Manchester Airport Future Airspace

Stage 2, Develop and Assess Q&A – phase one engagement

November 2021

MAG Manchester Airport

Current operations

Q. What % of departures use each route?

In 2019, which was our last year of normal operations:

- Westerly
  - SONEX (North and East) 39%
  - EKLAD (South West and West) 31%
  - SANBA (South) 26%
  - LISTO (South) 4%
- Easterly
  - ASMIM (North and West) 31%
  - DESIG (East) 39%
  - LISTO (South) 30%

Our aim is by providing additional routes (as outlined by the design envelopes) we will create additional flexibility and in turn help to respond to the design principles on noise, efficiency, and demand.

Q. Do you have ILS/Final approach minimum join points either for noise abatement or safety?

There are design rules applicable for aircraft coming into land, and at this stage, to define the boundary within which we can design the arrival routes, for MAN we have assumed that the Final Approach Fix (FAF) will be at a minimum of approximately 2,000ft above sea level based on PANS OPS criteria.

Q. If Manchester Airport design is constrained by NATS upper air structure, is there benefit in influencing that as part of the Airspace Modernisation process? Similarly, noting the area constraint imposed by Liverpool Airport operations, would there be benefit in harmonising Liverpool and Manchester procedures to maximise efficiency at both?

We have already started to work closely with both NATS and Liverpool via bilateral meetings to understand constraints and identify where conflicts might occur, with the aim of reflecting solutions in our design options. Working in partnership is a key part of the national programme of airspace modernisation and is a requirement of the CAA Airspace modernisation Strategy and CAP1616 Airspace Change Process.

Q. How do you monitor noise and fine aircraft for disturbance?

Air transport movements relating to Manchester Airport are continually monitored using the Manchester Airport Noise and Track Information System (MANTIS). There are a number of electronic noise monitors, which are situated along the flightpaths used by departing aircraft. Those used for fining outbound aircraft are positioned at 3.5 Nautical Miles from the start of roll on the runway, the flyover noise measurement point used at time of noise certification of aircraft. We therefore have different monitors positioned for each runway to measure the noise of each departing aircraft. The airlines of departing aircraft that exceed the noise limits (at these monitors) are required to pay a financial penalty of £750 for exceeding the limit, plus £150 per decibel over thereafter.

We also have monitors in place to measure the general noise climate and these are positioned within centres of population.

Q. Do aircraft dump fuel?

As is evidenced by the price at the pump or your gas/electric bill, fuel is an expensive commodity. In the same way that you would not throw away the contents of a cars fuel tank or leave the gas on; no pilot/airline would jettison such a high value product, except in a life-threatening emergency. Many

modern aircraft do not even have the ability to jettison fuel. Fuel jettisoning is extremely rare; you are very unlikely to ever see an aircraft 'dumping fuel.'
The need to 'dump' or 'jettison' fuel is governed by the difference between the gross take-off weight and maximum landing weight of the aircraft. In the earlier days of aviation an aircraft could take off with a far greater payload than the undercarriage would allow it to land with. Aircraft operating in 21st Century have much stronger undercarriages and the difference between take-off and landing weight is much less (and so some aircraft do not even have the ability to jettison fuel). There are safety implications with jettisoning fuel; because of the potential ignition of fuel vapour and so it would only be jettisoned if it were essential for the safety of the aircraft. In an emergency it is usually much safer for an aircraft to burn the fuel, through flight time. Fuel jettisoning is very rare, less than 0.003% of aircraft using UK Airspace per annum have cause to 'jettison fuel'; the procedures that minimise such discharge are outlined below. The Civil Aviation Authority records all such occasions.

Q. Do you measure emission and Air Quality?

Our Emissions Information Pack gives information on emissions from activities associated with Manchester Airport. It also provides information about how emissions contribute to local air quality and climate change. We also provide other information on these pages: https://www.manchesterairport.co.uk/community/living-near-the-airport/airspace-and-operations/emissions-information/.

Departure envelopes

Q. Is the climb rate for departing aircraft a constant gradient or does it consider the variable gradient that aircraft fly?

These initial envelopes have been designed to 6% as this is the gradient that we know all aircraft can fly, based on the responses to our fleet survey. Within this envelope the design assumes a constant climb gradient, but actual aircraft performance varies depending on multiple factors including weight and weather conditions.

There are discussions ongoing with NATS to understand how much this can vary and the impact on the network if an aircraft climbs faster than the designed gradient and reaches 7000ft earlier. This will be incorporated into later designs that we produce through the process for consultation.

Q. What height are you considering as the minimum turn height during departures?

Our design principles require us to align with UK and international rules including International Civil Aviation Organisation's ("ICAO") PANS OPS 8168, including the point at which aircraft can make their first turn. The UK rules adapted from ICAO are for no turns below 500ft AGL (above ground level).

Q. Could you please explain at some point the relevance of fuel burn to the considerations i.e., height versus consumption?

In general terms, aircraft engines operate more efficiently at higher altitudes. Therefore, the quicker aircraft can get to a cruise altitude, the lower the fuel burn is likely to be across the total flight and hence lower total CO_2 emissions. There is a limit on the optimal climb gradient, and we are working with airlines to understand the impact to their operations and fuel burn of the different design options. At this stage, our fleet survey has given us important base information to inform our designs.

Q. Keeping 1.5 km from the centre of the route means a very high concentration of noise. Why can this not be spread be wider?

The 1.5 km criteria relate to the width of the current PNRs that the routes sit within. However, all options including concentration and / or dispersal can be considered. We monitor current operations within the PNRs using this 1.5km criterion but our design envelopes are using much wider criteria to provide an opportunity for us to provide a spread of routes and consider additional route options.

Q. Any idea at present what the percentage split of traffic may be on the use of the various envelopes?

No not yet. These are just conceptual envelopes as to where routes could be. As the designs develop, and the options start to narrow down we will be in a better position to describe which flights could use which routes. However, the question regarding which flights use which routes provide an approximate indication on which aircraft used which routes in 2019.

Q. What are the climb gradients typically of the older cargo aircraft and the heavies?

From the fleet survey, all the cargo operators that responded said they could achieve 6% climb gradient. More modern aircraft may be able to climb more quickly than 6% and we will work with the airlines to find the optimal and also to create options for those that perform less well.

Q. Repeated departures over the same location are one of the most annoying noise issues. If there are several departure routes available, can the procedure include that they are used in sequence to spread the noise disturbance?

The use of multiple routes to provide noise relief or predictable noise respite sits within our design principles under N2. This could be via multiple routes within the same envelope (subject to the rules that apply to the design of PBN routes) or alternatively through other types of respite such as different time periods.

How these operate are subject to rules on procedure design and considerations with joining the NATS network. Our proposals will form part of the consultation within the later stages of this process.

Q. Can there be multiple routes within one envelope?

That is a possibility yes, subject to ensuring we are aligned with the rules that apply to the design of PBN routes and the ability to join the NATS network. If that is something that is supported, we will look at options for doing that in the work on route design. If there is more than one route within an envelope, how this would then be operated would form part of the consultation within the later stages of this process.

Q. Why don't all aircraft do not simply take off in a straight line to 7000 ft and then turn into position for their onward journey. For a westerly take off how much more fuel would the shuttle to London use if it did this or an aircraft heading for Europe or is it just a time factor we must consider?

There are several reasons that departing aircraft don't do this.

Firstly, there are consideration on both noise and emissions (fuel burn). With respect to noise, a system such as this would concentrate noise over one area (which may be a town or village) for each runway direction, rather than sharing it.

Secondly this sort of system would result in additional track miles and emissions from aircraft. For example, if an aircraft was taking off to the west, but eventually heading to a destination to the east, it would need to fly several miles in the wrong direction before turning round to head back and go east. Calculating the additional fuel burn is a complex calculation especially in the initial climb and varies according to both the aircraft type and the load it is carrying. However, as a rough estimate on mileage, having to fly west before turning round to fly east could add as much as 20-30 miles to the route.

Thirdly we need to consider delays and safety; all departing aircraft are managed by air traffic control to maintain a safe distance between themselves and the aircraft in front of them. If all are flying in the same direction until 7,000ft and the first aircraft is a slower performing type, any aircraft that are following that are faster will need to wait on the ground until this safe distance can be assured. This will cause delays and result in aircraft burning unnecessary fuel on the ground whilst they wait.

So, in summary creating turns after departure reduces delays and makes routes more fuel efficient and result in noise being shared rather than concentrating all flights over one area.

Q. Is the 23 North is a too tight a turn back over Altrincham?

We're required by the process to develop a comprehensive list of options and this means we have to look at all areas where it is viable to design. For this envelope we have based it upon the current departure routes, but we have also looked at how these could be improved, and whilst noise is a consideration, emissions (by reducing the miles flown) also has to be considered. This envelope has been designed to provide opportunities to design routes in the next stage that respond to both of these design principles. That said, any feedback you have on this is welcome, especially if you don't feel the envelope accurately reflects the design principles.

Q. The South C left turn seems very tight and could perhaps head more towards Northwich on a wider arc? -Why is that not included in the envelope at this stage?

As with all these envelopes we have had to balance the placement of envelopes that align with the

design principles against the constraints that we have within the airspace. For the 05 South C left turn, the envelope has been created to provide a route that directly responds to both the Capacity and Emissions design principles, and this is the reason it routes south in the position it does. However, it also needs to be safe and that has also been taken account of. A design envelope further west (towards Northwich) would be less fuel efficient, but more importantly there is potential for conflict with Liverpool traffic. However, we will take this feedback on board and investigate this as we progress into the next phase.

Q. It is good to see the 23 Left East option as there are a lot of flights that head North after take-off and fly over Altrincham to then fly East and South East. I am wondering why there is such a big gap between 23 East Left turn and 23 South A&B? Why can't those flights fly over Macclesfield and that area?

Yes, there is a gap, and that relates to the criteria (rules) in the ICAO PANS OPS that relate to how tight a turn can be. For the 23 south envelope the first turn to head south is relatively small and this creates the eastern edge of the envelope where it is. However, for the 23 East left turn a 180-degree turn is required. When we apply the criteria to design this, that creates the slightly different shape that you can see on the diagram. The radius of this turn is a combination of where we can start the turn, the type of procedure, and the speed that the aircraft can fly this type of turn. However as with all the envelopes, as we move into creating lines on maps, we will look at the viability of a range of different options to respond to the design principles.

Arrival envelopes

Q. Can I confirm your arrivals CONOPS will include PBN 'transitions' to the final approach? i.e., no radar vectoring.

Yes, our current assumption is that from 7,000ft aircraft will be operating on PBN routes rather than being vectored by air traffic control. This aligns with the design principles on policy and technology, but the final concepts and designs will be dependent on the results of these discussions and consultation in Stage 3.

Q. For CDAs, are you expecting pilots to manually alter their rate of descent to comply with the CDA or, will it be purely an FMS driven procedure without intervention?

Consistent with our design principle 'Technology' we would expect the aircraft systems to manage the CDAs, but we will be taking guidance from our airlines stakeholders as to what works best for them and also working with NATS. Due to the requirement for variable arrival spacing (for both wake turbulence and runway efficiency reasons) some limited Air Traffic Control ("ATC") vectoring will still be necessary.

Q. How is the missed approach routing considered in the new proposals?

Because these are only design envelopes to illustrate where aircraft could fly there are no supporting routes that sit behind these. Therefore, the missed approach procedures (MAPs) have not yet been developed. At present the standard missed approaches follow one of the Noise Preferential Routings, but the need for MAPs will always be necessary and they will be incorporated in the designs as we move through the airspace change process.

Q. How can we find out about the possible stacking consultation please?

As discussed in the slides, the airspace above 7000ft, which will include the arrivals holds (or stacks) is the design responsibility of NATS. Their work is being conducted under a separate ACP which is currently paused but which is expected to re-commence shortly. Information on all airspace changes can be viewed on the CAA portal at https://airspacechange.caa.co.uk/ which includes information on proposed dates for consultation.

General information on airspace change can also be found at:
https://airspacechange.caa.co.uk/about-airspace-change

Q. Are operators expected to do work to ensure they comply with your requirements -or is it standard ops for them?

The Manchester Airport Future Airspace project is one part of a wider project of airspace change across the whole of the UK. Changes that affect airline operating procedures such as climb gradient will (as closely as possible) be aligned with other airports. As part of the process, we'll be working with the airlines that operate in and out of Manchester to ensure the changes are as seamless as possible and once implemented, these procedures will become standard operations.

Q. Has this modernisation process commenced in other countries? Are there any that face similar challenges in terms of complexity? Have you considered/reviewed the modernisation principles/learnings applied to airspace in other countries?

Some limited airspace modernisation has been achieved in other countries, but UK airspace remains some of the most complex airspace in Europe. To make our changes, we're required to follow the CAP1616 process, and the Airspace Modernisation Strategy created by the UK CAA and the Department for Transport. This applies to all airports in the UK.

Our technical team has comprehensive experience of airspace solutions, including experience outside of the UK, and if ideas can be brought into the project (within the rules that apply to UK airspace), these will be considered.

Q. How does this fit into the national project and the benefits that could be derived from cross project sharing?

Our airspace project is part of the Future Airspace Strategy Implementation programme which covers over 20 major airports in the UK including Stansted, Heathrow, Leeds Bradford, Liverpool, Gatwick, and Doncaster Sheffield airports. Whilst airports are driving their individual projects, the wider programme is being coordinated by an organisation entitled Airspace Change Organising Group ("ACOG"). ACOG is making sure that airports are fully aligned so that we can all capitalise from the benefits.

In addition, the process requires us to coordinate with other airports and NATS via bilateral meetings. These help us understand each other's designs as they emerge and create designs that make the best use of the finite airspace in the north. In the past month we have had several meetings with both ACOG and airport close by to share these options with them.

Q. Does this mean that if the plane starts an approach further away from the airport there is more likely to be a stepped approach? How different are the descent performances of different planes? I presume every aircraft is known and so its performance will be understood.

Yes, there is a limit beyond which a stepped approach is more likely (i.e., the further away, the greater the chance of a stepped approach). Where this point is depends very much on the aircraft type and the weight, but the direction and the strength of the wind also plays a part in how the approach is flown. However, as a rule of thumb, this point will be slightly closer in for a large heavy aircraft than a small lighter one. Therefore, we have created our design boundary within a range that should ensure all aircraft can fly a CDA regardless of size and based upon the performance of the aircraft that operate into Manchester.

Q. Could there be a chance an aircraft could come too close to be able to do a CDA and would have to go round again? Is this accounted for?

No, the chance of a very steep approach (caused by a procedure that is started too late) has been designed out of our envelopes. Firstly, we have designed our CDAs within a range recommended by ICAO PANS OPS and which avoids this happening. Secondly, in most cases the aircraft flight management system will fly the CDA, and the system is calibrated with tolerances that ensure this wouldn't happen.

Q. How accurate is the 2000ft calculation? Has this been tested?

The 2,000ft joining point has been taken from ICAO PANS OPS guidance which forms part of the rules and regulations we're required to follow and relates to the altitude that aircraft join the final approach when coming into land. We have used these criteria to help calculate the inner boundary within which we can design the arrival routes, but it does not mean that all aircraft will join at this point in the designs we create. In addition, it is not the only consideration on the minimum, and as we move forward to design routes, we will be taking into account the design principles and engaging with airlines on their minima and operating procedures.

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Stakeholder engagement

Q. Are there several sessions like this at this stage? There are new areas which may be affected but I'm not sure those councils are represented here, is there another mechanism for their involvement?
At this stage we are engaging with a range of representative stakeholders. Full public consultation follows at Stage 3 - which is likely to take place in 2023. Paragraph 121 of CAP1616 sets out the categories of stakeholders to be engaged at Step 1B, while paragraph 125 requires engagement at Stage 2 with the same stakeholders as at Step 1B. At Step 1B, in addition to engaging with the stakeholder categories specified in CAP1616, we went 'above and beyond' in choosing to engage with members of the general public.
In Stage 2 (this Stage) we have invited the Stakeholders within and around the 'Area of Potential Impact' (identified in Stage 1) to attend one of 26 sessions hosted by the Manchester Airport Future Airspace team. We will update all stakeholders who were invited but did not attend, prior to the second phase of engagement in Spring 2022.
Alongside these sessions for the CAP1616 identified 'Stakeholders' YouGov are holding 18 sessions for a representative sample of the population. By these means they seek to accurately reflect the characteristics of the larger group.

Q. Will it be appropriate that you circulate a list of attendees/bodies etc please?
Full details of all stakeholders engaged will be published on the CAA portal at the end of Stage 2 when we submit details of the work we have completed at this Stage to the CAA for approval.

Q. Are we going to receive the mapped design envelopes for us to review and consider the local constraints and any other matters that we would wish to comment on?
The slides including the questions posed have been provided with this document. Please provide any additional comments by 10th December. To be meaningful, the information we have provided to you needs the context and explanation that we have provided. We would not want the material to be shared without the accompanying explanation and therefore we ask that it is not to be shared outside of your organisation or with any third party without prior consent. At this stage we are engaging with a range of representative stakeholders. Full public consultation follows at the next Stage 3 - which is likely to take place in 2023.

Q. 10th December does not give much time to respond - can it be a little later?
10th December represents the end of our engagement and we are required to collate thoughts to progress to Phase 2 -if you have further thoughts after this date, we will do our best to accept them and take them on board. You will also be invited to attend a further engagement session in Spring 2022 and there will be a full public consultation on our detailed proposals, currently expected to take place in 2023.

Q. How / when potential impacts on people living under the new envelopes are assessed?
At this stage we have simply identified design areas where routes could be created. Designing the potential routes and getting feedback on these will be the focus of the next engagement session during Spring 2022.

Design considerations

Q. How do these envelopes reflect the second runway inquiry decision of 1997 and the Section 106 Agreement (and its Supplemental Agreements) that was signed with Cheshire County Council and Manchester City Council in 1994?

The 1994-95 public inquiry was not an inquiry into departure routes but into the proposed construction of a second runway at Manchester Airport. At the Inquiry, information was shared on the likely operation of the Runway, but this was simply to show the practicalities of operating two runways. There were no conditions imposed on the planning permission as to the operation of departure routes.

The Section 106 Agreement attached to the consent contains a statutory provision that states: "In the event that the Airport Company …[is] required to comply with any planning condition, licence or other statutory or legal obligation imposed on them by any relevant authority, the terms of which conflict with the provisions of this Agreement, then the said condition, licence or obligation shall prevail over the terms of this Agreement and the Airport Company …shall not be in breach of this Agreement".

The Government's Airspace Modernisation Strategy represents such an obligation. It is also relevant that the Section 106 obligation B4(v) states 'No changes to PNRs to be made without prior public consultation through the Airport Consultative Committee and Environmental Health Officers Consultative Committee'. The CAA's seven stage, fourteen step, four gateway CAP1616 airspace change process that we are following (developed itself because of statutory requirements) more than exceeds the S106 obligation. We are engaging with these specified parties (and many more) in Stage 2, and Stage 3 will include a full public consultation.

Other continuing obligations in the Section 106 Agreement, for example regarding noise, are unaffected by the Manchester Airport Future Airspace project.

Q. How will you address the safety of airspace users not inbound to/outbound from Manchester?

Safety is critical when designing procedures and we have a safety assurance process that is already running within the project. As part of our final submission, the CAA require us to produce a full safety case for the airspace change which will detail the safety requirements we need to meet, how we've met them, and the mitigations and assurances we will put in place once operational. This safety case covers the aircraft in and out of Manchester and aircraft transiting Manchester airspace, which are not taking off or landing with us.

For the wider airspace network, a similar safety case will be produced by NATS which will ensure the operations of all airspace users is considered.

All safety cases need to be coordinated and approved by the CAA before the new routes "go live".

Q. Has any consideration been given for Helicopter movements?

Our design principles mean we will ensure access for helicopter operations. Helicopters generally operate under visual flight rules ("VFR") and feedback during Stage 1 of the airspace change process (Design Principles) was to minimise the impact on this type of user by limiting controlled airspace (within which they generally don't fly)

The design principle 'Airspace' addresses this point specifically and the final designs will ensure access for both 'helimed' helicopters and other VFR operations. However, this project will not be designing any specific routes for these operations.

Q. Is there any understanding (and if so, what) of the impact of the new emission control?

The current rules and regulations require us to give priority to noise below 7,000ft. However, we understand the importance of fuel burn and emissions which is why these are included within the Emissions design principle and our options are seeking to minimise these.

Airport emissions are a complex subject and are a product not only of airspace design, but also airline fleets and the ground transportation using the airport. However, as we are only addressing airspace and the fact that the new controls have only recently been announced, it's not yet clear as to whether these are expected to be applied to airspace design.

Q. Will this mean more flights to and from Manchester Airport?

That doesn't necessarily follow. By way of an example in 2006 the airport throughput was 22 million passengers a year (mppa) on 225,000 aircraft movements to and from the airport. In 2017 the throughput was 27 mppa but facilitated by only 200,000 air movements. Increasingly larger aircraft and increased load factors on those aircraft drove up passenger numbers but the number of movements had dropped. So, more movements are not necessarily a direct consequence of change.
Increasing airport capacity and throughput is dependent on a range of measures and certainly the availability of airspace is one of those. However, it needs to be backed up with the capacity of the runways, the availability of space on the ground to accommodate aircraft, the capability of terminal buildings to process and accommodate passengers and the capacity of the means of physically accessing the airport. All these factors must be in alignment – if one of them fails, then the rest fail. So, whilst freeing up airspace constraints could lead to an increase in the number of flights to and from the airport it isn't the only determinant.

Q. What is the understanding of the future demand for travel from Manchester Airport?

The UK travel industry has been badly impacted by the global pandemic and we continue to take the necessary measures to minimise our costs. However, we believe that the situation will stabilise, and we expect to fully recover over the next few years. In the long term, we believe that Manchester will continue to grow.

Q. Are adverse weather conditions or security concerns at Manchester considered and the need to divert aircraft to either Liverpool or East Midlands (local to Manchester) airports?

To ensure the final options are flyable under a range of weather conditions, the new procedures will need to undergo simulation under a range of weather (temperature and wind) conditions, although this will not take place until much later in the process.
With regards to diversions, these are a separate consideration from the design of these options. Diversion procedures will be put in place and these flights will be managed on a case-by-case basis, by air traffic control, as each situation is different and needs to be handled safely.

Q. At what stage would the decision be made on placing a turn?

Our design principles require us to align with UK and international rules including ICAO PANS OPS 8168, which cover the point at which aircraft can make their first turn. The UK rules adapted from ICAO are for no turns below 500ft.
This is the earliest point we can turn, but where the turns are placed in the final designs will be informed by this process we're currently going through. The next stage is to take your feedback and create detailed routes options, presented as 'lines on a map', and we will share these options with you at the next stage in September. However, these will only be options, and the final decision will only be made following full public consultation at Stage 3.

Q. Do you have in your modelling the effect created and the noise and visual impact?

No; not yet, as we are so early in the process.

Q. What was the biggest change made to the original design after considering the CONOPS criteria?

The CONOPS didn't drive any changes to the designs, rather it responded to the information in the fleet survey and the design principles. It is the design principles that influence our options and our choices, whereas the CONOPS interprets and supports the design principles.

Q. What is the consequence of landing or taking off with a tail wind? Can technology reduce the associated risks to make them acceptable?

The amount of tailwind is governed by safety regulations (which are developed in association with aircraft manufacturers). All aircraft fly because of airspeed, i.e. the speed of the air over the wings. The consequence of a tailwind take off is that the aircraft take off run will be longer and the climb out profile is likely to be shallower as the airflow over the wings will be less than if flying into wind. This would mean that the aircraft would climb more slowly.

For landings the impact is similar; aircraft will have to fly faster on final approach and their speed on touchdown would be higher. This would extend the landing run and has safety implications on touchdown hence the limits imposed by regulations.

Q. What is the contingency plan in case satellite systems go offline?

The contingency procedures covering a failure of the satellite system will all be contained within the safety case that supports the implementation of our new procedures. This safety case is a requirement within the CAP1616 process and the CAA as the regulator will expect this as part of our final submission.

However, in basic terms there are two fallback systems; one is the use of the inertial navigation system on the aircraft, which is not satellite dependent, and the other is the monitoring and vectoring of aircraft by ATC. Whilst vectoring will not be routinely used when all systems are working normally, ATC monitoring of all flights will remain as a means ensuring safe operations.

Q. How many of the initial options envelopes do you see becoming a reality?

All the options envelopes are viable, and routes can be designed within all of them. The next stage in the process is to start designing route options (lines on a map) within these envelopes.

The number of final route options that become a reality will then depend on how well different options fit our design principles, the views we receive at this stage of the process and in public consultation in Stage 3. However, we have deliberately created a set of options that provides as much flexibility as possible.

We're required by the process to develop a comprehensive list of options. This means we must look at all areas where it is viable to design and that's what these envelopes are intended to describe.

Q. Will there be restrictions on aircraft types, times of day or volume of traffic using a particular Route?

At this stage in the process, we aren't making any proposals on what aircraft will use which routes, and neither is it practical because of how wide the envelopes are. This phase is just about applying the design principles correctly. How we will operate will form part of our public consultation in stage 3

Q. Would any planned housing developments place any further constraints with regard to noise? Also, could any yet unplanned schemes have an impact in the future?

As part of the CAP1616 process that we're following, there is a requirement for us to factor the content of local plans into our route development work at Stage 2. We will therefore be liaising with councils that fall within the initial options envelopes developed as part of our engagement at this stage to understand any additional factors of this nature that should be considered. This dialogue will continue as we move through the process beyond Stage 2 so that local councils can in turn factor in any eventual route changes that may influence their future local plans.

Q. Are you taking into account all the potential new housing developments around the area?

Yes, the process requires us to take into account all committed housing and allocated sites within our route development and assessment activities.

Q. Do your routes aim to reduce contrail formation which contribute to global heating?

The design of our routes is only up to 7000ft and this is well below the zone within which contrails are formed, so we're unable to address that.

Q. I seem to see flights getting quite quickly to 8000 feet. Is 7000 the right level to set?
The 7,000ft criteria relates to the design responsibility for the airspace change, rather than the operational responsibility for flights when they climb. These criteria is not set by Manchester Airport, but by the UK CAA and applies to all airport airspace changes in the UK which are being conducted under the CAP1616 process.

Q. Why are the beacons being taken away in a few years' time?
The current navigation beacons (also known as DVORs) were established to support aircraft navigation before the development of satellite-based systems. Aircraft technology is now significantly more advanced and in addition many of the beacons are no longer supportable.
Because of this, UK and European legislation requires a transition of aircraft flight procedures towards a Performance-Based Navigation ("PBN") environment which doesn't require DVORs. A number are now being withdrawn as part of a UK wide programme that was agreed in 2009 by the CAA as the regulator.

Q. How wide will the corridors be and who determines where the plane is at any given point in the flight?
The design envelopes start at the runway and gradually widen to be approximately 4.5 miles (8km) wide when they reach 7000ft. The vertical position of the flight at any given point is determined by the climb gradient, and the horizontal is dictated by the placement of "waypoints" that create the path for the aircraft to fly along. Both will be described in the SID and which is coded into the aircraft flight management system in a similar way to a car sat nav.

Q. The UK and businesses are obliged to comply with tackling climate change. You spoke of the technology airlines have on board to be able to safely navigate and manage the new proposed routes. What measures have you taken to ensure the airport, and the aviation industry that serves the airport, comply, and invest in increased research and development into zero carbon energy options for aviation?
MAG has a long standing commitment to carbon neutrality and details of which can be found in the current MAG CSR strategy here: MAG CSR Strategy 2020
As a group, all our airports are carbon neutral, and we are now working to reduce remaining emissions so that we can become net zero. Last year MAG launched an initiative that is offering five years free landing fees to the first electric aircraft operating at one of our airports. More recently, we announced a Memorandum of Understanding to accelerate low carbon sustainable aviation fuels in the North West which are expected to make Manchester the first UK airport with a pipeline connection to SAF production. MAG is also supporting research as a founding member of the UK Government's Jet Zero Council.
Decarbonisation is a much wider topic than can be addressed solely by this project, but we are able to make contributions to achieve the aims and the objectives of the strategy. In that respect, our design principles require us to consider both noise and CO_2 emissions and as we move forward with designs, we will undertake analysis that demonstrates the potential benefits in both these areas.

Q. How do you account for CO_2 emissions for arriving and departing aircraft?
Once we have more detailed designs, we will be conducting computer simulations that will provide some metrics on the potential fuel burn which can be translated into CO_2 emissions for the various design options. This analysis will be contained in our Stage 3 public consultation.

Q. Do you have an average decibel for aircraft arriving and departing at each 1000ft interval? If so could you issue a sound map for each option?
We do not now as these are only design envelopes that illustrate where aircraft might fly. Once we have more detailed designs, noise contours will be produced to help ascertain the pros and cons of

the options being considered. This analysis will be contained in our Stage 3 public consultation and is a requirement of the CAP1616 process.

Q. Do the design principles address air quality impacts?
The design principles include 'Emissions' -We will minimise, and where possible reduce, emissions when we design routes. This may be achieved by selecting the most direct routes.

Q. Does your research take into account predicted changes in aircraft type and number of movements in future years e.g., more larger cargo, long haul /more short haul aircraft and would this impact on your selection of route changes given aircraft performance differences?
We have information on future aircraft types and avionics capabilities through our forecasts and our work with airlines on the Fleet Equipage Survey which has helped us in our concept design. This will be reviewed as necessary, as the project progresses.

Q. Will there be time constraints for flights arriving and departing?
Manchester Airport has operated on a 24-hour basis for nearly 70 years. Heathrow and Gatwick Airports operate at night too and like us have a Night Noise Policy, although the Manchester Policy is much stricter in several areas. The Manchester Airport Night Noise Policy restricts the operations permitted so that the noise climate is much reduced from daytime levels. The Policy strikes a careful balance between the interests of our local community and the demand from our passengers to fly. Under the terms of the policy between 23:00 hrs and 06:59 hrs; certain types of noisier aircraft are restricted, the noise level at which a departing aircraft can be fined is reduced and the overall volume of traffic is constrained. The current Night Noise Policy runs 2020-2024 and will be reviewed. The Manchester Airport Future Airspace will be constrained by the Night Noise Policy in force at that time. You can see the current Night Noise Policy here: https://live-webadmin-media.s3.amazonaws.com/media/9447/night-noise-policy-2020-2024.pdf

Q. Is there some responsibility by airlines to use more environmentally friendly planes?
Yes, there is a pressure for airlines to use the most environmentally friendly planes available. In recent years we have seen the Boeing 787 Dreamliner and Airbus A350 widebodies enter the long-haul market and the Airbus A320neo and Boeing 737 MAX narrow bodies have entered the short haul market. All these airframes incorporate light composite materials and ultra-modern engines and so urn much less fuel/emit much less pollution. All these types are in regular service at Manchester Airport, and we use our fees and charges to incentivise airlines to operate them into our Airport.

Q. Can you define danger areas? Why are they dangerous and to whom?
A Danger Area is defined as airspace within which there may be activities that are dangerous to the flight of aircraft. The types of activities under this description are listed in the UK Aeronautical Information Publication, which is the reference manual for all airspace activities within the UK, but activities include areas of military activity, drones or parachuting.
The aim of danger areas is to separate these hazardous activities from aircraft, and the areas have both a lateral and a vertical dimension. In addition, all have operating hours listed; some are used 24 hours, others only operate during certain days or hours of the day.
The classification and management of danger areas is the responsibility of CAA's Safety and Airspace Regulation Group (SARG) who also conduct regular audits of the danger areas.

Q. What are the 2 danger areas hatched red here?
A Danger Area is defined as airspace within which there may be activities that are dangerous to the flight of aircraft and the areas have both a lateral and a vertical dimension. The types of activities under this description are listed in the UK Aeronautical Information Publication, and activities include areas of military activity which is the reason for the two areas to the SE of Manchester. The classification and management of danger areas is not a Manchester Airport task but is the responsibility of CAA's Safety and Airspace Regulation Group (SARG).

Q. What measures have been put in place in your risk assessment to reduce dangers?
The management of risks and safety is ongoing throughout our development of routes and is supported by a Safety Programme Plan. As part of this plan, at this stage we have involved multiple aviation stakeholders including airlines and air traffic control to identify the safety objectives and safety requirements for the new airspace.
As designs are developed, these will be assessed against these safety requirements in line with the UK CAA guidance on hazard identification and the production of safety cases.
As the regulator of airspace, the CAA will make the decision on whether our airspace change is safe. To do this we are required to produce a Safety Case which provides safety assurance and evidence to support why the airspace change is safe, and this will be submitted with our final airspace change documents at Stage 5.

Q. How are you collaborating with other airports?
Collaboration is a key part of the national programme of airspace modernisation and is a requirement of the CAA Airspace Modernisation Strategy and CAP1616 Airspace Change Process.
In line with this we have already had meetings NATS (who control the Terminal and Upper Airspace Network) and with Liverpool, Leeds Bradford, East Midlands, and Doncaster Sheffield airports.
This process will continue via regular bilateral meetings to understand constraints and resolve any issue and interactions between our operations. The aim of these meetings is to allow each airport to operate independently without causing unnecessary restrictions to the other.

Q. This brings in the City Airport again. Is this included in the Constraints?
City Airport is one of our stakeholders and we will be working with them throughout this process to ensure their needs and access to airspace for general aviation is taken account of. They have a small piece of airspace that extends from the ground to 2,000ft but because they are well to the north of Manchester International and at a low altitude, this airspace will not be a constraint to the routes we're creating.

Q. 3 & 4 seem to block off significant areas to departures.
Area 3 is an area used by general aviation and in particular gliders and we'll continue to look at this area (and all the constraints) as part of our next phase design work. This is an iterative process because both us and NATS who have responsibility for this upper airspace are embarking on airspace change at the same time. Creating design envelopes from Manchester in an area that might not always be available or where commercial flights conflict with gliding traffic would not be aligned with either our safety design principle or the Airspace Modernisation Strategy. We believe we have taken a safe and prudent approach at this time in creating this as a constraint.
Area 4 is also airspace that is the responsibility of NATS but on our maps this is marked as an "Airspace Consideration" rather than a "Constraint" and is shown as amber rather than red for this reason. The consideration with this area is twofold. Firstly, it's an area where we need to make sure our departures align with NATS network traffic flows. Secondly the minimum height to access this controlled airspace is 9,000ft. When looking at departures at 6% climb gradient, there is a possibility that aircraft may not reach this minimum altitude without changes to the route design. We have therefore identified this as something to consider as we move forward to ensure all commercial aircraft fly within controlled airspace which aligns with our safety design principle.

Q. Why is Leeds/Bradford airspace 9,000ft and Manchester is 7,000ft?" is this a misunderstanding?
No this is created by the difference between Design responsibility and Operational responsibility.
The 7000ft foot requirement relates to the design responsibility for an airport that is undertaking an airspace change. It is in line with the CAP1616 document that states this as the height that all airports in the UK are required to design routes to/from.
The 9000ft element we talk about in the "Constraints" diagram relates to the controlled airspace that is

used by flights into and out of Leeds/Bradford and is the operational responsibility. Each airport has its own operational airspace and the height that this extends to varies from airport to airport.
In our airspace change projects, both Manchester and Leeds/Bradford remain responsible for designing the routes up to 7000ft, and above that is the responsibility of NATS.

Q. Why the noise and emissions design principles not 'must haves'?
Yes, we fully agree that noise and emissions are vitally important design principles and will be of the greatest interest to local residents. For that reason, when we go to full public consultation in Stage 3, we will be producing a data driven analysis of our shortlisted options against a baseline of current operations. This will include details of noise levels and the emissions generated by each option when compared against today's routes. That way you will be able to see whether the route creates more or less noise and emissions than currently, allowing you to make your own decisions and comments. These comments will be used in creating our final solution which will also take into account the views of other airports and the NATS network as they also form part of our stakeholder community. This is because, as we've talked about in the presentation, the modernisation strategy requires us to create a system that works for all users. The outcome of these assessments will be used in developing our final solution. We will also take into account your comments, the views of other airports and the NATS network as they also form part of our stakeholder community.

Q. The constraints identified earlier are incorrect. The gliding site simply requires all gliders to have FLARM and for this to be promulgated to ATC, often coming in from DAYNE the current vectors provided already route through that airspace. Secondly curved approaches can exist as per RNP-AR approaches such as Gibraltar. Multiple STARs should be developed with 1nm offsets to mitigate for weather, instead of aircraft asking for vectors and delaying the arrival approach pattern.
We will continue to look at the use of the gliding area (and all the constraints) as part of our next phase design work to make sure we make best use of the available airspace. However, one of the concepts both we and the NATS network are seeking to apply is greater systemisation which will result in aircraft routing with minimal ATC intervention. This means that ATC vectoring will significantly reduce so what we are seeking to create are routes that are de-conflicted by design. Creating design envelopes that route through an area that may not always be available or where routes are not deconflicted with gliding traffic runs against this idea, hence the reason for creating this as a constraint at this time.
With regards to curved approaches and RNP AR, these have not been discounted. However, our design principles require us to design to the latest widely available aircraft technology. Whilst the number of aircraft that are RNP AR equipped is increasing, the strict requirements of this type of approach means that it is not yet a realistic arrival option for most flights into Manchester. This is an evolving process, and we are only at the very first stage, but part of our design process includes discussions with airlines. If it becomes clear they intent to invest in the technology and the crew training requirements to achieve RNP AR we will look to reflect that in our designs, especially if there are benefits to be achieved.

Q. In a much more radical approach, has MAN considered displaced GPS arrivals with a shorter LDA for certain types of aircraft - this has been mooted by other airports in previous paper and would move the noise potentially over the airfield boundary?
As we are at such an early stage of the process, we're only looking at design envelopes which outline where aircraft might fly rather than the detailed operational procedures. The current envelopes assume the continued use of Instrument Landing System (ILS) as the primary precision approach aid, but different strategies for the final approach phase will be explored as we progress.

Q. As per previous comments, the constraint imposed by MAN that they don't interfere with LPL traffic actually results in a sub-optimal solution for both airfield, and instead why is there not a common approach to both airports, a common holding pattern with STARs taken to respective runways. Uncontrolled airspace will be resolved using surveillance data. In short, the designers haven't really adopted much of a blue-sky approach to Airspace Change and instead will simply codify what already exists in a PBN world.

liver

To address your point on common approaches, despite the relative proximity of the airports the creation of a single Standard Arrival Route (STAR) is likely to result in inefficiencies and as traffic recovers may result in unnecessary delays. The evidence to support this can be seen in the London area, where there has been a common arrival hold for Stansted and Luton Airports (which share a similar close interaction) for some years. An airspace change has just been approved by the CAA that will separate the arrival operations of the two airports because this arrangement is inefficient and has significantly increased the complexity of the airspace. This has led to operational disruption and delays for passengers and has resulted in unnecessary fuel burn and emissions.

With regards to codifying what already exists, you are correct that we need to create "Do Minimum" options which will be replication of the existing departure routes (SIDs) to PBN standard. However, you will have also seen on the presentation that we've created two additional envelopes and in the next phase we will be creating a comprehensive list of additional options across all of the envelopes. These will be based on meeting the design principles, so for example we will be looking at how to reduce the impact of noise or reducing fuel burn and emissions. This will result in a suite of route options all of which route in a slightly different way to reach the end of the design envelope. This is actually one of the purposes of creating design envelopes as their width provides us with the flexibility to do things differently, rather than just replicating what we have today.

Q. I think that the principles are clear, but I wonder what weighting each will have in practice as for e.g., to use the most direct route (as mentioned in emissions), may not be congruent with reducing the number of people affected by noise from flights.

You're of course right; the inter-dependencies between community noise and aircraft emissions can sometimes mean that achieving an improvement in one area, may come at the expense of the other. Inevitably, there must be some trade-offs. CAP 1616 sets out a framework, known as Altitude Based Priorities, to help in this respect. Based upon government guidance (Air Navigation Guidance 2017), the Altitude Based Priorities say that:

- in the airspace from the ground to below 4,000 feet, the Government's environmental priority is to limit and, where possible, reduce the total adverse [noise] effects on people
- where options for route design from the ground to below 4,000 feet are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements
- in the airspace at or above 4,000 feet to below 7,000 feet, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the Government's overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO_2 emissions
- in the airspace at or above 7,000 feet, the CAA should prioritise the reduction of aircraft CO_2 emissions and the minimising of noise is no longer the priority

Q. If Leeds/Bradford have airspace to 9,000 feet, why not Manchester?

Airspace is a complex patchwork of areas across the whole of the UK with different altitudes in different areas, and in fact Manchester does have a large area of airspace. However, it should be highlighted that all terminal and upper airspace is controlled by NATS as part of the en-route air traffic network. The area we've identified just west of Leeds extends from 3,000ft up to around 9,000ft and is there to provide a safe operation to traffic routing either into Leeds/Bradford or aircraft around it. At Manchester because our area is more complex, we have airspace around us that extends from the ground to around

3,500ft and there is then a further layer of airspace above us which extends from 3,500ft to around 20,000ft. This provides a safe operation to all of our flights and those into airports such as Liverpool. So, whilst Leeds/Bradford airspace acts as a constraint to our designs within this process, our airspace is also a constraint to theirs. These constraints and any interactions will be managed through bilateral meetings as we move through the process.

Q. It seem to see flights getting quite quickly to 8,000 feet. Is 7,000 the right level to set?
The 7,000ft criteria relates to the design responsibility for the airspace change, rather than the operational responsibility for flights when they climb. This criterion is not set by Manchester Airport, but by the UK CAA and applies to all airport airspace changes in the UK which are being conducted under the CAP1616 process.

Q. How accurate is the 2,000ft calculation? Has this been tested?
The 2,000ft joining point has been taken from ICAO PANS OPS guidance which forms part of the rules and regulations we're required to follow and relates to the altitude that aircraft join the final approach when coming into land. We have used these criteria to help calculate the inner boundary within which we can design the arrival routes, but it does not mean that all aircraft will join at this point in the designs we create. In addition, it is not the only consideration on the minimum, and as we move forward to design routes, we will be taking into account the design principles and engaging with airlines on their minima and operating procedures.

Q. What are the 2 danger areas hatched red here?
A Danger Area is defined as airspace within which there may be activities that are dangerous to the flight of aircraft and the areas have both a lateral and a vertical dimension. The types of activities under this description are listed in the UK Aeronautical Information Publication, and activities include areas of military activity which is the reason for the two areas to the SE of Manchester. The classification and management of danger areas is not a Manchester Airport task but is the responsibility of CAA's Safety and Airspace Regulation Group (SARG).

Q. What about drones?
Flights by Drones or Unmanned Aircraft Systems (UAS) are governed by the UK Air Navigation Order, and by a UK CAA document entitled CAP722 "Unmanned Aircraft System Operations in UK Airspace". This and other legislation restrict drone operations in the vicinity of major airports such as Manchester through a Flight Restriction Zone (FRZ). No drones of any size can be flown within the FRZ without appropriate permission for safety reasons. The basic dimensions of the zone around Manchester is a 2.5 mile radius 'cylinder' around the aerodrome, extending 2000 ft above ground level and with additional protection either side of both runways to a distance of 5km. So, in summary, all operations at the airport both now and in the future are offered protection through law.

Q. Who defines where the 7000ft joining location is on the NATS routes?
The decision on the 7,000ft joining point is a complex one because of the need to balance our design principles with the NATS network. Ultimately this will be a joint decision between ourselves and NATS, but at this stage (without the existence of lines on a map) we have not gone further than making sure we're aligned with the network traffic flows.

Q. What altitude must aircraft attain before turning?
Our design principles require us to align with international rules under ICAO and the UK CAA, and these UK rules state that there should be no turns below 500 feet above ground level

More information

Q. Who can I contact if I need further information?

Please email futureairspace@manairport.co.uk or call 08000 967 967 and leave a message, a member of the airspace team will call you back.