Leeds Bradford Airport Future Airspace

Stage 2 - Develop and Assess Design Swathes

Purpose

Following feedback from our ACP Stage 2A Stakeholder Workshop on 5th July 2022 this update provides information on the process we are following and answers to questions you asked.

Please remember to complete the Stage 2 Stakeholder survey by 12th August 2022.

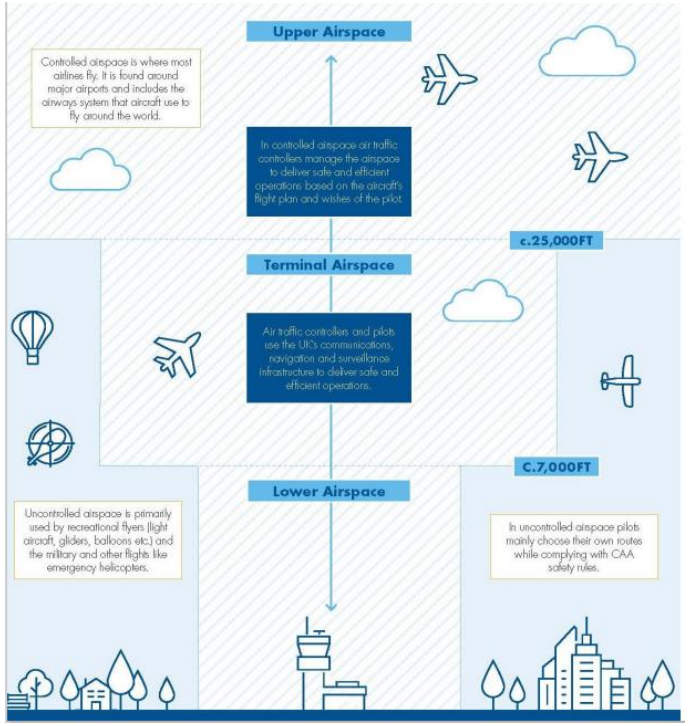
If you have any further queries please address them to Airspace Change

We are very grateful for your assistance.

Abbreviations

ACP	Airspace Change Proposal
AMS	Airspace Modernisation Strategy
APDO	Approved Procedure Design Organisation
ATC	Air Traffic Control
CAA	Civil Aviation Authority
DfT	Department for Transport
DME	Distance Measuring Equipment
DVOR	Doppler Very High Frequency Omni-Directional Range
FASI	Future Airspace Strategy Implementation
FMS	Flight Management System
LBA	Leeds Bradford Airport
NATS	National Air Traffic Services
NERL	National Air Traffic Services En-Route Limited
NDB	Non-Directional Beacon
PBN	Performance Based Navigation
RNAV	Area Navigation
SID	Standard Instrument Departure
VOR	Very High Frequency Omni-Directional Range

What is Airspace?



Three dimensional volumes of air in which different rules apply to aircraft and operators flying within them.

Divided into controlled airspace (all flight activity is known to ATC) and uncontrolled airspace (flying can take place without reference to ATC).

Used by commercial flights, general aviation and the military.

Divided into a number of vertical layers

LBA has its own controlled lower airspace called a control zone which extends up from ground level.

Above this is terminal and upper airspace which is the responsibility of NATS.

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The Foundation of our Route Design

CAP 1616 sets out the rules for airspace change.

Our responsibility is from the ground to 7,000ft

Above that it is the responsibility of NATS.

Each departure route option has two points which define the start and finish of each route:

The start point is the runway.

The finish is at 7,000ft where the route option joins with the NATS upper (network).

For arrivals, the reverse applies:

The start point is at 7,000ft (i.e. where the arrival leaves the NATS upper (network) airspace.

The finish is the runway.

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Design consideration – The rules

INTERNATIONAL RULES

The rules for route design are governed by the International Civil Aviation Organisation (ICAO) under a document called PANS-OPS 8168.

This stands for Procedures for Air Navigation Services – Aircraft Operations and sets out aspects such as:

- Minimum clearances between aircraft and obstacles (such as buildings or masts)
- When an aircraft can turn, and how tightly and at what speed.
- The standards that apply to aircraft using satellite based navigation.

UK RULES

The UK rules are driven by ICAO and regulated by the Civil Aviation Authority (CAA).

In addition to CAP1616, they have also set policies and guidance on many aspects of route design.

These include the Airspace Modernisation Strategy which our 'AMS Realisation' design principle requires us to be consistent with.

Design consideration – Aircraft

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Our PBN Design Principle states – The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.

To make sure we know what technology airlines have, we are conducting a fleet technology survey which will ask questions about current and future aircraft fleets.

This will give us information on:

- Their ability to fly different standards of satellite navigation routes,
- Climb performance,
- The types of onboard navigation equipment they have.

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Design consideration – The NATS Network

The airspace network is similar to motorways in the sky.

- When designing our routes, we must consider the airspace network and how other airports access this structure.
- This aligns with our **‘Systemisation’** Design Principle.
- This creates some constraints on our designs, based on where the NATS network can connect to us or where we expect other airports to have routes.
- As the designs mature, we’ll share our options with other airports and work together to resolve any interactions.

Design consideration – The CONOPS

CONOPS (Concept of Operation) is a technical document that gives the specification of how we wish to operate (but not where).

It takes input from:

- The fleet technology survey
- Operational plans for Leeds Bradford Airport
- Our Design Principles (Including community impact)
- The CAA's Airspace Modernisation Strategy

It provides a specification for the designers to create the route options.

Some of our CONOPS criteria

- Routes designed to Performance Based Navigation (PBN) principles
- Minimum departure climb gradients 6%
- Instrument Landing System (ILS) to be used for final approach
- Remove the reliance on ground based navigation aids (DVORs)
- Design routes to ensure minimum ATC intervention with Continuous Climb or Continuous Decent Approach (CCO/CDA)
- Deconflict our routes from other airports

Route design considerations

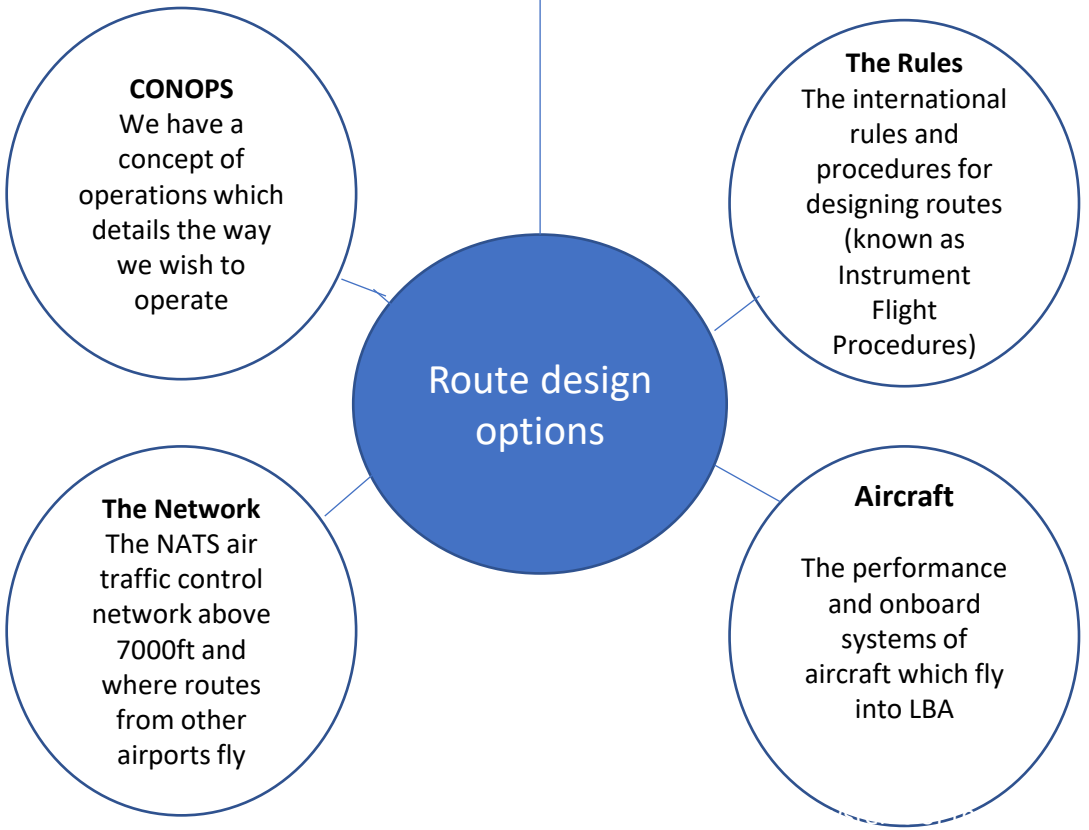
Our route design needs to take several things into consideration. Each of the considerations listed here affect aspects of our agreed design principles and contribute to our designs in a different way;

Some provide an opportunity

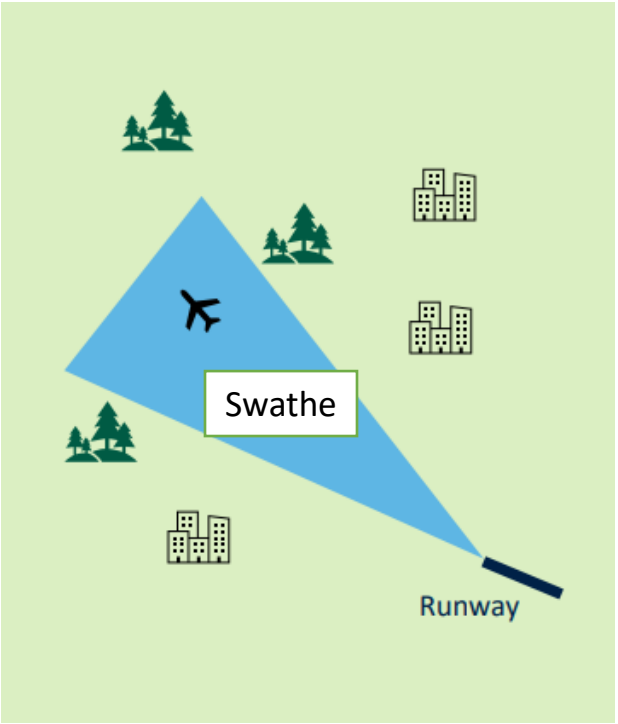
Others create a constraint

But we cannot ignore any of them if we are to get a balanced design

Design Principles
The high-level considerations on the development of our route options



Design swathes – What are they?



- **An area where we can design route options**

- **A wide area of airspace that goes from the runway to 7,000 feet above sea level**
  - Our baseline swathes are based on a 6% climb gradient which all aircraft can fly
- **Some are based around existing routes - which creates our 'do nothing' options**
  - New swathes have been created where there may be a benefit
- **Based around aircraft flying Continuous Climb Departures**
  - Less noise and improved fuel efficiency
- **At least 4.5 nautical miles wide at 7,000 feet**
- **Some swathes have been created as options to design in respite and these are shown as alternative design swathes.**

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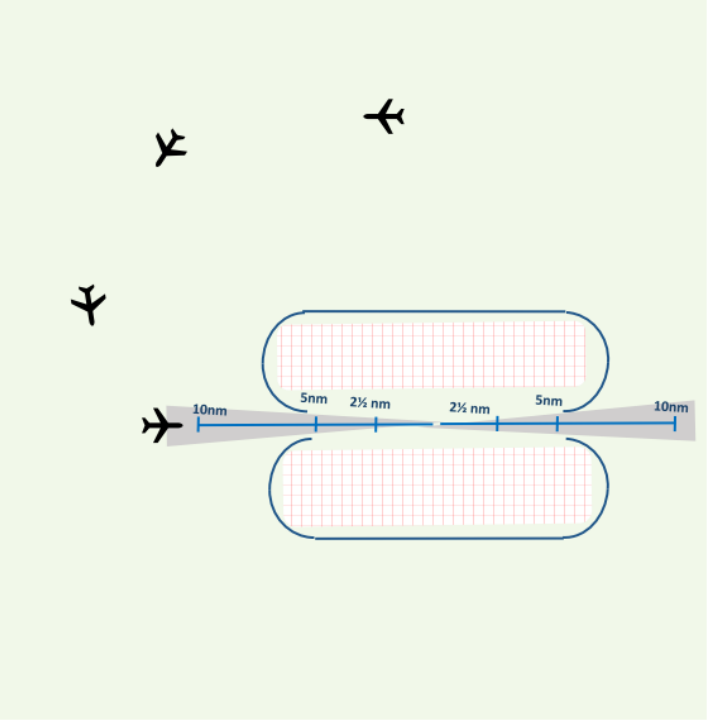
Applying our design principles



- Our **'Technical Requirements'** Design Principle requires us to design to industry standards and regulations

- These provide guidance on the joining point onto final approach and create an area within which we can't design an arrival procedure
    - This is because of safety rules on turn radius, speed and the minimum height for final approach

- Our '**Systemisation'** and **'Technical Requirements'** Design Principle requires us to consider 2 documents:
    - The Air Navigation Guidance 2017 and the CAA Airspace Modernisation Strategy (AMS)

- Both highlight the use of Continuous Descent Approaches (CDA) to reduce the environmental impact of arriving aircraft
    - Our arrivals designs will therefore provide continuous descents to both runway ends to meet this design principle

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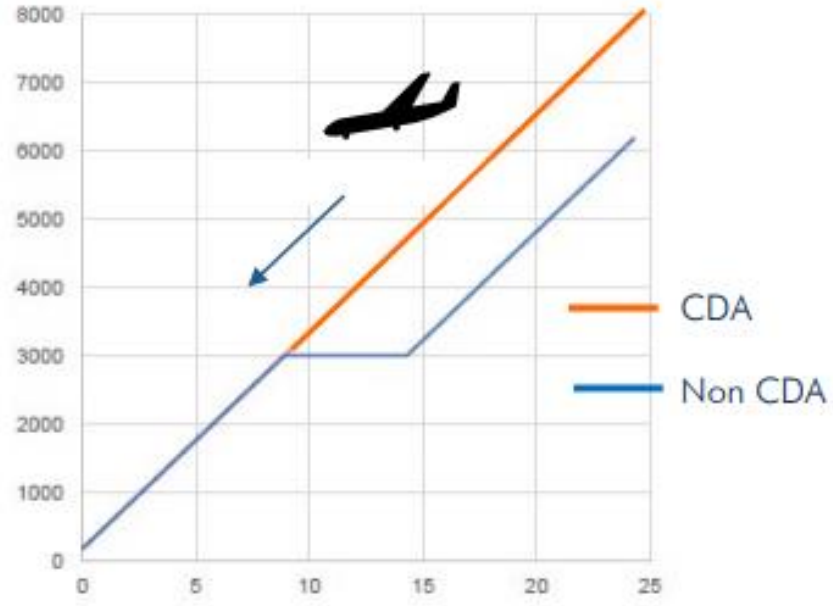
What are Continuous Descent Approaches?



- **Continuous Descent Approaches (CDA)** involve arriving aircraft using minimum thrust and avoiding prolonged level flight

- The objective of a **CDA** is to reduce the environmental impact of the arrival by:
  - Reducing noise
  - Minimising CO2

- There is a range of descent gradients for a **CDA** which will provide benefits
  - The optimal is between around 3.5% and 5.25%
  - Below this may require engine power, creating noise
  - Above this may result in air brakes being needed, which also create noise
- We've therefore created a design area for arrivals that provides a **CDA** within this optimal range
  - This equates to an arrival track of between 25-32 miles from 7,000 feet

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The design boundary for departures

1

The first step is understanding where departures could fly.

- We know that all aircraft can climb on a gradient of at least 6%
- The first step is to understand where an aircraft would reach 7,000ft based on this gradient

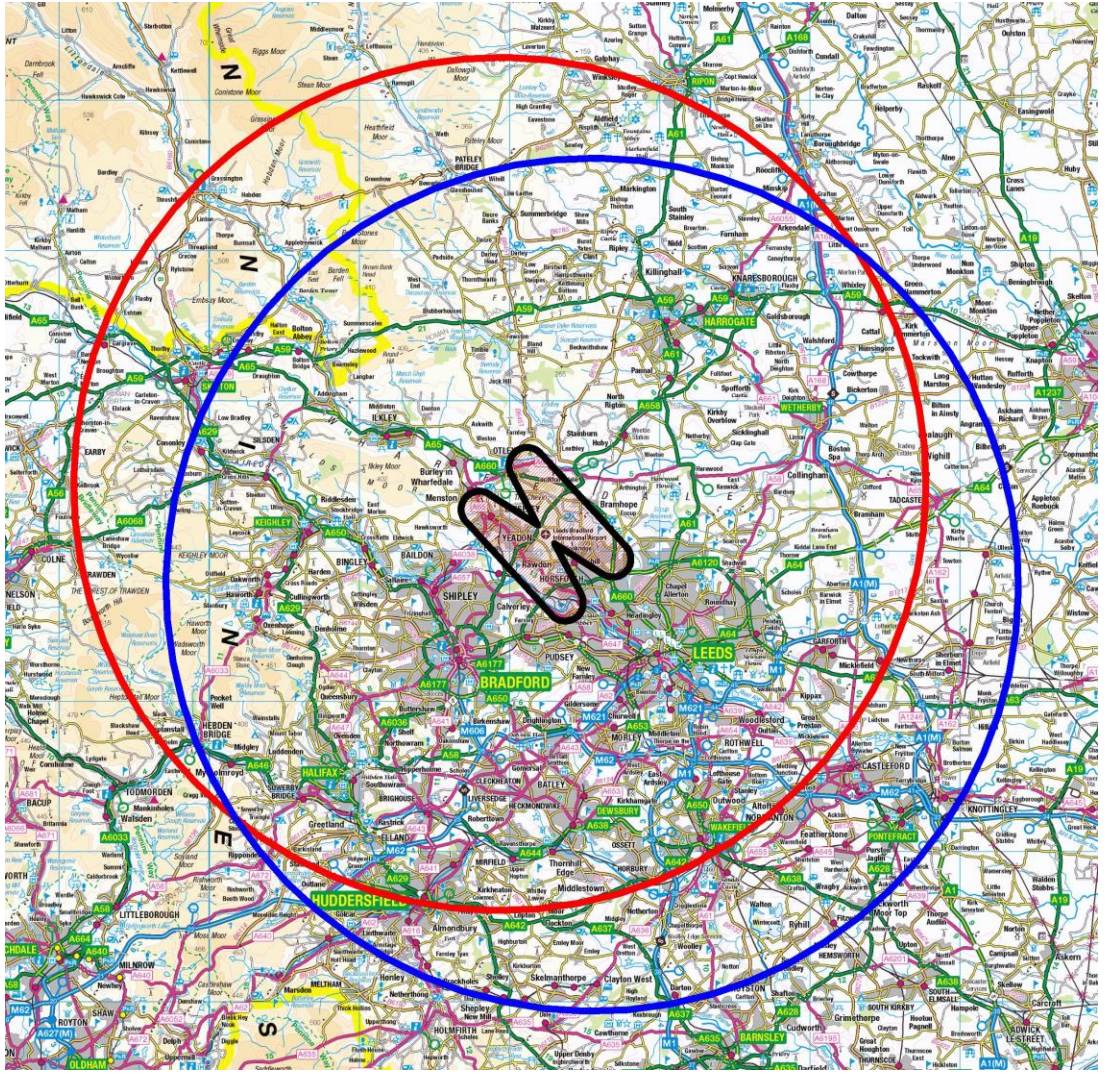
2

This establishes our design boundary without reference to our current controlled airspace.

3

We will then apply the ICAO rules on procedure design

- Which stipulates the rules regarding the radius of turns for departing aircraft, which creates a more realistic design area
- And describes where we cannot design departures



Blue circle RWY14

Red Circle RWY32

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The design boundary for arrivals

Our starting points for arrivals is at 7,000 feet above sea level (asl) using the following criteria:

- To provide a **Continuous Descent Approach (CDA)** in line with our '**Systemisation', 'PBN' and 'Noise'** Design Principles
- The flow of traffic that interfaces with the NATS network in line with the **'Systemisation'** Design Principle

Or **PBN** Design Principle also requires us to use the latest technology

- Our arrivals will therefore be based on Performance Based Navigation
- These remove the need for significant tactical intervention by air traffic control
- PBN routes would result in less dispersed aircraft tracks than currently

The theoretical area where arrivals could descend from 7,000 feet is shown above

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Thank you for your time. We hope that you find this information on Leeds Bradford Future Airspace useful.

Please remember to complete the Stage 2 Stakeholder survey by 12th August 2022.

If you have any further queries, please address them to Airspace Change

We are very grateful for your assistance.

The Leeds Bradford ACP Team

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