January 2022

Future Airspace Research: Stage 2 –Phase one engagement

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Background, aims and objectives

Background

As part of Government proposals to modernise the way UK airspace is managed, UK airports have been tasked to undertake extensive engagement and consultation with stakeholders and local communities. From 2018 onwards, Manchester Airport together with NATS, the CAA and other airports will work together to shape the airspace design on which it will formally consult. Before this, it will be important to speak to individuals that have an interest in the airspace around Manchester Airport to provide feedback on principles that will be used to redesign the airspace, and the new routes generated, as part of the overall programme. Following the completion of the first stage (1B), there is now a need to test the design envelopes amongst general public before final routes are designed.

Aims / objectives

The aims and objectives of the research are outlined below. Ultimately, the research seeks to identify:

- Whether participants understand the rationale for the design envelopes (e.g. design considerations, arrivals and departures boundaries, and constraints)
- Whether the design envelopes meet the design principles established by Manchester Airport.
- Whether there are additional local factors that Manchester Airport must consider in their design envelopes.
- Whether the ‘do nothing’ or ‘do minimum’ scenarios are accepted, and what could be done to improve these if they were taken forwards.

Method and sample

The research involved 6 x 3-day online forums with members of the public living the area surrounding Manchester Airport. Research took place between 17th November and 8th December 2021. A total of 160 were recruited to take part, with 123 completing all 3 days of the forum. Participants were recruited from the YouGov panel, and via Manchester Airport.

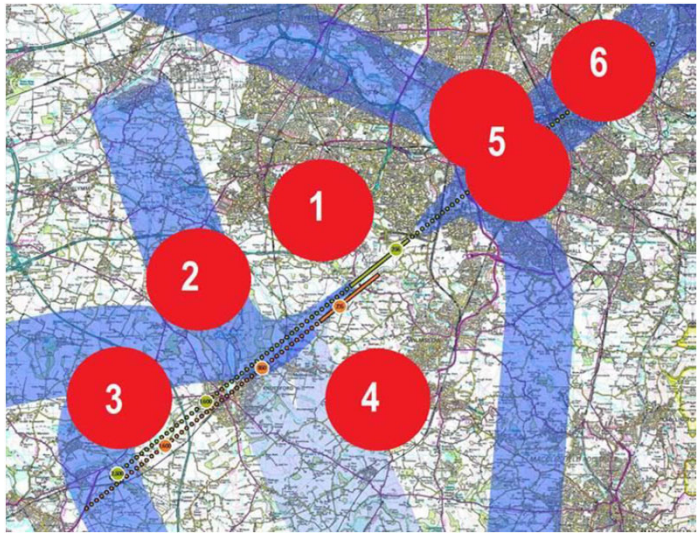
Participants were recruited to the following specification: Mix of locations (under departure / arrivals routes) from zones defined by Manchester Airport

- Mix of age and gender
- Mix of social group

The forum took a light-touch deliberative approach as we 'drip-fed' information to participants across the 3-days, building up their base level understanding of the programme, and the development of the design envelopes. Each day participants completed questions to test their comprehension of the rationale for designs, and the design envelopes.

Manchester Airport provided technical support, feeding back on any technical questions raised by participants during the fieldwork period.

Areas (zones) of interest



Forum 1 – Zone 6
Forum conducted 17th – 19th November

Forum 2 – Zone 2
Forum conducted 22nd – 24th November

Forum 3 – Zone 5
Forum conducted 24th – 26th November

Forum 4 – Zone 1
Forum conducted 29th November – 1st December

Forum 5 – Zone 3
Forum conducted 1st – 3rd December

Forum 6 – Zone 4
Forum conducted 6th – 8th December

Airspace Modernisation review

Most agree with the need to modernise the airspace, and understand the overall process

Key take outs

- Based on the pre-read information, participants understand that Manchester Airport aims to modernise their current flight routes in line with principles developed in stage 1B. Some think that technology is going to play a key role in in this process, particularly to reduce emissions and improve efficiency of the airport's operations.

Challenges and concerns

- They think that this is a challenging task due to congested airspace and the number of objectives set.
- They agree that safety is paramount, and welcome the fact that Manchester Airport is working closely with other airports to ensure safety over the areas where their boundaries meet.
- At the same time, they also have concerns what impact the new routes would have on the local population in terms of noise, their primary concern, which they would like to be distributed. Some also worry about the environmental impact of the programme as not enough information has been provided on that.
- A few also thought that Manchester Airport's primarily focus is to expand, both on the ground and in the air.
- Finally, if they want to show strong commitment to achieve the outlined principles, a more direct language is needed which would replace 'might' or 'whenever possible' with 'will'.

YouGov

> ***"The key point is that the airspace needs to be modernized, routes will be redesigned, and emissions will be reduced, planes will be on time and not delayed either incoming or outgoing. Also, noise pollution has had to be looked at so residents close to the airport are inconvenienced as little as possible."*** Zone 5

> ***"The key features appear to me to be to determine how the method of flight arrivals and departures can be upgraded to lessen a number of environmental aspects of air travel and airport policies and procedures."*** Zone 2

Design principles

S Safety
Our routes must be safe, and must comply with industry standards and regulations.

P Policy
Any change must accord with the Civil Aviation Authority's Airspace Modernisation Strategy. Any airspace change must also allow connection to the wider UK En-Route network and be aligned with the Future Airspace Strategy Implementation for the North programme and take into consideration the needs of other airports.

C Capacity
Our future airspace must enable best use of the capacity of our existing runways, in line with government policy.

E Emissions
We will minimise, and where possible reduce, emissions when we design routes. This may be achieved by selecting the most direct routes.

N1 Noise
Our route designs should seek to minimise, and where possible reduce, the number of people affected by noise from our flights.

N2
Where practical, noise effects should be shared. The use of dispersion and/or respite, especially at night, will be considered to achieve this.

N3
Where practical, our route designs should avoid, or limit effects upon, noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education.

A Airspace
Our route designs should minimise the impacts on other airspace users by limiting Controlled Airspace.

T Technology
Our route designs should be based on the latest aircraft navigational technology widely available.

"It's a given that safety is primary in the design process, but I am concerned about wider issues of safety e.g., emissions, noise pollution and an increase in air traffic in general… How will these issues be addressed in the longer term?" Zone 6

"What weight is given to those not in bold - are they a nice to have ? Do historic assets include listed buildings given their limited ability to insulate against noise? What does dispersion and respite mean?" Zone 4

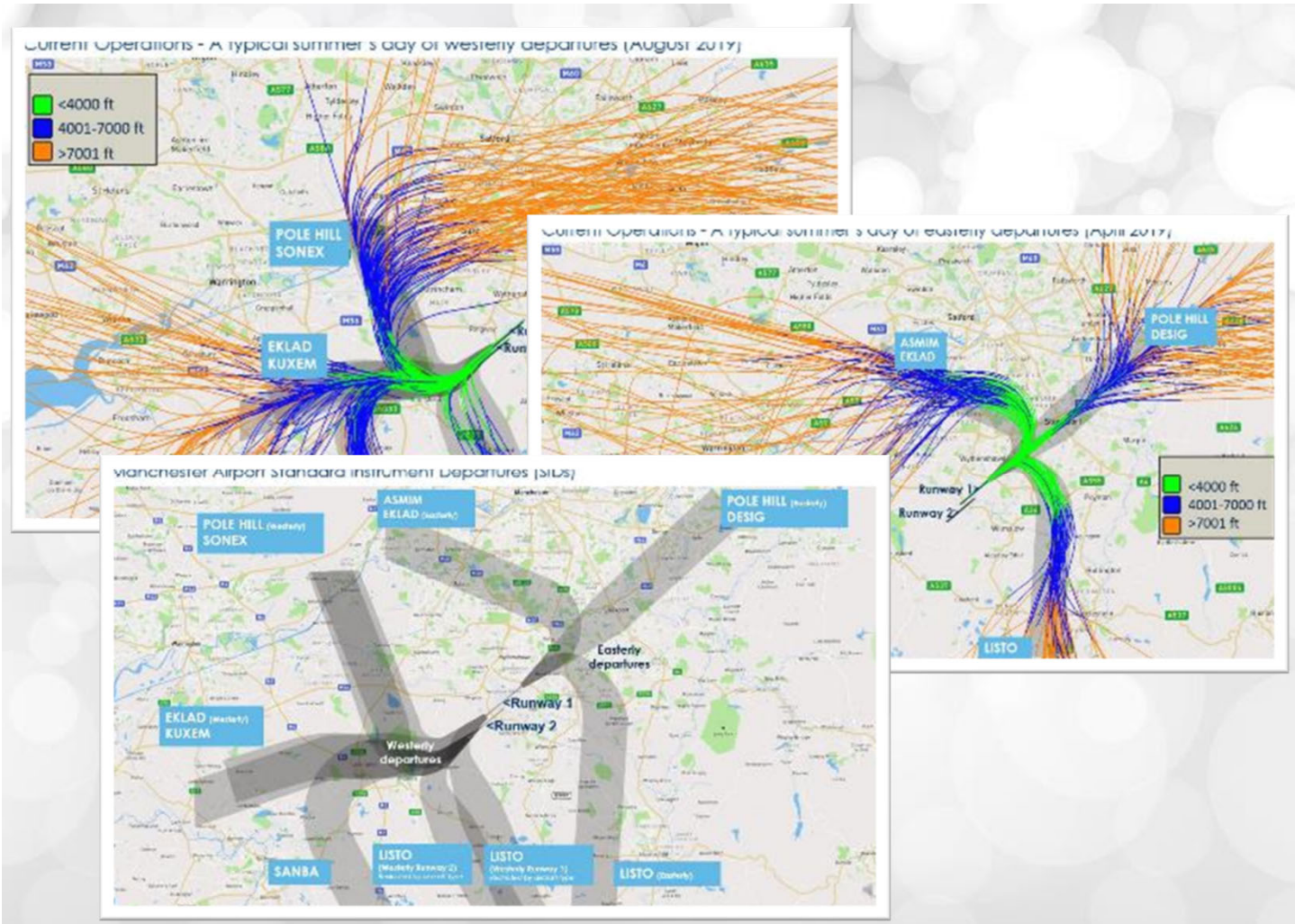
Participants agree with the principles that feed into route design consideration, but question how they would be enforced

- Participants think that the design principles are logical and comprehensive.
- However, they would welcome more detailed definitions of some of the principles.
- Some were unsure whether capacity refers to airport's expansion on the ground, more flights or just more efficient coordination of their operations. This is important as it makes some think that Manchester Airport want to focus on increasing their profits.
- Many would also like clearer definitions of Emissions – how would it be measured and achieved? and Noise – what are the sensitive areas and how would noise be measured?
- Many think that some of the principles conflict with each other. For example, the most direct routes would meet the Safety standard but they would not necessarily reduce Noise, and reducing the number of people affected by noise contradicts with the idea of sharing it. This feeds into uncertainty whether all the principles are feasible.
- Many would like to understand the weighting behind each principle. They understand that Safety, Policy and Capacity are classified as 'must', but they feel that Emissions and Noise should be in this category as well as these are the most important factors for those affected by the aircraft flights.

"I was hoping emissions would be one of the principles with which your routes must comply as well as the three above, S, P and C. Best use of capacity suggests to me that there will be more aircraft at the airports and in the sky. This will not help in the overall reduction of emissions." Zone 1

"There are conflicts in the principles. i.e. "Our route designs should seek to minimize the number of people affected by noise" and "our route designs should avoid... tranquil or rural areas". Zone 3

Current operations



"I'm shocked and surprised at just how many planes use the same "route" for initial departure and arrival." Zone 4

"Very many more "easterly operations" in the last few years. This has much greater impact on Knutsford." Zone 2

Information on the current operations gives participants a better understanding of the complexity behind designing new routes

- Many are surprised to learn that SIDs have not been updated since the 1950s and the role wind plays in dictating which runways aircrafts use. Some are aware of this based on their observations and lived experience as well as information provided to them on other occasions e.g., other consultations and MAG publications.
- Many did not realise the high volume of operations run by Manchester Airport and existence of the holdings stacks and the role they play in managing arrivals.
- Some thought that the operations are unfairly distributed and heavily concentrated over a few places. Areas under easterly operations (mainly Knutsford) are more affected than those under westerly operations. Some participants in Zone 4 also think that the runways are not used to their maximum capacity and feel that the flights could be distributed to provide respite for those most affected.
- Some also feel that night flights at Manchester Airport have not been addressed appropriately, something they would like to be done in the future.
- Many are also interested in learning how the current situation could be improved through technology and the use of a CDA.

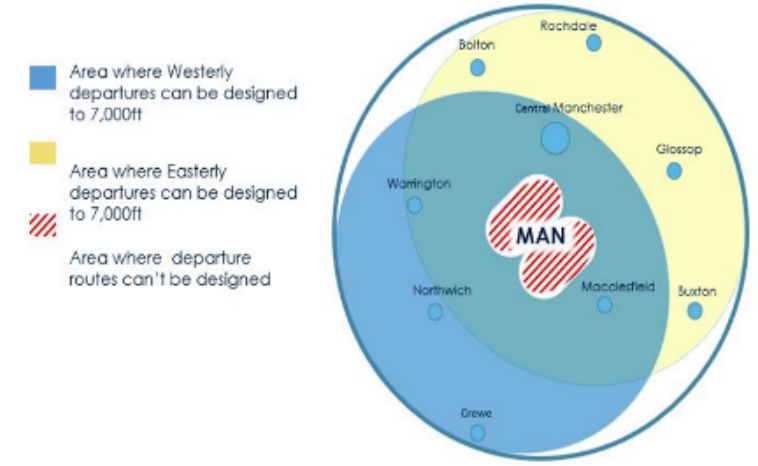
"I am surprised by how concentrated the routes are over certain areas. The use of stacks is necessary given how busy the airport is but must be contributing to environmental pollution." Zone 5

"The diagrams/maps are incredible and put it into perspective. The logic is perfect. Without having thought about it before I'm sure I would have assumed the continuous descent approach was always used and not a stepped approach. It makes more sense to me and I'm glad they'll be used more in the future." Zone 1

YouGov

Boundary for departures

Step 1– The Boundary for Departures



This doesn't define where aircraft will fly, just the viable design area below 7,000ft.

The first stage is creating our viable design area

- From the Fleet Survey we know all aircraft can climb at a gradient of at least 6%
- We need to understand when an aircraft would reach 7,000ft above sea level based on this gradient

This establishes the outer blue line and aligns with the Technology (T) design principle on constant climb operations.

Next we apply the ICAO Rules on procedure design.

- This uses the rules on turns to create a more realistic design area
- It also shows where we cannot design departures

MAG Manchester Airport

Manchester Airport Future Airspace - Stage 2, Develop and Assess

"It all seems sensible. You have fixed limitations, i.e. the rate of climb, you know the impact of putting bends into the climb, so it would appear sensible that this generates the plan shown." Zone 6

"This information is very interesting and useful, but in isolation is of less use. I would suggest that you should show the change to this boundary diagram relative to the existing situation. Will there be greater or fewer flights below 7000ft over a large or smaller area?" Zone 3

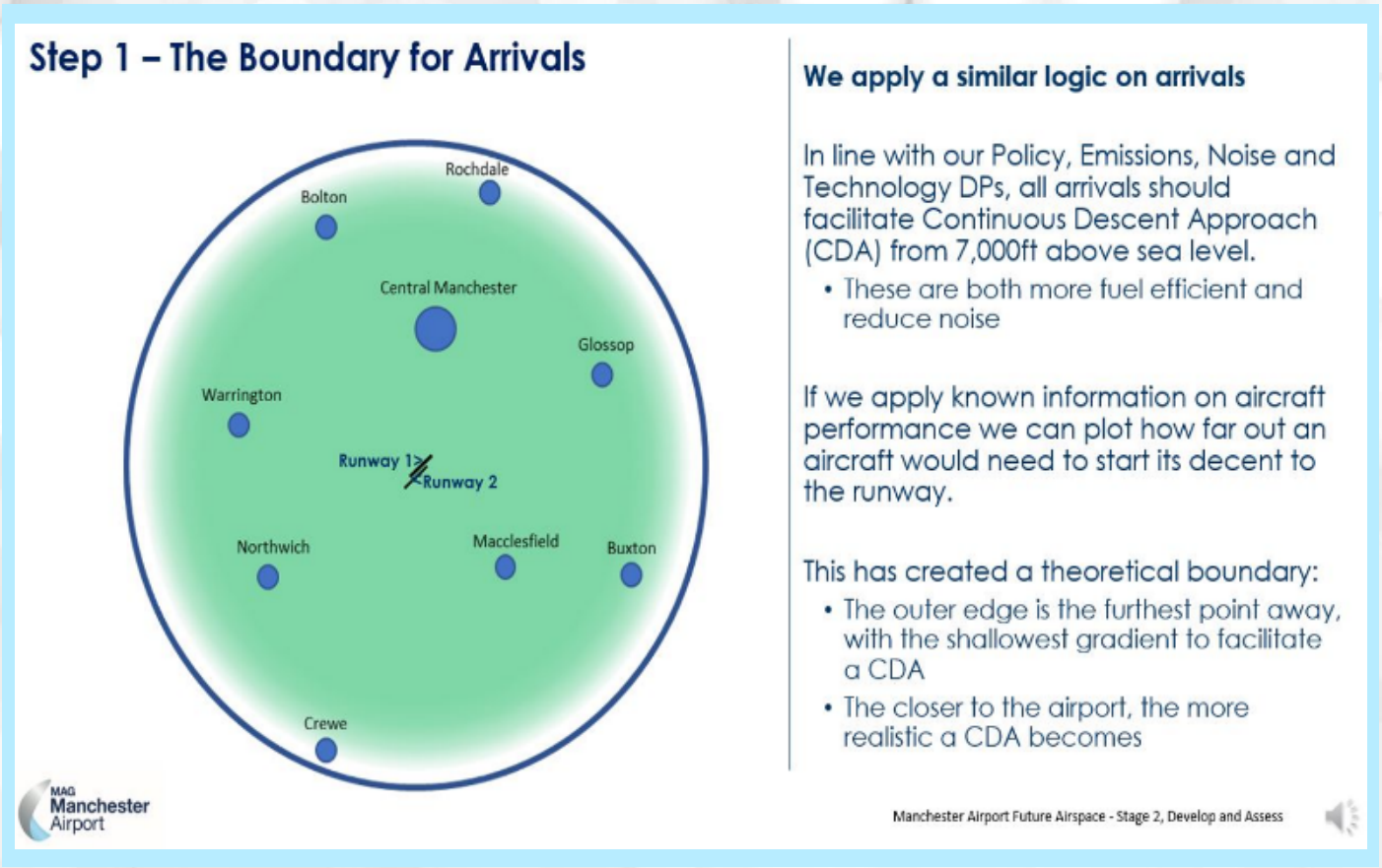
Many understand the rationale behind the boundary for departures but not where the boundaries would lie and what role technology would play in defining it

- Many participants find the information on the boundary for departures clear and easy to understand; only a minority think it is too technical.
- However, some struggle to comment on the impact it would have as the maps do not define which specific areas would be overflown. This is important to them as without this and no maps to compare existing boundaries, they find it hard to comprehend how progressive the future boundaries are and whether there would be more or less flights accommodated within them or whether the area would be the same, smaller or larger than the current one.
- Some would welcome more information on how the gradient and weather conditions affect the boundaries and why the radius is calculated at 6% climbing gradient since most aircraft can climb at a higher rate. They think that using a higher climbing grate should decrease the size of the areas and aircrafts which cannot climb at 6% should just be updated.
- Some participants would like to better understand the role technology plays in designing the boundaries and noise emissions – Do all aircraft climb at the same gradient when they take off? What effect turning has on noise? Do planes maintain 6% when turning? Would lower gradient improve emissions and noise?

> ***"It is also interesting that the area covered looks much wider than the current departure profiles. I suppose I would consider how you can break this down into a little more detail does it need to be a consistent climb, could a stepped climb broaden your departure area?"*** Zone 2

> ***"6% seems a very low angle. My experience of flying is a much steeper angle, say 15 to 20%. This would significantly reduce the footprint of the blue and yellow areas. This method does not appear to take account of the aircraft turning."*** Zone 4

Boundary for arrivals



"I understand the principle for the boundaries for arrivals - especially how important it is to get it right to allow for CDA to take place." Zone 5

"It would seem the boundary for arrivals depends on type of aircraft and cannot be altered much, but consideration of built-up areas must be taken into account." Zone 2

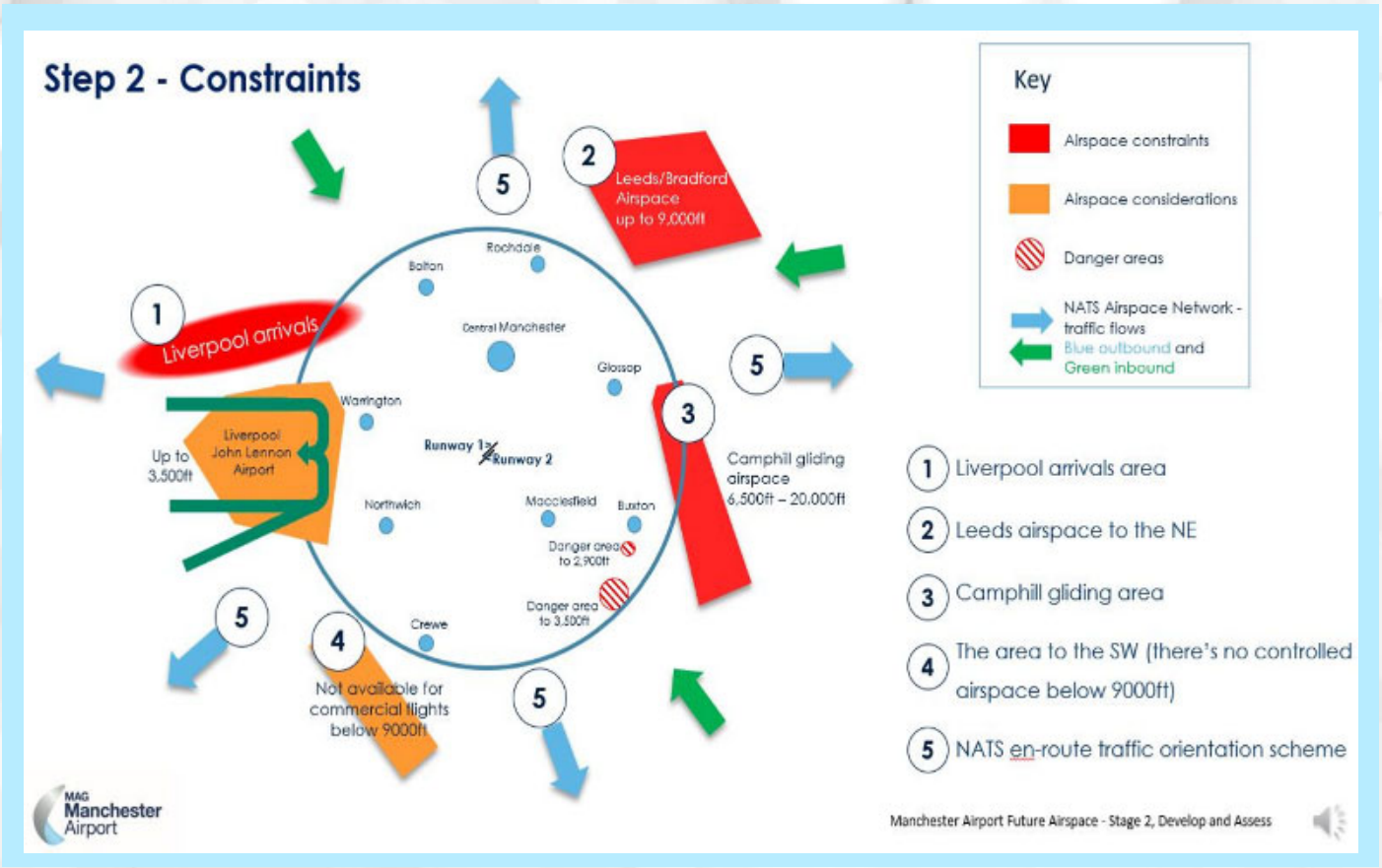
While the information about CDA and its impacts is broadly accepted, there are some questions about the role of technology

- Many respondents think that the information regarding the boundary for arrivals is clear and logical, and it seems to depend on wind and CDA.
- However, some had specific questions about aircraft's ability and conditions for performing a CDA and what impact it has on noise – Are all planes able to do a CDA? Will all planes be descending from 7000ft in the future to ensure the CDA? Do all planes need the same distance to the runway when performing a CDA? Is noise an issue with aircraft descent? Is there a trade-off to be made with the angle of descent? Some in Zone 4 would like to know if aircraft could fly higher over Knutsford to limit the level of noise.
- Some wondered what impact technology would have on designing the boundaries as there seems to be fewer options for arrivals.
- As with the boundary for departures, some would like to be able to compare the proposed area with the current one to learn if the same or new areas (especially those highly populated) would be affected.

> ***"I understand rationale as outlined. I would like clearer information on areas covered particularly relating to those nearer outer boundaries. It might be that in one of these areas e.g., Rochdale it has no impact on some residents but has impact on others depending where they live or work."*** Zone 1

> ***"There seems to be less options for arrivals if you need to operate the desired CDA, from 7000 feet to a joining point at 2000 feet allowing for fuel efficiency and noise reduction."*** Zone 3

Constraints



"I didn't realise there were all these constraints to think about… I was naïve to how close the other airports are & the impact it has on Manchester airspace. It seems lots has been considered here that sit well with the safety principle." Zone 5

"Get shot of the gliding airspace and tell them to find a new hobby, overrule the small private aircraft as its typically people with too much money and open that up in order to spread the load across the wider city region, what is the danger area and why?" Zone 6

Information about constraints is understood but some question why certain constraints are classified as such and the impact they would have on the new routes

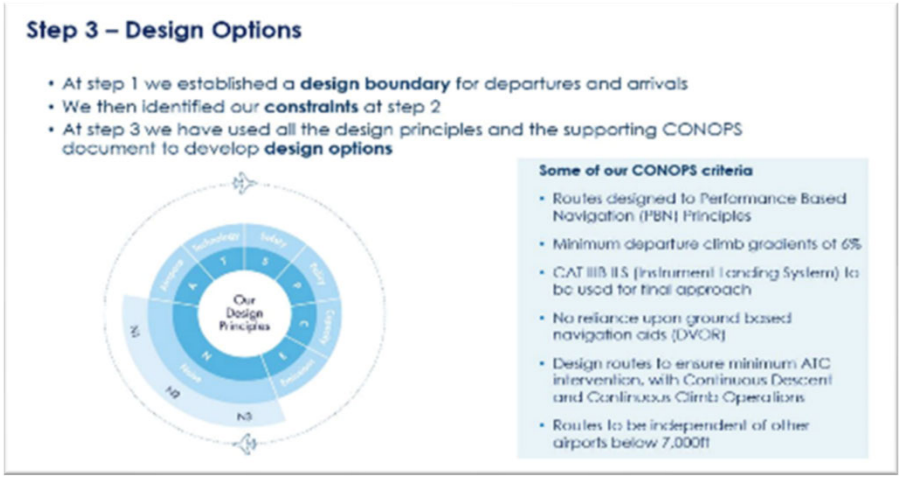
On the whole participants grasp that many constraints significantly impact the design of new routes, however some think that these are not new and wonder whether some of them will remain constraints in the future.

Some are surprised why certain areas e.g. those used for gliding restrict the design of new routes and would like to learn more about the reasons behind this. Some also think gliders and small aircrafts seem to be given too much leverage in the process by pushing designing new routes over highly populated areas.

Some participants would like to know if the current flight paths are used to the maximum capacity considering that the whole area seems to be congested and how the design options would change the current situation. Having two maps, with current and constraints used for the proposal, would help them understand whether the design options take relevant factors into account.

Many also voice their concerns over the close proximity to other airports and wondered whether future usage of airspace has been considered – what are the limits of veering into other airport's airspace and the limits to expansion and whether some of the flights should potentially be shared with other airports which has some spare capacity e.g., Liverpool.

While the design options are generally clear as the information presented is comprehensive and well laid-out, participants repeatedly raised questions and concerns about noise implications…



… and some feel that…:

- It is impossible to see how flight paths can be changed as the constraints leave little room for improvement.
- Capacity has not been explored enough and they would welcome more information on this – what will the future look like?
- Noise disturbances haven't been given enough consideration and this is a major concern for residents. They think that Manchester Airport seem to focus mainly on addressing the three core principles but less on Noise and Emissions.
- It is surprising how technological change brings benefits to noise reduction and they wonder if it then could help to narrow the corridors within existing routes, implying that potentially minimal changes are needed.
- They need more clarification on why ground-based navigation aids cannot be used any more.

Departures design envelopes

Most agree that Manchester has developed departure routes that meet the design principles

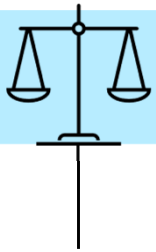
- Disagreement arises more amongst those participants residing in Zones 3 & 4 as they believe the design principles should have more emphasis placed on noise/emissions than currently do.
    - Noise/emissions not given enough prominence, a sense that it comes last in importance and therefore relegating the impact it has on residents as less of a concern.
- Safety & Capacity are felt to be key principles driving the designs, with the majority agreeing that safety should take this position.
- Some concern around safety, with certain issues not being addressed adequately such as the proximity to Liverpool airport and the increase of flights over highly populated areas driving this.
- For some, frustration is exposed over the apparent lack of consultation around the suggested increase in capacity.
- The proposed dispersal of routes is understood and perceived as positive by some, who believe that is a fairer way to distribute noise/emissions.
    - For others, it does not go far enough in addressing their key concerns around noise & emissions and only serves to increase the flying areas and suffering of those living underneath.
- It is clearly understood that Knutsford will be the area most affected.
- Some participants felt that they could not assess this question and require clearer visual information of the towns/villages potentially affected, as well as direct comparisons with current routes.

YouGov

"The environment should be a must have along with safety, policy and capacity and in my opinion should supersede all three, it is so important that whatever option is taken that it's the most environmentally friendly on top of everything else." Zone 6

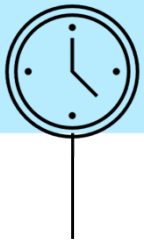
"As I read it, you are already committed to spreading the departures wider than at present because, although more residents will suffer noise, it will not be so frequent." Zone 4

Across all zones, many local issues are flagged that need to be taken into account of plans



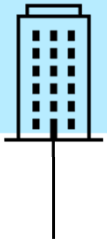
Fairer distribution

Some areas already heavily overflowing - a desire to protect Knutsford from any more disruption. Mobberley, Peover, & Chelford Marthall also worthy of additional protection. A belief that flights should not all be concentrated over certain areas. Additionally, newly developed areas that are not currently affected would be unfairly impacted upon with regards to noise, pollution and house prices. Southern routes should be restricted to lighter aircraft.



Timing

Thoughts around the impact of night flights are frequently mentioned. A desire to support local residents around night time disruptions leads to repeated requests for flights to stop between the hours of 10pm – 7am.



Densely populated areas

A concern, especially for easterly departures (e.g., Cheshire, Derbyshire, North Staffordshire). A strong desire to protect schools/hospitals/care homes from noise and pollution. Narrowing the envelopes to include less populated areas thereby impacting fewer people. Avoiding the M60 and tall buildings also felt to be critical for safety. Tatton Park mentioned as possible option as few live there, but…

Wildlife/green spaces

…consideration should be given to minimising impact on areas that house local wildlife/flora/fauna (i.e. Rotherne bird activity) or provide the community with respite. i.e. woodland areas, local beauty spots such as Lyme Park, Dunham Park, Tatton Park, The Peak District, Pennines and Delaware also mentioned.

These local issues can be in conflict with one another, with residents in Zone 3 & 4 more likely to feel that the proposed wider areas will just create additional local hazards around noise and pollution, for a broader area/group of people

Many feel the ‘do minimum’ scenario does not go far enough in improving noise, emission and capacity issues

Technology

New technology is seen as the key mechanism to improve safety, noise, emissions & environment. It can directly benefit residents by delivering solutions that address their specific concerns, mainly around noise and emissions. Some feel it can also enable the reduction in proposed corridor widths, though there was an understanding that it won’t happen overnight.

Respite

For many, the idea of ‘respite’ is a better way to ensure fairer distribution, something most are keen to see.
They would like to see routes changed frequently, the avoiding of night time flights between the hours of 10pm and 7am, and more use of Runway 1 to achieve this respite for residents.

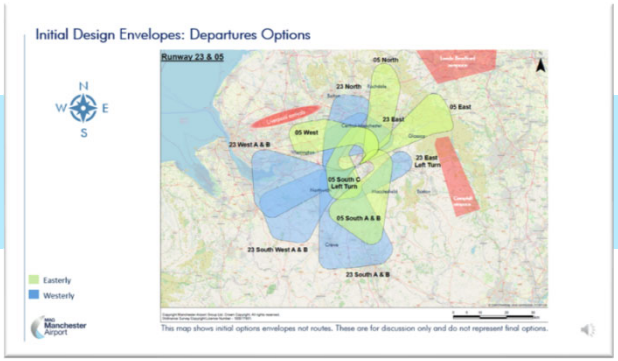
Penalties

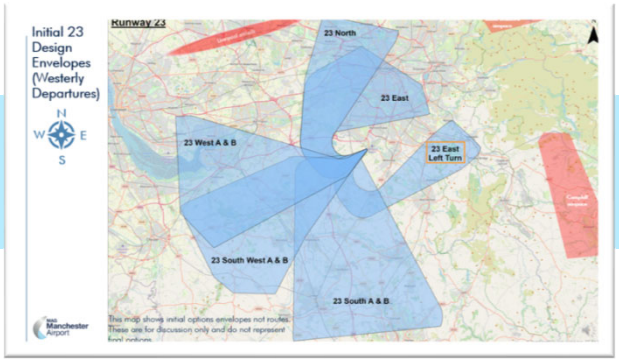
Many would like to see the airport penalise airlines, to ensure that regulations and routes are stuck to.
The increase in penalties to those aircrafts not meeting certain standard is will have a direct impact on noise and emissions.
Areas mentioned as being relevant include deviating from standard take off and landing routes, noise level of plane, emission level of plane.

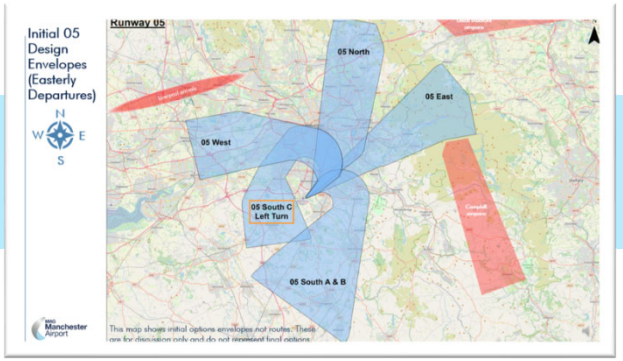
“On the basis that 'do minimum' means using PBN technologies that the opening remarks of this paper acknowledge would to all intents and purposes concentrate aircraft within the current flight paths, there is nothing that the airport could do to improve them and still adhere to the Design Principles. 'Do minimum' is not acceptable.” Zone 5

Residents in Zone 3 & 4 are more likely to be content with the current situation/feel this scenario is a good starting point – it does not affect them any more adversely than currently.

Respondents additional questions focus on being able to understand the impact in more detail







Feel key information missing around the impact on noise/emissions

- Presentation of maps do not highlight the impact clearly enough: Higher resolution, more detailed, zoomed in, comparison maps needed
- When will the noisy/quiet periods be?
- Will any current envelopes be reduced/retired?
- How will wildlife/green spaces be affected?
- How will those not currently affected be impacted on?

Zones 3 & 4 communicate a higher level of cynicism

- Belief that MAN airport will be the main beneficiaries of these proposed designs
- The effect of aircraft turning requires more consideration
- Would like to share airspace better with other airports, to relieve the pressure

YouGov

Arrivals design envelopes

Many agree that Manchester has created arrivals design envelopes that align the design principles

- Consideration has been given to their key areas: Safety, Noise & Emissions, via the proposed use of technology, CDA, removal of stacking
- However, others feel that Manchester have taken the constraints into account more
  - But an appreciation of how difficult it is, owing to the sheer number of constraints in existence → an understanding that this must impact on the designs and there being little room to manoeuvre.
- Some of the terminology is hard for participants to understand, particularly around the Viable Arrival Points.
- A few concerns over whether the issue of safety is met through the proposed envelopes, particularly around the interaction points with Liverpool, Leeds and Campbell airspace
- A fear that the proposals will lead to a heavier concentration of departures
  - Keen to see these distributed more fairly
- More cynicism is displayed across Zones 3 & 4
  - A sense that Manchester has placed the issue of noise last in its priorities and that the principle around emissions is simply a cover for airport cost savings.

> ***"They seem to have done taking into account the issue of reducing noise and emissions and also staying within what is allowed considering Leeds and Liverpool airports."*** Zone 6

> ***"There are principles covering Safety, Emissions and Noise. I get the impression that Noise comes a poor third when assessing priorities. Safety is obviously of prime importance, but Emissions is also equivalent to cost for the airlines and I believe that this is the driving force behind the assessment."*** Zone 3

To enable those struggling to judge this question, more details are required

- A sense for some that the impact on residents is not being prioritised
- Providing more reassurances around noise level and emissions can combat this, mainly through:
  - Providing clear comparisons against the current situation
  - More information highlighting the benefits to noise, emission and other benefits
  - Clarity as to whether the new envelopes will result in more or less residents being affected by noise

"I think it should be a design requirement that no area should have an increased noise burden than they currently experience." Zone 4

"I am concerned about the comments 'if PBN arrivals are adopted this will result in less dispersed tracks than currently' does this mean noise will be even more concentrated with more frequent flights and an increased disturbance in certain areas under the existing flight path?" Zone 2

"I'd definitely have liked some better quality maps here to identify specific areas where there are likely to be changes to current practice." Zone 6

"We think that design envelopes for arrivals will greatly increase noise levels over Knutsford and other nearby areas of Cheshire." Zone 3

Some repetition of local issues from previous stage (departures) but arrivals appear less of a concern overall

Timings

Consideration of flights occurring during the hours of 10pm – 7am.
Increased arrival traffic during peak summer holidays already an issue – perceived to become more of one, as capacity increases.

New developments

New housing developments and areas with increasing populations should not be ignored.
Express desire for new developments to be halted, in light of any additional design plans.
Want to ensure those currently unaffected are not subsequently burdened.

Densely populated areas

Concerns over highly populated areas remain. In particular, hospitals, sport facilities and schools, should be spared any more disruption (given requirement to keep windows open since C19).
Westerly operations to be maximised and low flying aircraft minimised.
Desire to see those already affected spared any further disruption i.e. Knutsford, Northwich, Sandbach, Winsford, Homes Chapel.

Wildlife/green spaces

Tranquil and rural populations just as deserving of respite
Tatton Park, Dunham Park, farms, animals.

Additionally, the proximity to Liverpool airport, gliders and smaller aircraft also mentioned

Overall, similar themes emerging and being reiterated

- A tension exists between those advocating for built-up areas to be more protected and those wanting the same protection afforded to rural/green spaces.
- Participants keen to understand the impact on noise in more detail
  - Would like to know how Manchester will measure this.
- Many accept the constraints but continue to worry about the perceived concentration of flights over particular areas.
- Participants need to be able to see clearly identifiable, affected areas on the maps.

"As with departures, the design of any new envelopes should try to avoid flying over new areas as far as possible." Zone 5

"If the new technology is much better at keeping a plane on course cannot route variation be personalised to suit a particular aircraft to reduce frequency on relentless noise lines of approach?" Zone 2

"I think it's important to consider where already gets a lot of air traffic and ensure that the air traffic isn't increased." Zone 4

"The maps need to highlight main conurbations more clearly and state population densities." Zone 1

Final thoughts

Final feedback

- Overall, there was consensus that the arrival and departure envelopes do broadly meet the design principles.
- Many realised that designing new routes is a very complicated process, with a number of constraints placed on the airport, however seeing all the different wheels in motion gives them confidence in the work being undertaken by Manchester Airport.
- However, some keep reiterating that the design options cover a very broad area, which, which makes it hard to assess which places would be affected. Some worry that not much will change, and the same residents would be disturbed, potentially even more frequently if the number of aircraft overlying them increases but others are hopeful that dispersal would bring noise respite.
- There was a real desire among some to better understand potential downsides and benefits of the proposed envelopes and review information on current and future number of operations in order to really challenge and design ideas that are future proofed.
- Even though they agree that earlier consultation identified appropriate design principles, they would like more clarity on their definitions and know what weighting they will be given.

Final feedback (2)

- Capacity is a concern for some as they do not know what it entails, and it seems to be significant since it is placed in the must category. They oppose increasing number of flights to ensure health and well-being of local residents.
- Many would like to understand how the noise principles would be applied considering that they seem to conflict with each other. They understand that there is a heavy reliance on technology to achieve them but they would like to know about alternative solutions to decide if the right approach has been identified by Manchester.
- They also would like to know what happens if the technology fails, and what is the backup system.
- More information on how the operations would be managed e.g., how the CDA would be spread, the interaction between departures and arrivals, night flights, and whether the stacks would be removed, would help to convince some that Manchester Airport have health and well-being of local residents in their interest when designing new routes.

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Future Airspace Research: Phase 2 – develop & assess Phase one engagement