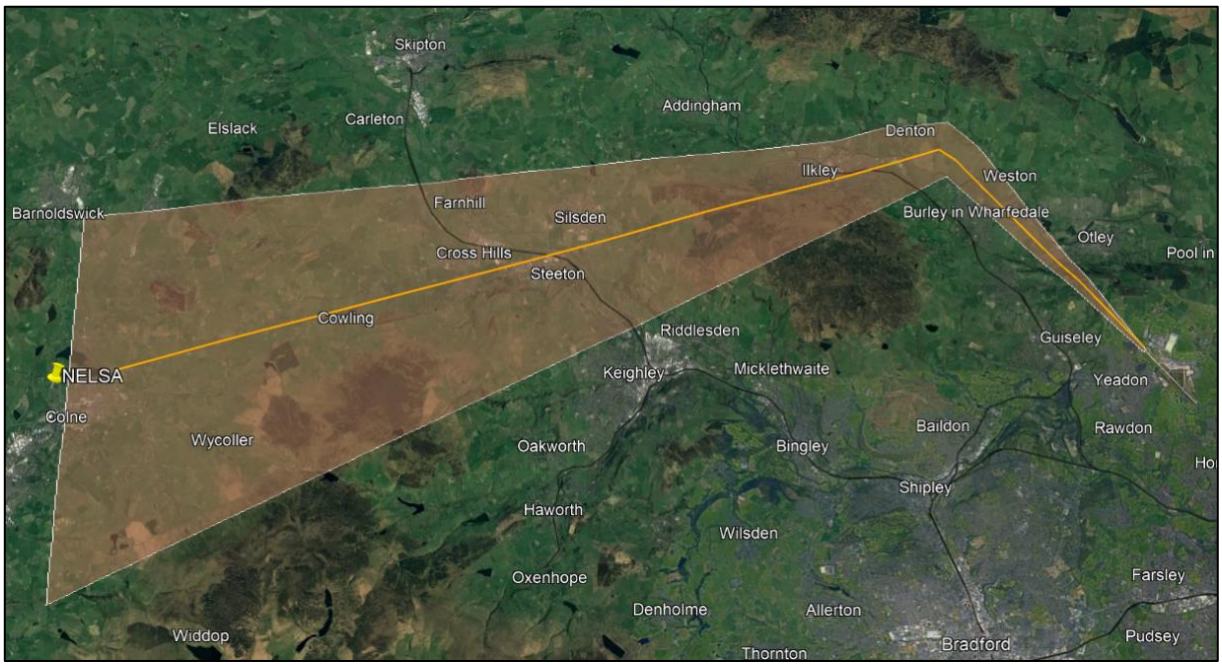


Figure 93: 32S&WH Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 32S&WH was evaluated as red for DP2 for overflight of Otley and Ilkley and DP3 was assessed as amber for Ilkley Moor. No changes to the assessment were deemed necessary post-engagement. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.25. RW14 North-West Option A (14NWA)

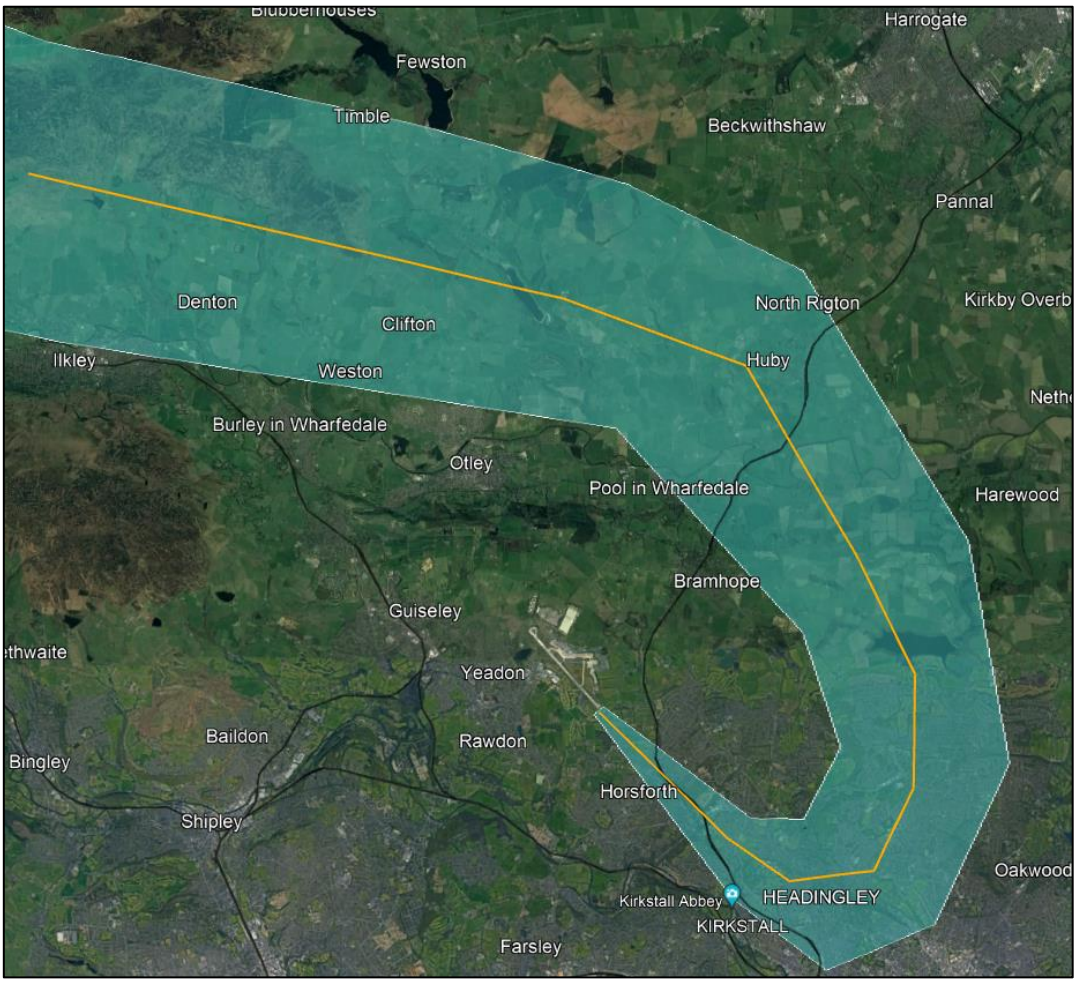


Figure 94: 14NWA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NWA was evaluated as amber for DP1, 5 and 6 for the potential lack of CAS containment and for potential conflict with traffic inbound from the North. Post-engagement, DPs 2 and 3 were amended to reflect the impact to newly affected built up areas of North-West Leeds and areas of tranquillity such as Meanwood Park and Eccup Reservoir. DP8 was amended to amber as the potential conflict with inbounds from the North may impact upon future systemisation. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.26. RW14 North-West Option B (14NWB)

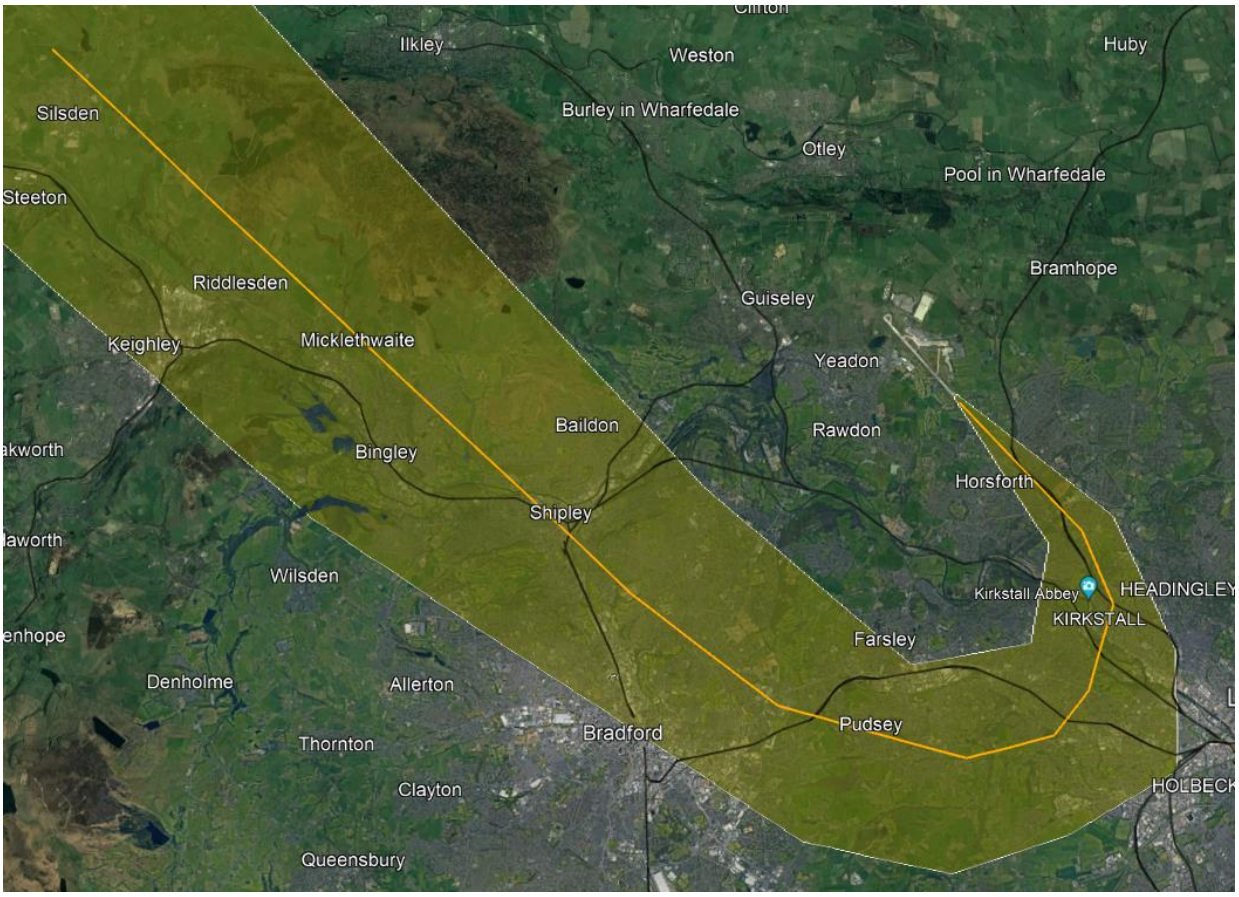


Figure 95: 14NWB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NWB was evaluated as amber for DP2 due to the overflight of built-up communities in the vicinity of Leeds and Bradford. Following engagement, DP3 was also amended to amber to reflect consideration to the Yorkshire Dales NP although it should be noted that departing aircraft would be well above 7,000ft before overflying the NP. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.27. RW14 North-West Option C (14NWC)

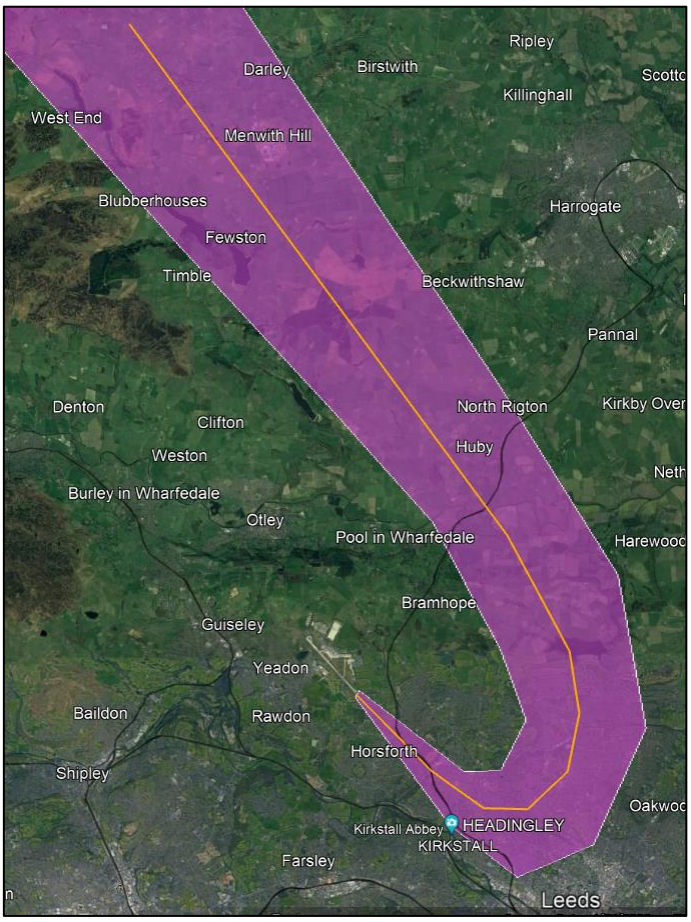
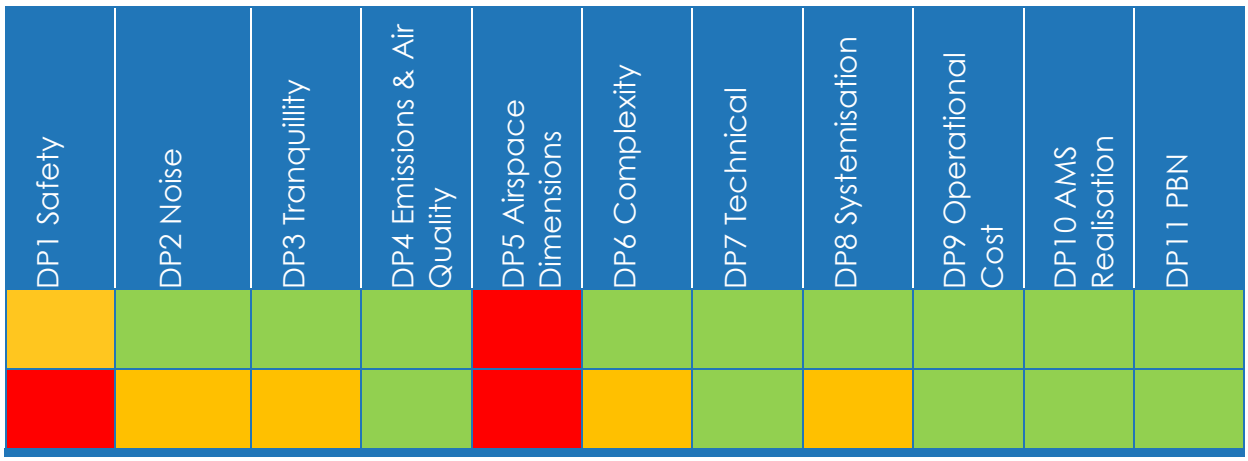


Figure 96: 14NWC Swathe



Prior to engagement, 14NWC was evaluated as amber for DP1 and red for DP5 for the lack of CAS containment and for potential conflict with traffic inbound from the North. Post-engagement, DPs 2 and 3 were amended to reflect the impact to newly affected built up areas of North-West Leeds and areas of tranquillity such as Meanwood Park and Eccup Reservoir. DP8 was amended to amber as the potential conflict with inbounds from the North may impact upon future systemisation. DP1 was amended to red, following comments from the glider community about wave soaring up to FL100 in the current Class G airspace to the North. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.28. RW14 North-West Option D (14NWD)

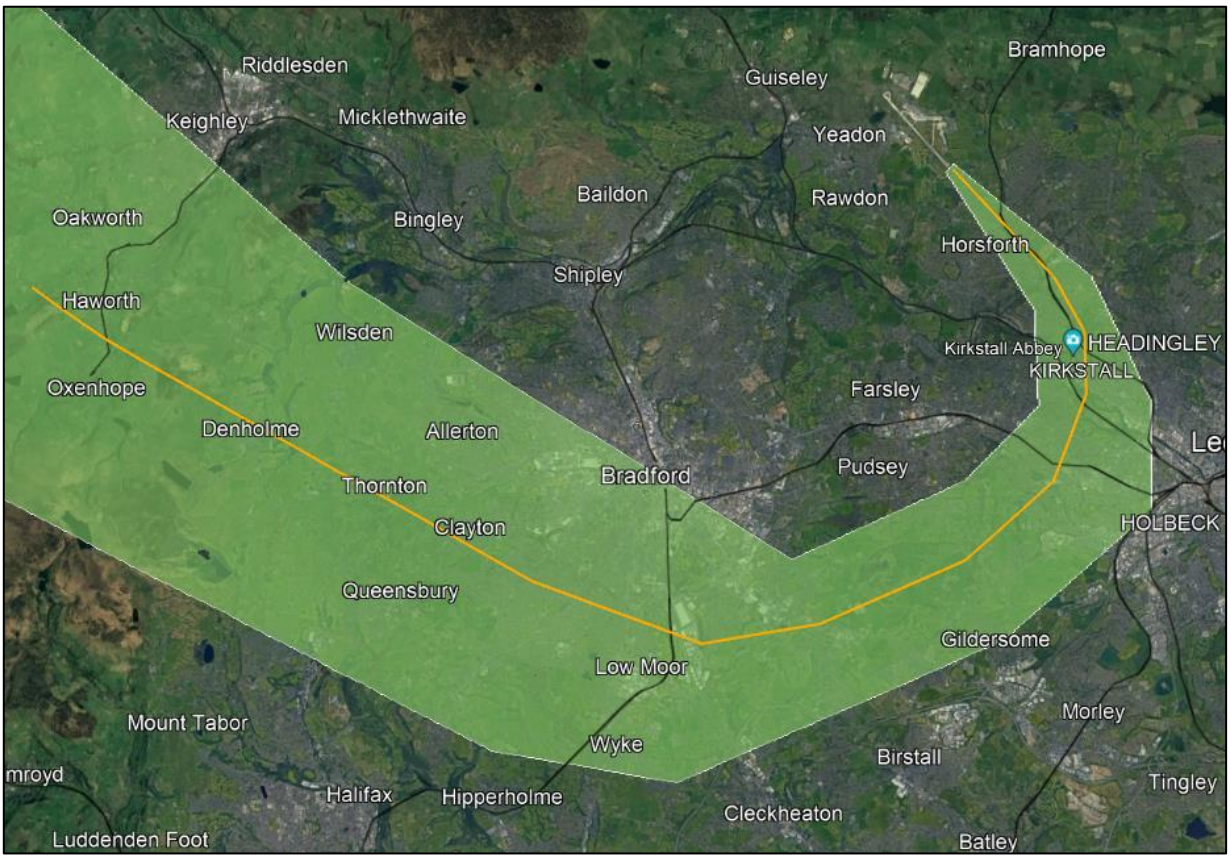


Figure 97: 14NWD Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NWD was evaluated as green for all DPs however, post-engagement DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds and Bradford. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.29. RW14 North-East Option A (14NEA)

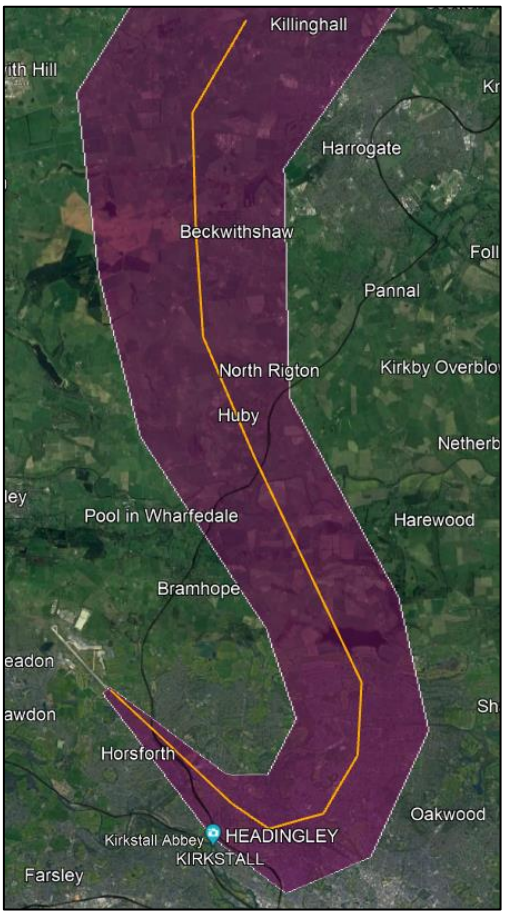


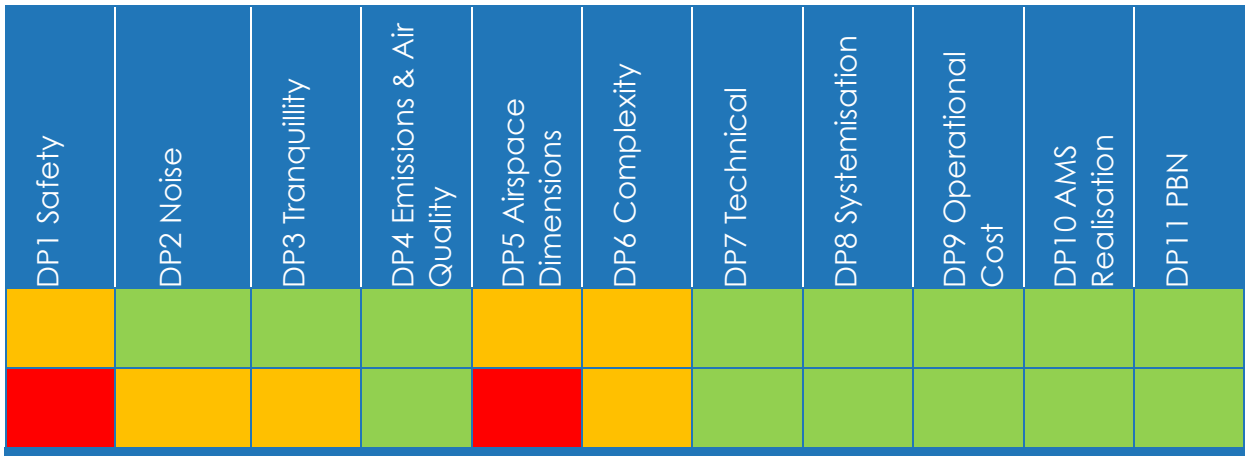
Figure 98: 14NEA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NEA was evaluated as amber for DP2 due to the overflight of built-up communities in North-West Leeds and red for DPs 1 and 5, owing to the lack of CAS and the routing through the Vale of York AIAA. Following engagement, DPs 4 and 9 were amended to red as the routing did not make any sense as it takes aircraft away from the Route Network and results in considerable additional track miles being flown. The airspace would be significantly more complex in the Vale of York and the Temporary Restricted Area set aside for Gliding (TRA(G)) that sits above the lower airspace would also be affected and, as such, DP6 was amended to red. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.30. RW14 North-East Option B (14NEB)

Figure 99: 14NEB Swathe



Prior to engagement, 14NEB was evaluated as amber for DPs 1, 5 and 6 owing to the lack of CAS and the routing through a portion of the Vale of York AIAA. Post-engagement, this assessment was upgraded to red in the case of DPs 1 and 5 following comments from the gliding community. DP2 was amended to amber due to the overflight of built-up communities in North-West Leeds and DP 3 was amended to amber to reflect the overflight of the Nidderdale AONB. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.31. RW14 North-East Option C (14NEC)

Figure 100: 14NEC Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NEC was evaluated as amber for DPs 1, 5 and 6 owing to the lack of CAS and the routing through a portion of the Vale of York AIAA. Post-engagement, DP2 was amended to amber due to the overflight of built-up communities in North-West Leeds and DP 3 was amended to amber to reflect the overflight of the Nidderdale AONB. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.32. RW14 North-East Option D (14NED)

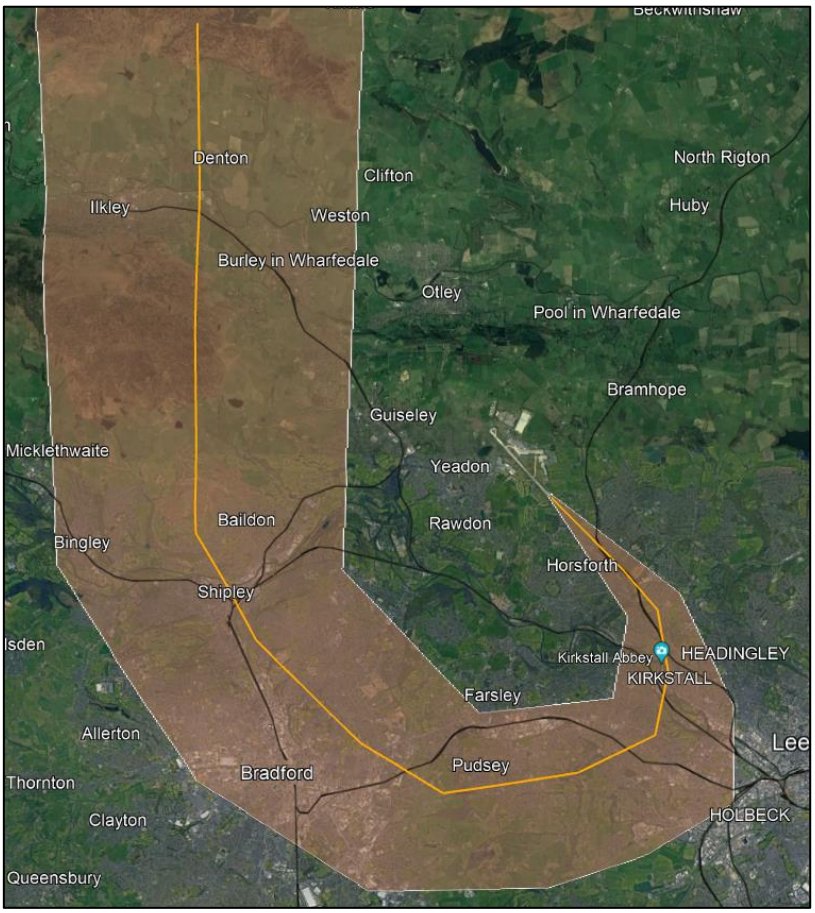


Figure 101: 14NED Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NED was evaluated as amber for DPs 1, 5 and 6 owing to the lack of CAS containment and the potential for conflict with inbounds from the North. Following engagement, DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds and Bradford., DP3 was also amended to amber to reflect consideration to the Yorkshire Dales NP and the Nidderdale AONB although it should be noted that departing aircraft would be well above 7,000ft before overflying the NP. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.33. RW14 North-East Option E (14NEE)

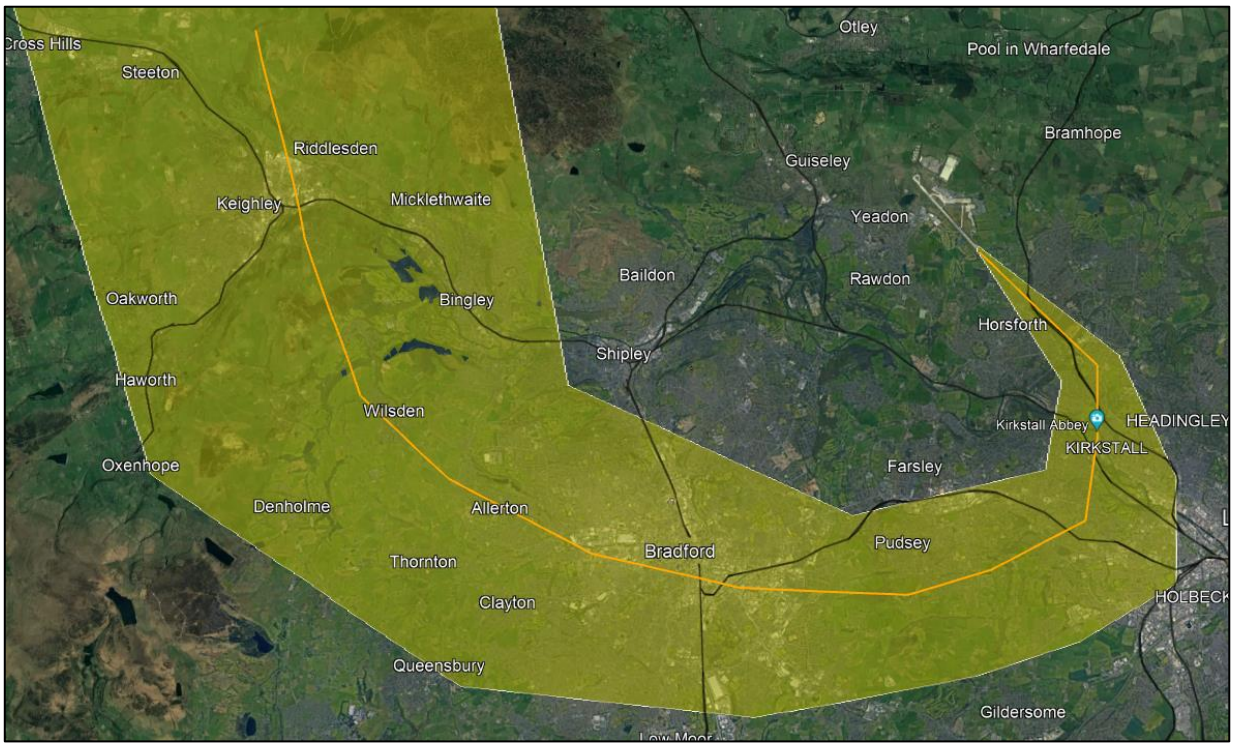


Figure 102: 14NEE Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NED was evaluated as green across all the DPs. Following engagement, DPs 1 and 5 were amended to amber owing to the lack of CAS containment to the North. DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds and Bradford. DP3 was also amended to amber to reflect consideration to the Yorkshire Dales NP and the Nidderdale AONB although it should be noted that departing aircraft would be well above 7,000ft before overflying the NP. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.34. RW14 South-East Option A (14SEA)

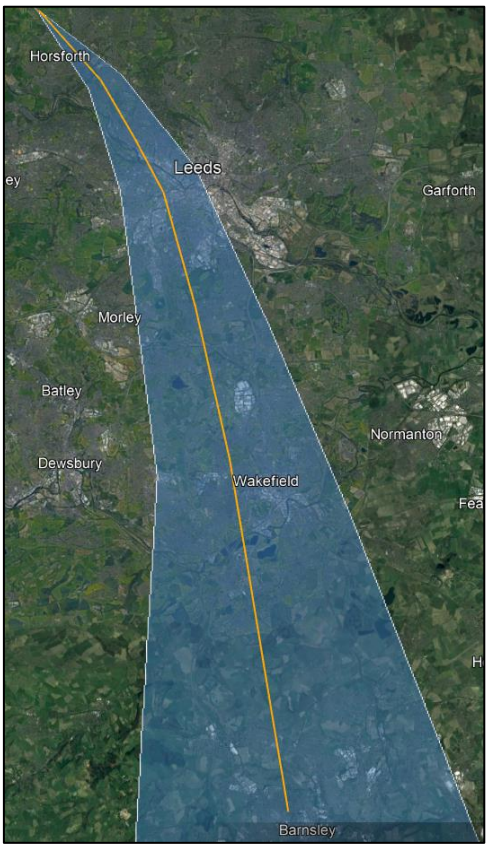


Figure 103: 14SEA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14SEA was evaluated as amber for DP9 due to the additional track miles likely to be flown as compared with 14SED. Following engagement, this was also reflected in the changing of DP4 to amber. DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds and DP3 was amended to amber to reflect consideration to the Peak District NP although it should be noted that departing aircraft would be well above 7,000ft before overflying the NP. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.35. RW14 South-East Option B (14SEB)

Figure 104: 14SEB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14SEB was evaluated as green across all DPs. Post-engagement, DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.36. RW14 South-East Option C (14SEC)

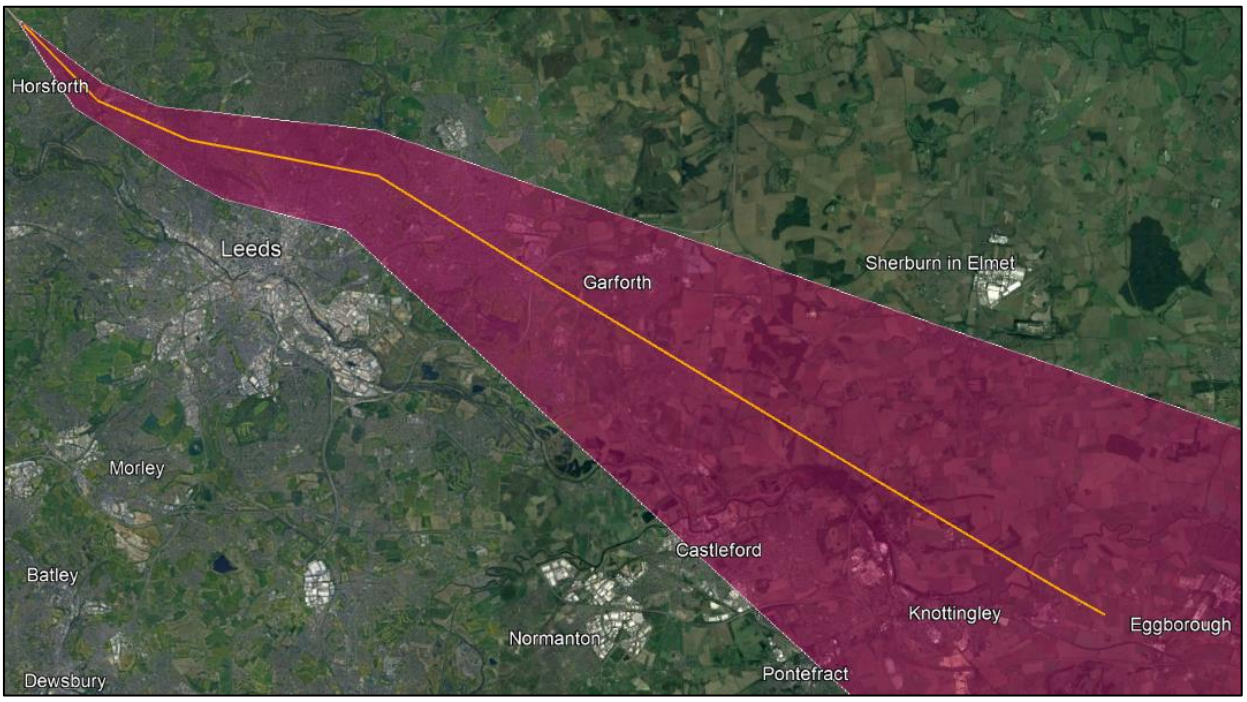


Figure 105: 14SEC Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14SEC was evaluated as amber for DP1 and red for DP5 due to the lack of CAS containment and the need for additional CAS. Following engagement, DP1 was amended to red for consistency with other assessments and due to it flying into direct conflict with the inbound traffic routing down the northern side of L975. DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.37. RW14 South-East Option D (14SED)

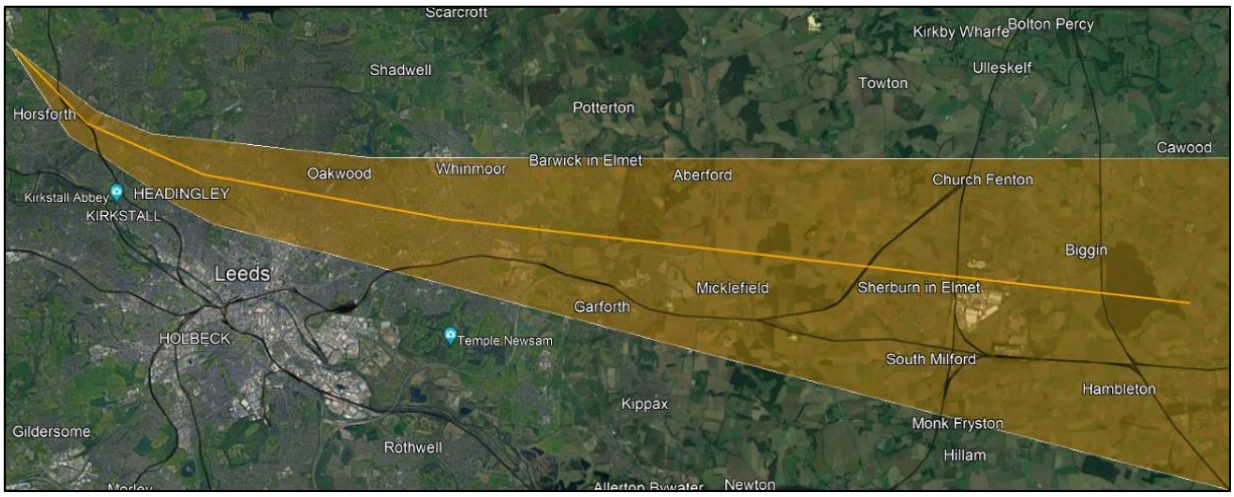


Figure 106: 14SED Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14SED was evaluated as amber for DP1 and red for DP5 due to the lack of CAS containment and the need for additional CAS. Following engagement, DP1 was amended to red for consistency with other assessments and due to it flying into direct conflict with the inbound traffic routing down the Northern side of L975. DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.38. RW14 South & West Option A (14S&WA)

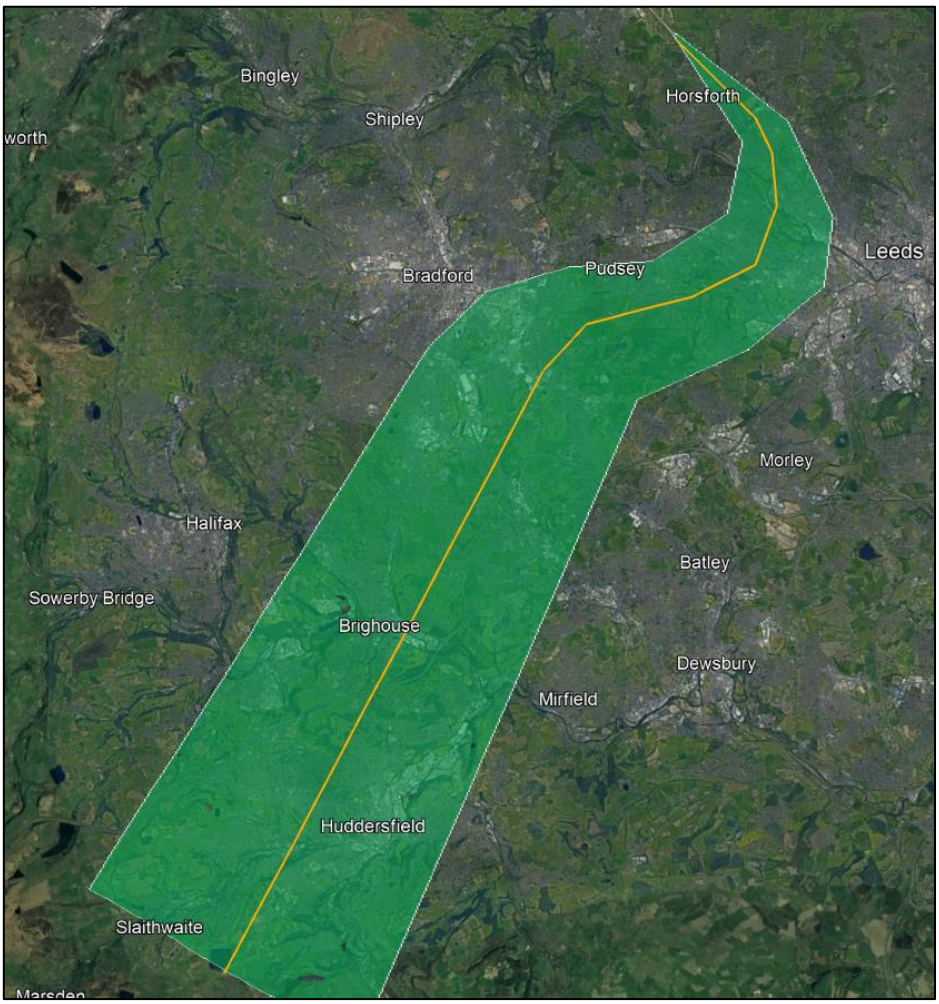


Figure 107: 14S&WA Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14S&WA was evaluated as amber for DP4 as it would result in additional track miles for aircraft wishing to route to the West as compared with some of the other options. Following engagement, this was also reflected in the changing of DP9 to amber. DP6 was amended to amber as there was a potential for complexity with inbounds to LBA via POL. DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.39. RW14 South & West Option B (14S&WB)

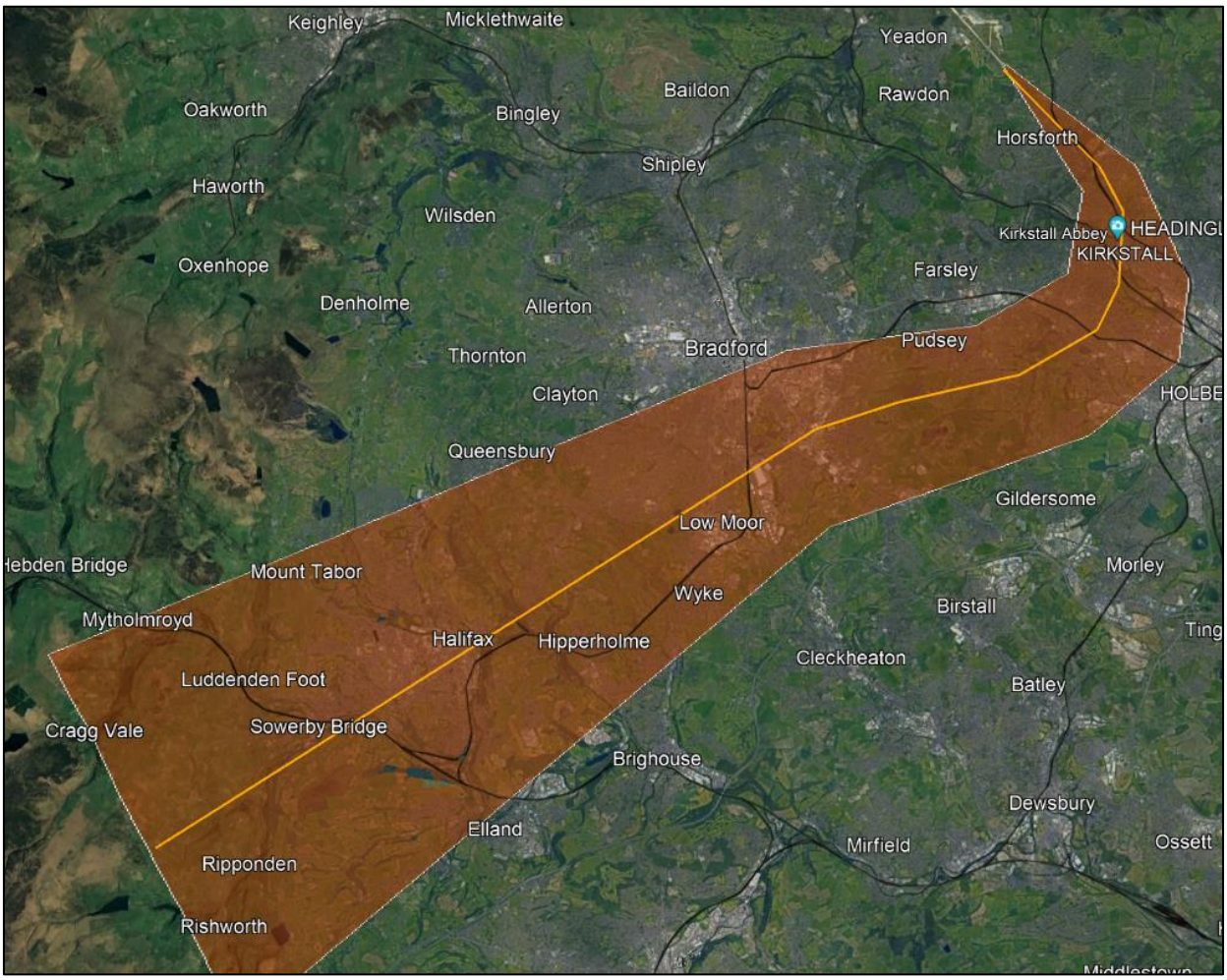


Figure 108: 14S&WB Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NSEB was evaluated as green for all DPs. Following engagement, DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds. DP6 was amended to amber as there was a potential for complexity with inbounds to LBA via POL. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.40. RW14 South & West Option C (14S&WC)

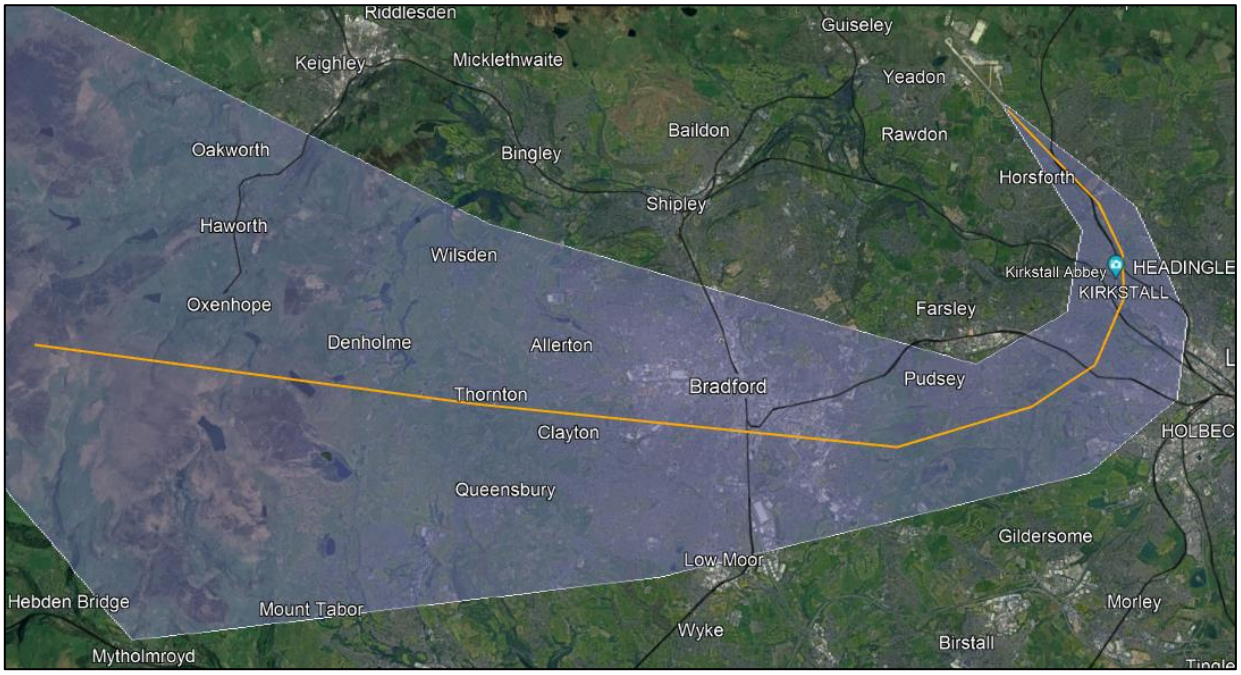


Figure 109: 14S&WC Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14NSEC was evaluated as green for all DPs. Following engagement, DP2 was amended to amber due to the overflight of built-up communities in the vicinity of Leeds and Bradford. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber evaluation.

6.41. RW14 South & West Option D (14S&WD)

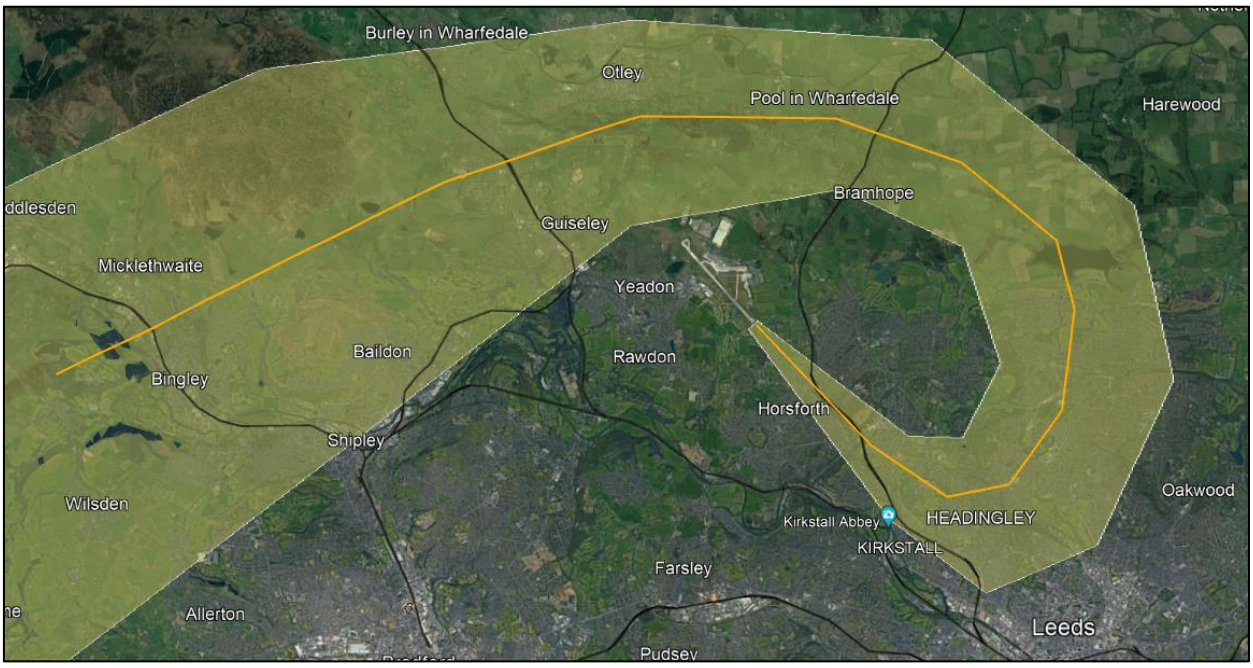


Figure 110: 14S&WD Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14S&WD was evaluated as red for DP4 and amber for DP9 due to the additional track miles flown by conducting a left-hand wraparound turn. It was rated amber for DP5 the potential for additional CAS to be required and amber for DP6 due to potential conflict with traffic via NELSA. DP2 was assessed as amber due to the impact on newly affected built up areas of North-West Leeds. Post engagement, DP3 was also assessed as amber for the areas of tranquillity such as Meanwood Park and Eccup Reservoir. DP1 was also amended to amber due to the potential for conflict with inbounds via NELSA. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber/red evaluation.

6.42. RW14 South & West Option E (14S&WE)

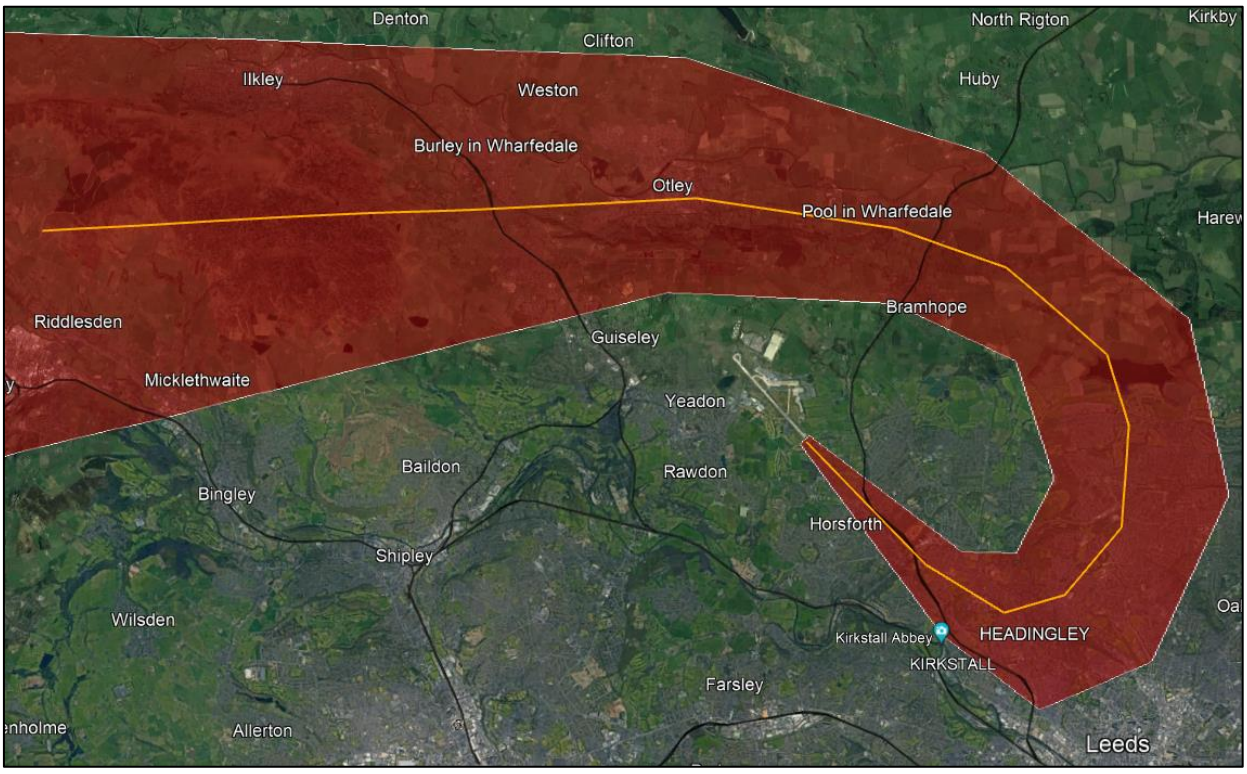
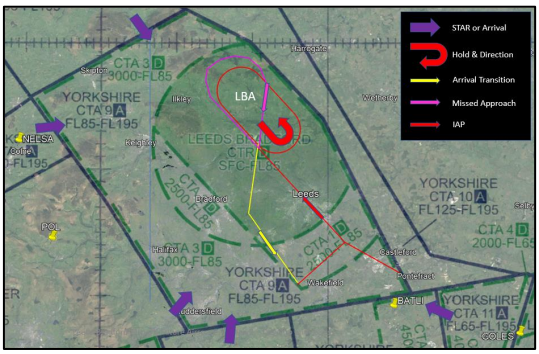


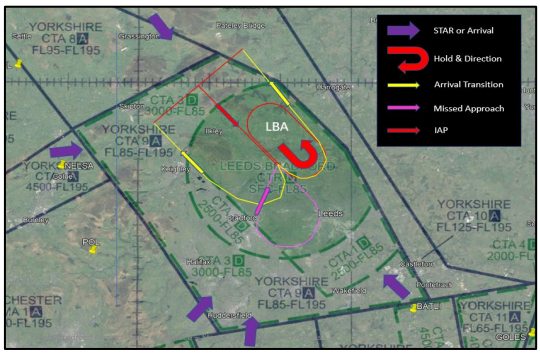
Figure 111: 14S&WE Swathe

DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, 14S&WE was evaluated as red for DP4 and amber for DP9 due to the additional track miles flown by conducting a left-hand wraparound turn. It was rated amber for DP5 the potential for additional CAS to be required and amber for DP6 due to potential conflict with traffic via NELSA. DP2 was assessed as amber due to the impact on newly affected built up areas of North-West Leeds. Post engagement, DP3 was also assessed as amber for the areas of tranquillity such as Meanwood Park and Eccup Reservoir. DP1 was also amended to amber due to the potential for conflict with inbounds via NELSA. Any future proposals contained within this swathe need to consider these aspects that have resulted in amber /red evaluation.

6.43. Arrival Option 1



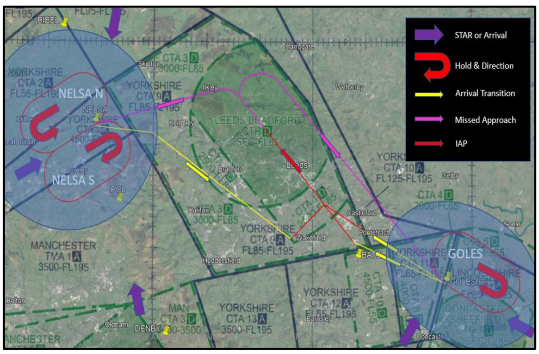


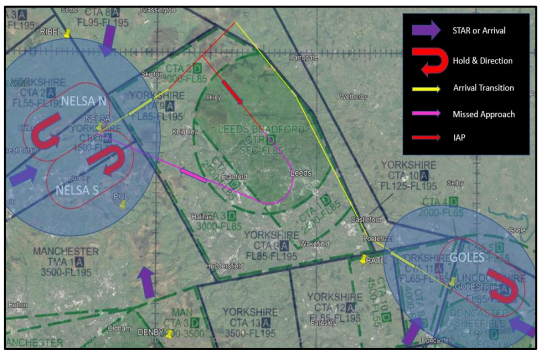
DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, it was assessed that DP1 was amber due to the need to proactively manage the existing Missed Approach Procedure as this DO retains the existing procedure. DP2 and 3 were assessed as amber as the easterly pattern flown to RW14 potentially affects new people with noise more frequently (albeit smaller population densities) and this may also impact upon the Nidderdale AONB. As a system, it was assessed as slightly less efficient and therefore, DP4 was assessed as amber.

Additional CAS would be required for the eastern T-Bar to RW14 resulting in an amber rating for DP5. Having the hold in the overhead of the Airport (at the LBA) can result in stepped climbs for departing aircraft and this represented a lack of forward thinking and modernisation for the operations at the Airport. This goes against the goals of the AMS and accordingly, DPs 8 and 10 were assessed as amber. There were no comments in the feedback received that affected the DPE of this DO. Any future proposals associated with this system need to consider these aspects that have resulted in amber evaluation.

6.44. Arrival Option 2

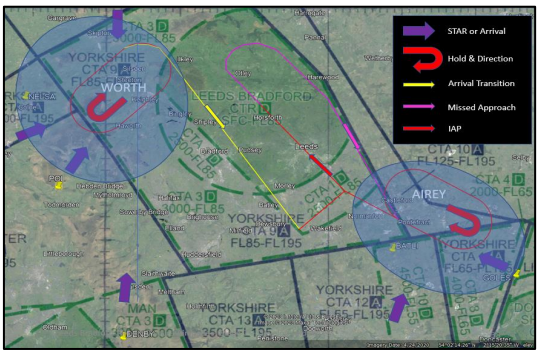


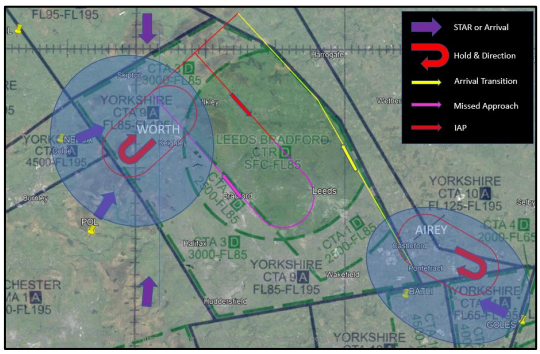


DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, it was assessed that DP2 and 3 should be amber as the easterly pattern flown to RW14 potentially affects new people with noise more frequently (albeit smaller population densities) and this may also impact upon the Nidderdale AONB. Additional CAS would be required to contain holds at NELSA and GOLES and for the eastern T-Bar to RW14 resulting in an amber rating for DP5. DP6 was assessed as amber as the future of the airspace in the vicinity of DSA is in a state of flux. Concerns relating to the use of the airspace in the area previously occupied by the glider community resulted in a change of DP1 to amber. Any future proposals associated with this system need to consider these aspects that have resulted in amber evaluation.

6.46. Arrival Option 3

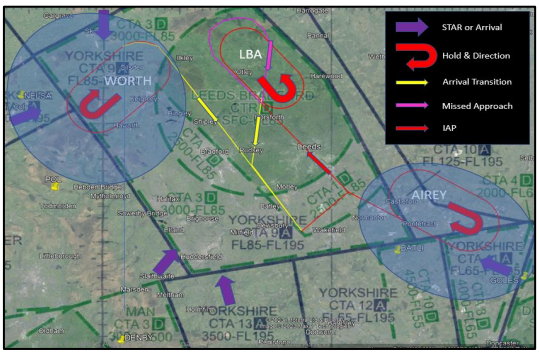


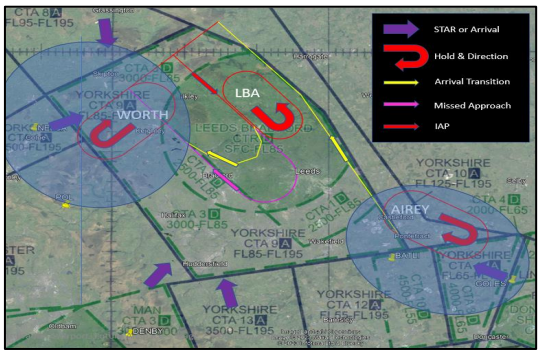


DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, it was assessed that DP2 and 3 should be amber as the easterly pattern flown to RW14 potentially affects new people with noise more frequently (albeit smaller population densities) and this may also impact upon the Nidderdale AONB. Additional CAS would be required to contain the hold at AIREY (in close proximity to Sherburn-in-Elmet and Leeds East airfields) and for the eastern T-Bar to RW14 resulting in a red rating for DP5 and an amber rating for DP1. DP6 was assessed as amber as the future of the airspace in the vicinity of DSA is in a state of flux. The position of the WORTH hold would likely result in stepped climbs for departures off RW32 and accordingly DP8 was assessed as amber. There were no comments in the feedback received that affected the DPE of this DO. Any future proposals associated with this system need to consider these aspects that have resulted in amber evaluation.

6.47. Arrival Option 4

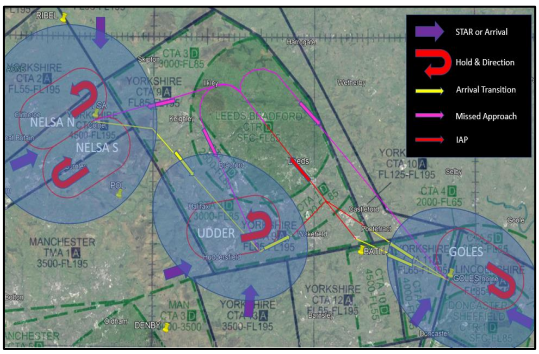


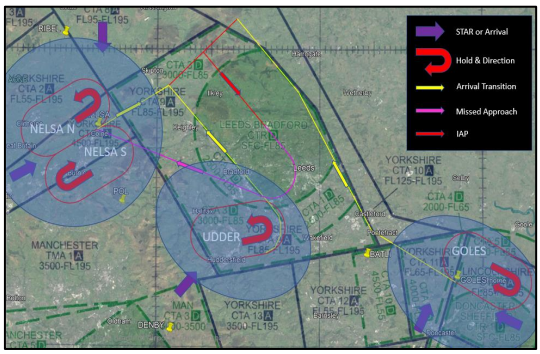


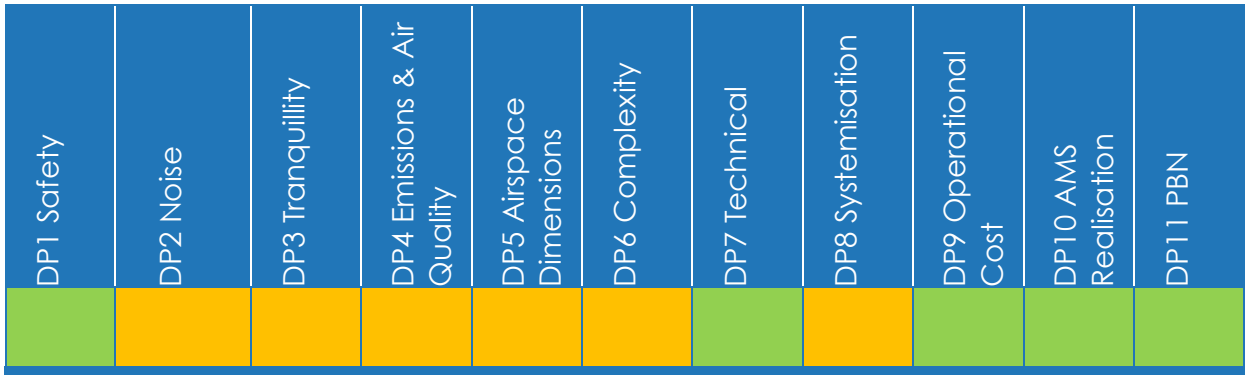
DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN

Prior to engagement, it was assessed that DP2 and 3 should be amber as the easterly pattern flown to RW14 potentially affects new people with noise more frequently (albeit smaller population densities) and this may also impact upon the Nidderdale AONB. Additional CAS would be required to contain the hold at AIREY (in close proximity to Sherburn-in-Elmet and Leeds East airfields) and for the eastern T-Bar to RW14 resulting in a red rating for DP5 and an amber rating for DP1. DP6 was assessed as amber as the future of the airspace in the vicinity of DSA is in a state of flux. The position of the WORTH hold would likely result in stepped climbs for departures off RW32 and accordingly DP8 was assessed as amber. There were no comments in the feedback received that affected the DPE of this DO. Any future proposals associated with this system need to consider these aspects that have resulted in amber evaluation.

6.49. Arrival Option 5







Prior to engagement, it was assessed that DP2 and 3 should be amber as the easterly pattern flown to RW14 potentially affects new people with noise more frequently (albeit smaller population densities) and this may also impact upon the Nidderdale AONB. Additional CAS would be required to contain the holds at GOLES and NELSA and for the eastern T-Bar to RW14 resulting in an amber rating for DP5. DP6 was assessed as Amber as the future of the airspace in the vicinity of DSA is in a state of flux. The position of the UDDER hold would likely result in stepped climbs for departures off RW14 and accordingly DPs 4 and 8 were assessed as amber. There were no comments in the feedback received that affected the DPE of this DO. Any future proposals associated with this system need to consider these aspects that have resulted in amber evaluation.

6.50. Outcome of Evaluation

6.50.1. The DPE is a useful exercise in determining to what extent DOs meet the agreed set of DPs although it is not necessarily the final arbiter. The DPE is a very subjective process and relies upon DPs that have been well worded such that they capture the real intent of all concerned. Whilst certain DOs may score 'red' against certain DPs, this does not mean that they are definitively discounted from further consideration. It could be that the DO in question scores 'red' for safety as it has been assumed that current environmental/configuration constraints remain in place, and this may not ultimately be the case.

6.50.2. Ultimately, within reason, it is important to ensure that all viable DOs are considered in greater detail particularly if they show relative benefits in certain aspects. A clear example of this in this case is the departure options that turn right off RW32 and left off RW14. It is possible that the inclusion of these DOs may reduce the number of people overflown and having these DOs may result in the potential for alternate 'respite' operations.

6.50.3. Forty SID DOs were developed for consideration at DPE, and it has been determined that twenty-four of these should progress into Step 2b for IOA. As previously discussed, all the initial array of DOs for arrivals were discounted and these evolved into the five DOs that will all progress to the IOA. The following SID DOs were discounted:

- All SIDs with the departure direction of North-East – There is insufficient demand for a North-Easterly SID from LBA. There isn't a North-Easterly SID currently and all aircraft requiring a departure in this direction can follow a North-Westerly SID until such time as it is safe (and environmentally appropriate) to turn to the North-East;

- 32SEA and 32SEE – Fundamentally these will not work with the Route Network as use of these would result in aircraft climbing towards (head-to-head) aircraft descending into the MTMA along the Northern side of L975.

- 32S&WE – This DO is inefficient as it does not point aircraft in the direction they wish to depart.

- 14NWC – This DO is discounted on the grounds of safety and airspace demands. There is no requirement to route so far to the east of the other DOs and across the Vale of York AIAA.

- 14SEC and 14SED - Fundamentally these will not work with the Route Network as use of these would result in aircraft climbing towards (head-to-head) aircraft descending into the MTMA along the Northern side of L975.

6.50.4. The Final DPE Matrix is at Table 6 overleaf.

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	Outcome
RW32 North-West												
32NWA												Retained
32NWB												Retained
RW32 North-East												
32NEA												Discounted
32NEB												Discounted
32NEC												Discounted
32NED												Discounted
32NEE												Discounted
RW32 South-East												
32SEA												Discounted
32SEB												Retained
32SEC												Retained
32SED												Retained
32SEE												Discounted
32SEF												Retained
32SEG												Retained
RW32 South & West												
32S&WA												Retained
32S&WB												Retained
32S&WC												Retained

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	Outcome
32S&WD												Retained
32S&WE												Discounted
32S&WF												Retained
32S&WG												Retained
32S&WH												Retained
RW14 North-West												
14NWA												Retained
14NWB												Retained
14NWC												Discounted
14NWD												Retained
RW14 North-East												
14NEA												Discounted
14NEB												Discounted
14NEC												Discounted
14NED												Discounted
14NEE												Discounted
RW14 South-East												
14SEA												Retained
14SEB												Retained
14SEC												Discounted
14SED												Discounted
RW14 South & West												
14S&WA												Retained

Option	DP1	DP2	DP3	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP11	Outcome
14S&WB												Retained
14S&WC												Retained
14S&WD												Retained
14S&WE												Retained
Arrival Options (first iteration) – Pre-engagement Evaluation only												
A – LBA Hold	Existing System so not evaluated in this DPE											Discounted
B – NW/SE Holds												Discounted
C – NW/SW Holds												Discounted
D – West Hold												Discounted
E – Extended CL Holds												Discounted
F1 – Point Merge South												Discounted
F2 – Point Merge East												Discounted
F3 – Point Merge West												Discounted
Arrival Options (second iteration)												
1 – LBA												Retained
2 – NELSA/GOLES												Retained
3 – AIREY/WORTH												Retained
4 – AIREY/WORTH/LBA												Retained
5 – NELSA/GOLES/UDDER												Retained

Table 6: Final DPE Matrix

7. Next Steps

7.1. The Stage 2 submission for the LBA FASI(N) ACP is scheduled for 2nd Jun 2023 and will include this document along with a document detailing the IOA. In addition, all supporting documentation such as the presentations used for stakeholder engagement and the Engagement Record will be posted on the ACP Portal.

7.2. The Manchester Airport and the MTMA (NERL) ACPs are successfully through the Stage 2 Gateway and the Liverpool ACP is scheduled for the September 2023 Gateway. As Stage 3 commences, it is anticipated that several workshops will be held with the MTMA Team and other key stakeholders over the coming months to begin the refinement process of turning swathes into procedures that allow for greater analysis.

A. Stakeholder List

A.1. Local Councils

Barnsley Council	Kirklees Council
Bradford Council	Leeds City Council
Calderdale Council	Mayor of West Yorkshire
Craven District Council	Pendle Borough Council
Doncaster Council	Selby District Council
Harrogate Borough Council	Wakefield Council

A.2. Airport Consultative Committee

Chairman	Pool In Wharfedale Parish Council	Horsforth Town Council
Transdev	Bramhope & Carlton Parish Council	City Of Bradford MDC
Harrogate District Chamber of Commerce	Wakefield Council	LBA Support Group
Burley in Wharfedale Parish Council	Inner North-West Community Committee	Yorkshire Local Councils Association - Leeds Branch 1 of 2
Calderdale Council	Leeds City Council (CON)	Vale of York Gliding Clubs
North Yorkshire County Council	Rawdon Parish Council	Aireborough Neighbourhood Forum
Local Resident Rep - Yeadon	Leeds City Council (LAB)	Yorkshire Local Councils Association - Leeds Branch 2 of 2
Baildon Town Council	Otley Town Council	Menston Parish Council
Local Resident Rep - Horsforth End of Runway	Trades Union Congress - Yorkshire & The Humber	

A.3. Environmental Bodies

National Trust
Natural England
Peak District National Park Authority
Yorkshire Dales National Park Authority

A.4. Technical Stakeholders

Aurigny	KLM
British Airways (BA Cityflyer)	Manchester ATC
Doncaster Sheffield ATC (ATCSL)	Multiflight
Eastern Airways	NATS En-Route Ltd (NERL)
EasyJet	RAF Leeming ATC
Helijet	Ryanair
Jet2	Teesside ATC

A.5. Local Aviation Stakeholders

(Doncaster Sheffield Flight Training)	Dales Hang gliding and Paragliding Club	Humber Flying Club
Bagby	Derbyshire Soaring Club	Humberside Airport Flying School
Breighton Aerodrome	Doncaster Sheffield Airport	Humberside POM Flying Club
Burn Gliding Club	Doncaster Sheffield Airport (Yorkshire Aero Club)	LAC Flight School
Camphill	Flight Academy Manchester	Leeds East Airport
City Airport and Heliport	Full Sutton Airfield	Netherthorpe (Sheffield Aero Club)
Cleveland Flying School	Heli-Jet Aviation	North-West Leeds Transport Forum

Crosland Moor Airfield	Hields Aviation	NPAS
Pennine Soaring Club	Sandtoft Airfield	Sutton Bank (Yorkshire Gliding Club)
Pocklington (Wolds Gliding Club)	Sheffield Aero Club	Teesside International Airport (Eden Flight Training)
Retford Gamston	Sherburn Aero Club	Sutton Bank (Yorkshire Gliding Club)
Warton Aerodrome	West Yorkshire Police	York Rufforth (York Gliding Centre)
Yorkshire Air Ambulance		

A.6. NATMAC

ACOG	British Airways (BA)	Helicopter Club of Great Britain (HCGB)
Aircraft Owners and Pilots Association (AOPA)	British Balloon and Airship Club	Honourable Company of Air Pilots (HCAP)
Airfield Operators Group (AOG)	British Hang gliding and Paragliding Association (BHPA)	Light Aircraft Association (LAA)
Airlines UK	British Gliding Association (BGA)	Low Fare Airlines
Airspace4All	British Helicopter Association (BHA)	Military Aviation Authority (MAA)
Aviation Environment Federation (AEF)	British Microlight Aircraft Association (BMAA) / General Aviation Safety Council (GASCo)	Ministry of Defence - Defence Airspace and Air Traffic Management (MoD DAATM)
BAe Systems	British Parachute Association (BPA)	NATS / NERL
British Airline Pilots Association (BALPA)	General Aviation Alliance (GAA)	PPL/IR (Europe)
UK Airprox Board (UKAB)	UK Flight Safety Committee (UKFSC)	

A.7. Others

Independent submission: former ACC member	ARARA (Ash Road Area Residents Association)	Climate Action Menston
Liverpool John Lennon Airport	Crosland Moor Airfield (Huddersfield)	Ledsham Parish Council
MAG Manchester Airport	Bramhope & Carlton Parish Council	Cardigan Triangle Association
Regional Soaring Airspace Group (RSAG)	The four Gliding Clubs in the Vale of York	Skyhigh skydiving
Harrogate District Chamber of Commerce	LCC Planning	Leeds City Council Inner North-West Community Committee
Pennine Soaring Club	City Airport Ltd (Manchester Barton)	Several individuals

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