



# Stakeholder Engagement Report

CAP1616 Stage 2 Develop and Assess

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# 1. Introduction

This document details the stakeholder engagement undertaken by Manchester Airport (MAN) to meet the engagement requirements of Stage 2 of CAP1616, the Civil Aviation Authority's (CAA) guidance on the regulatory process for airspace change. The Stakeholder Engagement Report (SER) is part of a suite of documents submitted to the CAA at Gateway 2 of the CAP1616 process and is intended to be read alongside those documents. The purpose of the engagement at Stage 2 was to test the design options with stakeholders to understand whether they are satisfied that they are aligned with the Statement of Need (SoN)<sup>1</sup>, the design principles<sup>2</sup> and that stakeholder comments have been considered. The way that this was achieved is described in this document and reflected in the other Stage 2 submission documents.

The full suite of Stage 2 submission documents is:

- **Stage 2 Summary Document**, which draws together the key points from the Stage 2 submission and provides an overview of the Government's national programme of airspace change, the CAP1616 process and the progress to date of the Manchester Airport Future Airspace project. This information is not repeated in this report.
- **Design Options Evolution (DOE)**, Appendix A to the Stage 2 Summary Document, shows the evolution of the design options through Steps 2A and 2B of the CAP1616 process. The resulting shortlist of design options will be considered in the Full Options Appraisal (FOA) at Stage 3.
- **The Design Options Report (DOR)**, which sets out the change sponsor's approach to the design process and the output of that process in the form of design options for both departures and arrivals at the airport. It presents the design options identified and describes how those options were refined to provide a comprehensive list of design options to be progressed to the Design Principle Evaluation.
- **Design Principle Evaluation (DPE)**, which assesses how the design options have responded to the design principles, which were established at Stage 1 of the CAP1616 process and identifies those that warrant further analysis at the next stage.
- **Initial Options Appraisal (IOA)**, building on the results of the DPE, the IOA is the first iteration of three option appraisals, required as part of the CAP1616 process. The purpose of the IOA is to provide, at a minimum, a qualitative assessment of each route option providing stakeholders and the CAA with the relative differences between impacts, both positive and negative.
- This report, **the Stakeholder Engagement Report (SER)**, which explains how engagement has been used in the processes described in the other Stage 2 documents and records its outputs.

The full suite of submission documents, together with their supporting Appendices, will be published on the CAA Airspace Change Portal [www.airspacechange.caa.co.uk](http://www.airspacechange.caa.co.uk)<sup>3</sup>.

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<sup>1</sup> A Statement of Need as submitted by MAG Manchester Airport to the CAA in March 2019 and forms Step 1A of the CAP1616 process. Details can be found at [www.manchesterairport.co.uk/futureairspace](http://www.manchesterairport.co.uk/futureairspace) and [airspacechange.caa.co.uk](http://airspacechange.caa.co.uk).

<sup>2</sup> A set of nine design principles was agreed with local stakeholders in Step 1B of the CAP1616 process. Details can be found at [www.manchesterairport.co.uk/futureairspace](http://www.manchesterairport.co.uk/futureairspace) and [airspacechange.caa.co.uk](http://airspacechange.caa.co.uk).

<sup>3</sup> The CAA Airspace Change portal enables all stakeholders, including members of the public, to monitor the progress of an airspace change proposal at [airspacechange.caa.co.uk](http://airspacechange.caa.co.uk).

## 2. Stakeholder engagement during Stage 2 ‘Develop and Assess’

### 2.1 Overview

Stage 2 (Develop and Assess) of the CAP1616 process focuses on the development of design options and is divided into two steps: Step 2A – Options Development, and Step 2B – Options Appraisal. CAP1616 requires stakeholder engagement to be carried out as part of Step 2A.

Step 2A requires the creation of a comprehensive list of design options to address the SoN and that respond to the design principles established in Stage 1 of the CAP1616 process. These options must then be tested with stakeholders and evaluated against the design principles to establish the list of options to be progressed to Step 2B. The first process followed at Step 2A was to develop the initial design envelopes, broad areas where it is possible to design routes for arriving and departing aircraft. These design envelopes were then refined before design options were designed within them. These design options were then evaluated and refined. For more information see Sections 6 to 18 of the Stage 2 Summary Document.

Stakeholder input is an important component of the ‘Develop and Assess’ process set out at Stage 2 of CAP1616, which requires the demonstration of how stakeholders’ views and feedback have informed the development of the design options. A full chronology of the engagement activities completed by MAN during Stage 2 is contained in Appendix 2.

Alongside the engagement described below, we used a series of bilateral meetings with airports within and around the Manchester Terminal Manoeuvring Area (MTMA) (including other change sponsors) to communicate progress on the MAN Future Airspace project, and to obtain feedback on the concepts and design options being developed. Feedback received during these meetings has been taken into account during the Stage 2 design process, with changes incorporated as appropriate. Further details of the meetings and the changes made as a result of feedback received are provided Appendix 2.

### 2.2 Stakeholder engagement strategy

The stakeholder engagement was split into two distinct phases:

- Phase one – Engagement on the identification and creation of design envelopes.
- Phase two – Engagement on any revisions to design envelopes resulting from phase one, and the creation of specific design options.

The decision to use this approach was informed by discussions with our advisers, the Consultation Institute (tCI) and by the experience gained when delivering Stage 2 of the London Stansted Airport Future Airspace project. This approach ‘layered knowledge’ from phase one to phase two, ensuring stakeholders from all backgrounds could understand, follow, and make an informed contribution to the process. This methodology also enabled us to explain, test and refine our initial and further design work with stakeholders.

The first phase of engagement explained and sought feedback on the initial part of the design process. It showed how constraints and operational requirements had been identified and how these factors, along with the design principles, were used to create the design envelopes. The feedback provided was then used to refine and improve the envelopes and feed into the design process to develop specific design options.

At the second phase of engagement, further feedback from stakeholders was sought to understand if they thought the phase one engagement feedback had been correctly interpreted and considered in the evolved designs.



Figure 1, below, shows how engagement shaped the wider Stage 2 process. Further detail on the content covered in both phases of engagement can be found later in this document and in Appendices 3 and 4.

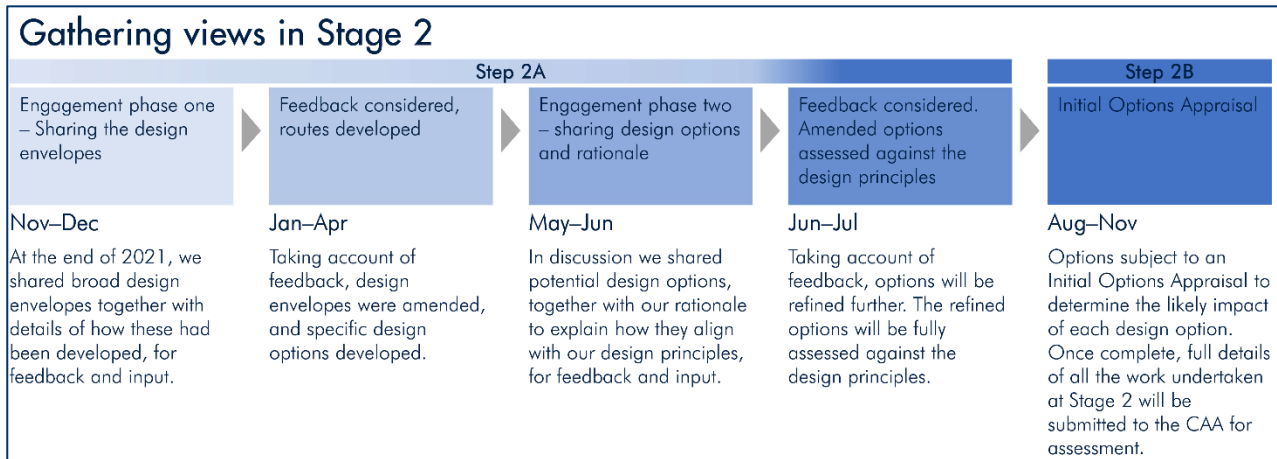


Figure 1: Stage 2 process

### 2.3 Stakeholders

As required by CAP1616, at Stage 1 of the process we defined an area around the airport, which may be affected by the airspace change, known as the ‘Potentially Affected Area’. CAP1616<sup>4</sup> sets out the categories of stakeholders to be engaged at Step 1B. In Step 1B these categories were used to form a list of stakeholders within the Potentially Affected Area to engage with. In addition to engaging these stakeholders we chose to engage members of the general public. This resulted in two groups of stakeholders at Step 1B: those falling within the CAP1616 categories and the general public. However, for the purposes of this SER, the collective group of CAP1616 stakeholders and the general public participants are referred to as ‘stakeholders’.

CAP1616<sup>5</sup>, requires engagement at Stage 2 with the same stakeholders as Step 1B. The pandemic had necessitated a 14-month pause of the MAN Future Airspace project, between passing through the Stage 1 Gateway and the start of engagement for Stage 2. Given the time that had elapsed, the stakeholder list was reviewed in July and August 2021 to reflect any changes that had taken place and identify suitable replacements where it was necessary to do so. By using this revised list in Stage 2, the same stakeholder categories, be they the same or new representatives as at Step 1B, were engaged in the process, meeting the requirements of CAP1616.

In Step 1B, the general public had been engaged face-to-face through outreach events, at focus groups independently facilitated by YouGov. We also offered information on our website and had targeted e-mail communication. The pause of the MAN Future Airspace project meant that the YouGov record of the individuals who attended their general public focus groups had been deleted, in-line with their data protection regulations. While the general public are not a required stakeholder for the purpose of Stages 1 and 2 of CAP1616, to ensure that, so far as reasonably practicable, the same stakeholders were engaged in Stage 2 the following categories of general public participants were referred to:

- The list of people who had submitted their thoughts on the earlier design principles exercise and specified that they would like to be kept up to date on progress.
- People who contacted the Future Airspace team through the website [www.manchesterairport.co.uk/futureairspace](http://www.manchesterairport.co.uk/futureairspace) or e-mailed [futureairspace@manairport.co.uk](mailto:futureairspace@manairport.co.uk) to request they were kept up to date on the MAN Future Airspace project.

<sup>4</sup> Paragraph 161 of the March 2021 CAA’s Airspace Change guidance document CAP1616 ([www.caa.co.uk/cap1616](http://www.caa.co.uk/cap1616)).

<sup>5</sup> Paragraph 125 of the March 2021 CAA’s Airspace Change guidance document CAP1616 ([www.caa.co.uk/cap1616](http://www.caa.co.uk/cap1616)).

These lists, combined, included those attendees of the Stage 1 YouGov-run general public focus groups who had requested that future contact be maintained. This meant the members of the general public engaged in Stage 1 who had stated that they wished to continue to be involved could be invited to participate in Stage 2 engagement. People on this list were invited to contact YouGov if they wished to participate in the Stage 2 engagement. YouGov 'topped up' the resulting forums by recruiting a mix of participants from the areas within the Potentially Affected Area, ensuring a representative sample of the general public were involved in the engagement. This enabled feedback to be gathered from a broad range of the general public, in terms of demographic mix, perception of the airport and aircraft noise and a geographic spread across the Potentially Affected Area. YouGov, as research experts, were well positioned to ensure the engagement of a broad cross section of the public.

## 2.4 Methods of engagement

Due to the restrictions imposed by the COVID-19 pandemic, it was necessary to undertake phase one engagement using online methods only. Online engagement offered some important benefits in terms of participation levels, due to the added level of convenience and accessibility. Although the phase one engagement was conducted online, postal and telephone communication was also offered. Neither of these alternative methods were taken up. At phase two, as restrictions were eased, a blend of online and in person engagement activities were employed. In both phases stakeholders were offered printed copies of the materials supplied, and some took up the offer, finding the material easier to engage with in this format.

Many of the individuals in the defined list of 'Councillors' and other stakeholders were people that colleagues from MAN had been meeting with on a regular basis for the last two decades. Previous meetings had included briefings on current operations and the evolution of the Airspace Change process from CAP725 to CAP1616. A high degree of confidence was therefore held by the MAN Future Airspace team, that these stakeholders were well informed and could be engaged with directly without the need for additional support.

However, it was recognised that the general public would not necessarily have prior knowledge and expertise on the subject matter and would need more support. YouGov was therefore employed to facilitate engagement with the general public, ensuring that these general public participants, with potentially less background knowledge, would be supported to understand the content shown and engage with it. Using YouGov also ensured an independent report of the views expressed by the general public at these sessions. Members of the MAN Future Airspace team were made available, as required, to provide technical assistance to YouGov in these sessions.

## 2.5 Stakeholder Reference Group

A Stakeholder Reference Group (SRG) was formed at the start of the Future Airspace project. Its role is to provide advice on the communication, engagement and subsequent consultation plans for the duration of the project. The SRG is designed to be reflective (but not necessarily representative) of local businesses, community and voluntary groups and other interests.

With the pause in the MAN Future Airspace project (described above) a review of the SRG membership took place in July 2021. The purpose (for the review) was to identify any members who had moved on in their job or lives and were no longer able/willing to participate and secure like for like replacements. Eleven of the 18 original SRG members, including the Chair, agreed to continue in their roles. Seven positions became vacant whilst the MAN Future Airspace project was paused. Six alternatives from the same organisation, skill set, or representative group were proposed to and selected by the Chair. One organisation, the Cheshire and Warrington Local Enterprise Partnership, withdrew from participation in the SRG.

The SRG met to review and comment on the draft materials to be presented at both phases of engagement, to test for ease of understanding. The SRG will remain central to the development and monitoring of a full consultation plan for

subsequent stages of the airspace change process, including during the full consultation exercise to be carried out at Stage 3. The SRG was pleased with the approach that had been taken to Stage 2 engagement and the ease of understanding of the materials presented. It provided comment and feedback that further strengthened the engagement materials.

Details of the SRG membership, meetings (including agendas and minutes) can be found on [www.manchesterairport.co.uk/futureairspace](http://www.manchesterairport.co.uk/futureairspace).



## 3. Phase one engagement

### 3.1 Overview

The purpose of the first phase of engagement was to explain the initial design process and introduce stakeholders to the initial design envelopes. Feedback was then sought on the process followed and the envelopes themselves which helped to inform the next stage of design work.

Phase one engagement took place in November and December 2021 and consisted of 24 discussion sessions facilitated by the MAN Future Airspace team and 18 three-hour forums facilitated by YouGov. YouGov were chosen to deliver this research as they had successfully facilitated the Step 1B focus groups at MAN and both Step 1B and Step 2A sessions at London Stansted Airport. YouGov were therefore familiar with the programme, the technological considerations applicable to airspace change and the requirements for engagement as part of CAP1616. As outlined in Section 2.4, using a third-party specialist ensured that the general public stakeholders received the additional support they would need to understand the project and provide informed feedback.

#### 3.1.1 Stakeholders engaged by the MAN Future Airspace team

The discussion sessions that the MAN Future Airspace team facilitated included stakeholders from aviation, business, community, national organisations, special interest groups and elected representatives. These events were 90 minutes long and held virtually using the Microsoft Teams communication platform. In all but three sessions (these were supplementary sessions available to any stakeholder that could not make any of the bespoke dates offered), stakeholders were grouped with other persons of their representative group – to encourage discussion around likely common themes. For example, a bespoke session for Environmental Health Officers was held.

The discussion sessions consisted of a presentation from the MAN Future Airspace team followed by the opportunity for stakeholders to pose questions to clarify points arising from the session or the pre-read materials (as described below in Section 3.3). The content shared in these sessions can be found in Appendix 3. The delivery of the presentation elements was pre-recorded, to ensure all stakeholders received the same information. Stakeholders were able to post their questions through the ‘meeting chat function’ throughout the presentation, which the team would then respond to in ‘real time’ or post session. After the event, the presentation and a Q&A document containing questions that had been asked at previous sessions and any questions it was not possible to answer in real time were e-mailed to attending stakeholders. The combined Q&A documents for phase one and phase two are included in Appendix 11. Stakeholders were provided a link to a Microsoft Forms online survey, to provide feedback after the session. The deadline for completing the survey was communicated at the end of the presentation and in the post-event emails.

Stakeholders were offered a choice of 26 sessions between 17 November and 10 December 2021. It was important to provide a good range of dates and the opportunity to select a morning, afternoon, or evening session to ensure stakeholders could participate at a time of their convenience. In total over 2,400 stakeholders received an invitation to take part, and regular reminders were sent leading up to the sessions. 154 stakeholders representing 88 organisations attended 24 of the discussion sessions in phase one (two sessions had no stakeholders who wished to attend). Details of stakeholders invited and those that attended can be found in our stakeholder list in Appendix 1.

#### 3.1.2 Stakeholders engaged by YouGov

For the general public engagement, YouGov facilitated six online forums and each forum was held over three evenings. Forums, rather than focus groups, were conducted in this first phase of engagement, to better allow participants to consume the information and respond in their own time.

Information was provided over three days, incrementally building the knowledge and confidence of the contributors, and enabling YouGov to ensure their understanding. Participants were asked to log in for a period of time each day, where they were presented with the engagement materials and then asked to provide their answers to a series of questions. The forum was 'open', enabling participants to see other comments. This was intended to stimulate discussion and debate. The MAN Future Airspace team were able to watch the conversations each day, answer questions in real time or source answers so that they could be addressed the next day.

The forum that a person was invited to was determined by their location, meaning that each forum contained people from nearby areas; allowing participants the ability to discuss the material with other stakeholders located close to them. A total of 160 local general public participants were recruited to take part in the forums with 123 of these completing all three days. Further detail can be found in Appendix 5.

### 3.2 Changes to the Potentially Affected Area

As described in 2.3, a Potentially Affected Area had been defined and published in Stage 1. The creation of envelopes and design options, described below, established that there were viable arrival and departure design options that would extend beyond the Potentially Affected Area. Whilst these design options would not necessarily be carried forward in the process, it was considered prudent to expand the Potentially Affected Area, see the highlighted areas added in Figure 2 opposite.

As this change was identified at the start of the phase one engagement, we were able to ensure that the additional areas identified were properly represented in the Step 2A engagement process. A further process of stakeholder identification, within the Potentially Affected Area, was completed and invitations sent as engagement commenced. A small number of additional stakeholders were identified within the categories set out in CAP1616, including 44 Ward Councillors (from City, Borough and County Councils) and 18 additional Parish/Town Councils. All were sent invitations to attend a choice of eight sessions at different times of the day and on different days of the week. Only one stakeholder (Shevington Parish Council) accepted the invitation to participate, and their feedback is included, along with that received from other stakeholders, in the feedback reports (Appendices 7 and 9). As described in Section 3.3 the pre-read materials issued to and the session attended by Shevington Parish Council included an overview of the CAP1616 process and the actions completed by MAN during Stage 1.

A revised map of the Potentially Affected Area has been uploaded onto the CAA portal as part of the Stage 2 submission.

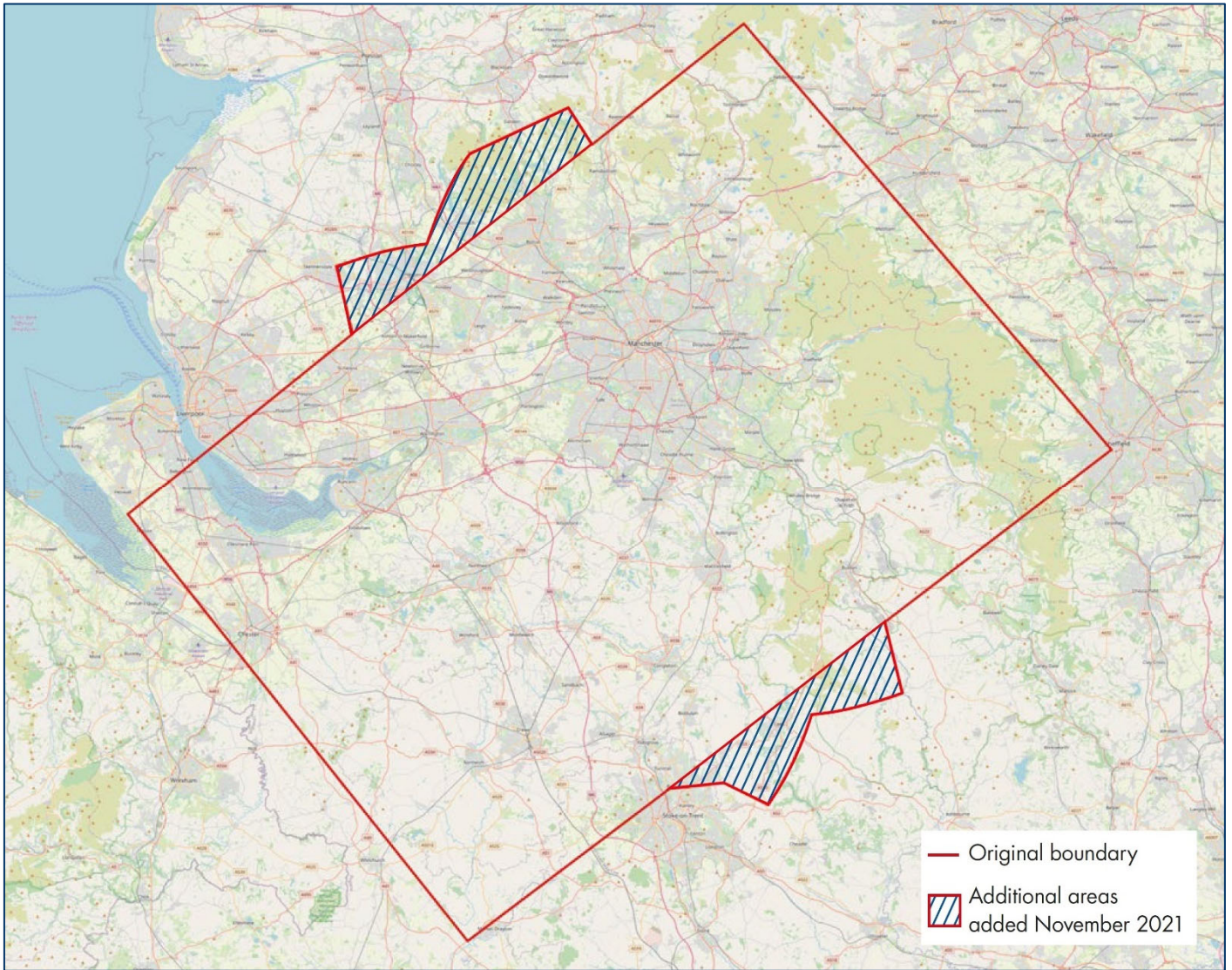


Figure 2: Revised area of potential impact

### 3.3 Materials shared during phase one engagement

As set out in 2.2, the purpose of phase one engagement was to guide stakeholders through the process behind the production of the initial design envelopes; areas within which it would be possible to draw design options that complied with the SoN and responded to the design principles. To ensure the best possible understanding of the process, detailed background information was provided, including how MAN currently operates<sup>6</sup>, how airspace works, how the design principles are the foundation of the proposals and the constraints that had been applied to the development of the design envelopes. Whilst to some of the audience this material was very familiar, for others, particularly participants drawn from the general public or those elected stakeholders who had not been part of the pre-COVID business-as-usual engagement, this background information was important to give them the foundation knowledge needed to help them make the best possible contribution to the process.

The materials shared, including the content of the presentation, are summarised below. Full details of all the materials provided can be found at Appendix 3. Materials were reviewed by the Plain English Campaign and tCI to ensure they were as accessible and understandable as possible. Please letter from the tCI, Appendix 12.

<sup>6</sup> Information on current operations, including video clips and pdf data sheets is published on [www.manchesterairport.co.uk/runwaydatasheet](http://www.manchesterairport.co.uk/runwaydatasheet)

### 3.3.1 Pre-reading materials

Prior to the engagement sessions, pre-reading material was circulated (a week before the session) to remind participants of Stage 1 of the CAP1616 process at MAN and set out some brief details on current operations. In addition, a short, animated video<sup>7</sup> was produced to support the engagement activity. This explained the wider programme, outlined the work to be completed in Stage 2 and explained how stakeholder engagement formed part of it. This video was intended to act as an introduction. A link to the video was included in the invitation to stakeholders to participate in phase one engagement and it was shown again as part of the presentation made during the sessions. In addition, during the discussion sessions the information shared in the pre-reading was reprised to encourage stakeholders to ask any questions they may have had.

### 3.3.2 Current operations

The current operations and the way in which aircraft arrive and depart from MAN<sup>6</sup> were described. How the direction of arrivals and departures is determined by the wind direction and that current operations are dependent upon ground-based DVOR navigational beacons was also outlined. The way that the two runways are used was explained, including how they support near simultaneous operations by arriving and departing aircraft. Manchester Airport Noise and Track Information System (MANTIS) 'plots' were formed to illustrate the paths of arriving and departing aircraft, coloured by their altitude.

#### Departures

First, a slide that showed the Preferred Noise Routes (PNRs) on a map base and the Standard Instrument Departure routes (SIDs) that these encompass were displayed. Then stakeholders were shown MANTIS plots of the distribution of departing aircraft over a typical summer's day during 2019, representing the last summer and calendar year of (pre-pandemic) normal operations, over a map base. These plots showed westerly operations using Runways 23R/23L on one slide and easterly operations using Runways 05L/05R on another. These plots displayed:

- The radar traces of aircraft and their paths relative to the tolerances of the PNRs.
- The distribution of aircraft relative to each route.
- The path of aircraft as they achieved height and were vectored on to a path more appropriate for their onward routing.

#### Arrivals

For arrivals, it was explained that although there are some similarities in routes for approaches, unlike departing aircraft there are no fixed flight paths for arriving aircraft until they are established on the Instrument Landing System (ILS), or 'final approach'. It was described that, when the airport is busy, arriving aircraft may be directed, by Air Traffic Control (ATC), in to a 'holding stack' before being instructed to make their final approach. On one slide a MANTIS plot of the radar traces, on a typical summer's day of westerly arrivals onto Runway 23R was shown, and on another slide a plot of a day of easterly arrivals on to Runways 05L/05R. The slides showed:

- The typical pattern of arrival traffic onto each runway end.
- The location of the three holding stacks (DAYNE, MIRSI and ROSUN), which serve arriving flights and enable them to await runway availability.
- The position of aircraft coloured by their altitude.

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<sup>7</sup> The video is embedded in our website: [www.manchesterairport.co.uk/futureairspace](http://www.manchesterairport.co.uk/futureairspace).



### 3.3.3 Airspace

Stakeholders were then introduced to the concept of airspace and its relevance to this programme:

- What airspace is.
- How airspace is divided into distinct vertical layers.
- The difference between controlled and uncontrolled airspace.
- What controls and restrictions apply within the different layers.
- How multiple climbing and descending flights between different airports interact.

It was explained that through the Future Airspace project, MAN is responsible for devising arrival and departure paths between the ground and 7,000ft and that determining the path of aircraft above that altitude remains the responsibility of National Air Traffic Services (NATS). How the MAN airspace fits into the complex MTMA was also explained, emphasising that any proposals that emerge for MAN would have to take account of the proposals emerging at other airports sharing the MTMA.

### 3.3.4 Defining the design boundary

It was explained that the size and shape of the design boundary was influenced by several external factors. These included:

- The international and national rules governing airspace and flight procedure design as defined by ICAO and the CAA.
- The performance capabilities and navigation equipage of aircraft.
- The need to connect to the NATS upper airspace network.
- The future operational requirements of the airport.

It was explained that this design boundary was used to create the design envelopes, followed by a comprehensive list of design options. Section 5 of the DOR sets these factors out in more detail and the materials presented to stakeholders can be found in Appendix 3.

In addition, it was explained that these factors would also be considered in the evaluation of the design options against what we have described as the 'must have' design principles: Safety, Policy, and Capacity.

With reference to the above factors, it was demonstrated to participants how design boundaries had been developed and how the constraints had been mapped, explaining that this process provided an outer boundary showing an approximation of where departing aircraft could be expected to reach 7,000ft from each end of the runway.

It was explained that a similar process had been applied to arrivals, allowing for Continuous Descent Approach (CDA) from 7,000ft with the outer edge representing the furthest point away from the airport that a CDA could be achieved by the aircraft operating into the airport.

### 3.3.5 Identifying constraints

It was explained that having defined the design boundaries, local factors that may constrain where design options could be placed had been identified. The major constraint described to participants was the proximity of other airports and aircraft operations to those of MAN as illustrated by Figure 3 below. As shown on Figure 3, two danger areas were plotted – but it was explained that the vertical ceiling of the restrictions posed no limitation on the planning process because both arriving or departing aircraft would pass some distance above these ceilings. It was outlined that any options developed also need to be aligned to the traffic flows within the NATS upper airspace network (shown by the blue and green arrows on Figure 3).

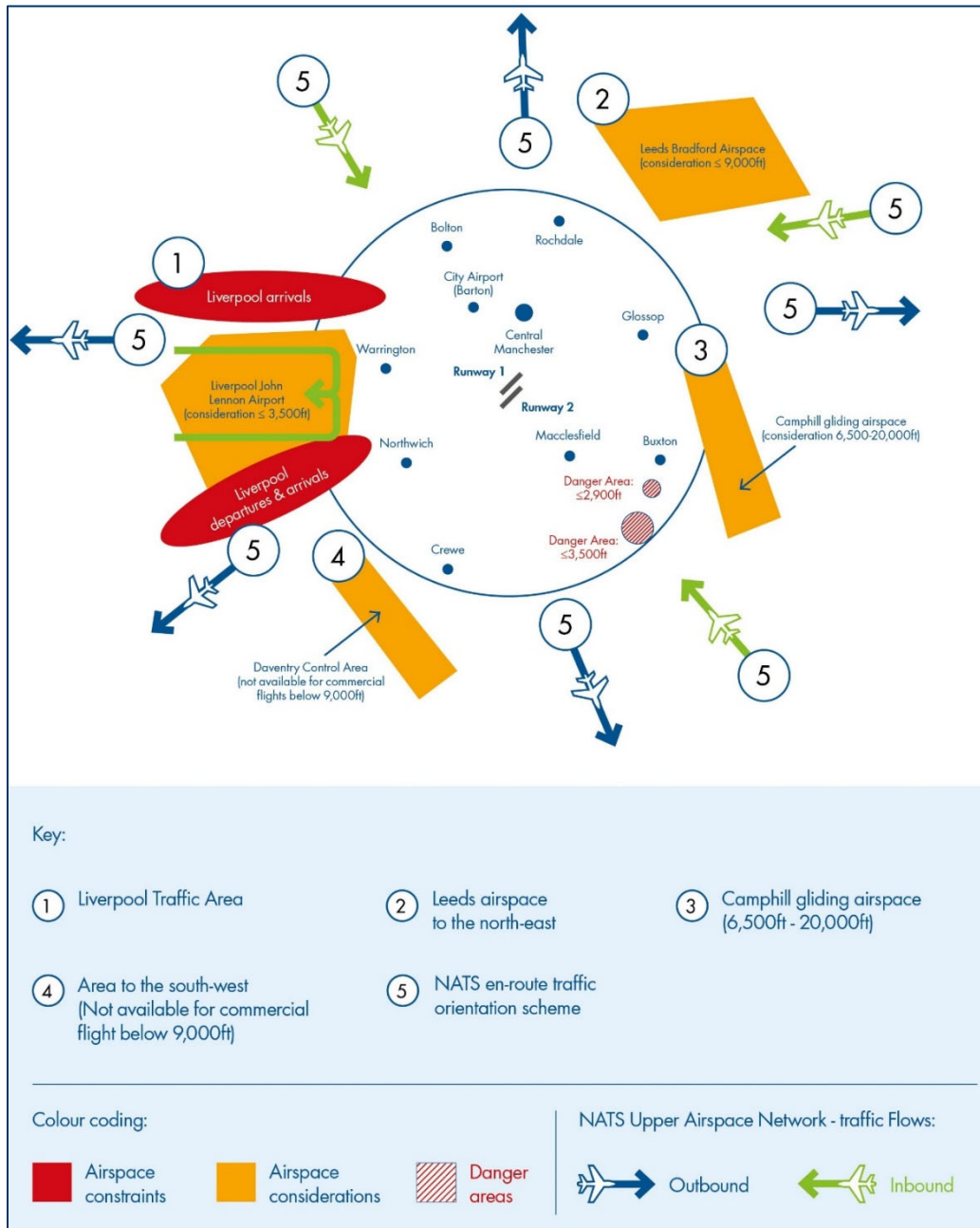


Figure 3: Constraints and considerations

### 3.3.6 Envelope design options

CAP1616 requires a comprehensive list of design options to be developed that address the SoN and align with the design principles. In addition, CAP1616 requires the change sponsor to consider the 'do nothing' scenario and, where 'do nothing' is not a feasible option, 'do minimum' options. In defining the 'do minimum' options, the change sponsor must set out its informed view of the future and the minimum changes required to address the issues with the 'do nothing' scenario that mean that it is not a feasible option and to begin addressing the issues identified in the SoN. These scenarios were explained to stakeholders. More detail as to the 'do nothing' and 'do minimum' scenarios can be found in Section 4 of the DOR and the materials presented to stakeholders can be found at Appendix 3.

### 3.3.7 Initial departures design envelopes

The six initial departure design envelopes for Runways 23R/23L and five for Runways 05L/05R that had been developed were then presented. It was explained that each design envelope was designed to enable the creation of design options to address the SoN and align with the design principles. The process to design the initial design envelopes was



explained and maps of the initial departure design envelopes were presented. The envelopes were intentionally presented on a minimal map base to encourage focus on the reasoning behind their design, rather than on their geographic location. See Appendix 3 for more detail.

### 3.3.8 Initial arrivals design envelopes

In describing the initial arrivals design envelopes, two important factors that had guided the design process for arrivals and where the start of the envelope should be, were highlighted:

- The need to provide for CDA to all four runway ends in line with the Design Principle Policy.
- The need to align our arrivals with the flow of traffic within the NATS network in line with the design principles Policy and Airspace.

The constraints and considerations that influenced where the 7,000ft starting points for arrivals could be placed and the process that had been followed were outlined. It was explained that an arc has been drawn for easterly arrivals to Runways 05L/05R and another for westerly arrivals to Runways 23R/23L. The outer limit of the arcs was the furthest away aircraft could be at 7,000ft and expect to achieve a CDA to that runway end.

The area within which the two arcs overlap is the area where a CDA is possible to all runway ends. Wherever the 7,000ft start point is placed within this area, aircraft can fly on a CDA, and because they are anticipated to be on systemised Performance Base Navigation (PBN) routes, the arrivals will not be as dispersed across this area as they are today. Although some ATC vectoring will still be required for safety and capacity reasons, it was explained that aircraft will be more concentrated on a specific route or routes that lie within this boundary, and which start at wherever we place our 7,000ft point. To provide points of reference the positions of the existing MIRSI, DAYNE and ROSUN holds were marked. Full details of the materials provided during this engagement can be found in Appendix 3.

## 4. Phase one engagement stakeholder feedback

### 4.1 Feedback channels

In the first phase of engagement stakeholders provided feedback via four channels.

For the sessions facilitated by the MAN Future Airspace team, feedback was taken via:

1. Responses were recorded through the 'chat' function and dialogue from the engagement sessions.
2. After the session stakeholders were provided with a pdf of the presentation, a Q&A document (see Appendix 11), a Glossary, and a link to an online survey. By these means stakeholders had the opportunity to absorb the content and provide feedback through the online survey.
3. Some stakeholders chose to send their response as an e-mail or within an attachment to [futureairspace@manairport.co.uk](mailto:futureairspace@manairport.co.uk).

The feedback was put into a report (Appendix 7).

For the YouGov facilitated sessions feedback was via:

4. A YouGov report of the forum discussions, which was discussed with, and presented to, the MAN Future Airspace team (Appendix 5).

A report combining feedback from the MAN Future Airspace team and YouGov facilitated sessions was then produced (Appendix 9, see also Appendix 11 where points feedback and responses have been summarised).

### 4.2 Feedback overview

Feedback indicated all stakeholders engaged by the MAN Future Airspace team and YouGov understood the initial design process and agreed it was a logical approach to creating both arrival and departure envelopes. Additionally, stakeholders acknowledged the complexity of designing within the MTMA and the constraints and considerations created by the wider network, particularly to the west of the airport. Overall, feedback from stakeholders was that a logical process had been followed. In addition, stakeholders, including change sponsors at other airports, told us they felt the right constraints and considerations had been identified. Several stakeholders cited the importance of MAN's airspace aligning with Liverpool John Lennon Airport (LPL). Stakeholders understood the switch-off of the beacons meant 'doing nothing' is not a realistic option and were generally supportive of the change required to switch to PBN. You can find more information in Appendices 5, 7, 9 and 11.

Stakeholders could see how the design envelopes responded to the design principles created in Step 1B. However, some queried the hierarchy of the design principles. Nearly half of the stakeholders considered the design principles Noise and Emissions just as important as those identified as 'must-have' design principles. The stakeholders were reassured that both noise and emissions would be carefully considered in later phases of Stage 2 and in Stage 3.

Managing noise impacts was raised by stakeholders as a key concern, particularly in the light of the concentration of aircraft that would result from the adoption of PBN. The importance of creating options for respite and relief was a common feedback theme, particularly with the general public, elected representatives, and community stakeholders. There was broad consensus that, where it was practical to do so, noise impacts should be shared. The need for respite and relief featured heavily in feedback for arrival and departure proposals. There was particular concern that the arrival design envelopes would lead to a greater concentration of noise than is currently experienced.

The possibilities afforded by the new 05 South C Left Turn and 23 East Left Turn Design Envelopes received a mixed response. Although some stakeholders welcomed the respite opportunities, others were concerned that some communities would be heavily impacted and/or that communities who had never experienced overflight previously would be overflowed.

Many stakeholders commented on the amount of housing developments within their local areas. It was felt that consideration should be given to future housing developments when designing routes within the envelopes. It was explained that consideration of local plans was a requirement of CAP1616 and that the plotting of housing developments of 50 or more housing units, contained within local plans and five-year housing land supply statements, falling within the Potentially Affected Area would be completed. These sites were depicted on the maps used in phase two engagement.

Stakeholders raised the importance of noise sensitive sites and wanted reassurance that these would be taken account of when drawing design options. It was explained that consideration of National Parks and Areas of Outstanding Natural Beauty (AONBs) was required within the CAP1616 process and that these locations had been plotted. It was also highlighted that we have mapped Sites of Special Scientific Interest (SSSIs) and noise sensitive buildings. A map base highlighting National Parks, SSSIs and AONBs was used to present design options in the phase two engagement materials. It was also explained that this issue would be considered later in Stage 2 as part of the DPE in relation to the Design Principle Noise N3.

In respect of the arrival design envelopes, feedback from phase one engagement was very clear that:

- minimising noise (Design Principle Noise N1),
- creating respite from noise (Design Principle Noise N2),
- minimising emissions (Design Principle Emissions),
- use of Continuous Descent Approaches (CDA),

were stakeholders' priorities. As a result, any route option that would not provide a CDA would not align with stakeholder feedback, in addition to being incompatible with the Design Principle Policy. For these reasons, any such route option was classed as 'viable but poor fit' in the classification of design options referred to in Section 5.3.2 of this document. This approach and the associated revisions to the arrivals design envelopes were presented during the phase two engagement, with a map showing the area where an aircraft at 7,000ft could make a CDA to either runway end using optimal descent gradients from a noise generation and fuel burn perspective.

Full details of the feedback received during the phase one engagement and how this informed our development of design envelopes and design options is presented in the reports at Appendices 5, 7, 9 and 11.

### 4.3 Refining the design envelopes

Feedback collected in the first phase of engagement informed the revision of the design envelopes for departures and arrivals and influenced the creation of design options within the design envelopes. The feedback relating to avoiding centres of population and seeking deconfliction with LPL drove the greatest change. For a full review of the feedback received please see Appendices 5, 7, 9 and 11. The design envelope changes made are set out in Section 4.5.

### 4.4 Operations to or from other airports

Meetings with all the other airports within the MTMA have been a part of the engagement process, the included a 'HAZID' workshop in October 2021. The design options were shared, at an early stage, as part of the engagement process with these other airports in spring 2022. A series of meetings with colleagues from LPL, assisted by colleagues

from Airspace Change Organisation Group (ACOG) and NATS En Route Ltd (NERL) have also been held. These meetings were arranged to consider how the emerging designs at MAN interfaced with the proposals from LPL.

#### 4.5 Changes to the envelopes that reflected feedback received, the design process and the development of design options.

The departure design envelopes for Runways 23R/23L and 05L/05R were reviewed in light of the feedback summarised above, and the design process followed to develop design options.

##### Runways 23R/23L changes

Figure 4 shows the amendments to the departure design envelopes for Runways 23R/23L, red hatching shows areas removed from the envelope and blue hatching shows areas added. Each letter corresponds to the letter on Figure 4.

- An area (A) along the right-hand edge of the 23 North Design Envelope was removed. On occasions, inbound aircraft are unable to land successfully on their first approach and perform an action known as a ‘go-around’; this takes the aircraft on a right-hand orbit (aircraft cannot turn to the left due to possible conflict with departing aircraft). Aircraft are then routed to re-establish on to the arrivals path for another approach. The tightest turn that can be made to the north is therefore restricted by the need to leave airspace clear of departing aircraft in case of the need to accommodate a go-around. The international design rules document PANS-OPS 8168 outlines the rules on where you can and cannot design including the point at which aircraft turn. When the rules were applied, it was clear that such a sharp turn radius was not possible. Therefore, a revision to the envelope was required. The updated envelope matches to the radius of the earliest turn possible to align with the design principles Safety and Policy.
- A small extension (B) at the end of the 23 East Left Turn Design Envelope at 7,000ft was added. This took account of a route option designed to be as short as possible in line with the Design Principle Emissions. Because the route took such a tight turn it was heading east much sooner and for aircraft to have sufficient distance to achieve 7,000ft, the envelope had to be extended slightly east.
- An area (C) was added to the east of the 23 South Design Envelope to enable the creation of design options that avoid Congleton in line with the Design Principle Noise N1. These options are just to the east of the town, so the envelope was expanded to accommodate them.
- The size of the 23 South-west Design Envelope was reduced (D) because of potential interaction between design options in this envelope and those in the southbound envelope. This change aligned with the design principles Safety and Capacity.
- The initial design envelopes included existing routes for Runways 23R/23L South-west that were duplicated as part of the Runway 23R/23L West envelope. In line with the design principles Safety and Capacity, and to make the use of the envelopes clearer the west and south-west envelopes were separated to create two distinct envelopes. As detailed, in section 6.2 of the DOR, each design envelope is approximately 4.5nm wide, and this process of creating two separate areas resulted in an area between these two envelopes (E). Figure 4 shows this as the small triangular area marked with a thick black line between Runways 23R/23L South-west and Runways

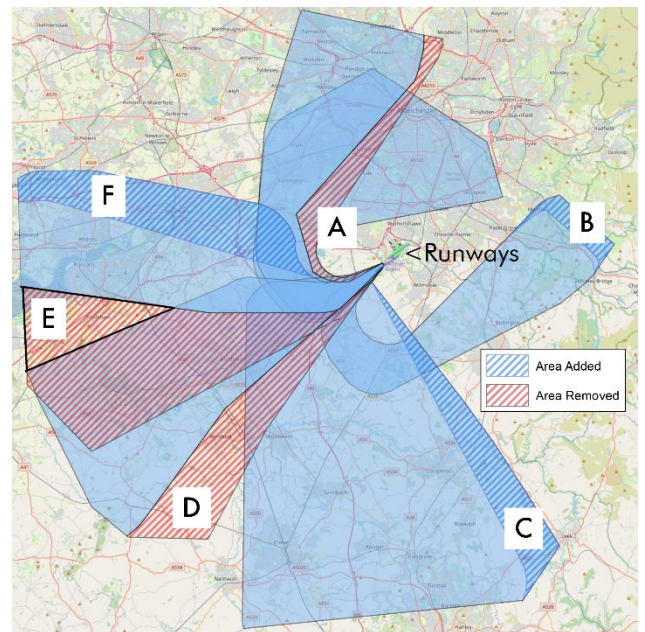


Figure 4: Revised Runways 23R/23L Departure Design Envelopes

23R/23L West envelopes. In line with the Design Constraints and Considerations detailed in section 5.8 of the DOR this area was not deemed to be a viable area to create design options because of the potential interaction with both the CAS and flights to and from LPL and this was therefore removed from the westerly envelopes. This change resulted in a clear distinction between the two new envelopes and created separation between the design options for traffic heading either south-west or west, and this removal was offset by the creation of the area (F) detailed below.

- An area (F) was added to the north of the 23 West Design Envelope. This was in response to highlighted interaction with traffic using LPL. This change aligned with the design principles Safety, Policy, and Capacity.

### Runways 05L/05R changes

Figure 5 shows amendments to the departure design envelopes for Runways 05L/05R red hatching shows areas removed from the envelope and blue hatching areas added. Each letter corresponds to the letter on Figure 5:

- The initial boundary of the 05 North Design Envelope was created to accommodate an early left turn. When reviewed, the position may have impacted the design principles Safety and Capacity by creating conflict with other routes that turn left. Therefore, an area (A) to the west and northern edge of the envelope was removed to reduce the risk and avoid potential interaction with routes in other envelopes, specifically the 05 West and South Left Turn.
- An area (B) was added to the lower edge of the 05 East Design Envelope. This change was necessary to accommodate a route option aligned to the Design Principle Capacity and helped align all design options in the envelope with the NATS network traffic flow in line with Design Principle Policy.
- An area (C) was added to the right of the 05 South Design Envelope. The expansion of the envelope allowed for the creation of design options that avoided direct overflight of Macclesfield in line with Design Principle Noise N1.
- A small area (D) to the north of the 05 South Design Envelope which was added to accommodate design options in that area. These options were created to reduce the interaction with arriving aircraft to Runways 05L/05R. This change aligned with the design principles Safety and Capacity.
- The westerly edge of the 05 South Left Turn Design Envelope was extended (E) to provide more room for design options that could align to the Design Principle Noise N1. These options route slightly further west to avoid communities before turning south.
- A new design envelope (F) created in line with two design principles. Firstly, responding to the Design Principle Safety; by providing an alternative envelope that seeks to remove potential conflicts with LPL traffic operations present inside the 05 West Design Envelope. Secondly enabling the creation of a shorter route to the south-west in line with the Design Principle Emissions. At present, traffic routing to the south-west needs to route via the west envelope initially before turning south-west later. Routes within this envelope make that turn earlier and therefore reduce track miles, fuel burn and emissions.
- The end of the 05 West Design Envelope was slightly extended (G). This was to accommodate the shortest possible route to the west, which turned as early as possible after departure to reduce fuel burn in line with the Design Principle Emissions. Because the route took such a tight turn to head west the envelope had to be extended slightly west to allow aircraft to have sufficient distance to achieve 7,000ft.

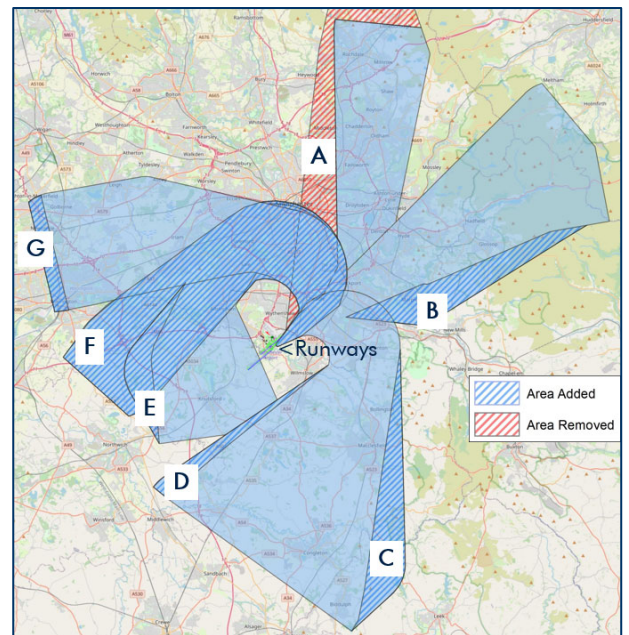


Figure 5: Revised Runways 05L/05R Departure Design Envelopes



## 4.6 Generation of design options

Having considered the additional factors identified by stakeholders during phase one of engagement and other design considerations, a set of revised design envelopes was created. Design options were then created within each design envelope.

It was clear from the phase one engagement that providing opportunities to create respite within the overall design was important to stakeholders. For departures, this feedback, in part, influenced the creation of the additional design envelope, as well as the extension and widening of other design envelopes, as described above, to give greater scope for respite for overflowed communities.

Stakeholders told us that they were concerned about noise impact on overflowed communities and specific locations that, due to proximity to the airport, were included in all the envelopes. Through the inclusion of various respite options, the potential for sharing noise can continue to be explored as the process develops.



# 5. Phase two engagement

## 5.1 Overview

The purpose of the second phase of engagement was to update stakeholders on the development of the design envelopes following phase one engagement and to outline the design options that had subsequently been developed within the design envelopes.

Phase two engagement took place in May and June 2022 and consisted of 26 discussion sessions facilitated by the MAN Future Airspace team and eight focus groups facilitated by YouGov. YouGov were chosen to deliver this research as they had successfully facilitated 18 forums for phase one and similar sessions at London Stansted Airport. As outlined in Section 2.4, using a third-party specialist ensured that the general public stakeholders received the additional support they would need to understand the project and provide an independent report on this portion of engagement.

## 5.2 Stakeholder management

After the phase one engagement sessions, time was taken to learn from the experience and adjust the delivery to match the insights from phase one and the different subject matter that would be presented in phase two. It was originally planned to run engagement sessions over three weeks. The third week included the Spring Bank Holiday on Thursday 2 June and Platinum Jubilee Bank Holiday on Friday 3 June. As it was recognised that these dates together with the coincidence of the school half term holiday might mean many stakeholders would be unavailable, a fourth week was added to the planned engagement.

### 5.2.1 Stakeholders engaged by the MAN Future Airspace team

It was recognised that the concepts and the materials shared in phase two would be more complex and take longer to explain. Before planning commenced it was important to understand how stakeholders would like us to engage in phase two. In January 2022, a short survey was sent to all stakeholders who had engaged with the MAN Future Airspace team in phase one. Subject areas included:

- With the anticipated relaxation of COVID restrictions, it was questioned whether stakeholders would prefer a virtual (online Microsoft Teams) or face-to-face engagement session.
- Stakeholders were asked whether two sessions of around an hour or a single session of around two hours would be preferred.

The clear preference was to continue engagement online through Microsoft Teams and to cover all aspects in a single session.

With experience from phase one it was possible to better match the number of sessions and their time of day (more evening and less morning) to stakeholder demand. In April 2022 stakeholders were invited to choose from 22 2.5-hour sessions between 18 May and 10 June 2022 to participate in phase two engagement. Stakeholders were able to choose between attending a virtual (online Microsoft Teams) or a face-to-face session. This approach allowed stakeholders to benefit from their preferred method of engagement, including the minority who expressed face-to-face as their preferred method of engagement in the survey. The opportunity to select a morning, afternoon or evening session was also important as the survey had revealed stakeholders valued this choice. Four bespoke sessions for individual MPs, at their constituency office or Westminster, were also arranged and so a total of 26 sessions were held.

Invitations were sent to all the stakeholders identified in the amended Potentially Affected Area (2,465 stakeholders), including all of those stakeholders that had attended the phase one sessions, with regular reminders sent leading up

to the sessions. In the invitation the date feedback would be required was specified (16 June 2022) enabling stakeholders to choose an earlier date/session if they expected to require more time to feed back. With the original invitation, a link to attend a virtual 'drop-in' session was included; to allow stakeholders to ask any questions they might have and support any stakeholders who had not attended a phase one session. The opportunity was accepted by four stakeholders who attended, raised their questions, and discussed the MAN Future Airspace project.

In advance of their engagement session each attendee was sent a pre-read document, a glossary, and either a guide to using Microsoft Teams or details of the face-to-face venue. Stakeholders were again reminded of the deadline for feedback.

In total, 172 stakeholders were met (11 face-to-face and the rest virtually) representing 96 organisations in the phase two sessions. Full details of stakeholders invited and those that attended can be found in the stakeholder list in Appendix 1. Each engagement session lasted just under two hours and in most cases, stakeholders attended a session with other similar stakeholders so that any conversations or questions raised would likely be most relevant to their specific areas of interest and knowledge levels.

After the session, stakeholders were provided access to an online portal where they could view or download:

- A pdf copy of the presentation; with the full script/narrative aligned with the slides.
- A Q&A document; list of questions and answers we thought might help stakeholders' understanding and any questions posed during the engagement sessions, together with our responses.
- A video recording of the presentation so that they could watch the presentation again.

Stakeholders were also given the opportunity to request/receive a printed 'hard copy' of the materials. This approach helped stakeholders digest the content in a way best suited to them and then provide a considered opinion. Stakeholders were again reminded of the deadline for feedback. All content shared during the phase two engagement can be found in Appendix 4. Further details on the stakeholder mix and feedback received can be found in Appendices 6, 8, 10 and 11.

### 5.2.2 Council elections Thursday 5 May 2022

On 5 May 2022, elections were held in 26 City and Borough Councils within the Potentially Affected Area (see sections 2.3 and 3.2). As invitations were sent out at the beginning of April a potential change to more than 300 Ward Councillors was recognised. The election results were carefully monitored, and invitation emails sent to the 134 newly elected Ward Councillors within a week of the election. These Councillors had the same choice of attending a virtual session or a face-to-face session between 18 May and 10 June 2022. All Councillors, who had not responded to the original invitation in April, were also sent a reminder in case they had missed the original invitation during the election period. The newly elected Councillors were also invited to attend a virtual drop-in session, during the four weeks of engagement sessions, to run through the detail they had missed in phase one and provide an opportunity for them to pose any questions that they might have.

### 5.2.3 Stakeholders engaged by YouGov

As stated above (5.2.1) it was recognised that the concepts and the materials shared in phase two would be more complex and take longer to explain. Working with research specialists YouGov, the sessions they facilitated changed in format, from forums to focus groups. This change was designed to provide support to participants in understanding the concepts and encourage active discussion and debate to establish opinion. Facilitation by YouGov provided independent assurance that stakeholders had understood the material and that it was presented to them in a way that enabled them to fully engage.

For these general public participants, eight focus groups were facilitated by YouGov. Invitations were sent to the 123 members of the general public that took part in the phase one sessions. Of the eight focus groups, two were face-to-face and six were virtual; giving participants the option of the format that suited them best. Participants were split by location so that each group would have a mix of stakeholders broadly located around similar areas. Four sessions considered arrivals and four departures, and all eight considered respite (for further information see 5.3.1 below). In total, 77 general public participants attended the focus groups. Further details can be found in Appendices 6 and 10.

## 5.3 Stakeholder engagement

Materials were reviewed by the Plain English Campaign and tCI to ensure they were as accessible and understandable as possible. Please see the letter from tCI, Appendix 12. These same materials were used in the sessions facilitated by the MAN Future Airspace team and the focus groups facilitated by YouGov and are included in Appendix 4.

### 5.3.1 Materials shared during phase two engagement

Engagement materials for the second phase of engagement followed a similar format as the first. The presentation delivered by the MAN Future Airspace team was pre-recorded; to ensure consistency of content. Recognising the increased volume and complexity of information to be shared, some changes were necessary:

1. In the sessions led by the MAN Future Airspace team, detailed description was limited to a single example arrival envelope and two example departure envelopes. Limiting the number of envelopes presented in the sessions ensured that the concepts were clearly explained in detail, and the remaining five arrival and ten departure envelopes were shared after the session. This enabled stakeholders to review the remaining design options and provide further comment.
2. As described in section 5.2.3, the YouGov sessions focussed on either the arrival or departure envelopes. However, after the event all participants were sent the full presentation of both arrival and departure design options and were able to e-mail the MAN Future Airspace team to clarify their understanding and/or provide feedback.

The presentation provided a recap of the content that had been shared at phase one. This was important for any stakeholders that may not have attended the earlier phase but also provided a reminder for those that had. An overview of the feedback stakeholders provided in phase one was then outlined with details of the resultant actions taken and changes made. This enabled stakeholders to confirm that pertinent feedback had not been missed and that stakeholder comments had been interpreted correctly.

Stakeholders were then taken through the next steps of the design process completed to create the design options. This included use of the feedback (from phase one engagement), the ICAO PANS-OPS design rules, the capabilities of the aircraft using MAN, the constraints and considerations outlined in phase one and the application of the three 'must have' design principles (Safety, Policy, and Capacity) to the design options. Full details of the materials presented to stakeholders during the phase two engagement can be found in Appendix 4.

### 5.3.2 Developing the design options

It was explained to stakeholders that, having incorporated the design envelope changes, the route designers had then created design options within the amended design envelopes. The design process for the development of those design options, as described in detail at Sections 6 and 19 of the DOR, was explained. Details of the methodology for classifying the potential design options was provided, along with an explanation of the three categories. These classifications are explained fully in Section 5 of the DOR but were summarised in the table on the next page, please see Figure 7.

<b>Unviable</b>	Would not comply with PANS-OPS design criteria or did not have a supporting safety justification for non-compliance.	Not progressed to DPE.
<b>Viable but poor fit</b>	Fail to meet the requirements of the three design principles with which all design options 'must' comply (Safety Policy and Capacity).	Not progressed to full DPE, although an initial evaluation against the three 'must have' design principles is included in the DPE.
<b>Viable and good fit</b>	Expected to meet the three design principles with which all design options 'must' comply (Safety, Policy, and Capacity).	Progressed to full DPE.

Figure 6 – Viability classification

### 5.3.3 Describing the design options

Stakeholders were provided with 12 departure envelopes and six arrival envelopes with the 'viable and good fit' design options shown. Each individual route option was numbered and the rationale for the numbering regime (not always running sequentially) was explained. It was explained that some design options had been designed but then failed the test against the 'must have' design principles. These meant that they were classified as 'viable but poor fit' and they were discounted from further consideration. The end of each departures route option was shown to be the point where the route option achieved 7,000ft when applying a 6% climb rate. For each of the arrival design options, the start was shown at a height of 7,000ft before showing the route the aircraft would use before landing at the airport.

It was explained that all departure design options within a design envelope had a consistent climb gradient of 6% to ensure that the Design Principle Safety was met. The choice of 6% was informed by the fleet equipage survey, which showed that this is the minimum climb rate that aircraft using MAN can achieve. The fleet equipage survey also showed that a greater climb rates would be possible for most aircraft, which is why the gradient was expressed as a minimum.

For arrivals, it was shown that aircraft would join the final approach between 2,500ft and 3,000ft when approaching to Runways 05L/05R and between 3,000ft and 3,500ft when approaching to Runways 23R/23L (due to the higher ground to the north-east).

It was outlined that eight of the departure envelopes contained at least one existing SID that was based upon current ground-based DVOR navigation aids. As most of these ground-based DVOR navigation aids are to be removed from service, replications of each these existing routes were designed by applying PBN standards. These 'replicated routes' act as a 'do minimum' option which, in addition to the 'do nothing' option, could be used to compare new design options to. It was explained that this would still result in differing patterns of movement than those currently experienced because the 'replicated routes' extend the path of the SID to 7,000ft and would be 'systemised', meaning aircraft would be less likely to be vectored off the routes than at present. Currently many aircraft are vectored away from the SID at 3,000ft, 4,000ft or 5,000ft.

Aside from the replications, all envelopes contained a variety of different coloured and numbered design options that were designed to respond to the design principles established in Stage 1. It was highlighted to stakeholders that two slightly different technologies had been applied to the PBN route design, RNAV1 and RNP1. This is because the fleet survey showed all aircraft flying into MAN could use RNAV1 and 80% could utilise RNP1. It was explained that the technologies are similar, but that some slightly different design rules apply, and they produce slightly different tracks.

In relation to the arrivals design envelopes, it was explained that all routes were designed to the RNP Approach standard but that it was not possible to provide a replicated route option as these are so varied prior to final approach because of ATC vectoring. However, to provide an indication of current operations, in the narrative to each envelope, the route

option which commenced from a point nearest to the ROSUN or MIRSI holds (the Runway 23R North, Runway 05R North and Runway 05L North arrival envelopes) or DAYNE hold (the Runway 23R South, Runway 05R South and Runway 05L South arrival envelopes) was highlighted.

#### 5.3.4 The design options presented at phase two engagement

In the next section of the phase two engagement, maps were presented showing each of the design envelopes. The design envelopes contained the 'viable and good fit' design options that met the 'must have' design principles against a detailed map base. The map base showed the envelope, built up areas, future housing sites, national parks, country parks, SSSIs and AONBs. These features were in part included in response to phase one feedback (Section 4.2).

At the sessions led by the MAN Future Airspace team the Runway 23R South Design Envelope was presented as an example arrival envelope and the Runways 05L/05R East Design Envelope and Runways 23R/23L South-west Design Envelope were presented as examples of departure envelopes. With these examples a narrative was provided for each route option to explain which design principle(s) the option principally sought to respond to. For the remaining five arrival and ten departure envelopes, a written narrative was supplied to accompany the map so the stakeholder, understanding the concept from the examples given, could examine the options in their own time and provide feedback.

The same example envelopes were used at the YouGov sessions before the group looked at each of the remaining arrival or departure envelopes.

All the materials presented to stakeholders at phase two engagement are provided in Appendix 4.

#### 5.3.5 Respite

During the phase one engagement sessions participants asked that the airport consider options for respite, in line with the Design Principle Noise N2 (see 4.2 of this report). CAP1616 suggests that the change sponsor should seek the guidance of stakeholders on how they would like to see respite delivered<sup>8</sup>. The change sponsor can use that guidance to inform how potential respite opportunities are used as design proposals mature. This guidance was also to help inform the DPE assessment criteria for Design Principle Noise N2. Therefore, the final section of the presentation was dedicated to discussing respite.

Stakeholders were reminded of the three noise design principles and the MAN Future Airspace team explained how each had been addressed through the design process:

- For Design Principle Noise N1, options that avoid major towns and settlements wherever possible were prioritised. Built-up areas and known future housing sites were detailed on the map bases onto which design options were overlaid; so, stakeholders could clearly identify which routes affected current and future populations.
- Design Principle Noise N2 relates to the provision of relief or respite, and it was explained that the potential combinations offered by the 160 arrival and departure design options maximised the opportunity to consider respite options.
- Design Principle Noise N3 relates to design options that avoid or limit effects on noise sensitive areas. To assist identification of issues for such areas as National Parks, AONB, SSSI, and country parks were plotted on the detailed map bases the design options appeared on. It was explained that noise sensitive buildings such as centres of education, healthcare, and worship as well as historical assets had also been mapped to enable more detailed assessments of the individual design options in Stage 3. Feedback from stakeholders was also sought to identify any additional local factors.

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<sup>8</sup> Paragraph D10 of Appendix D of the March 2021 CAA's Airspace Change guidance document CAP1616 ([www.caa.co.uk/cap1616](http://www.caa.co.uk/cap1616)).

Stakeholders were asked several questions to help drive the discussion, including whether they agreed with the definition of respite and relief supplied, what they felt would constitute a sufficient period of respite and whether there were preferable times to have a period of respite. The several options of how it was believed respite could be delivered were outlined and feedback on these was sought. The options and the questions posed are set out in Appendix 4 and the stakeholder feedback received is listed in Appendices 6, 8, 10 and 11.

### 5.3.6 Change to slide 48 – post engagement

The presentation included a depiction of the design options in the Runway 23 South-west Design Envelope. Currently aircraft within this envelope use three SIDs, namely EKLAD, KUXEM and MONTY.

The solid red line 1a on slide 48 of the slide deck was described as the replication of the current route. However, the route option 1a shown was the replication of the MONTY SID only, and the replication of the KUXEM and EKLAD SIDs were omitted from the slide. Post engagement this issue was clarified for stakeholders and a revised slide was shared, with the design options previously depicted, together with the paths of all the replicated SIDS MONTY (1a), KUXEM (1c) and EKLAD (1d) shown as red lines. The MONTY (1a), KUXEM (1c) and EKLAD (1d) share the same path over the ground for the first 16 miles and only diverge for the last few miles as they achieve 7,000ft within four miles of each other. It was outlined that the south-west envelope for Runways 23R/23L contained 12 design options (not ten) and that all would be evaluated against the design principles as part of the DPE.

Should the inclusion of the additional routes KUXEM (1c) and EKLAD (1d) prompt any additional comments stakeholders were invited to let the MAN Future Airspace team know. No new comments were received.



## 6. Phase two engagement stakeholder feedback

### 6.1 Feedback overview

In the second phase of engagement stakeholder feedback was received through five channels.

MAN Future Airspace team facilitated sessions:

1. Responses were recorded through the 'chat' function and dialogue from the engagement sessions.
2. After the session, stakeholders were e-mailed a link to an 'online survey', together with a link to an online portal where they could access the engagement materials (Appendix 4).
3. Some stakeholders chose to send their response as an e-mail or within an attachment to [futureairspace@manairport.co.uk](mailto:futureairspace@manairport.co.uk)

The feedback was put into a report (Appendix 8).

From the YouGov facilitated sessions:

4. YouGov created a report of the forum discussions (Appendix 6).
5. Some YouGov stakeholders also sent feedback as an e-mail or within an attachment direct to the MAN Future Airspace team via [futureairspace@manairport.co.uk](mailto:futureairspace@manairport.co.uk)

A report combining feedback from the MAN Future Airspace team and YouGov facilitated sessions was then produced (Appendix 10, see also Appendix 11 where feedback and responses have been summarised).

### 6.2 Discussions with other aviation interests

Throughout Stage 2, meetings were held with NATS, Liverpool John Lennon, Leeds Bradford, Hawarden, East Midlands, Manchester City (Barton) and Doncaster Airports. Discussions with LPL identified several interactions between Manchester/Liverpool design options that required more detailed consideration. The LPL stakeholder response highlighted these issues and additional detail was added from discussions.

LPL passed through the Consult Gateway in January 2020 and in the summer of 2022 was paused at Stage 4a. Therefore, in addition to the meetings listed above, ACOG facilitated a collaborative design review in June 2022 with technical experts from LPL, MAN and NATS En Route (NERL). The aim of the meeting was to assess the potential route interactions between the MAN and LPL Airspace Change proposals, and how they would interface with the network at a higher level. The meeting identified several design interactions and considerations (which were reflected in the LPL feedback to the MAN engagement) and allowed additional detail to be discussed and potential operational solutions to be explored. The interactions (and potential mitigations) discussed at this meeting were then used in the development of additional design options, see Section 5.11 of the DOR and Section 6.4 below. A programme of further workshops is planned to resolve route interactions between MAN and LPL. It was agreed that this activity would take place towards the latter part of 2022 and into 2023 and will form a key and part of Step 3A activities.

The Design Principle Technology requires that our route designs should be based on the latest aircraft navigational technology widely available. Feedback received in engagement made clear that stakeholders were keen to see new technology, particularly technology that improved environmental performance, adopted. However, in some cases, such as the use of Ground-Based Augmentation System (GBAS) approaches, the fleet equipage survey (prior to the pandemic in 2020) indicated the level of equipage to be low, such that any designs created to these standards would not be aligned to the Design Principle Technology. Therefore, to ensure we have the latest understanding of the technology widely available, we will repeat our fleet equipage survey during Stage 3. This action will address this feedback received in Stage 2 engagement. See Section 5.6 of the DOR for more information.

### 6.3 Overall feedback

Feedback indicated that stakeholders understood the process followed to identify arrival and departure design options. It was felt that the process followed was clear and logical and that the level of detail was welcomed.

Overall, stakeholders were clear that they could see how feedback from the first phase of engagement had influenced the development of the design options as evidenced in Appendices 6, 8, 10 and 11. In particular, members of the general public who engaged through YouGov were pleased to see such a wide range of design options spread across the envelopes.

It was clear to stakeholders how the design options aligned to the design principles established in Stage 1 and some expressed preferences of individual design options (see Appendices 6, 8 and 10 for more information). A number of stakeholders also described potential additional design options they would like to see considered. In Section 6.4, the recommendations are described according to their design envelope.

Feedback on respite was mixed. Although there was a clear consensus that stakeholders would prefer predictable respite, there was no overall agreement on how it was best achieved. Further details are set out in Section 6.4 point K below.

### 6.4 Feedback – recommendations

As a result of feedback during the engagement process, changes were considered for eight departure envelopes (A to H below) and two arrival envelopes (I and J below). These were considered by the MAN Future Airspace team at a post-engagement workshop in July 2022:

**A. Investigate a new route option in Runway 23R/23L South-west Design Envelope that uses 2a to point of interception and then follows path of 1a and /or 1b.**

New design options (7a and 7b) were created that used an offset after departure up to a maximum of 15° (as used by 2a) and then follow the 1a and 1b routes.

**B. Investigate a new route option in Runway 23R/23L East Right Turn Design Envelope that follows path of 1a to 4,000ft and then the average of the path of the currently experienced easterly traffic on a 7% climb.**

This feedback indicated a desire to broadly recreate the current path followed by aircraft following ATC vectoring above 4,000ft. A new route option (1c) was created with a 6% climb to 4,000ft and then followed a path aligned to low populous areas to the east.

**C. Investigate the feasibility of creating design options to the west of Mere in the Runway 23R/23L East Right Turn and 23R/23L North Design Envelopes.**

It was determined that there were already many design options that took different paths through and around Mere and that it would not be possible to create design options further west without creating interactions with aircraft in other envelopes, conflicting with the design principles Capacity, Safety and Airspace.

**D. Investigate new route option in Runway 05L/05R South Right Turn Design Envelope to follow the A34 on point of interception.**

A new route option (6b) was created that followed option 6 to where it meets the A34 and then turns left to follow the A34 south until achieving 7,000ft.

**E. Investigate the feasibility of creating 15° offset design options within the Runway 05L/05R West and 05L/05R South-west Design Envelopes.**

Two new design options (option 7 in both the Runway 05L/05R West and the 05L/05R South-west design envelopes) were created that used an offset to the north after take-off, up to the maximum of 15°, and then followed a line of least population to the west and south-west (respectively).

**F. Investigate additional design options within the Runway 23R/23L South-west Design Envelope that are deconflicted from LPL Runway 27 arrivals and Runway 09 departures.**

Following both feedback and the information emerging from the ACOG-led discussion with LPL (see 6.2 above), interactions had been identified between departures within the south-west envelope and LPL arrivals and departures. This resulted in a scenario where only design options 5 and 6 within the 23R/23L South-west envelope appeared to be fully deconflicted from LPL operations. ACOG are to lead a bilateral workshop to investigate potential solutions within Step 3a, and to aid this work further design options south of 5 and 6, within the departure envelope, were created.

**G. Investigate the feasibility of the Runway 23R/23L West Design Envelope as interactions have been identified with LPL Runway 27 arrivals and Runway 09 departures.**

As with action F, both feedback and discussions with LPL identified interactions between departures within the Runway 23R/23L West envelope and LPL arrivals. In response to this, additional options were created, which are initially more than 6%, but once clear of the LPL airspace return to a lower procedural climb gradient. These seek to terminate at a similar position as the 6% options (i.e., to create a net gradient close to 6% with a steeper initial climb). In combination with creating these options, work will be undertaken with airlines to investigate their flyability and an agreed solution will be developed within the ACOG-led bilateral workshop with LPL within Step 3a. As with actions F and I, the ACOG-led bilateral workshop in Step 3a will be used to identify the optimal operational solution.

**H. There is an appetite for steeper than 6%, climb gradients – the feasibility of providing them needs to be investigated.**

It was agreed that there were no vertical restrictions to aircraft climbing more quickly than the 6% minimum climb gradient (until 7,000ft). The NATS network have confirmed that aircraft will be permitted to use their preferred climb rate unless specific conflicts exist that require altitude restrictions to be applied. The choice of 6% was informed by the fleet equipage survey; it is the minimum climb rate and greater climb rates will be possible by most aircraft operating out of MAN.

**I. Arrivals Envelope Runway 23R South – a requirement to check the interaction between arrival design options 8a and 8b and the Manchester departure design options.**

It was agreed that this check would naturally follow as part of the Step 3a design process. Simulation of future operations with NERL and LPL will be used to understand interactions such as this, and where necessary provide resolution.

## J. Arrivals Envelopes Runway 05R North and Runway 05L North – require the drawing of more design options that are deconflicted from LPL Runway 27 arrivals and Runway 09 departures.

As with actions F and G, feedback and discussions with LPL identified interactions between Manchester arrivals to Runways 05L/05R from the north and both departures and arrivals to LPL. In response to these issues, three new design options have been created for each envelope (Runway 05R North and Runway 05L North), all of which will intercept the final approach at 2,000ft.

- Route option 10 to use Initial Approach Fix 7 as a start point and route south to intercept the respective ILS.
- Route option 11 to take 2,000ft join as start point and work backwards at using the gradient of 2.5° (defined as achieving the optimum noise by modern aircraft types in 'A Low Noise Arrival CAP2302'<sup>9</sup>) to establish a start as far west as possible to be deconflicted for Manchester arrivals.
- Route option 12 to start from a point parallel, but to the east, of the start of route option 6a/6b and then track broadly parallel to option 7/7b and join the ILS at 2,000ft.

Consistent with the requirement that each Initial Approach Fix (IAF) should be capable of providing a CDA to both runway ends, options that join final approach for Runways 23R/23L from these points have also been created.

## K. Noise relief/respice.

Based on feedback from the engagement sessions it is clear that stakeholders would prefer predictable noise respice/relief and options should be included in the Stage 3 consultation. Stakeholders in Stockport and Knutsford believe that changes in runway direction already provide them some respice, and this should be accounted for in any options taken forward. Though there was no consensus, overall, multiple design options seem to be the most popular way of delivering some respice.

Many stakeholders strongly felt that the noise penalties levied<sup>10</sup>, and the Night Noise Policy<sup>11</sup> should be reviewed. Both matters will be considered as part of the next MAN Noise Action Plan and fall outside of the MAN Future Airspace project.

Stakeholders are concerned that when enacted, airspace change will both alter noise levels and the areas that experience noise. New predicted noise contours will be produced during Stage 3 as part of the Future Airspace project to inform discussions about mitigation measures. Any recommendations for changes to the MAN Sound Insulation Scheme can be considered when the project has advanced beyond Stage 3.

Further detail on the feedback received at phase two can be found at Appendices 6, 8, 10 and 11.

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<sup>9</sup> See page 30 of 'A Low Noise Arrival CAP2302'. A report that makes recommendations to implement low noise arrivals. ([www.caa.co.uk/cap2303](http://www.caa.co.uk/cap2303)).

<sup>10</sup> See 3.11 Noisy Jet Surcharge of the 'Manchester Airport PLC Schedule of charges and Terms and Conditions of use' at:

[www.manchesterairport.co.uk/about-us/publications/fees-and-charges/](http://www.manchesterairport.co.uk/about-us/publications/fees-and-charges/).

<sup>11</sup> See the Manchester Airport Night Noise Policy at: [www.manchesterairport.co.uk/environment](http://www.manchesterairport.co.uk/environment).

## 7. Engagement next steps

The design process undertaken by the MAN Future Airspace Team has enabled the development of a comprehensive set of design options for both departing and arriving aircraft. These design options have been tested with stakeholders and, where appropriate, refined and clarified to take account of the feedback received.

At Stages 1 and 2 of the CAP1616 process MAN has demonstrated commitment to ensure that stakeholders, including members of the general public, have the opportunity to inform the MAN Future Airspace project, and we will continue this commitment into Stage 3.

The process of engagement has been guided by an independent SRG, and their continued participation will ensure an inclusive approach and that stakeholders' views remain at the heart of developing proposals.

The completion of Stage 2 stakeholder engagement has developed and refined the design options at MAN, as well as developing a detailed understanding of stakeholders' views on those options.

All stakeholders that have participated in engagement activities to date will be provided with the information submitted to the CAA at the conclusion of Stage 2, to ensure that they remain informed of the development of the MAN Future Airspace project ahead of the full public consultation in Stage 3. The information shared will include details of the feedback gathered at phase one and phase two engagement sessions, the revised design options and the assessments undertaken as part of Step 2B. This will ensure those stakeholders engaged during Stage 2 are fully updated on the latest work as the project moves towards Stage 3.

Further detail on the next steps within the CAP1616 process can be found in the 'Next steps' section of the Summary Document, the DPE and the IOA.

# Glossary

<b>ACOG</b>	Airspace Change Organisation Group formed in 2019 as a fully independent organisation within NATS under the direction of the UK Government Department for Transport and Civil Aviation Authority, who are the co-sponsors of the AMS.
<b>ACP</b>	Airspace Change Proposal.
<b>ADWR</b>	Airspace Development Workshop Record - the output from bilateral discussions with NERL to record and inform their comprehensive list of options for the network that interfaces with MAN traffic.
<b>Agl</b>	Above ground level.
<b>AIP</b>	Aeronautical Information Publication - A document published by the UK CAA which contains information essential to air navigation ( <a href="http://www.aurora.nats.co.uk/htmlAIP/Publications/2022-07-14-AIRAC/html/index-en-GB.html">www.aurora.nats.co.uk/htmlAIP/Publications/2022-07-14-AIRAC/html/index-en-GB.html</a> ).
<b>Altitude Based Priorities</b>	The ANG sets out a framework of 'Altitude Based Priorities', to be taken into account when considering the potential environmental impact of airspace changes.
<b>AMS</b>	Airspace Modernisation Strategy (CAP1711) - this is the Government's strategy and plan for the use of UK airspace, including the modernisation of airspace ( <a href="http://www.caa.co.uk/cap1711">www.caa.co.uk/cap1711</a> ).
<b>Amsl</b>	Above mean sea level.
<b>ANG</b>	Air Navigation Guidance 2017 - Guidance to the CAA (from DfT) on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management ( <a href="http://www.gov.uk/government/publications/uk-air-navigation-guidance-2017">www.gov.uk/government/publications/uk-air-navigation-guidance-2017</a> ).
<b>ANSP</b>	Air Navigation Service Provider - an organisation which operates the technical system, infrastructure, procedures, and rules of an air navigation service system, which includes air traffic control.
<b>AONB</b>	Area of Outstanding Natural Beauty - an area of countryside which has been designated for conservation because of its significant landscape value, recognising its national importance.
<b>AQMA</b>	Air Quality Management Area - designated by a local authority and subject to a Local Air Quality Management Plan.
<b>ASMIM<sup>12</sup></b>	A navigation fix to the north-west of Manchester used by departing aircraft.
<b>ATC</b>	Air Traffic Control - service from an air navigation service provider providing guidance to aircraft through Controlled Airspace.
<b>ATM</b>	Air Transport Movement - an aircraft operation for commercial purposes, as opposed to a flight for recreational or personal reasons.
<b>ATS</b>	Air Traffic Services.
<b>Biodiversity</b>	The variability among living things from all ecosystems (including terrestrial, marine, and aquatic amongst others) and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems.
<b>CAA</b>	Civil Aviation Authority -the aviation industry's regulator.
<b>CAP</b>	Civil Aviation Publication - a document published by the UK CAA which can provide information, guidance or policy depending on the subject covered. The list of all CAPs is published on the CAA website ( <a href="http://www.caa.co.uk/our-work/publications">www.caa.co.uk/our-work/publications</a> ).
<b>CAP1385</b>	The CAA's PBN enhanced route spacing guidance ( <a href="http://www.caa.co.uk/cap1385">www.caa.co.uk/cap1385</a> ).
<b>CAP1498</b>	The CAA's definition of overflight - the report defines overflight as it relates to airspace regulation; and an overflight metric which may be used to quantitatively compare different airspace options ( <a href="http://www.caa.co.uk/cap1498">www.caa.co.uk/cap1498</a> ).

<sup>12</sup> The language to communicate between a pilot and an Air Traffic Controller needs to be clear and avoid misunderstanding. Names need to sound different and be incapable of confusion with others, particularly others close by.



<b>CAP1616</b>	The CAA's airspace change guidance document - it sets out the regulatory process which all airspace change proposals must follow ( <a href="http://www.caa.co.uk/cap1616">www.caa.co.uk/cap1616</a> ).
<b>CAP1616a</b>	A technical annex to CAP1616- guidance on the regulatory process for changing airspace design including community engagement requirements. This annex outlines relevant methodologies for use in environmental assessments relating to airspace change ( <a href="http://www.caa.co.uk/cap1616a">www.caa.co.uk/cap1616a</a> ).
<b>CAP1781</b>	The CAA's DVOR/DME/NDB Rationalisation - guidance for the use of RNAV Substitution ( <a href="http://www.caa.co.uk/cap1781">www.caa.co.uk/cap1781</a> ).
<b>CAP1711</b>	Airspace Modernisation Strategy - this is the Government's strategy and plan for the use of UK airspace, including the modernisation of airspace ( <a href="http://www.caa.co.uk/cap1711">www.caa.co.uk/cap1711</a> ).
<b>CAP1991</b>	Procedure for the CAA to review the classification of airspace ( <a href="http://www.caa.co.uk/cap1991">www.caa.co.uk/cap1991</a> ).
<b>CAP2091</b>	CAA Policy on Minimum Standards for Noise Modelling -document defines categories of noise modelling sophistication and sets out requirements of the minimum category which different stakeholder or sponsor groups should use when providing noise calculations to the CAA. ( <a href="http://www.caa.co.uk/cap2091">www.caa.co.uk/cap2091</a> ).
<b>CAP2156A</b>	Airspace change masterplan - CAA acceptance criteria, the criteria against which the CAA will make the decision whether to accept the airspace change masterplan into the Airspace Modernisation Strategy ( <a href="http://www.caa.co.uk/cap2156A">www.caa.co.uk/cap2156A</a> ).
<b>CAP2302</b>	A Low Noise Arrival CAP2302 - a report that makes recommendations to implement low noise arrivals ( <a href="http://www.caa.co.uk/cap2303">www.caa.co.uk/cap2303</a> ).
<b>CAP493</b>	Manual of Air Traffic Services - contains procedures, instructions and information which are intended to form the basis of air traffic services within the United Kingdom ( <a href="http://www.caa.co.uk/cap493">www.caa.co.uk/cap493</a> ).
<b>CAP725</b>	The CAA's airspace change process guidance document that preceded CAP1616 ( <a href="http://www.caa.co.uk/cap725">www.caa.co.uk/cap725</a> ).
<b>CAP760</b>	CAA's Guidance on the Conduct of Hazard Identification, Risk Assessment, and the Production of Safety Cases ( <a href="http://www.caa.co.uk/cap760">www.caa.co.uk/cap760</a> ).
<b>CAP778</b>	The CAA's Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace ( <a href="http://www.caa.co.uk/cap778">www.caa.co.uk/cap778</a> ).
<b>CAA Controlled Airspace Containment Policy Statement</b>	The CAA Controlled Airspace Containment Policy Statement (January 2014 superseded in August 2022) sets out the minimum criteria applicable to containment of instrument flight procedures for airports already within Controlled Airspace (CAS). Annex B provides the design criteria that have been applied to the arrival and departure routes in this ACP. ( <a href="https://publicapps.caa.co.uk/docs/33/Policy%20for%20the%20Design%20of%20Controlled%20Airspace%20Structures%20110822.pdf">https://publicapps.caa.co.uk/docs/33/Policy%20for%20the%20Design%20of%20Controlled%20Airspace%20Structures%20110822.pdf</a> ).
<b>CAS</b>	Controlled Airspace is airspace within which air traffic services are provided. There are different classifications which define the air traffic control service provided and the requirements of aircraft flying within it. All commercial (passenger) flights fly within Controlled Airspace.
<b>CCO</b>	Continuous Climb Operations - allows departing aircraft to climb continuously, which reduces the level of noise heard on the ground, reduces fuel burn and emissions.
<b>CDA</b>	Continuous Descent Approach - allows arriving aircraft to descend continuously which reduces the level of noise heard on the ground, reducing fuel burn and emissions.
<b>CF</b>	Course to Fix - a path that terminates at a fix with a specified course at that fix.
<b>Change sponsor</b>	An organisation that proposes, or sponsors, a change to the airspace design in accordance with the CAA's airspace change process.
<b>Comprehensive list</b>	The full list of design options that are viable designs as required by Stage 2 of the CAP1616 process and which are detailed in the Design Options Report.
<b>CONOPS</b>	Concept of Operations - a document that outlines how we want the airspace system to work in the future and the standards that we will use.

<b>COVID-19</b>	Coronavirus disease 19 is a contagious disease caused by a virus that was identified in 2019 and which resulted in a pandemic in the year 2020.
<b>CP</b>	Country Park - areas of land designated and protected by local authorities to provide access to the countryside.
<b>Cumulative Impact</b>	Where an environmental topic/receptor is affected by impacts from more than one source/project at the same time and the impacts act together.
<b>CTA</b>	Control Area - the controlled airspace that exists in the vicinity of an airport
<b>DAYNE</b>	One of three existing hold stacks used at Manchester Airport.
<b>dB</b>	Decibels - a unit used to measure noise levels.
<b>DEFRA</b>	Department for the Environment, Food and Rural Affairs (UK Government).
<b>DER</b>	Departure End of Runway - a term that, when used in PANS-OPS 8168, determines the start point for the design of a departure procedure.
<b>DESIG</b>	A navigation fix to the north-east of Manchester used by departing aircraft.
<b>Design envelopes</b>	Broad areas where it is possible to design routes and which are the areas where we have created design options for arriving and departing aircraft.
<b>Design option</b>	An output from the route design process that responds to the design principles and the Statement of Need (SoN). Design options are a requirement of the CAP1616 process. During the engagement carried out at Stage 2, design options were also referred to as "route options".
<b>Design principles</b>	The principles encompassing the safety, environmental and operational criteria, and the strategic policy objectives that the change sponsor seeks to achieve in developing the airspace change proposal. They are an opportunity to combine local context with technical considerations and are therefore drawn up through discussion with affected stakeholders and in Manchester's case - members of the public. The design principles at Manchester Airport were established during Stage 1 of the CAP1616 process.
<b>DF Coding</b>	Direct to Fix coding - type of waypoint used in the design of PBN procedures.
<b>DfT</b>	Department for Transport.
<b>DME</b>	Distance Measuring Equipment - a ground-based beacon that allows aircraft to measure their precise distance from its location, often used to define a turn point.
<b>DOE</b>	Design Options Evolution - shows the evolution of the design options through Stages 2A and 2B of the CAP1616 process. Included as Appendix A to the Stage 2 Summary Document.
<b>DOR</b>	Design Options Report - this responds to the requirements of CAP1616 to develop a comprehensive list of options that address the SoN and that align with the design principles. It details the design process and the output of that process in the form of design options for both departures and arrivals.
<b>DPE</b>	Design Principle Evaluation - the document that undertakes an evaluation of the viable and good fit options described in this report against the design principles.
<b>DVOR</b>	Doppler VHF Omni-directional Range - ground-based radio navigation beacon used by pilots to assist in aircraft navigation.
<b>EASA</b>	European Union Aviation Safety Agency.
<b>Education (facilities)</b>	For our analysis we have used the 'Ordnance Survey Address Base' count of educational facilities, details of which they receive from the local government contributing authority. These include all educational services including College, Further Education, Higher Education, Children's Nursery / Crèche, Preparatory / First / Primary / Infant / Junior / Middle School, Non State Primary / Preparatory School, Secondary / High School, Non State Secondary School, University, Special Needs Establishment and Other Educational Establishments.
<b>EGCC</b>	The four-letter ICAO code for Manchester Airport.
<b>EU</b>	The European Union - an economic and political union of 27 countries.
<b>EKLAD<sup>12</sup></b>	A navigation fix to the west of Manchester used by departing aircraft.

<b>FAF</b>	Final Approach Fix - The point at which an aircraft starts its final approach to land.
<b>FASI-N</b>	Future Airspace Strategy Implementation – North: The programme of airspace changes across the northern part of the UK, including Manchester, that is implementing the Governments Airspace Modernisation Strategy.
<b>FIR</b>	Flight Information Region - airspace delegated to a country by ICAO. In the UK there are two FIRs, London and Scottish.
<b>FL85</b>	FL means 'Flight Level' and uses the standard international pressure (1013.2 hPa) to express altitude in hundreds of feet. FL85 equates to 8,500ft calculated according to the 'constant' pressure altitude rather than local pressure (QNH). So FL90 would mean 9,000ft.
<b>Flat segment</b>	A defined period of level flight as required by a PANS-OPS PBN Approach procedure.
<b>Flightpath</b>	The routes taken by aircraft within airspace.
<b>Flight Level</b>	A means to separate aircraft (above the transition altitude) by using a standard pressure setting for all aircraft.
<b>FMS</b>	Flight Management System - a specialised computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew.
<b>FOA</b>	Full Options Appraisal - the options appraisal carried out at Stage 3 of the CAP1616 process.
<b>Focus group</b>	Group of representative stakeholders brought together to discuss proposals and offer feedback.
<b>Ft</b>	Feet.
<b>Future housing sites</b>	Future housing sites with a reasonable prospect of being developed based on Local Plan allocations and Local Authority five-year Housing Land Supply Assessment data. During engagement we have used the term 'Future Housing Sites' to represent the broader phrase of Planned Property Development as we are not aware of other future noise sensitive developments that would sit within this category. Data was collated by CBRE and supplied to MAN on 17 <sup>th</sup> March 2022 with updates included to the Cheshire East Borough Council and Staffordshire Moorlands District Council areas in July and August 2022.
<b>GA</b>	General Aviation - defined by ICAO as 'all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.
<b>GBAS</b>	Ground Based Augmentation System - augments the existing GPS by providing corrections to aircraft in the vicinity of an airport to improve the accuracy of, and provide integrity for, the aircrafts' GPS navigational position.
<b>GDPR</b>	The General Data Protection Regulations.
<b>GIS</b>	Geographic Information System.
<b>GNSS</b>	Global Navigation Satellite System - a term used to describe a system that uses satellites for position fixing.
<b>GPS</b>	Global Positioning System - a satellite-based radionavigation system owned by the United States government and operated by the United States Space Force.
<b>HAZID Workshop</b>	Hazard Identification workshop - held with air traffic control experts from the Future Airspace team, NATS Manchester, NATS En Route and Liverpool John Lennon Airport as well as airline representatives operating from Manchester Airport.
<b>HON</b>	Abbreviation for the HONILEY DVOR navigation beacon that is to the south of Manchester and is used by departing aircraft as a navigation point.
<b>IAF</b>	Initial Approach Fix - the start of the approach phase of flight. For the Manchester arrival design options, the IAF is at 7,000ft unless stated otherwise.
<b>IATA</b>	The International Air Transport Association - a trade association that supports aviation with global standards for airline safety, security, efficiency and sustainability.
<b>ICAO</b>	International Civil Aviation Organisation - an agency of the United Nations
<b>IFP</b>	Instrument Flight Procedure.
<b>ILS</b>	Instrument Landing System - a radio navigation system that provides vertical and horizontal guidance to arriving aircraft to help them land safely, especially in bad weather.

<b>Instrument Approach Procedures (IAPs)</b>	A series of predetermined manoeuvres for the orderly transfer of an aircraft operating under instrument flight rules from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.
<b>IOA</b>	Initial Options Appraisal - the document that is the first iteration of the three option appraisals required by CAP1616 - the design options appraised within the IOA are the outputs from the DPE.
<b>KIAS</b>	Knots of indicated airspeed - the number shown on the airspeed indicator.
<b>KUXEM<sup>12</sup></b>	A navigation fix to the south-west of Manchester used by departing aircraft.
<b>LISTO<sup>12</sup></b>	A navigation fix to the south of Manchester used by departing aircraft.
<b>LBA</b>	The three letter IATA code for Leeds Bradford Airport.
<b>LDA</b>	Localiser Directional Aid - an assisted approach not aligned with the landing runway, used in places where terrain or other factors prevent the localiser antenna from being aligned with the runway that it serves.
<b>LLR</b>	Low-Level Route - the Manchester LLR is Class D airspace within which the CAA have exempted aircraft from requiring an ATC clearance to fly within the route ( <a href="http://publicapps.caa.co.uk/docs/33/ORS4%20No.1545%20Correction.pdf">http://publicapps.caa.co.uk/docs/33/ORS4%20No.1545%20Correction.pdf</a> ).
<b>LOAEL</b>	Lowest Observed Adverse Effect Level - below this level, there is no detectable effect on health and quality of life due to the noise.
<b>LNAV</b>	Lateral Navigation - a term for lateral (left/right) navigation used within Performance Based Navigation.
<b>LPL</b>	The three letter IATA code for Liverpool John Lennon Airport.
<b>m</b>	Metres.
<b>MAGIC map</b>	Interactive map managed by DEFRA containing authoritative geographic information about the natural and built environment from across Government.
<b>MAP</b>	Missed Approach Procedure - on occasions, inbound aircraft are unable to land successfully on their first approach and perform an action known as a 'Go-Around'. The Missed Approach Procedure outlines a mechanism to route the aircraft, without conflict with departing or arriving aircraft, and re-establish on to the arrivals path for another approach.
<b>MAN</b>	The three letter IATA code for Manchester Airport.
<b>MANTIS</b>	Manchester Airport Noise and Track Information System - a system that monitors and records the path and noise of aircraft arriving and departing from Manchester Airport.
<b>Masterplan</b>	The strategic plan for the coordinated national programme of airspace change, created by the ACOG under the direction of the CAA and DfT.
<b>MCT</b>	Abbreviation for the Manchester DVOR navigation beacon and routes that use that as a navigation point.
<b>Medical (facilities)</b>	For our analysis we have used the 'Ordnance Survey Address Base' count of 'Medical', details of which they receive from the local government contributing authority. These include Dentist, General Practice Surgery / Clinic, Health Centre, Health Care Services, Hospital, Hospice, Medical / Testing / Research Laboratory, Professional Medical Service, Assessment / Development Services. Not all of these are 'noise sensitive' receptors and in Stage 3 those which are not 'noise sensitive' will be removed from future analysis.
<b>MIRSI</b>	One of three existing hold stacks used at Manchester Airport.
<b>MONTY<sup>12</sup></b>	A navigation fix to the south-west of Manchester used by departing aircraft.
<b>MSD</b>	Minimum Stabilisation Distance - a design criteria within PANS-OPS 8168 that ensures aircraft stability when flying a procedure.
<b>MTMA</b>	Manchester Terminal Manoeuvring Area - the designated area of Controlled Airspace for Manchester Airport.
<b>NANTI</b>	A navigation fix to the south-west of Manchester used by Liverpool aircraft.

<b>NATS</b>	The air navigation service provider for the UK, formerly National Air Traffic Services. NATS 'En Route' manage the traffic in the upper airspace and climbing and descending to land in the Manchester area.
<b>NERL</b>	NATS En Route Ltd - the part of NATS that delivers en route air traffic control.
<b>Nm</b>	Nautical miles.
<b>NNR</b>	National Nature Reserves - designated under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981 to protect important habitats, species or geology.
<b>Noise abatement</b>	Activity to reduce the emission of noise from a given source (aircraft operations).
<b>Noise-sensitive receptors</b>	Specific locations or developments identified as likely to be adversely affected by noise from or due to aircraft operations. Individual locations will have varying degrees of sensitivity (measured noise exposure levels) depending upon their use. These provide a useful reference to the design principles N1, N2 and N3 where the number of people affected by noise, noise effects and noise sensitive areas are referenced.
<b>NP</b>	National Park - designated areas under the National Parks and Access to the Countryside Act 1949 to protect landscapes because of their special qualities.
<b>Overflight</b>	According to CAP1498, the definition of overflight is 'an aircraft in flight passing an observer at an elevation angle (approximately the angle between the horizon and the aircraft) that is greater than an agreed threshold, and at an altitude below 7,000ft.'
<b>PANS-OPS</b>	An ICAO document that stands for Procedures for Air Navigation Services Document 8168 outlines the rules and criteria for designing aircraft flying procedures - commonly shorted to PANS-OPS.
<b>PBN</b>	Performance Based Navigation - a range of specifications that requires aircraft to navigate to specific accuracy standards, mainly by using satellite-based navigation systems. It is designed to improve track-keeping accuracy for departing and arriving aircraft. The transition to PBN is a UK and International policy requirement and a foundation of the AMS and this ACP.
<b>PBN IR</b>	The PBN IR introduces the gradual implementation of PBN flight procedures to support safer, greener, and more efficient aircraft operations. The Regulation is binding in its entirety and directly applicable in all EU Member States.
<b>Peak District</b>	The Peak District - an upland area in England at the southern end of the Pennines. Mostly in Derbyshire, it extends into Cheshire, Greater Manchester, Staffordshire, West Yorkshire and South Yorkshire.
<b>PDG</b>	Procedure Design Gradient.
<b>Places of Worship</b>	For our analysis we have used the 'Ordnance Survey Address Base' count of 'Places of Worship', details of which they receive from the local government contributing authority. These include any Abbey, Baptistery, Cathedral, Church, Chapel, Citadel, Gurdwara, Kingdom Hall, Methodist, Mosque, Minster, Stupa, Succah, Synagogue, Tabernacle or Temple.
<b>PNR</b>	Preferred Noise Route - lines of tolerances widen from the runway ends out to 1.5km each side of the Standard Instrument Departure route. The area encompassed by these 1.5km tolerances is commonly recognised as the PNR.
<b>Point Merge</b>	Is based on a specific precision-area navigation (P-RNAV) route structure, consisting of a point (the merge point) and pre-defined legs (the sequencing legs) equidistant from this point. The sequencing is achieved with a "direct-to" instruction to the merge point at the appropriate time.
<b>POL</b>	Abbreviation for the Pole Hill DVOR navigation beacon and routes that is to the north of Manchester and is used by departing aircraft as a navigation point
<b>Q&amp;A</b>	Question and Answer - a list of questions (and their answers) that help the reader understand the subject material.
<b>Radius to fix</b>	Radius to Fix (RF) is defined as a constant radius circular path around a defined turn centre that terminates at a fix.

<b>RAG</b>	Red, Amber, Green - a means of assessing a project's status using the traffic light colours.
<b>RF</b>	Radius to Fix is defined as a constant radius path around a defined turn centre. It is a type of waypoint used in PBN procedures and provides highly accurate track keeping in a turn.
<b>RNAV1</b>	Area Navigation 1 is one of the specifications within PBN. Aircraft must maintain specific navigational accuracy within the flight. The '1' suffix refers to the accuracy requirement in the procedure, in this case aircraft must fly within +/-1 nautical mile of the centreline of the designed route.
<b>RNP APCH</b>	Required Navigation Performance Approach - a type of RNP procedure used in the descent phase of flight.
<b>RNP1</b>	Required Navigation Performance - one of the specifications under PBN. Aircraft must maintain specific navigation accuracy, and in RNP are aided by on-board performance monitoring and alerting. It provides slightly more predictable track-keeping when compared to RNAV1. The '1' suffix refers to the accuracy requirement in the procedure, in this case aircraft must fly within +/-1 nautical mile of the centreline of the designed route.
<b>RNP1 +RF</b>	Required Navigation Performance with Radius to Fix turns.
<b>ROSun</b>	One of three existing hold stacks used at Manchester Airport.
<b>Route option</b>	A term used in engagement to describe the design options that have been created in this step of the Airspace Change Process.
<b>SAC</b>	Special Area of Conservation - Designated under the Conservation of Habitats and Species Regulations 2017 as making a significant contribution to the conserving of the habitats of protected species.
<b>Safety Case</b>	A written demonstration of evidence and due diligence provided by a corporation to demonstrate the ability to operate safely and effectively control hazards.
<b>SANBA<sup>12</sup></b>	A navigation fix to the south of Manchester used by departing aircraft.
<b>SARG</b>	Safety and Airspace Regulation Group which drives UK Civil Aviation Authority (CAA) safety standards including overseeing aircraft, airlines and air traffic controllers. They are also responsible for the planning and regulation of UK airspace.
<b>Secretary of State</b>	The title typically held by Cabinet Ministers in charge of Government Departments.
<b>SESAR</b>	The Europe-wide Single European Sky Air Traffic Management Research programme - a joint undertaking is an institutionalised European partnership between private and public sector partners set up to accelerate through research and innovation the delivery of the Digital European Sky ( <a href="http://www.sesarju.eu">www.sesarju.eu</a> ).
<b>SID</b>	Standard Instrument Departure - pre-determined flightpath set by Air Traffic Control that aircraft follow when departing an airport.
<b>SME</b>	Subject Matter Expert(s) is a person (are people) who has (have) accumulated great knowledge in a particular field or topic.
<b>SoN</b>	Statement of Need - the means by which the change sponsor sets out what airspace issue or opportunity it is seeking to address and what outcome it wishes to achieve, without specifying solutions, technical or otherwise. Manchester Airport's SoN can be found online ( <a href="http://airspacechange.caa.co.uk/documents/download/602">airspacechange.caa.co.uk/documents/download/602</a> ).
<b>SONEX<sup>12</sup></b>	A navigation fix to the east of Manchester used by departing aircraft.
<b>SPA</b>	Special Protection Area - protected areas for birds classified under the Wildlife and Countryside Act 1981 and protected under the Conservation of Habitats and Species Regulations 2017.
<b>SSSI</b>	Sites of Special Scientific Interest - areas of importance designated and protected by Natural England under the Wildlife and Countryside Act 1981 to recognise the land's wildlife, geology or landform is of special interest.
<b>STAR</b>	Standard Terminal Arrival Route - a pre-determined flightpath set by Air Traffic Control that aircraft follow when arriving at an airport.



<b>Step 1B Design Principles Report</b>	A document that formed part of Manchester Airport's Stage 1 submission to the CAA ( <a href="https://airspacechange.caa.co.uk/documents/download/1382">https://airspacechange.caa.co.uk/documents/download/1382</a> ).
<b>T-Bar</b>	A name given to a type of RNAV final approach procedure. There is a final approach based on an extended centreline from the runway and then perpendicular to that, two Initial Approach Segments are connected to form a 'T' shape.
<b>TABLY</b>	A navigation fix to the south-west of Manchester used by departing aircraft.
<b>Technical Coordination Group</b>	Created by ACOG the Group regularly meet to discuss and resolve policy and technical issues affecting airspace design across all airports.
<b>TODA</b>	Take off Distance Available - The length of the paved surface of the take-off runway plus the length of the clearway.
<b>TOS</b>	Traffic Orientation Structure ensures smooth traffic flows and decrease the safety risks associated with crossing traffic.
<b>Track to fix</b>	A Track to Fix (TF) leg is used in PBN procedures to create a line between two waypoints. It is defined by the flight track to the following waypoint and Track to a Fix leg are sometimes called point-to-point legs for this reason.
<b>Tranquillity</b>	There is no universally accepted definition of tranquillity and therefore no accepted metric by which it can be measured. In general terms it can be defined as a state of calm. The consideration of impacts upon tranquillity for airspace change is with specific reference to National Parks and Areas of Outstanding Natural Beauty (AONB), plus any locally identified 'tranquil' areas that are identified through community engagement and are subsequently reflected within an airspace change proposal's design principles.
<b>Transition</b>	The part of the arrival route from the IAF at 7,000ft where aircraft are descending prior to joining the final approach at the FAF.
<b>Transition Altitude</b>	The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes. Above this, the reference is to a Flight Level.
<b>Transport Act 2000</b>	The Transport Act 2000 is an Act of the Parliament of the United Kingdom. The Act provided for a number of measures across the transport industry. In the aviation sector, the Act set a framework for creation of a public-private partnership of National Air Traffic Services.
<b>Uncontrolled Airspace</b>	Uncontrolled airspace is airspace where an ATC service is not deemed necessary or cannot be provided for practical reasons.
<b>Unviable</b>	Options which would not comply with the rules or for flight procedure design, specifically the requirements of ICAO PANS-OPS 8168, or if they are not compliant with these rules, did not have a supporting safety justification.
<b>VHF</b>	Very High Frequency.
<b>Viable and good fit</b>	Options that are viable to design and which would be expected to meet the three design principles with which all design options 'must' comply (design principles Safety, Policy, and Capacity).
<b>Viable but poor fit</b>	Options that are viable to design, but which would not be expected to meet the requirements of the design principles Safety, Policy and Capacity.
<b>VNAV</b>	Vertical Navigation - a term for vertical (up/down) navigation used within Performance Based Navigation.
<b>VRP</b>	Visual reference point.
<b>WAL</b>	Abbreviation for the Wallasey DVOR navigation beacon that is to the west of Manchester and is used by departing aircraft as a navigation point.
<b>XORBO<sup>12</sup></b>	A navigation fix to the north-east of Manchester used by departing aircraft.
<b>XUMAT<sup>12</sup></b>	A navigation fix to the north of Manchester used by departing aircraft.

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