UK Civil Aviation Authority

Airspace Classification Review

REVIEW

MANCHESTER LOW LEVEL ROUTE - 2023

We are listening

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Introduction

1. As part of the CAA's Airspace Classification Review procedure[1], a detailed investigation of airspace usage and classification within the Manchester Low Level Route (MLLR) has been conducted. This report:
    - captures the history of the MLLR and its current operation;
    - considers pertinent safety data;
    - examines commercial operations within the surrounding airspace;
    - references ongoing Airspace Change Proposals (ACPs);
    - describes the engagement we've undertaken as part of our review;
    - seeks to understand the issues raised by stakeholders via survey responses, received as part of the Airspace Classification Review Team's review of the Barnsley region; and
    - details our suggestions for next steps to address these concerns and ultimately, improve the operation and safety for those utilising the airspace.
2. The Manchester Low Level Route (MLLR) is a 4 nautical mile (NM) wide portion of airspace, delineated north-south, facilitating visual flight rules (VFR) transits of the controlled airspace (CAS) surrounding Manchester and Liverpool Airports, without the need to obtain a verbal clearance from air traffic control (ATC).
3. It extends from the surface to 1,300ft (feet) above mean sea level (AMSL), enabling aircraft operating within the MLLR to remain below traffic operating into, or out of, Manchester and Liverpool Airports. Aircraft operating within the MLLR must comply with the visual meteorological conditions (VMC) appropriate to the airspace classification. Subject to their flying in accordance with a series of conditions, pilots of VFR flights within the MLLR are not required to be in receipt of an air traffic control service by ATC and are responsible for their own separation against other aircraft using the "see-and-avoid" principle.
4. The CAA has been party to numerous discussions regarding the operation of the MLLR and the oversight of aircraft operations within this volume of airspace. Concerns have been raised about the potential risk of mid-air collision, the number of airspace infringements, and the requirement for exemptions to the UK Standardised European Rules of the Air (UK SERA). As such, it was evident that a thorough review was required.

[1] CAP 1991: Procedure for the CAA to review the classification of airspace, Nov 2020.

5. This document has been written on the assumption that the reader has a broad understanding of aviation terminology. However, to assist readers, a glossary of the technical terms used has been provided as Appendix (B).

Purpose of this report

6. This report into the MLLR, was undertaken as part of the process to review airspace classification in the UK, contributing to the modernisation of UK airspace through the Airspace Modernisation Strategy (AMS). Any recommendations made from our review of this airspace will be underpinned by safety and with equitable access to airspace in mind.

Why we have reviewed the MLLR

7. ORS4 is the mechanism used by the CAA to promulgate exemptions, permissions and approvals. The exemption detailed within ORS4 No 1545[2] enables pilots to operate within the MLLR without being in receipt of an ATC clearance, subject to specific conditions being met (explained further in paragraph 22 below). Included in its publication was the CAA's statement that the Airspace Classification Review Team would review this volume of airspace, examining the possibility of re-classifying the airspace as class G.
8. An exemption is not a permanent solution to enable the operation of this volume of airspace. The exemption that facilitates the current operation of the MLLR is set to expire on 31 May 2024. After this date, the airspace is expected to return to standard class D operation, requiring an ATC clearance for entry.
9. Discussion at the Mid-Air Collision Challenge Group (MAC CG) has highlighted concerns over the perceived heightened risk of collision to pilots within this volume of airspace.

How we have reviewed the MLLR

10. A detailed and comprehensive review of the MLLR airspace was conducted, with numerous potential recommendations explored.
11. To ensure a thorough review of the MLLR, we:

Considered:

- **Internal Stakeholder Engagement:** Our internal stakeholder engagement involved detailed discussions with subject matter experts in aviation safety, policy, airspace regulation, and air traffic management, all providing valuable input and expertise to inform our review of the MLLR.

[2] ORS4 No. 1545 (caa.co.uk)

- **External Stakeholder Engagement.** We engaged with a wide range of external stakeholders, including airports, ATC service providers, other industry groups, and the general aviation community. Through this engagement, we gathered a diverse range of perspectives on the MLLR, as well as valuable feedback to help shape our findings and proposed recommendations. Our approach to stakeholder engagement was characterised by a commitment to transparency, open dialogue, and constructive feedback, in a bid to identify effective recommendations for improving the airspace and operations within it.

Reviewed:

- **Safety Data.** Working closely with United Kingdom Airprox Board (UKAB) and the CAA's Airspace Infringement Team, we reviewed available safety data for aircraft operations within the MLLR.
- **Airspace Analyser Tool (AAT).** The AAT has been developed for the Airspace Classification Review Team by a third party. The data is supplied by Plane Finder which records aircraft that are visible to their detection systems. Not all aircraft that operate in the airspace are visible on the tool, with aircraft detected and recorded using:
    - ADS-B (Automatic Dependant Surveillance-Broadcast) – detected by receiving equipment on the ground;
    - FLARM: A system that calculates and broadcasts aircraft position and future flight path; and
    - MLAT: Multilateration – this uses the responses (to ATC radar interrogation) of Mode-S transponders. These responses are received by the same ground receivers as the above signals. Aircraft position is then calculated by triangulation of multiple responses received and the time difference between signals. This is not a radar system and relies on line-of-sight between aircraft and receiver which means low level coverage can have "blind spots".

  Historical data and a live feed are available, giving the ability to collate aircraft track samples and examine individual flights. This functionality allows the CAA to carry out analysis of airspace usage as well as help to validate insight acquired through other means such as mandatory occurrence reports (MOR), ACPs or airspace review feedback. The traffic data has been overlaid with safety data, including airspace infringement locations and airprox data.

12. The AAT brings us the ability to review airspace and conduct evidence-led discussions in assessing whether airspace is fit for purpose, however, it is important to understand the limitations of the data within the tool. If an aircraft is not visible to Plane Finder's detection systems, it will not show on the AAT.

Overview of the Manchester Low Level Route

Introduction to the MLLR

History of the MLLR

13. The history of the MLLR, or 'Special Low Level Route' as it was originally titled, began in 1967 when the US military, who operated Royal Air Force (RAF) Burtonwood, ceased to support large fixed wing operations and consequently enabled the possibility of establishing a 'free-lane' for the transit of the Manchester Control Zone (CTR) and access to Manchester Barton Aerodrome. The Manchester CTR at that point extended from the surface to Flight Level 11,000 feet (FL110), encompassing both Liverpool Airport and Manchester Airport, with the exception of the Liverpool Special Rules Zone (see Figure 1), and this entire airspace was notified for the purpose of the Rules of the Air then in place (equivalent to class A airspace today, precluding VFR flight).

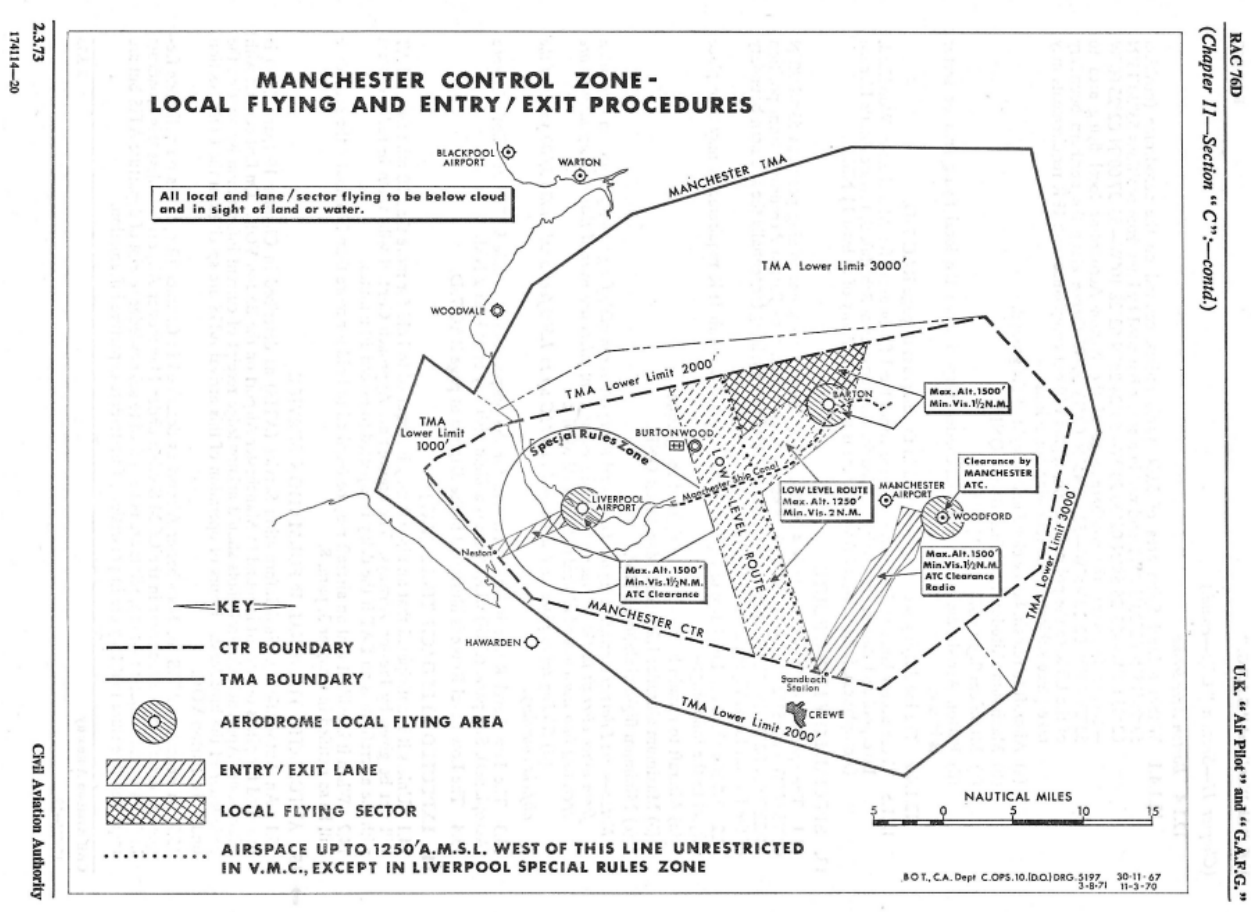

Figure 1 Historic chart detailing the Manchester Control Zone's local flying and entry/exit procedures, as at March 1973.

MLLR Today

14. The MLLR is a volume of airspace within Manchester Airport's class D CAS, which is notified as a route for VFR traffic – typically sport and recreational general aviation (GA) aircraft, to transit through it on a north-southbound routeing (see highlighted darker pink area in the centre of Figure 2 below).

15. Manchester and Liverpool class D airspace directly adjoins. To cross this airspace without the MLLR, VFR traffic would have to acquire an ATC crossing clearance or undertake a significantly longer route around the airspace. To transit around the airspace would require routeing to the east over the high ground of the Pennines with the associated concerns about terrain clearance, or to the west, flying over Liverpool Bay. Both options may increase the flight safety risk to light GA aircraft. The MLLR provides a direct route through the airspace, without the need for pilots to fly over high terrain or water.

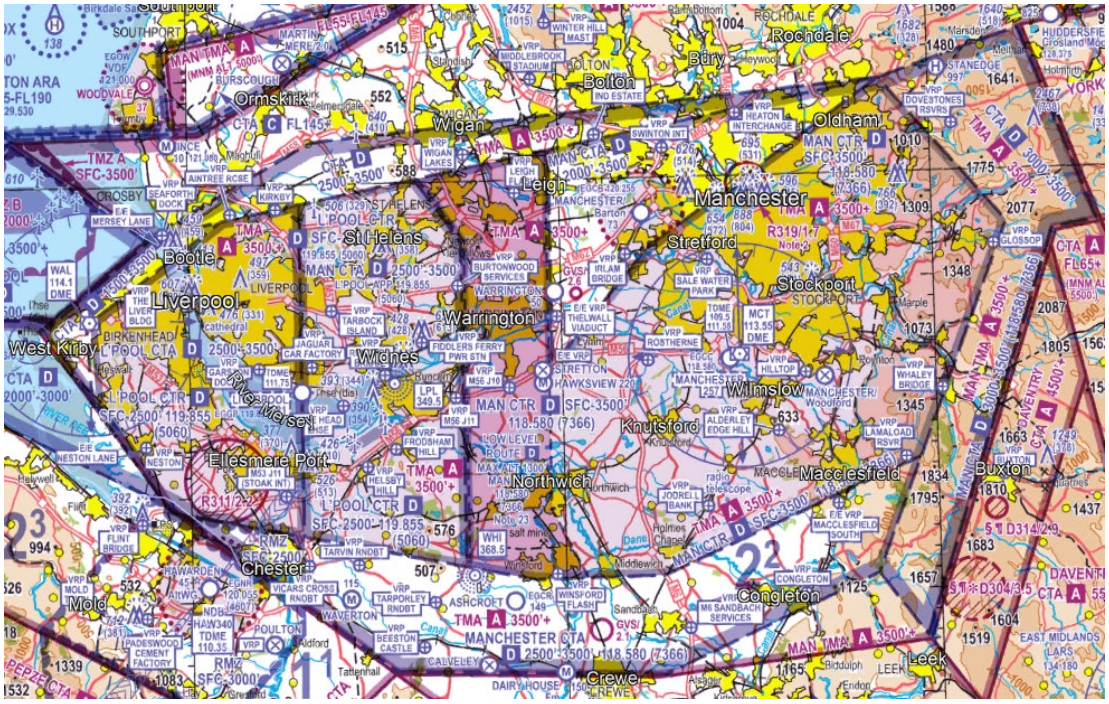

Figure 2 Screenshot of VFR 1:500,000 map (Edition 46: 22 April 2023) showing the location of the MLLR (pink north-south corridor in image centre)

16. UK class D[3] airspace requires all flights to be in receipt of an ATC service and an ATC clearance prior to entry of the airspace. Standard separation of 3NM or 5NM, dependent upon accuracy of radar equipment, is provided and maintained by ATC between instrument flight rule (IFR) traffic – typically commercial traffic – and other IFR traffic. VFR traffic provides its own separation against all other traffic which is aided by "traffic information" radio transmissions from ATC.

[3] SERA6001 Classification of airspaces (caa.co.uk)

17. Prior to 25 Mar 2020 despite its class D status, the requirement for an ATC clearance was not enforced for pilots operating VFR or special VFR (SVFR) within the MLLR and the airspace was operated similarly to class G.

18. On 25 March 2020 ORS4 No.1357 was introduced. This specifically exempted Manchester ATC of the requirement to provide a verbal ATC clearance to pilots operating in the MLLR either as VFR, in accordance with the newly adopted (at the time and since superseded) class D VMC minima of 1500m and 1000ft from cloud, or SVFR, in accordance with the following conditions:

    - by day only;
    - clear-of-cloud and in sight of the surface;
    - Maximum indicated airspeed (IAS) of 140kts (knots – nautical miles per hour)
    - In-flight visibility of 5 kilometres (KM);
    - In accordance with radio and transponder procedures set out in UK aeronautical publication (AIP) EGCC AD2.22. At the time this specified pilots should display a listening squawk of either Manchester Radar ATC or Liverpool Radar ATC and monitor the related frequency.

    ORS 4 No.1357 also exempted the requirement of ATC to provide standard separation between IFR and SVFR flights operating within the MLLR. SVFR flight was expected to be a frequent requirement in the MLLR when pilots could not maintain the class D VMC minima listed above.

19. In May 2021, ORS4 No.1489 (superseded by ORS4 No.1545 in May 2022) was introduced. Both the current and extant ORS4 regulations require pilots to adhere to specific conditions in order to operate within the airspace, and in accordance with additional radiocommunications and secondary surveillance radar transponder operation procedures as notified at UK AIP EGCC AD2.22. This was necessary due to the change to the VMC minima introduced by the Aviation Safety (Amendment) Regulations 2021. The CAA published a report: CAP2093: CAA Impact Analysis – Changes to VMC Minima in UK Class D Airspace which committed the CAA to address the increased risk of mid-air collision to helicopters operating within the MLLR, by 20 May 2021.

20. The specific issue for helicopters operating in the MLLR was the reduction of the VMC minima, such that they would only require 1500m flight visibility, with all other aircraft requiring an in-flight visibility of 5km. In UK class D airspace, the risk associated with reduced in-flight visibility is mitigated by the provision of ATC service. However, in the MLLR, the requirement for an ATC clearance was not enforced for VFR flight, therefore this mitigation did not exist. This was considered to be an unacceptable level of risk.

21. The conditions cited within ORS4 No.1545 were created and agreed through CAA collaboration with NATS, the Air Traffic Services (ATS) provider. These conditions prevent SVFR flight without ATC contact and ensure that all aircraft operate to the same VMC minima, mitigating the risk identified above[4].

22. The conditions specified within ORS4 No.1545 now require that, in order for VFR flights to operate within the MLLR without an ATC clearance, the aircraft must be flown:

- In accordance with SERA.5005 (VFR);
- Fly a maximum IAS of 140kts;
- Have in-flight visibility of 5km or more; and,
- In accordance with the radiocommunications and secondary surveillance radar transponder operation procedures applicable to the MLLR as notified at UK AIP EGCC AD2.22.

The operational procedures applicable to the MLLR, as detailed within UK AIP EGCC AD2.22, requires pilots to:

- Squawk 7366 (7367 for student pilots) if suitably equipped
- Monitor Manchester Radar 118.580 MHz if suitably equipped

23. These combined conditions are in lieu of a verbal clearance to enter class D airspace. Adherence to them constitues a clearance to enter the MLLR airspace.

24. **The combination of the conditions in ORS4 No.1545 and the procedures in the UK AIP EGCC 2.22 are referred to as 'the ruleset' throughout the remainder of this report.**

Who uses the MLLR?

25. The main users of the MLLR are sport and recreational GA. We examined the airspace usage within the MLLR for 2021 and 2022 using our Airspace Analyser Tool. In 2021 a total of 5091 movements were identified, with a total of 4980 movements in 2022. Of note, and as mentioned above, the tool would not capture aircraft operating without a transponder. Despite the squawk requirement specified in the ruleset, pilots of non-transponding aircraft are still able to operate within the MLLR, provided that they monitor the Manchester Radar frequency; these aircraft do not feature within our statistics.

[4] Clearance for SVFR flight in the UK is an authorisation by ATC for a pilot to fly within a CTR when unable to comply with the IFR. ATC will provide standard separation between all Special VFR flights and between such flights and other aircraft under IFR. For further details, refer to AIP ENR 1.2 Part 2, which provides more comprehensive information on SVFR operations in the UK.

26. Approximately 80% of users of the MLLR across our period of review were fixed wing aircraft. The statistics depicted below also include MOD aircraft, which account for 2–3% of all movements, the majority of these being helicopters operating into and out of Royal Air Force (RAF) Shawbury.

27. Figure 3 below shows the average number of flights within the MLLR for both 2021 and 2022, averaged out per day of the week.

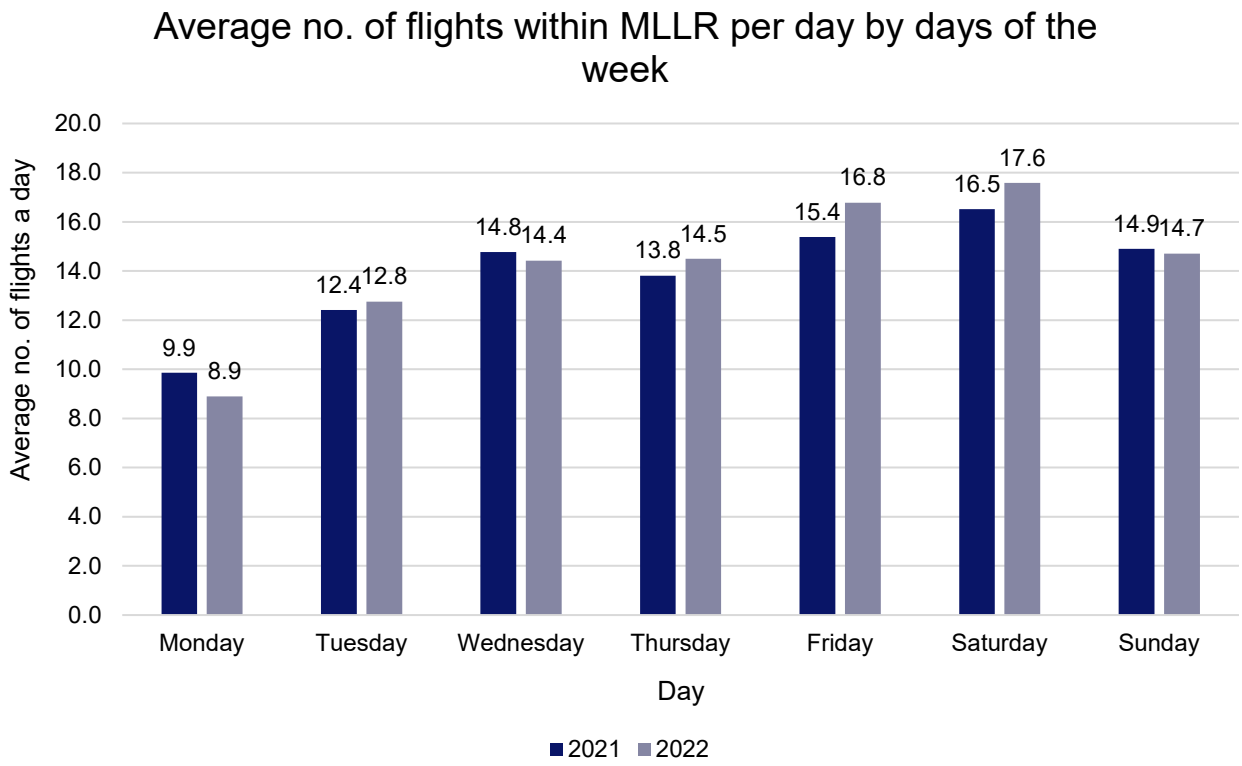

Figure 3 Chart displaying the average number of flights within the MLLR for the years 2021 and 2022. The data is further broken down and averaged per day of the week.

28. When considering how the MLLR is utilised, whilst most pilots use it to transit north-south or south-north, a significant number, predominantly in the northern portion, enter and exit on an east-west or west-east track. From investigating this with the AAT, we can see that many of these transits have operated to or from Manchester Barton Aerodrome. During our external engagement activities, we received feedback from pilots concerned about the high cockpit workload when flying this east-west track and the associated difficulty in complying with the ruleset, whilst also needing to establish timely two-way communications with Liverpool Radar or Barton Information.

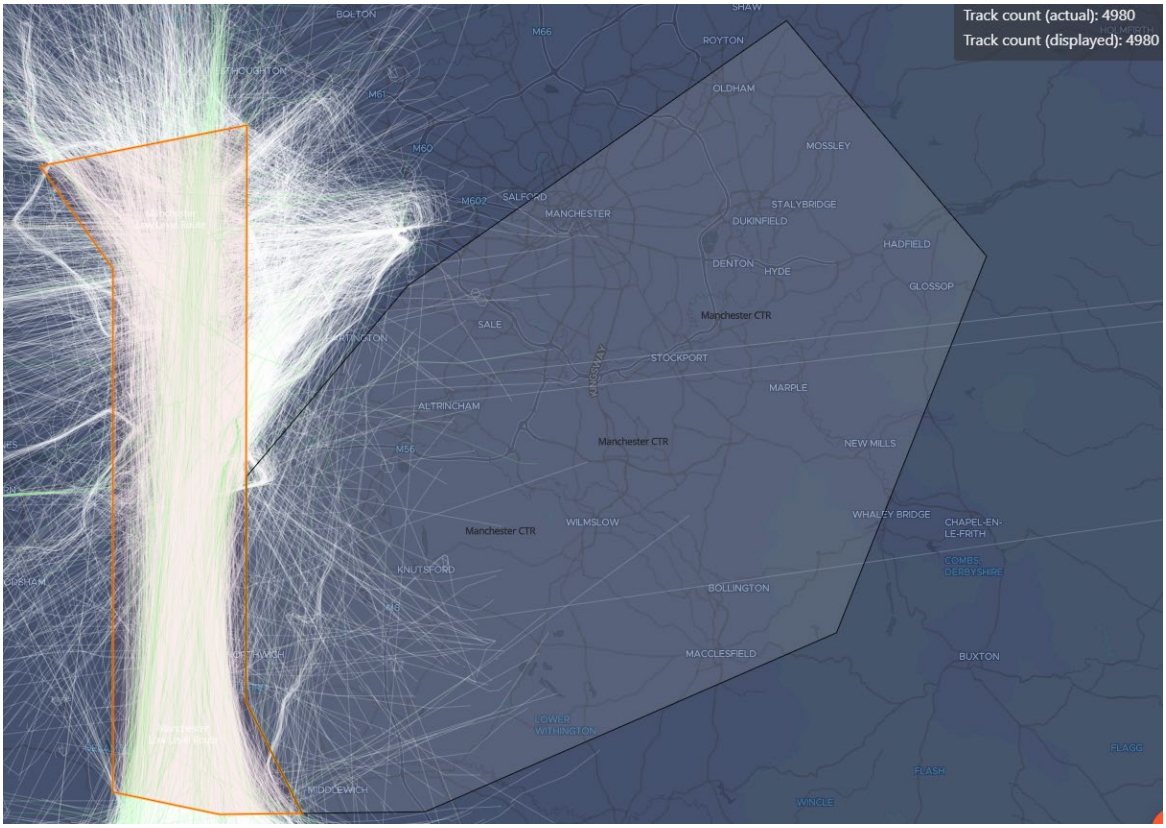

Figure 4 Tracks of non-commercial aircraft movements in and around the MLLR from the surface up to 1500ft AMSL in 2022.

29. Figure 4, above, shows non-commercial aircraft movements in and around the MLLR, surface to 1500ft AMSL[5], in 2022. The white lines represent non-commercial aircraft movements, and the green lines represent MOD aircraft tracks.

Instrument Flight Procedures (IFP) affecting the MLLR

30. The maximum altitude for flight in the MLLR is 1,300ft, which reflects the complexity of the airspace around it and the departure and arrival IFPs that serve both Manchester and Liverpool airports. It was apparent from comments received as part of our external engagement, further detailed in the Engagement section below, that some respondents didn't fully understand the impact of surrounding IFPs on the operation of the MLLR.

31. The following images, generated using the AAT, illustrate the IFPs and aircraft tracks for arrivals and departures at both airports. Manchester Airport has both inbound and outbound routes which cross the MLLR at a potentially low level, while Liverpool Airport only has inbound routes which cross it at low level.

[5] When using the Airspace Analyser Tool to interrogate airspace usage, the airspace altitude is filtered in increments of 500ft, therefore we have looked at tracks up to 1500ft and were unable to select the MLLR maximum altitude of 1300ft for the upper limit.

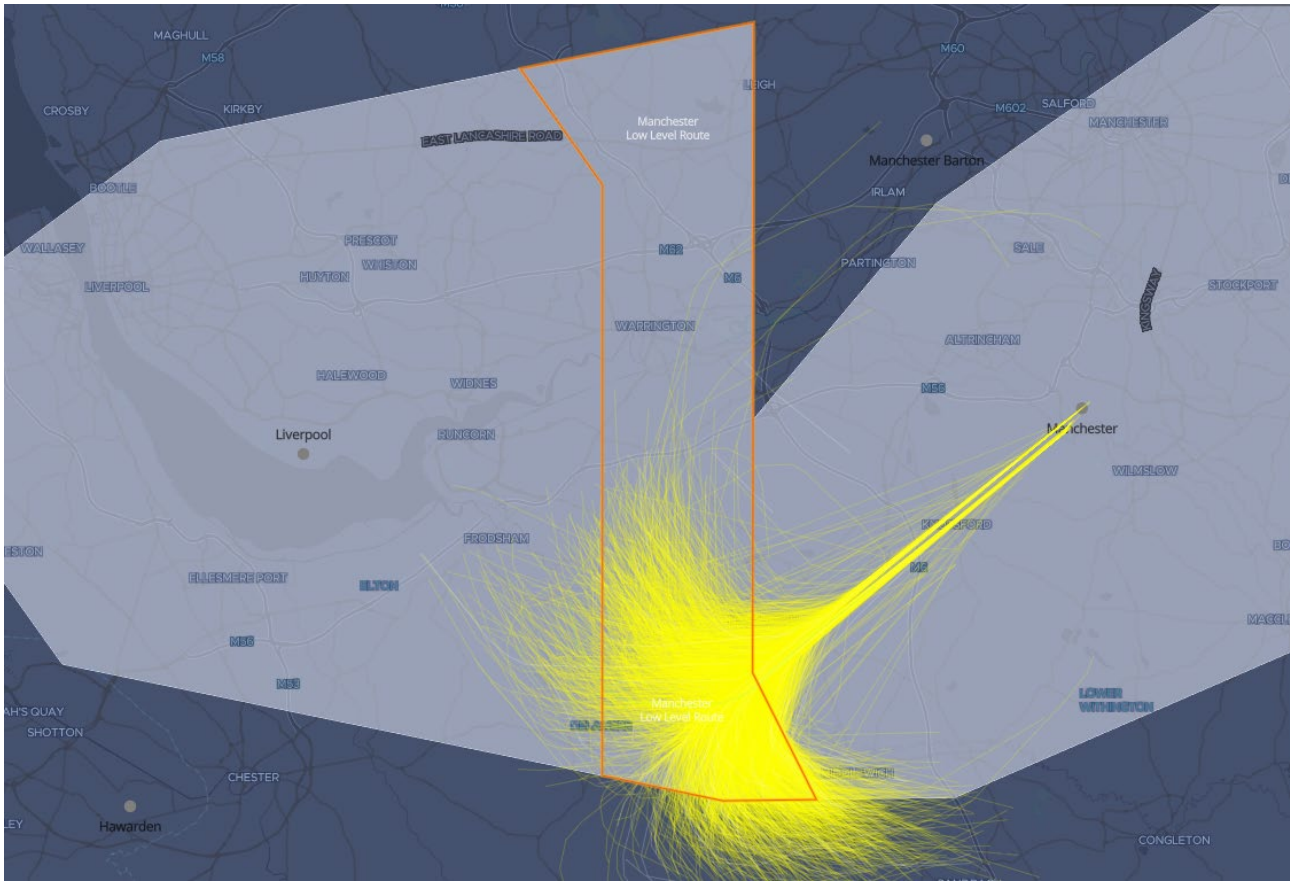

Figure 5 Yellow aircraft tracks for inbound flights for Manchester Airport's north-easterly runways.

32. The aircraft tracks (yellow lines) in Figure 5 are inbound to Manchester Airport for the north-easterly runways. The tracks are typically turning onto a final approach path and descending above the MLLR. They pass over it at a distance of 9NM from the threshold of runway 05R at Manchester Airport, meaning they are at a typical altitude of around 2,700ft. Descent below 2500ft is not instructed by ATC until east of the MLLR.

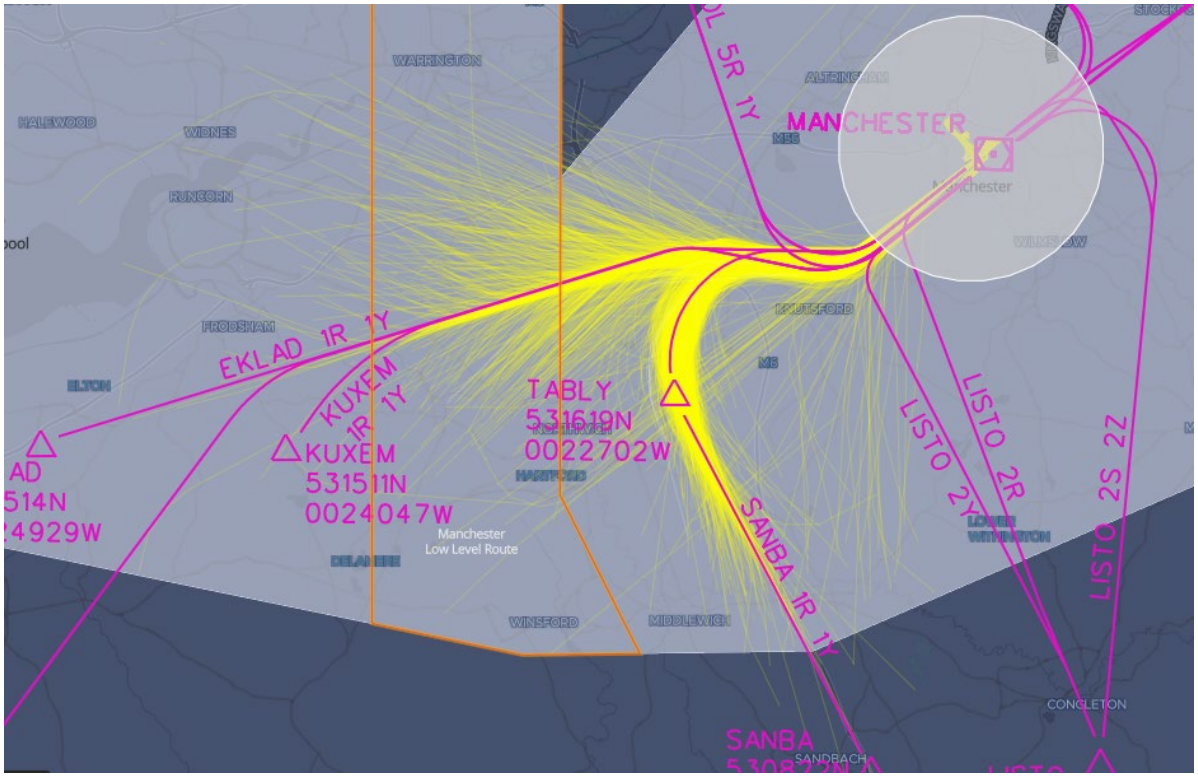

Figure 6 The departure routes from Manchester airport, represented by pink lines. The actual tracks of aircraft departing from Runway 23L/R are shown in yellow and overlay the MLLR.

33. In Figure 6 aircraft departing Manchester Airport on the south-westerly facing runways, 23L and 23R are shown. Easterly departures from 05L and 05R do not cross the MLLR at a low level due to the increased track mileage before aircraft reach the airspace, resulting in them having climbed well above it. Manchester Airport uses its south-westerly runways for around 70% of the year.

34. Aircraft depart Manchester Airport following a standard instrument departure (SID), which contains a specific route and vertical profile to be followed. The published SID routes over the ground are shown in pink in Figure 6. These SIDs, as IFP procedures, include a protected containment area beneath them. Not all aircraft climb at the same rate and therefore the containment exists to preserve the safety of slower climbing aircraft, such as heavier long-haul aircraft.

35. Despite being named the Manchester Low Level Route, the more significant interaction with commercial IFR traffic occurs with Liverpool Airport's arrivals. The prevailing winds in the UK are westerly, and as aircraft take off into wind, Runway 27 is the most utilised runway direction at Liverpool Airport. As with Manchester Airport, this results in westerly operations for around 70% of the year.

36. The western edge of the MLLR lies 7.3NM east of the threshold of Runway 27 at Liverpool Airport. This means that aircraft positioning to land, are at an altitude of not below 2,000ft when passing over the MLLR. These aircraft are shown in yellow below in Figure 7.

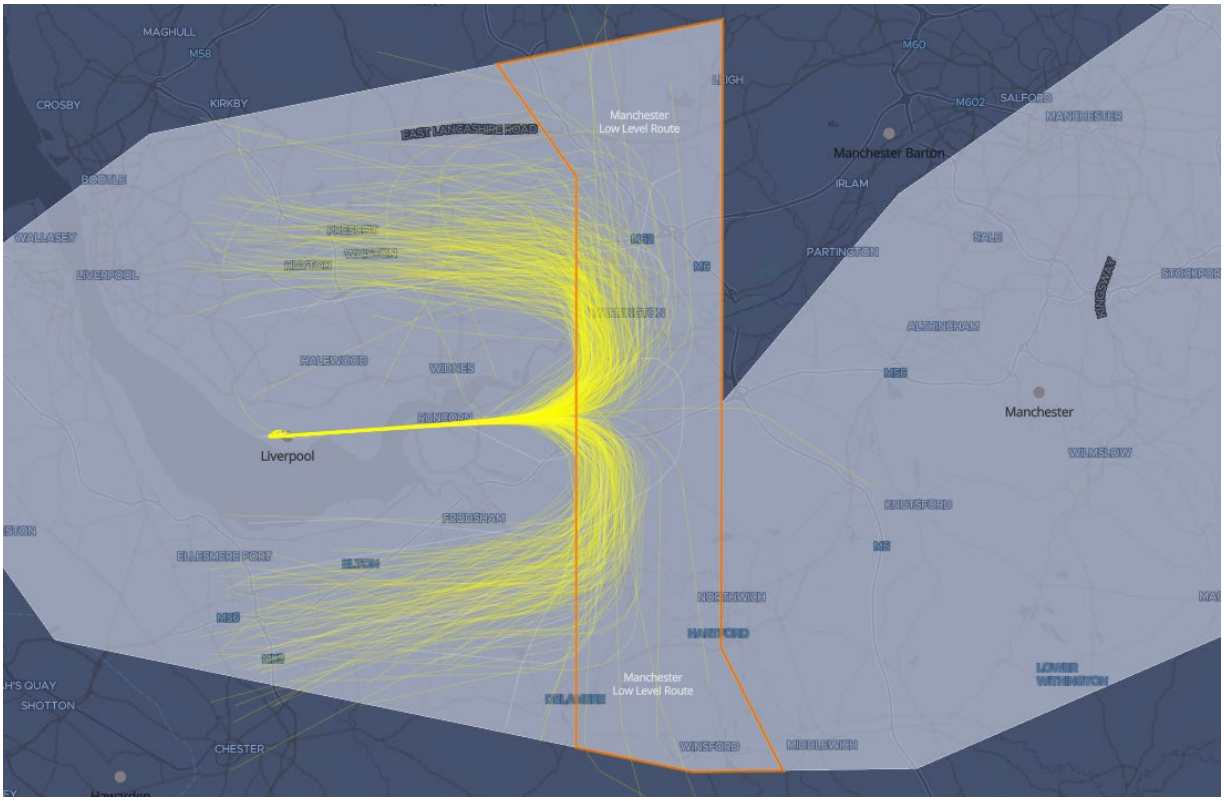

Figure 7 Liverpool Airport's arriving aircraft tracks in yellow above the MLLR (orange highlighted border)

37. The IFR traffic that comes closest to aircraft operating within the MLLR is generally on approach to Runway 27 at Liverpool Airport. There is typically 700ft between these aircraft and the MLLR's maximum altitude, 1300ft AMSL.

38. Pilots within the MLLR will not receive communications regarding Liverpool Airport's arrivals on the Manchester Radar frequency, which they are required to monitor whilst conforming with the ruleset. This may result in pilots being unaware of the proximity of these aircraft. The airspace directly above the MLLR is airspace for which Manchester Airport is the airspace control authority (ACA); however, Liverpool ATC has been granted a special delegation to use this area for control of inbound traffic approaching Runway 27. Manchester Airport's controllers are not permitted to clear aircraft through this airspace without prior co-ordination with Liverpool ATC. This applies to both MLLR traffic requesting higher altitudes and aircraft arriving or departing from Manchester Airport.

Airspace Change Proposals (ACPs) relevant to the MLLR

39. Significant parts of UK airspace are currently subject to ACPs which align to the CAA and Department for Transport's ambition to modernise UK airspace. These ACPs must follow a regulatory process for changing airspace structures and routes in the UK, this is through the CAA's CAP 1616[6] process.

[6] CAP 1616: Airspace Change: Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, an on providing airspace information. March 2021

40. Under the CAA (Air Navigation) Directions, the Secretary of State for Transport has given the CAA the function of preparing and maintaining a co-ordinated strategy and plan for use of all UK airspace for air navigation up to 2040. The objectives for the modernisation of UK airspace are set out in the Airspace Modernisation Strategy (AMS): to maintain and where possible improve safety, the integration of diverse users, simplification of operations and airspace, and environmental sustainability. Therefore, any ACP must be consistent with the AMS including any associated delivery plans. One such plan is the AMS Masterplan, which includes the Future Airspace Strategy Implementation (FASI) Programme.

41. FASI is one of the largest programmes of airspace change in the UK where many airports are re-designing arrival and departures routes from the ground up to 7000ft. Alongside the AMS consistency point noted above, these changes will need to consider extant policies, including the Policy for the Design of Controlled Airspace Structures and the requirement to ensure the volume of controlled airspace is the minimum required to ensure a high standard of air safety. These proposed airspace changes will then also be assessed against the requirements defined in Section 70 of the Transport Act. Any ACP will therefore consider the surrounding controlled airspace that protects arrival and departure routes

42. Both Liverpool and Manchester airports have ACPs in progress as part of the FASI programme. In reviewing the MLLR now, it is our intention to identify near term changes with a view to improving access and transit though the MLLR, prior to the implementation of any future change to the wider airspace implemented via the ACPs.

43. We have therefore engaged with the airspace design teams from these airports and will continue to do so as this work progresses to ensure that we remain aligned. This does not, however, change the fact that the long-term solution to identifying the best options for VFR transits within the Liverpool and Manchester airspace, should be achieved through the opportunity presented by the airspace change process.

More information about the Airspace Modernisation Strategy and the Future Airspace Implementation Programmes are available to view on the CAA website.

Airspace Change Proposals including ones within the FASI programme can be looked up on the Airspace Change Portal.

Safety and the MLLR

44. The CAA continues to strive for the highest aviation safety standards and, as such, certain occurrences, incidents, and accidents are reported. This information can be used to help build a picture of how and why an area of airspace operates as it does.

45. Airspace infringement reports are of particular interest when considering airspace safety and airspace usage, as these events could ultimately result in or lead to a mid-air collision. The composition and design of airspace and how it is represented on VFR charts, will have an influence on the likelihood of such events occurring.

46. Other influencing factors include, but are not limited to, the amount of traffic that uses a particular section of airspace, weather, personnel training, experience, and recency. Although there may be reference to these other factors, they lie mostly beyond the scope of this report.

47. This safety section includes analysis of airspace infringements, Airprox reports and other safety related findings that are relevant to the MLLR and its operation.

Airspace Infringements (AI)

What is an AI?

48. An airspace infringement is *'the unauthorised entry into notified airspace by an aircraft'* where notified airspace is either controlled airspace, prohibited or restricted airspace (permanent and temporary), active Danger Areas (permanent and temporary), aerodrome traffic zones, radio mandatory zones, transponder mandatory zones or a combination of these.

49. AIs have a serious implication on ATC operations and could potentially lead to a number of safety related outcomes. They result in the degradation of safety barriers which could then lead to a loss of separation between aircraft, airprox or mid-air collision.

Airspace Infringement within the MLLR

50. Within the UK flight information region (FIR) and upper information region (UIR) airspace is classified as A, C, D, E and G in accordance with UK SERA, subject to the Differences notified at UK AIP GEN 1.7.

51. For flights in class D airspace, the following apply:

    a. A fight plan is required (in certain circumstances, flight plan requirements may be satisfied by passing flight details via radio to ATC (detailed at UK AIP ENR 1.10);

b. An ATC clearance is required;

c. Radio communications are required; and

d. ATC instructions are mandatory.

52. In the case of the MLLR, the application of the ruleset contained within ORS4 No.1545 and notified in the UK AIP at EGCC AD 2.22 section 7 is mandatory and satisfies a to c above. It confirms to controllers that the pilot will remain VFR within the vertical and lateral confines of the MLLR thereby allowing the flight to be defined as 'known traffic'. The correct monitoring of the Manchester Radar frequency will enable the use of an alerting service if necessary or to facilitate the early resolution of an airspace infringement. In addition, ATC will endeavour to pass traffic information as far as practicable.

53. After the introduction of the ruleset, a significant spike in the number of AIs was observed. Many pilots were not displaying the correct squawk in the MLLR and as such were recorded as an AI. The controller observing this infringement is bound to file a report, in accordance with UK Regulation (EU) 376/2014.

54. Prior to 22nd April 2022, the airspace defined as the MLLR was depicted in the same manner as class G airspace on the 1:500,000 ("half mil") VFR chart by having no shading – as shown in Figure 8 below. This was representative of the fact that for many years no clearance was required to transit through this corridor of controlled airspace. Normally any class D depiction would require shading which would, in turn, alert pilots to the need for a clearance prior to entry. This has now been corrected and is believed to be one reason behind a reduction in infringements in the area. However, at the time of this report's publication, the depiction on 1:250,000 ("quarter mil") VFR maps remain as per class G depiction – with no shading. This is expected to be captured in the next edition release, due in August 2023.

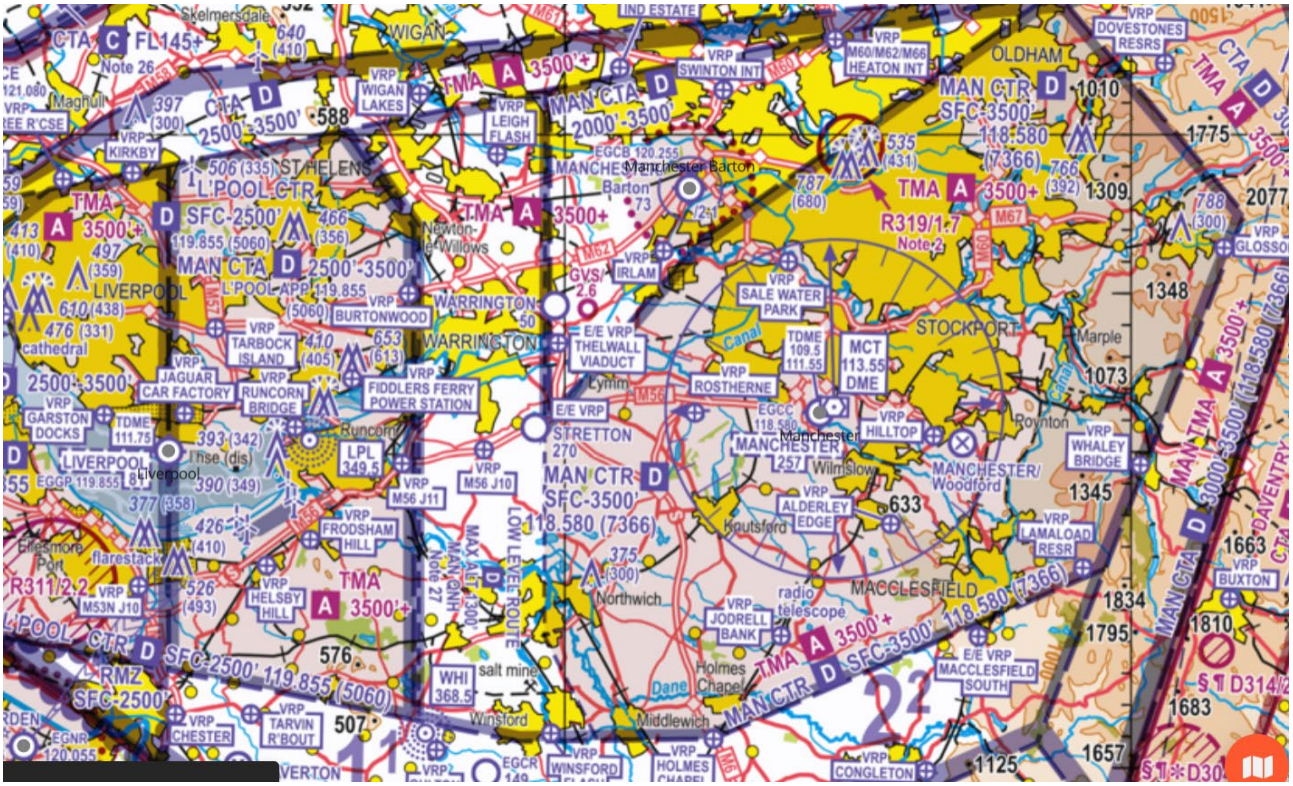

Figure 8 VFR 1:500,000 Chart prior to 22nd April 2022. MLLR is the north south area over Warrington shown with no shading

How an Airspace Infringement affects ATC

55. Air traffic controllers are required to provide a prescribed amount of separation between aircraft under their control (known traffic). Inside class D controlled airspace this separation is applied between all IFR traffic and is either 1000ft vertically *or* 3NM/5NM (distance dependent upon radar coverage and accuracy). VFR traffic in class D airspace is responsible for its own separation from all other traffic and this is aided by “traffic information” transmissions from ATC.

56. When an unknown aircraft enters CAS, an increased separation to that detailed above, must be applied between IFR traffic and the unknown aircraft. The separation criteria required is now 3000ft/5000ft vertically (provided the radar returns do not merge), *and* 3NM/5NM. This increase allows for the fact that the intentions of the infringing aircraft (its height and/or track) are unknown and therefore unpredictable. Extra separation allows the controller more time to avoid the unknown aircraft should it turn or climb/descend towards other traffic under their control.

57. Attempting to apply an increased separation with no advance warning results in a significant increase in ATC workload. This may also then require a change to the wider plans for aircraft under ATC control, sometimes with ‘avoiding action’ or radar vectors being issued to maintain or achieve separation and ensure safety. It is also the responsibility of a class D controller to issue traffic information on the unknown aircraft to VFR aircraft, adding further workload.

58. The establishment and maintaining of this separation minima is not always possible if an aircraft infringes airspace in close proximity to IFR traffic. Should separation not be maintained then this results in a loss of separation (LoS) which significantly affects controller capacity while the situation is resolved.

Effects of an MLLR AI

59. When a pilot fails to comply with the notified ruleset, controllers at Manchester and Liverpool ATC units have no way of knowing the pilot's intentions and thus the separation standards of paragraph 56 must be applied as the aircraft is "unknown" and infringing CAS. As a result, ATC is required to take the necessary action to ensure there is no erosion of safety.

60. As detailed above, the MLLR passes beneath the final approach course to Runway 27 at Liverpool Airport and Runways 05L and 05R at Manchester Airport, both with significantly less than the 3,000 feet vertical separation that is required against an unknown aircraft. Therefore, should the infringement occur in the vicinity of final approach course, any IFR aircraft on that approach will need to be 'broken-off'. This means being turned away and/or climbed to achieve the required separation – having potentially already lost separation.

61. There is no way to differentiate the response to unknown traffic for the MLLR without a serious reduction in safety barriers. These actions are a preventative measure to mid-air collisions with unknown traffic.

Airspace Infringement Data

62. Prior to the introduction of the ruleset in 2020, the only airspace infringements associated with use of the MLLR related to pilots entering the CTR without a clearance above 1,300 feet, or laterally into the Manchester or Liverpool CTR. No clearance or transponder squawk was required to enter the MLLR at this time and therefore it was not possible to infringe the CTR within the MLLR.

63. ORS4 No.1357 and UK AIP EGCC AD2.22 in March of 2020 introduced conditions for flight within the MLLR (as detailed in paragraph 18 above). Failure to adhere to these conditions was not recorded as an AI. The ORS4 and associated UK AIP EGCC AD2.22 were superseded several times with the conditions revised until the current ORS4 No.1545 and AD2.22 were introduced. Reporting of MLLR-specific infringements due to non-compliance with the conditions in UK AIP EGCC AD2.22, commenced in September 2021.

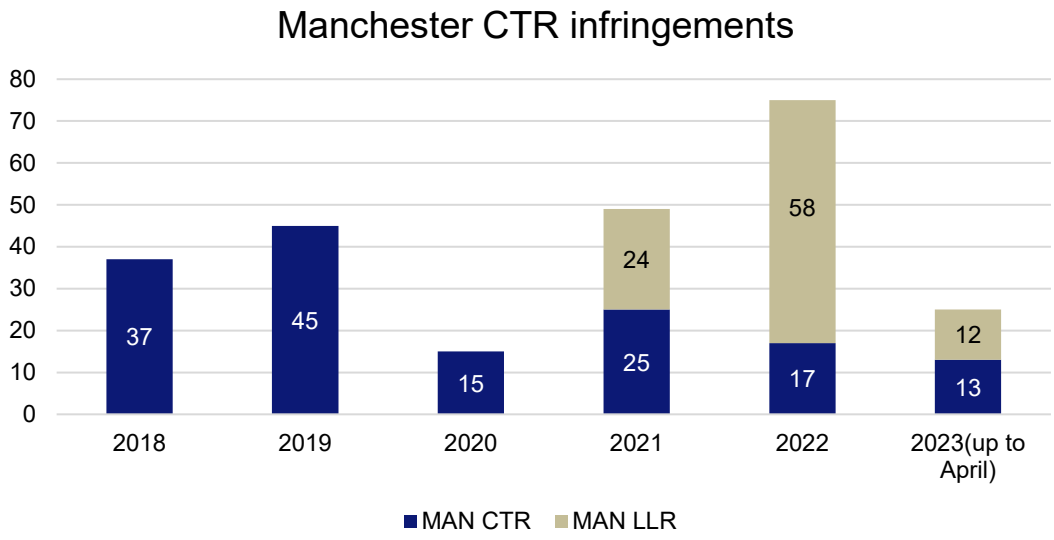

Figure 9 Manchester airspace infringement reporting numbers up to 01/04/23

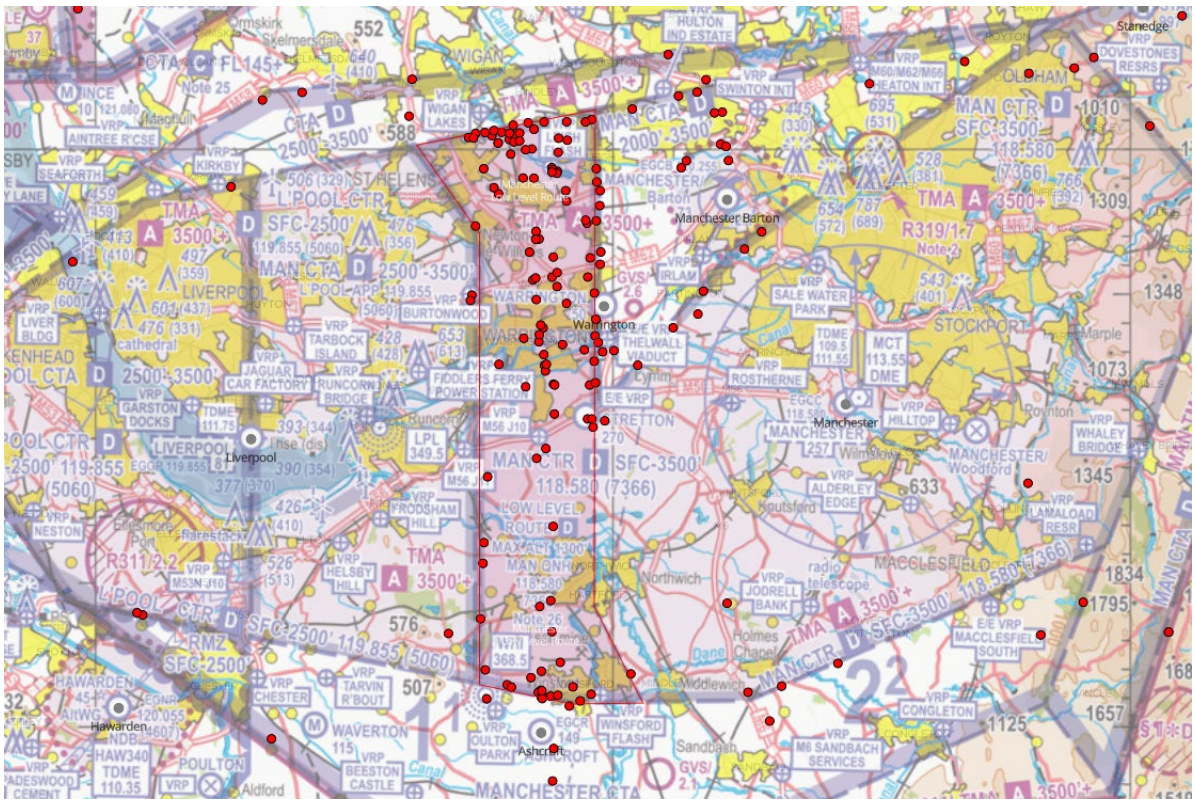

Figure 10 Locations of reported airspace infringements in the Manchester and Liverpool airspace surrounding the MLLR between 1 January 2021 and 1 April 2023 and plotted on VFR Chart Edition 45 (2022). The concentration of events around and within the MLLR is clearly visible.

64. Figure 10 shows the locations of reported airspace infringements in the Manchester and Liverpool airspace surrounding the MLLR post 2021. It can be

seen from this image that there is a clear concentration of events occurring around and within the MLLR.

65. Of the 94 reported infringements of the Manchester CTR within the MLLR, all involved pilots displaying the incorrect squawk, and, in over 60% of cases pilots were also not monitoring the Manchester radar frequency. This constitutes a failure to comply with the conditions listed in the EGCC AIP AD2.22 for entry to the MLLR without a verbal clearance. For the purposes of this paper, our analysis does not include infringements of the CTR above, or to the east of, the MLLR.

66. As previously stated, it is worth highlighting that despite these infringements occurring due to non-adherence to a published ruleset, they are still airspace infringements. The controller has no confirmation that the pilot intends to stay within either the vertical or lateral confines of the MLLR. As a result, ATC are still required to take the necessary action to ensure there is no erosion of safety. Across the 94 cases, there was a notable variety of squawks being displayed, including the Bristol frequency monitoring code, the London Control Non-Standard Flight (NSF) squawk and pilots squawking under a Basic Service with London Information.

67. Feedback from engagement suggests that the difficulties of operating in a busy portion of airspace that is 4 NM wide and surface to 1300ft AMSL vertically, over built-up areas, presents a significant challenge to pilots with regards to workload in the cockpit. Flying through this airspace is often further complicated by the fact that many pilots opt to fly through the centre and at similar flight levels. When this is combined with an unusual and unique ruleset, different to other class D airspace, and which has changed during the lifetime of the MLLR, it is apparent that the current ruleset and its application is a contributory factor to the current number of infringements.

68. In the Airspace Classification Review Team's recent Call for Evidence in support of its broader review of the Barnsley region, multiple responses were received referencing what was perceived to be "punitive reporting" for aircraft entering the MLLR without the correct squawk selected. Figure 11 below shows the decisions by course of action, specifically for Manchester CTR infringements in the airspace notified as the MLLR. All infringements are reviewed in accordance with CAP1404[7].

69. The majority of pilots (68 equating to 74%) received a letter providing educational material, to prevent a recurrence and to close the occurrence. The pilots that received formal training resulted from the pilot having been involved in a previous occurrence, or when the contributory factors indicated that the pilot would benefit from formal training. Of the 68 that received educational letters, none have had a subsequent infringement relating to the MLLR. The decisions by course of action

[7] CAP 1404: Airspace Infringement: review and actions, June 2023

are indicated in the table and figure 11 below and compared with airspace infringements (based on 2022 figures) across the entire UK airspace.

	UK % (2022)	MLLR RELATED AI % (2021-2023)
No AI	10	1
Military – NFA	6	4
NFA	11	2
Educational Letter	50	74
Online Tutorial and Test	3	5
Airspace Infringement Awareness Course	14	12
Training (Ground and/or Flight)	4	2
Provisional Suspension	2	0

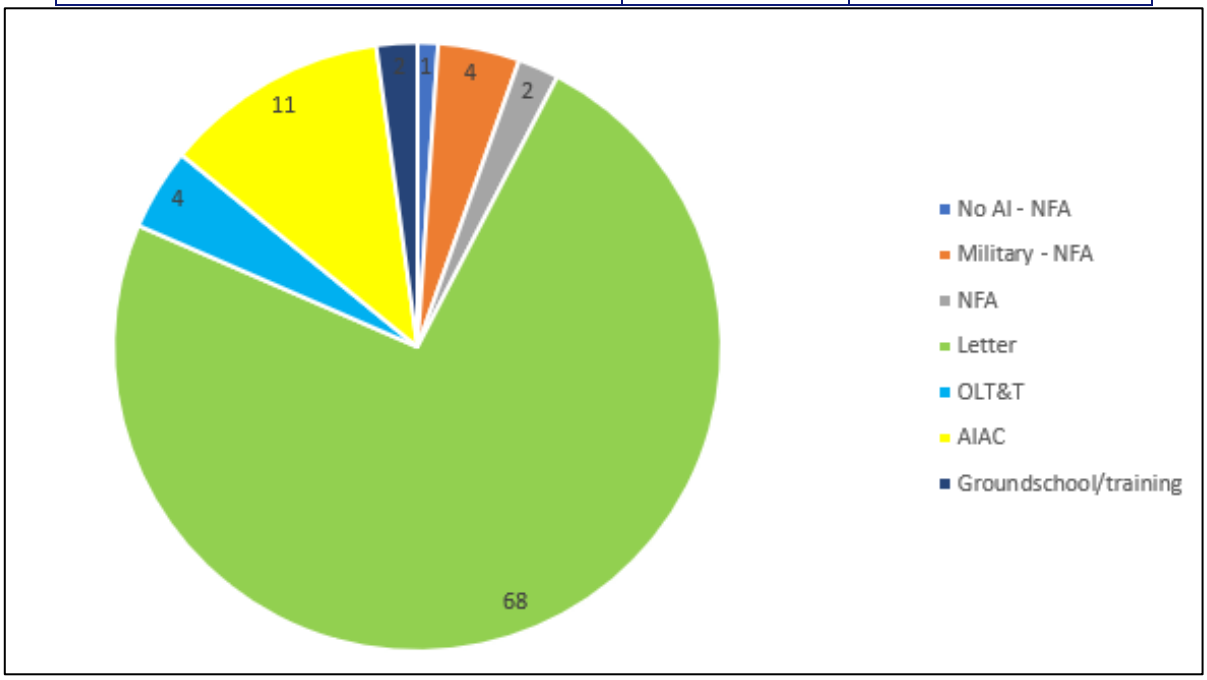

Figure 11 Decisions by Course of Action for Airspace Infringements in the MLLR

Infringement Co-ordination Group (ICG)

70. The CAA's CAP 1404 provides guidance for all activities related to infringements and highlights the CAA's audit and safety assurance functions of the Infringement Co-ordination Group (ICG).

71. The ICG only review reported AI if they meet one of three criteria:

- Direct safety impact
- Results in a safety intervention measure

- Repeat occurrence by Pilot-in-Command (PIC)

72. If it does not meet these requirements, it is not subject to review by the ICG and the case will be closed with an educational letter sent to the pilot in question. These letters can also be an outcome of an ICG review.

73. It is considered necessary to highlight the process and outcomes associated with airspace infringements because of the feedback we have received as part of this review. It is apparent that uncertainty and misunderstanding exists relating to the CAA's process and activities in this area. Further information and detail on the CAA's audit and safety assurance functions relating to airspace infringements can be found in CAP1404.

Airprox

74. An Airprox is defined as "a situation in which, in the opinion of a pilot or a controller, the distance between aircraft, as well as their relative positions and speed, was such that the safety of the aircraft involved was, or may have been, compromised".

75. Each Airprox is evaluated by the UK Airprox Board (UKAB) and assigned a risk of collision category based on the table and definitions below.

76. Risk of collision level assessments are made based on what took place and not on what may or may not have happened. There are four categories, A - D agreed at international level, and one UK category, E, as follows:

A	**Risk of collision: aircraft proximity in which serious risk of collision existed**
B	Safety not assured: aircraft proximity in which the safety of the aircraft may have been compromised.
C	No risk of collision. aircraft proximity in which no risk of collision has existed, or risk was averted.
D	Risk not determined: aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.
E	Met criteria for reporting but, by analysis, it was determined that normal procedures, safety standards and parameters pertained.

77. Whilst Airprox prevention is ultimately the responsibility of the pilot, air navigation service providers (ANSPs) can aid prevention by providing information or instructions and so, when pilots are in receipt of a service from an ANSP, the likelihood of an Airprox event is reduced.

78. The composition of airspace, the way in which it is used and how traffic navigates in and around it can have an influence on the number and location of Airprox events. Airprox can happen both inside and outside of notified airspace, and, by their nature, more often occur where traffic density is higher.

79. At the time of writing, there has been just one Airprox report related to the MLLR, which was assessed as a category A risk of collision (report linked here[8]).This lack of Airprox reports makes it difficult to quantify any conclusions from Airprox related data. From our Call for Evidence and anecdotal evidence that has been collated through engagement activities, it is suggested that a reason for this lack of Airprox reporting is due to pilots expecting to fly in closer proximity to aircraft within the MLLR, when compared to other volumes of airspace. This includes encountering traffic head on and routeing in the opposite direction at a similar altitude. It is also important to highlight that airprox reports are highly subjective and are entirely down to the pilot's perspective of the risk. Expecting to fly in close proximity to other aircraft may bias opinion within the MLLR, away from what may otherwise be filed as an Airprox when flying elsewhere.

80. Airprox incidents are a leading indicator for MAC risk and as such they are taken extremely seriously. The CAA, UKAB and other bodies work together to assess the level of risk that exists and mitigate where possible. In a similar way to airspace infringements, the reduction and mitigation of the risk of Airprox, and hence mid-air collision, are an important consideration of the Airspace Classification Review team and as such we have representation at MAC CG.

Mid-Air Collision (MAC)

81. The consequences of a MAC between aircraft are severe and could also impact persons on the ground.

82. It is apparent from the information presented by AI data and feedback from stakeholders, that concerns exist about both the ruleset and operation of the MLLR, and the risk of mid-air collision.

83. Aircraft are flying VFR within the MLLR and therefore can choose where to fly within the confines of it. The main mitigation to MAC is the maintaining of a see-and-avoid lookout for other traffic. Further mitigation is provided by ATC, subject to workload, passing traffic information to pilots listening out on the Manchester Radar frequency, informing them of conflicting aircraft. A recurring theme from our engagement with MLLR users was that cockpit workload was high whilst navigating the airspace and maintaining altitude awareness which can, at times, compromise lookout.

84. The design of the MLLR and its location results in pilots having to fly over Warrington, a major conurbation, as well as other smaller built-up areas, at a level lower than would normally be required, due to the exemption contained within ORS4 No. 1496[9]. Should an incident in the air occur, such as MAC, loss of control etc, the vertical constraints of the airspace combined with the presence of

[8] The classification of airspace in the Airprox report is incorrectly recorded as class G.

[9] ORS4 No.1496 (caa.co.uk)

these conurbations, make it more difficult to undertake a successful emergency landing without causing undue hazard to persons or property on the ground.

85. Concerns about the MAC risk within this airspace have also been voiced at the CAA's MAC-CG. This is a group of experienced pilots and aviation safety experts working with the CAA and UKAB to reduce MAC risk across the UK. Specific concerns about opposite direction traffic flying at the same level, down the centre line have been raised at this forum.

Engagement

How we have engaged

86. We have employed several approaches to engage with a range of stakeholders who are familiar with the MLLR and how it works. This engagement has included:

- **Our legacy consultation:** We have reviewed the comments about the MLLR from the legacy consultation seeking volumes of airspace to be reviewed under the then, emerging airspace classification review procedure, undertaken in 2019 and have taken these into account in our review.
- **Responses to our Barnsley Call for Evidence:** We have reviewed the responses received as part of our Barnsley Call for Evidence, which provided further insight into stakeholder perspectives on the use of airspace in the region.
- **UK Airspace Access or Refusal of ATS Report Forms:** We have reviewed the refusal of service forms (FCS1522) to identify patterns and areas of concern related to the current use of the airspace.
- **Internal engagement:** We have engaged with numerous internal stakeholders, including Airspace, Air Traffic Management (ATM) and Aerodrome (AAA) Policy teams, Airspace Regulation and ATM Inspectors, and the Airspace Infringement team, to ensure a comprehensive and coordinated approach to the MLLR review.
- **External engagement:** We have engaged with a range of external stakeholders, including the Ministry of Defence, Liverpool John Lennon Airport, Manchester Airport, Manchester Barton Aerodrome, and the North-West Local Airspace Infringement Team (NW LAIT). We have also met with the teams leading the ACP work on behalf of Liverpool and Manchester Airports.

87. We are very grateful to those who have participated in our engagement on the MLLR throughout this process. The quality of responses was extremely high and added significant value. The CAA has a duty to engage on a wide range of issues, and we are cognisant of consultation fatigue – especially with the vast amount of information on airspace and airspace change being made available in recent months. We appreciate the feedback we have received and would like to assure everyone who has participated that it has been considered when reviewing the MLLR and drafting our recommendations.

Legacy Consultation

88. The legacy consultation took place in 2019 and was a UK-wide consultation which asked respondents to alert the CAA to areas of airspace which they felt required further review under the upcoming Airspace Classification Review procedure (CAP 1991). The MLLR procedure was referenced by a small number of respondents citing issues with the dimensions and maximum altitude of the airspace. These comments were in alignment with many received in the call for evidence and, to avoid duplication, are explained in the next section of this report regarding that feedback.

Feedback from our Call for Evidence

89. We conducted a Call for Evidence as part of our review of airspace in the Barnsley region. The purpose of this exercise was to gather the views of stakeholders familiar with airspace in the region, to help us identify volumes of airspace for review and possible amendment. The MLLR sits within the Barnsley region and, as part of the survey, respondents were asked:

Focusing upon the Manchester Low Level Route (MLLR), do you have any comments or suggestions regarding this volume of airspace?

90. The Call for Evidence was open from 14 November 2022 to 8 January 2023 and 109 of the 121 responses received included comment to this question. 90% of respondents were from the General Aviation community, almost 80% of them being fixed wing, 11% microlight and 7% glider pilots. Out of the 109 responses to the question regarding the MLLR, 5 stated that it is functioning well as is, while 104 identified issues and/or provided suggestions for improvement. Overall, the comments proffered were detailed, measured and helpful, although the theme ranged from “it is an accident waiting to happen” to “I think it works well as it is”.

Issues and Concerns Raised in the Call for Evidence Regarding the MLLR

Risk of overflying towns at insufficient altitude

91. Over half of the responses mentioned that, due to the upper vertical limit of the MLLR, it was difficult to avoid overflying towns such as Warrington safely and remain able to ‘glide clear’. Whilst the concern about overflying conurbations at insufficient altitude is valid, of note, any reference to ‘glide clear’ is now out of date, with it having been replaced by SERA.3105[10] (Minimum Heights) in 2014, which in essence, has the same meaning.

[10] SERA.3105 Minimum heights (caa.co.uk)

92. Through a permission and authorisation published within ORS4 1496[11], the CAA has permitted aircraft to be flown below a level which is 1,000 ft above the highest obstacle within a radius of 600 m from the aircraft over the congested areas of cities, towns or settlements if it is operating in accordance with the procedures notified by the CAA for the route being flown.

Proximity to other airspace users

93. Proximity to other airspace users in the MLLR was highlighted as a major cause for concern by a number of respondents.

Monitoring Manchester Radar frequency

94. Having to monitor Manchester Radar's frequency was highlighted as a problem by 10% of respondents. Respondents stated that they would far rather listen out for other MLLR users on another frequency, rather than listen to commercial aircraft landing at Manchester Airport.

Difficulty in acquiring crossing clearances from Manchester ATC

95. 8% of respondents mentioned the difficulty in gaining a clearance to transit through the surrounding class D CAS, with questions raised over whether the airspace is managed in accordance with ICAO Annex 11. Throughout our engagement with users of the MLLR, we have repeatedly been told that "Manchester don't give bespoke crossing clearances" or that pilots simply do not ask for one, as they fully expect to be refused. This topic is discussed in detail in the "Feedback from Airspace Control Authorities" section below. UK Airspace Access or Refusal of ATS Report (FCS1522) forms are explained in paragraph 108 onwards.

Incorrect squawk in MLLR treated as an airspace infringement

96. More than 20% of respondents raised concerns about the MLLR rule change which treats any aircraft not squawking 7366 (or 7367 for student pilots) in the MLLR as an infringer. It is felt by some respondents that this is as an excessive measure. This was addressed in the Safety Section earlier in the report.

Manchester Barton Aerodrome arrivals and departures

97. A large proportion of MLLR users are arriving at or departing from Manchester Barton Aerodrome. Around 8% of users recommended reviewing the airfield's departure procedures or having special agreements in place regarding flights inbound to, or outbound from, Manchester Barton Aerodrome. Being permitted to monitor the Barton Information frequency rather than the Manchester Radar frequency to maintain better situational awareness in busy airspace was suggested as an option to improve matters. A number of concerns were cited about the extremely high cockpit workload for those operating in and out of

[11] ORS4 No.1496 (caa.co.uk)

Manchester Barton Aerodrome and using the MLLR. This requires pilots to adhere to the ruleset, which includes monitoring the Manchester Radar frequency, whilst also needing to make timely communications with the next ATS provider (Liverpool Radar or Barton Information for example) to obtain a positive clearance to enter the relevant airspace.

Lateral boundaries of MLLR

98. 8% of responses suggested reviewing the lateral boundaries of the MLLR to align them with recognisable ground features.

Insight from CAA Colleagues

99. In February 2021 a review of the airspace, and the ATS provided within it, took place between the CAA, NATS Manchester and ATCSL Liverpool. This was to discuss MAC risk, controlled flight into terrain (CFIT), existing procedures and ATM procedures. From this review the ORS4 1545 ruleset was introduced with the intention of mitigating the safety risks involved with the lowering of VMC minima in class D airspace.

100. Conversations were also held with ATS Inspectors for Manchester and Liverpool airports regarding past interactions with the units regarding the MLLR procedure, as well as discussions around potential suitable and appropriate resolutions to some of the issues identified in this report.

101. As part of this review, we have had extensive discussions with the AAA Policy team within the CAA. The AAA Policy team was responsible for the introduction of the ORS4 exemption detailed in paragraph 18-22 above, working closely with the CAA's ATS Inspectors and relevant ANSPs to implement. As well as investigating the reasons behind the change, potential solutions and what options may be available within the regulatory and legal framework of UK airspace were also examined.

102. The CAA's AMS team was also engaged to provide insight into future technologies as well as specific guidance regarding UK AMS policy and what solutions would be possible to align with this. It was confirmed that the MLLR currently aligns with UK AMS policy, by providing a preferred route to cross class D airspace where it is not always possible for ATC to issue a crossing clearance on demand. UK AMS encourages the use of such procedures in the future at other aerodromes.

103. Finally, the CAA's Airspace Regulation team has also been kept up to date on our review of the MLLR, both to help us to remain current with our understanding of the ACPs underway in the region and also to share invaluable feedback from our engagement. This in turn enabled them to have informed conversations with sponsors of airspace change in the airspace surrounding the MLLR.

External Engagement

North-West Local Airspace Infringement Team (NW LAIT)

104. The CAA's Airspace Classification Review Team is represented at LAIT meetings nationwide. These meetings are attended by members of the GA community as well as representatives from, but not limited to, ANSPs, flying groups, clubs and schools, and other CAA departments.

105. The MLLR investigative report has been on the agenda of these meetings as part of the Airspace Classification Review Team update. As such, it has been possible to garner opinion and feedback first hand from members of the flying community who are frequent users of the MLLR.

106. We met with NW LAIT attendees in October 2022 and January 2023 to discuss the MLLR. This meeting discusses AI reduction initiatives and promotes learning and education through active discussion of previous AIs and their contributory factors. Through these meetings many organisations have taken steps to reduce airspace infringements by education and actions. For example, local flying schools and clubs ensuring that the ruleset for the MLLR is highly visible inside their aircraft, as well as a mandatory part of training and briefing for an airfield.

107. At our attendance at the October 2022 NW LAIT we were provided with a paper produced by Future Airspace Strategy VFR Implementation Group Ltd (FASVIG), exploring possible options to improve the MLLR, written in 2017. The paper was written due to the stated concern that "safety within the MLLR was lower than elsewhere". Options proposed within the report included the establishment of alternative VFR routes, increasing the upper altitude of the MLLR and modifying the eastern boundary in the southern portion of the MLLR, by repositioning it 1.5 NM to the east.

Form FCS 1522

108. The UK Airspace Access or Refusal of ATS Report FCS1522[12], enables the CAA to monitor access to airspace and the provision of air traffic services. Pilots can report situations where they have been denied access to airspace or have been refused the provision of an ATS, through the submission of this form. The data captured from these submissions is examined and shared with several departments within the CAA, including:

- **ATS Inspectors**: who liaise with individual Air Traffic Service Units on the facts relating to any denied access or refusal of air traffic service.
- **Airspace Regulation**: who ensure relevant FCS1522 reports inform any relevant Post Implementation Review work of ACPs.

[12] Online portal for Form FCS1522 - UK Airspace Access or Refusal of ATS Report

- **UKAB**: who correlate any relevant FCS1522 submissions against airprox data and reports.

109. In addition, it will be used as part of our airspace classification review process and in reviewing airspace infringing trends. Correct use of the form provides continuous data and feedback to enable the CAA to identify volumes of airspace that may require review under the airspace classification review process.

110. In considering its use, pilots are asked to provide as detailed a submission as possible. Consideration should be given as to whether an instruction to remain outside controlled airspace was a denial of access or a temporary instruction/delay whilst air traffic controllers formulate a plan or coordinate a route due to the prevailing traffic situation.

111. It is important to note that whilst a pilot will submit a report, this process is not akin to an investigation into the circumstances of the report. A review will be conducted, and the information gathered will be used to inform ongoing work. It is important to make this distinction so that there is no misconception around the scope of this process and what its outcomes will be. However, those submitting an FCS1522 will receive feedback on the outcome.

Airspace Control Authorities (ACAs)

112. The ACAs in the region of the MLLR have been key stakeholders throughout this review. Individual stakeholder meetings have been held with Manchester Airport Group (MAG), NATS, the ANSP for Manchester Airport, Liverpool Airport, and its ANSP, Air Traffic Control Services Limited (ATCSL). We visited Manchester and Liverpool airports in person, initially to inform our review and garner facts about the operation of the airspace and later to feed back our findings and seek response to some of the call for evidence points raised.

113. Via our Call for Evidence there was a general belief that Liverpool Airport regularly provide crossing clearances as requested, but Manchester ATC are less likely to do so. We put this to General Manager ATC at Manchester Airport who explained that, “Manchester ATC is amenable to all requests for VFR transits across the CTR; however the volume of Manchester Airport traffic, and the need to provide sufficient room for pilots to navigate safely, taking into account wake turbulence behind heavy aircraft types, means that pilots can sometimes experience delays in crossing the runway centrelines, and therefore transiting via the MLLR will often be the most expeditious routing.”

114. The AMS includes a provision to consider equitable access for all airspace users and to ensure that the amount of CAS is kept to the minimum necessary for the safe provision of ATS. However, the AMS also highlights the need to ensure safety for commercial air transport flights, and the need for an appropriate balance to satisfy both the safety and economic requirements of the various types of (at times, conflicting) user operational requirements.

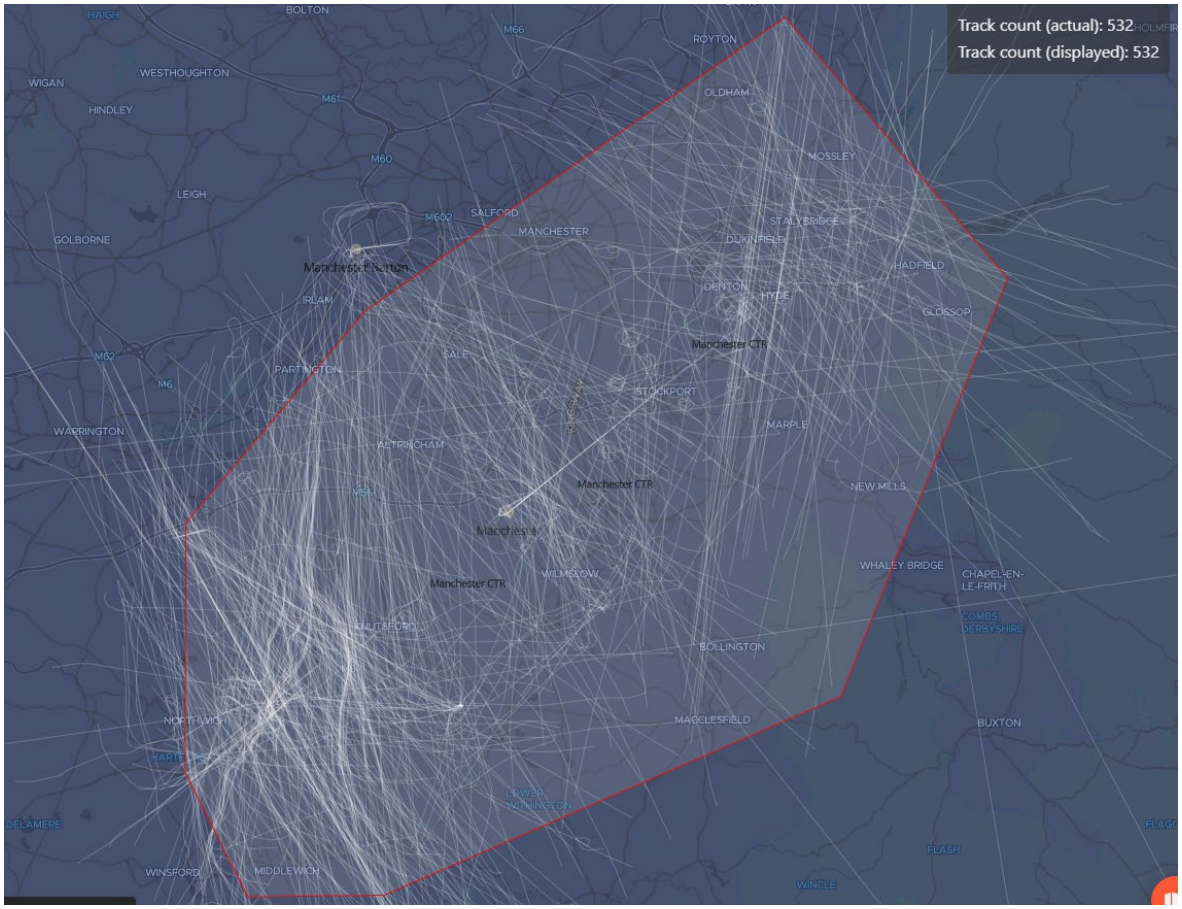

Figure 12 An AAT screenshot displaying aircraft tracks crossing the Manchester CTR from surface level to altitude 3,500ft. The movements shown have been filtered to not show air ambulance or police helicopter flights but will include infrastructure inspection flights (such as pipe/power line inspections).

115. The image in Figure 12 displays the tracks of all flights captured by the tool crossing the Manchester CTR for the calendar year of 2022, operating between surface and 3500ft AMSL (the vertical dimensions of this volume of airspace). The total number of flights tracked is 532. In comparison, the AAT showed the MLLR, despite the vertical constraints of the volume, was used almost 5000 times over the same period in 2022 (see Figure 4).

116. Feedback received through multiple forms of engagement with stakeholders conveyed a belief that “Manchester never give crossing clearances”. Whenever a crossing clearance is refused, we would encourage pilots to complete and submit a Form FCS1522 to report the event and allow it to be reviewed.

117. It is cannot be determined whether this relatively low number of tracks crossing the Manchester CTR relative to those transiting through the MLLR is due to the existence of the MLLR offering a simple procedure to cross (i.e. no ATC contact required), whether pilots are being refused a crossing clearance, or whether other factors such as the belief that “it’s not worth asking to cross this airspace as you won’t get a clearance” is shared and prevents pilots requesting to cross.

118. Four FCS1522 reports have been submitted in relation to the airspace around the MLLR.

119. The first report was submitted in 2020 and states that the pilot requested a transit of Manchester Airport's CTA and CTR (routing Wigan Lakes VRP to Holmes Chapel VRP), this was refused due to a conflict with an arrival, and the controller suggested that they descend and use the MLLR. The pilot stated that they were aware of the MLLR but felt that flying at 1100ft over a built area was an unnecessary risk. This was acknowledged by the controller who subsequently gave them an alternative transit (Stretton VRP to Holmes Chapel VRP), which the pilot accepted. Whilst the original transit request was refused, from the pilot's report, it is apparent that an alternative routing was suggested that allowed the pilot to transit the airspace without having to use the MLLR. Unfortunately, this report was submitted in 2020 and this was before the Airspace Classification Review team had ownership of the process for dealing with FCS1522 reports. At the time there was no mechanism to get any feedback from specific ANSPs on the details. As such, no feedback from the ANSP is available against this specific report.

120. The second report was submitted in 2022 (when a process to gather feedback from ANSPs was in place) and states that the pilot was refused an IFR transit of the Manchester CTA. The pilot reports that they were flying in poor conditions at the time and felt that the traffic levels did not warrant the refusal. Feedback from the ANSP states that the routing requested by the pilot would have necessitated a check on eastbound departures, as it was not guaranteed that 5NM/1000ft separation would have been achieved, especially against slow climbing heavy aircraft. The ANSP also fed back that the perceived lower level of traffic by the reporting pilot would have been due to the departing aircraft being on a different frequency and that the controller was not aware that the pilot was experiencing poor conditions as this was not communicated. They stated that had this been the case, they would have endeavoured to assist.

121. Two reports were submitted in June 2023, both by the same pilot, having been refused permission to transit the Manchester CTR on two separate flights; one south to north and one north to south. The pilot reported that they wished to avoid descending into the MLLR due to low level turbulence, reduced safety and increased fuel consumption for the aircraft type that they were operating. For both transits they were looking to maintain between 3,000 to 4,000ft, but were happy to accept any routing. Due to these reports being submitted in June, we do not yet have any feedback from the ANSP for inclusion in this report. Initial analysis conducted using the Airspace Analyser Tool suggests that Manchester had a series of arrivals and departures, appearing to support their inability to provide a transit clearance, however, we await response through normal channels.

122. Whilst the four FCS1522 reports mentioned above present evidence of difficulties in obtaining a transit at the requested altitude and routeing, as well as the pilots'

reported discomfort (in these instances) of using the MLLR due to safety concerns, we are unable to quantify with further evidence how difficult it is to get a crossing clearance from Manchester ATC. Our use of the AAT to investigate these FCS1522 reports, indicates that Manchester did have departing and/or arriving traffic at the time of these crossing requests.

Ministry of Defence (MOD)

123. The MOD has been contacted to discuss a future solution which ensures military jets, as well as larger MOD aircraft such as transport aircraft, where wake turbulence could become an issue, would not use the MLLR. It has been agreed that an update to the military Low Flying Handbook, with associated detail added to the AIP, would likely be a possible way to enforce this. This willingness to work with us is representative of the Joint-and-Integrated approach to aviation, which exists between the CAA and MOD.

Issues and Risks Identified

124. After reviewing the data and stakeholder feedback gathered during our comprehensive analysis of the MLLR, we have identified a number of key issues and risks which warrant further consideration. This section provides further detail on each of these.

Mid Air Collision (MAC) Risk

125. This is the most serious potential outcome of any of the issues identified with the MLLR. It has the potential to be fatal to both those in the air and on the ground. Minimising the risk of a MAC is a high priority for the recommendations of this report.

126. The CAA recommends the application of the 'Take 2' initiative. This applies to both the pilots of aircraft outside of controlled airspace, as well as air traffic controllers controlling aircraft within controlled airspace. This advice, which encourages pilots to plan to remain 200ft from the base of controlled airspace and/or 2NM from the edge, is intended to provide a safety barrier between flying operations in either side of the controlled airspace boundary, wherever possible. However, in the case of the MLLR, which is 4NM wide, by 'taking 2' it could have the unintended result of encouraging aircraft to route down the centreline and potentially increasing the MAC risk within the area. It must be stressed that the 'Take 2' initiative is not a rule and if it is unsafe to apply this separation, then pilots should not do so.

Moving Map Software

127. The advent of pilot GPS navigation and use of VFR 'moving map' software has enabled pilots to increase their navigational situational awareness when used appropriately. It is important to note that moving map apps are not regulated by the CAA, and users should remain aware that the depiction of aeronautical information on VFR moving maps may be different to the UK Aeronautical Information products accessed via the NATS AIS website, such as VFR charts, the UK AIP and NOTAM information.

128. In the case of the MLLR at 4 NM wide, there is an increased possibility of the same route being flown in a reciprocal direction. This leads to airspace users flying a common track and in turn increasing the risk of a MAC event with opposite direction traffic, or when a fast aircraft follows a slower aircraft through the MLLR. This risk is exacerbated due to the limited altitudes available as a result of the physical constraints of the airspace. Recent updates to some moving map platforms have resulted in the MLLR ruleset now being notified within the

application, either through information boxes or displayed on the map itself. The CAA welcomes this move as an aide-memoir to pilots helping to reduce the risk of airspace infringement.

Options to Improve Operations within this Airspace

129. Through our analysis of the MLLR and the valuable insight and suggestions proposed via our various forms of engagement, we have identified a range of options to potentially improve operations within the MLLR. We have carefully evaluated each of them, considering safety, airspace classification rules and operational feasibility.

130. In this section, we outline these options and explain our conclusions on if and how they could be implemented. While some options may seem initially appealing, often technical, or regulatory limitations render them unrealisable.

Conversion to Class G Proposal

131. It has been suggested through feedback received in this review, as well as the original suggestion within the ORS4 relating to the MLLR, that the possibility of converting the MLLR to class G airspace be examined.

132. This suggestion would reduce the number of airspace infringements within the MLLR as the complexity of class D and the current ruleset would no longer be a factor. It would, however, not eliminate all AI in the area as the Manchester CTR and CTA airspace structures could still be infringed.

133. However, several new issues could be caused by this conversion and these are explored below:

Speed Restriction

134. Class G airspace requires pilots operating below 10,000ft AMSL to not exceed 250kts IAS. Currently the 140kts max IAS restriction contained within the ruleset, mitigates the MAC risk by providing more time for pilots to see-and-avoid a collision. Whilst the same 250kts restriction applies to class G airspace elsewhere in the UK, where see-and-avoid is also used, these areas are not typically limited by a 4 NM wide corridor and a maximum operating upper vertical limit of 1,300ft over built up areas as is the case in the MLLR currently. By removing the speed restriction, the risk of infringement could increase with:

- Higher energy turns made at higher speeds to avoid other traffic
- Late see-and-avoid manoeuvres which may result in aircraft turning late and/or climbing further, leading to an inadvertent entry of controlled airspace

135. The current speed restriction also reduces the potential speed differential between aircraft types within the corridor. It also limits the size of aircraft using it as larger aircraft cannot typically cruise at such speeds. By removing the speed restriction, the route may become accessible to larger aircraft types, such as business jets

and A400M military transport aircraft. This could potentially make other pilots take a larger separation than they would against a small aircraft and the potential implications of wake turbulence may also become a safety factor. Additionally, the potential for an overtake by aircraft travelling in the same direction (therefore using more of the width of the airspace) is increased. All of these factors may result in taking more separation and likely therefore more of the width of the corridor. Removing the speed restriction may also increase the overall number of users in the MLLR which again increases risk by having more aircraft in a small volume of airspace.

136. The one significant Airprox within the MLLR referenced earlier in this report (2018083) involved a high speed differential between the aircraft involved. Increasing the potential speed difference could possibly increase the risk within the MLLR.

137. One potential mitigation to some larger and faster military aircraft is that, through our close collaboration with MOD, it has stated it would be willing to work with us to improve safety within the MLLR. Whether this could be achieved via reviewing operations within Low Flying Area 8, within which the MLLR sits or through other means would be subject to further discussion., but it is something that MOD is supportive of reviewing. This does not, however, apply to any civilian pilot flying a larger and/or faster aircraft through the airspace.

QNH difference

138. Outside controlled airspace pilots select an appropriate local QNH[13] upon which to base their altitude. Should the MLLR become class G there is a chance that, without the aide-memoir of entering controlled airspace or notes on a VFR chart, some pilots may remain on an incorrect QNH when flying within the MLLR.

139. Defining an appropriate local QNH is also problematic. Currently the airspace of the MLLR sits within the Manchester CTR which exists (as all CTRs must) from surface level. Therefore, should the airspace of the MLLR become class G, any airspace above the CTR must be renamed and become a CTA. When operating in airspace below terminal manoeuvring areas (TMAs) and CTAs listed in the AIP at ENR 1-7-2, pilots must use the QNH from an adjacent aerodrome when at or below the transition altitude. In the case of the MLLR it would be reasonable for pilots to choose either Liverpool or Manchester QNH as both are adjacent. Due to the proximity of these airfields, it is highly likely that both are operating on the same QNH, however the risk does remain that, on occasion, an aircraft may inadvertently penetrate airspace above by selecting a Liverpool QNH which differs from that of Manchester.

[13] QNH Is a pressure setting used by pilots, ATC and low frequency weather beacons to refer to the atmospheric pressure at sea level in an area

140. We explored the historic differences in QNH between these airports, by analysing the QNH on the 1st day of the month for 2022, from Liverpool and Manchester METARs (Meteorological Terminal Air Report). From our study, the QNH mostly matched and if a difference did exist, it wasn't more than one hectopascal. A more in-depth study of this QNH data would be required as part of a safety case should this be pertinent to an airspace change proposal. Our findings are presented at Figure 13 below.

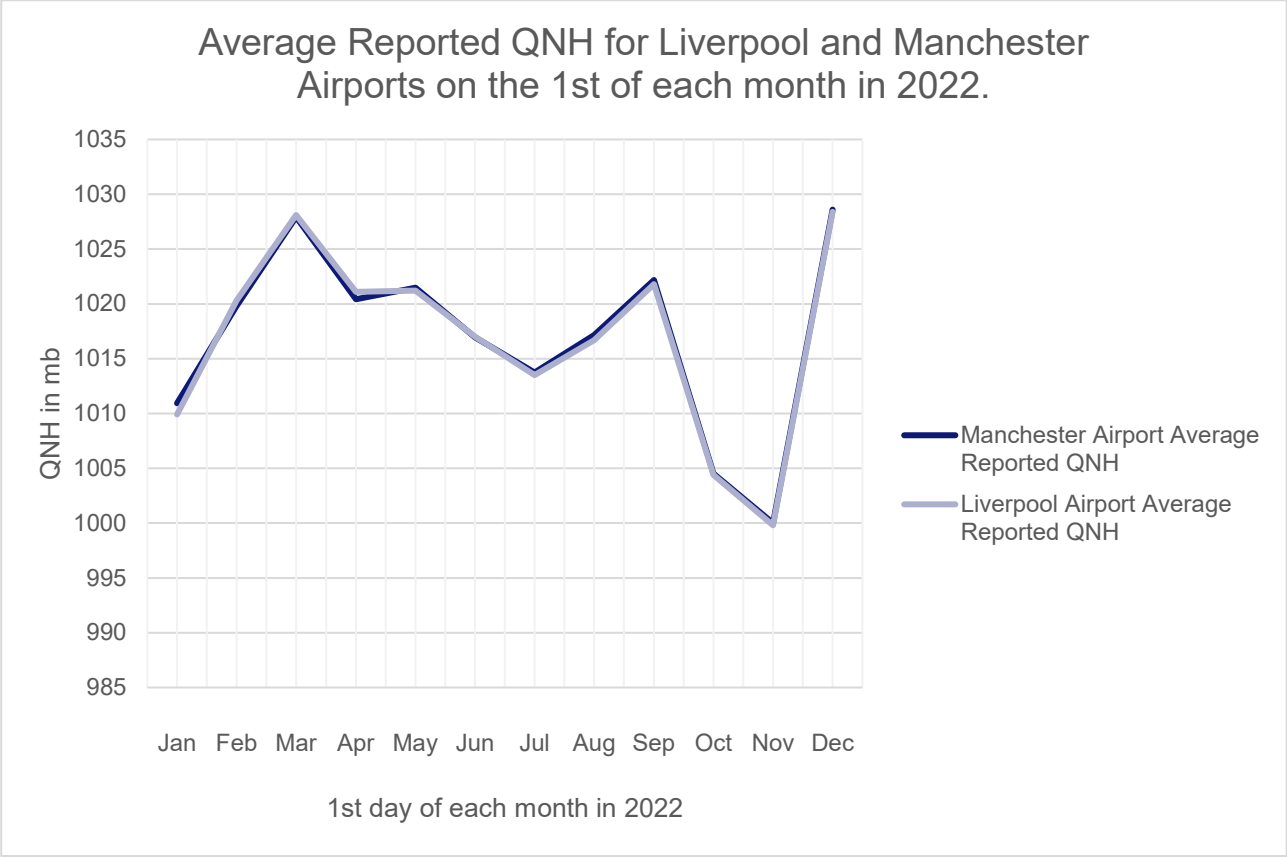

Figure 13 This chart displays the average reported QNH (altimeter setting) for Liverpool and Manchester Airports on the 1st of each month throughout 2022.

Raising the Upper Vertical Limit of the MLLR

141. Raising the upper vertical limit of the MLLR has been investigated as a possible remedy to some issues associated with the MLLR.

142. Due to the proximity of Liverpool Airport and the arrivals for the predominant runway in use, Runway 27, it is not possible to significantly increase the upper vertical limit. Arrivals for Runway 27 must descend to 2000 ft AMSL above the MLLR, to intercept the glidepath element of the instrument landing system (ILS). This low altitude also ensures Liverpool Airport's arrivals are beneath other traffic in the area being radar vectored for an arrival at Manchester Airport. It is therefore not possible to increase the altitude of Liverpool Airport's arriving traffic.

143. Despite the close proximity of Liverpool Airport's traffic, raising the upper vertical limit of the MLLR by 200ft to an altitude of 1,500ft AMSL is a potentially acceptable solution and will be investigated further. This would result in a 500ft buffer between MLLR traffic and Liverpool Airport's Runway 27 arrivals (which conforms to current Containment Policy requirements) and a 2NM buffer from the western edge of the MLLR before this ILS traffic will descend below 2,000ft on final approach. This proposal would require further investigation and agreement by Liverpool ATC and the CAA, but initial discussions support this possibility.

144. Raising the upper vertical limit of the MLLR would mean reducing the existing vertical separation between MLLR traffic and Liverpool Airport's arriving traffic (also applicable to Manchester arrivals). It would, therefore, be imperative that correct QNH was applied to maintain the minimum 500ft buffer accurately (Manchester would have a larger buffer of a minimum 1000ft). Any vertical airspace infringement would also have less protection from this reduced buffer, and should an infringement occur, the aircraft will already be 200ft closer than what is considered an infringement today providing less time for avoiding action to be taken by ATC. The use of airspace infringement alerting software within radar display systems may help to mitigate this risk.

145. The current MLLR section of UK AIP EGCC AD 2.22 warns pilots of the possibility of wake turbulence, particularly when flying in the vicinity of the Liverpool and Manchester extended centrelines. By reducing the vertical distance between the MLLR traffic and commercial traffic above, it is necessary to take into consideration the possible increased effects of wake turbulence from larger aircraft above.

146. Wake turbulence descends from its point of creation which potentially could affect the safety of smaller aircraft then having to fly through it. This problem would be the greatest from Liverpool Airport's arriving traffic, where MLLR aircraft could potentially just be 500ft below the arriving traffic. Currently aircraft in the MLLR are required to monitor the Manchester Radar frequency which may not provide the best solution to provide traffic information as a mitigation to wake turbulence. Any solution implementing a raised upper vertical limit would have to explore the effect of wake turbulence prior to implementation.

Changing the lateral boundaries

147. Both ATC providers and respondents to our call for evidence have suggested a change to the lateral boundaries of the MLLR.

148. Should a change occur to the lateral boundaries, resulting in interaction with IFPs or associated containment, it would then be out of scope for the Airspace Classification Review Team's work.

149. A potential alignment of airspace boundaries with geographical features could align with the suggestion by the European Action Plan for Airspace Infringement Risk Reduction.

Conversion to Class E Airspace

150. Converting the airspace to class E may be a potential solution. This would permit aircraft to remain VFR whilst crossing the airspace, however it is likely that a new 'ruleset' would be required to enter this classification of airspace, as class E is controlled airspace.

151. Class E airspace cannot extend below altitude 700ft AMSL. Therefore, any proposal to change the airspace to class E would also have to involve reclassifying the airspace from surface to 700ft as class G uncontrolled airspace. Class E would begin at 700ft AMSL and extend upwards for only 800ft to a suggested newly raised upper vertical limit of 1,500ft. This could therefore introduce a risk of airspace infringements into the new class E airspace from aircraft operating beneath it. Also, any class G airspace could see the introduction of the issues raised in earlier sections of this report.

152. Class E airspace also has different VMC minima for VFR flight to class D which, despite class E being less restrictive in terms of ATC service provision, creates a conundrum with the VMC minima being more restrictive. Class E requires aircraft to remain 1,000 ft vertically and 1,500m horizontally from cloud. This will restrict the use of the MLLR from its current operation as pilots are less frequently able to adhere to these minima. This could also lead to an increased workload for ATC, from pilots requiring avoidance of cloud. Airspace infringements are also a possibility if pilots cannot obtain the necessary clearance in time and enter the airspace of adjacent ATS providers without it. It may be possible to reduce the VMC minima in line with that used for class D airspace below 3,000 ft via a change to SERA.5001 (VMC visibility and distance from cloud minima).

Introduction of a Transponder Mandatory Zone (TMZ)

153. Stakeholders have proposed that a transponder mandatory zone (TMZ) be implemented in the MLLR as a measure to reduce the risk of mid-air collisions. The aim of the TMZ would be to enhance situational awareness for both airspace users and service providers by providing a recognised air environment.

154. A TMZ is intended to improve the conspicuity of aircraft operating within or in the vicinity of complex or busy airspace, without the need for a more restrictive classification of airspace. This approach aims to maintain a balance between safe and efficient operations, while ensuring equitable access for all airspace users.

155. UK policy on TMZs requires carriage and operation of a SSR Mode S transponder. The CAA has highlighted that, where SERA.6005(b) refers to an ANSP's ability to make alternative provisions for flight within a TMZ, this can include alternative forms of EC; for example ADS-B. However, at present, the controlling authority (NATS Manchester) lacks the capability to receive ADS-B transmissions, which would need to be addressed if ADS-B were deemed a suitable level of equipage in the MLLR. Future deployments, such as TIS-B

(Traffic information Service – Broadcast, where flights broadcast their position data), which involves the transmission, receipt, and re-broadcast of suitable EC emissions, may provide additional mitigation to the risk of mid-air collisions in relevant volumes of airspace.

Preferred Crossing Routes

156. The AAT indicates that the MLLR is well utilised, identifying just under 5,000 flights using it in 2022. It may be possible to reduce this volume of traffic if Manchester and Liverpool ATC units are able to offer alternative crossing solutions. The promulgation of information on routes that would be preferred for ATC and therefore more likely to result in a crossing clearance may achieve this reduction and therefore associated MAC risk within the airspace.

157. Feedback received through our Call for Evidence as part of our review into the Barnsley region suggests that currently pilots are likely to be refused an ATC clearance by Manchester Radar when requesting a bespoke crossing clearance and are instead advised to use the MLLR. Whilst the MLLR provides crossing functionality of the CTR, it is felt by many in the GA community that, were an alternative crossing service to be offered by ATC, this would be of great benefit to pilots wishing to avoid overflying the built-up area of Warrington or those wanting to remain at a higher altitude.

158. Preferred crossing routes could reduce the amount and length of radio transmissions required to facilitate a crossing clearance. This would help to controller workload and reduce the likelihood of them being unable to make time critical radio transmissions – and the potential safety risks that can arise from this. However, due to the all-day nature of the Manchester Airport operation, it is impossible to predict workload accurately in advance, making it difficult to approve crossing clearances requests within specific hours.

Air-to-Air Discrete Frequency

159. The current ruleset requires MLLR users to monitor Manchester Radar on 118.580MHz. MLLR users have suggested that awareness of other users, sometimes routeing opposite direction and at a similar level, would be preferable to listening to commercial aircraft landing at Manchester Airport. This could potentially be achieved by the introduction of a discrete air-to-air frequency, enabling pilots operating within the MLLR to alert other users to their position, routeing and altitude.

160. Initial investigations into the feasibility of an MLLR discrete frequency revealed that most pilots flying within the MLLR do so with only one radio. Further investigation showed that Manchester ATC also make safety-critical traffic information transmissions to MLLR users and therefore require aircraft on their

frequency. This would not be possible should a discrete frequency be operated and therefore the idea has been discounted.

CAA Preferred Options to Improve Operations within the MLLR

161. The long-term solution to identifying the best options for safe and uncomplicated VFR transits within the Liverpool and Manchester airspace, can only truly be achieved through the design opportunity presented by collaboration between these airports, NATS En Route Plc (NERL), and their associated airspace design teams. These conversations are happening as part of the ACPs within the FASI North activity, and the CAA will continue to encourage equitable access to be factored into any future airspace change. However, this does not present a short to medium-term fix. Therefore, we will work with all stakeholders with an interest in the MLLR, to examine the feasibility of progressing the following, as a short-term improvement, whilst recognising that the long-term solution for improved VFR transits, must come from the implementation of the ACPs, as the respective airports revise their CAS:

- Making the airspace class G with a defined portion of the airspace notified as a Restricted Area (RA).

  - Due to the airspace being used for VFR flight it is important to use an obvious visual reference point for the RA. The M56 motorway runs east-west beneath the MLLR airspace, and it is proposed to use this visual marker to delineate an area to the south of the motorway which will become class G RA. The M56 also aligns well with other airspace boundaries in the area. Of note, there is another east-west motorway, the M62 situated around 5 miles north of the M56. Should a misidentification of the motorways occur, this would not be a safety concern due to it being ‘fail-safe’ as pilots would adhere to the conditions of the restricted area for longer than required. A northbound transit would, at worst, apply the RA criteria for too long after leaving it, and a southbound transit would apply the criteria too early upon reaching the northerly M62. No change would occur to the southern boundary from today’s airspace design.

  -The restrictions may include, but may not be limited to, a max speed of 140 kts through the narrowest portion of the airspace, where the most restrictive funnelling occurs and a requirement to operate on Liverpool QNH. The reasoning being that a reduction in speed would mitigate the MAC risk and ensuring that pilots operate on the Liverpool QNH to remain clear of CAS and the traffic inbound to Liverpool Airport RW27 within it.

- Raising the upper vertical limit of the MLLR by 200ft from 1300ft AMSL to 1500ft AMSL.

- We have also requested that the NW LAIT provides expertise to review VRPs in the airspace, particularly with a view to assisting in prevention of AI. If we can safely extend the lateral boundaries south of the M56 and incorporate useful VRPs to assist with visual references, this might address the inability to 'Take 2'. This request received a positive response at the NW LAIT, which met in April 2023.

Next Steps

162. The Airspace Classification Review Team, through extensive engagement and analysis of the MLLR and surrounding airspace, has identified that steps can and should be taken to improve the operation of the MLLR. After considering numerous different options, all captured above, the following actions and next steps will take place:

- Working with Liverpool and Manchester airports, NERL and their associated airspace design teams, and via continued engagement with the NW LAIT, the impact of converting the MLLR to class G will now be taken through to the Amend phase of the CAP 1991 process, as will raising the current 1300ft AMSL upper vertical limit to 1500ft AMSL. Both actions will require additional safety analysis and Hazard Identification sessions to be carried out, prior to submission of a CAP 1991 amendment.
- Further internal work with relevant departments within the CAA will also be required to ascertain whether a speed restriction might be applied to the airspace south of the M56, if we were to convert it to class G.
- Progress the VRP review work in conjunction with the NW LAIT, to establish whether additional gain can be achieved from an AI perspective, whilst also attempting to expand the lateral dimensions of the MLLR, subject to surrounding CAS.

Appendix A – Airspace Change Proposal Activity

A-1. The ACPs we have focused on in this section are typically proposed changes to airspace between the ground up to 7000ft. As explained in the report, the MLLR is situated between the two major airports in the region: Manchester and Liverpool. Both airports are sponsoring ACPs which are included below.

Manchester Airspace Modernisation – Departures & Arrivals (FASI) (ACP-2019-23)

A-2. Manchester Airspace Modernisation – Departures & Arrivals (FASI) (ACP-2019-23) is proposing to:

- Modernise arrivals and departures operating to and from the airport up to 7000ft.
- Modernise the surrounding controlled airspace up to 7000ft.
- Phase out old ground based navigational equipment.
- Increase the use of new technologies such as satellite navigation.
- Coordinate proposed changes with neighbouring airports.
- Ensure any proposed changes connect into the higher-level airspace network above 7000ft.

A-3. Manchester Airport's ACP is currently at stage 3a of the CAP 1616 process, which is the ''Consult' stage. During this stage the ACP sponsor will prepare for and launch its formal consultation with stakeholders. The sponsor will be preparing consultation documents such as the full options appraisal detailing evidence of the chosen options that are being proposed. A full indicative timeline of this ACP cannot be confirmed at this current time, for more information please check the Airspace Change Portal.

A-4. The current design of Manchester's Airspace is shown in Figure A1: below;

Figure A1 Manchester airspace

Liverpool Departure and Arrival Procedures (ACP-2015-09)

A-5. Liverpool Departure and Arrival Procedures (ACP-2015-09) is proposing to:

- Modernise arrivals and departures operating to and from the airport up to 7000ft.
- Phase out old ground based navigational equipment.
- Migrate towards satellite-based technology.
- Seek to systemise the operation of the airspace.

A-6. Liverpool Airport's ACP was paused at Stage 4 of the CAP 1616 process during the COVID-19 pandemic. Liverpool Airport has recently re-started this ACP, and is re-visiting its Stage 2 work (Stage 2 is the 'Develop and Assess' stage). This is so that Liverpool Airport can synchronise its proposed changes with other ACP sponsors such as Manchester Airport and NATS Enroute Plc who have a vested interest in ensuring the surrounding airspace works for all. The re-visit will focus on any changes that neighbouring airspace change sponsors have made along with the Airspace Change Master Plan. Such changes have the potential to influence the final design options for Liverpool Airport.

A-7. Liverpool Airport's current airspace is shown below.

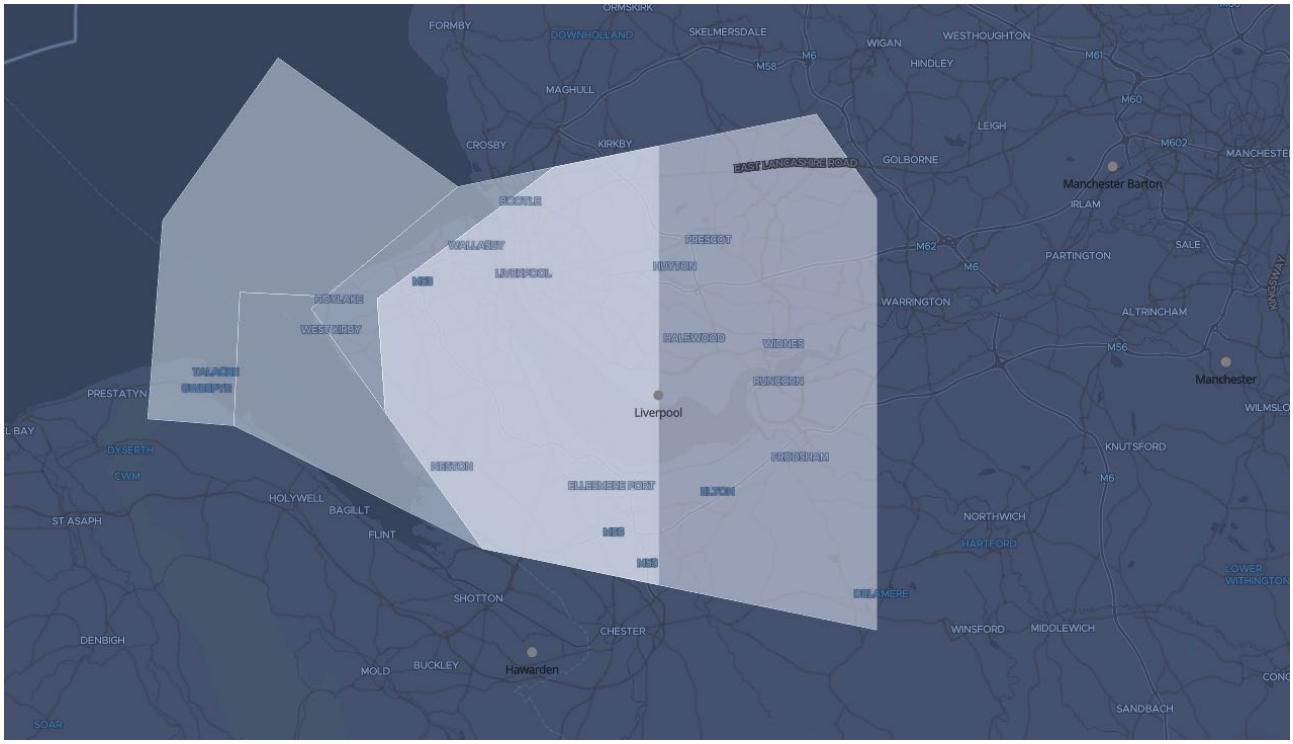

Figure A2 Liverpool existing airspace

Liverpool Airport RNAV (Required Navigation) Substitution (ACP-2022-066)

A-8. The 'Whitegate' (WHI) Non-Directional Radio Beacon Figure A3 is used by commercial operators for navigation is being switched off and removed. This ACP is looking to enable continued use of an affected departure route from Liverpool airport which uses the 'WHI' beacon.

A-9. To enable continued use of the affected departure procedure, Liverpool will look to overlay satellite navigation data on top of the existing departure route using the guidance set out in CAP 1781.

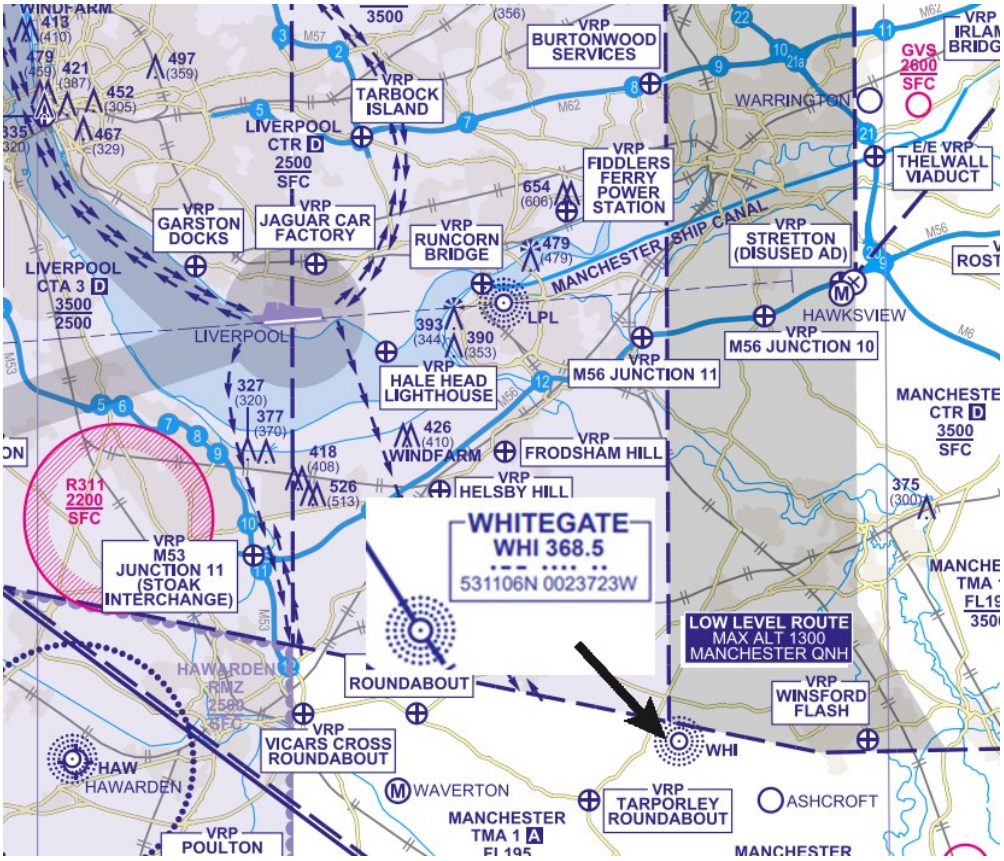

Figure A314 Airspace Map showing location of WHI NDB and MLLR (grey shading)

A-10. Liverpool's ACP is currently at the 'Define Gateway' of the CAP 1616 process, which is the last part of Stage 1. At the Define Gateway, the CAA will review and sign off any documentation relating to Stage 1 of the ACP. A full indicative timeline of this ACP cannot be confirmed at this current time, for more information please check the Airspace Change Portal.

Hawarden Radio Mandatory Zone (ACP-2014-07)

A-11. Hawarden instigated a CAP 725 ACP to establish a Radio Mandatory Zone to help create and maintain a known traffic environment for operators into and out of Hawarden Airport.

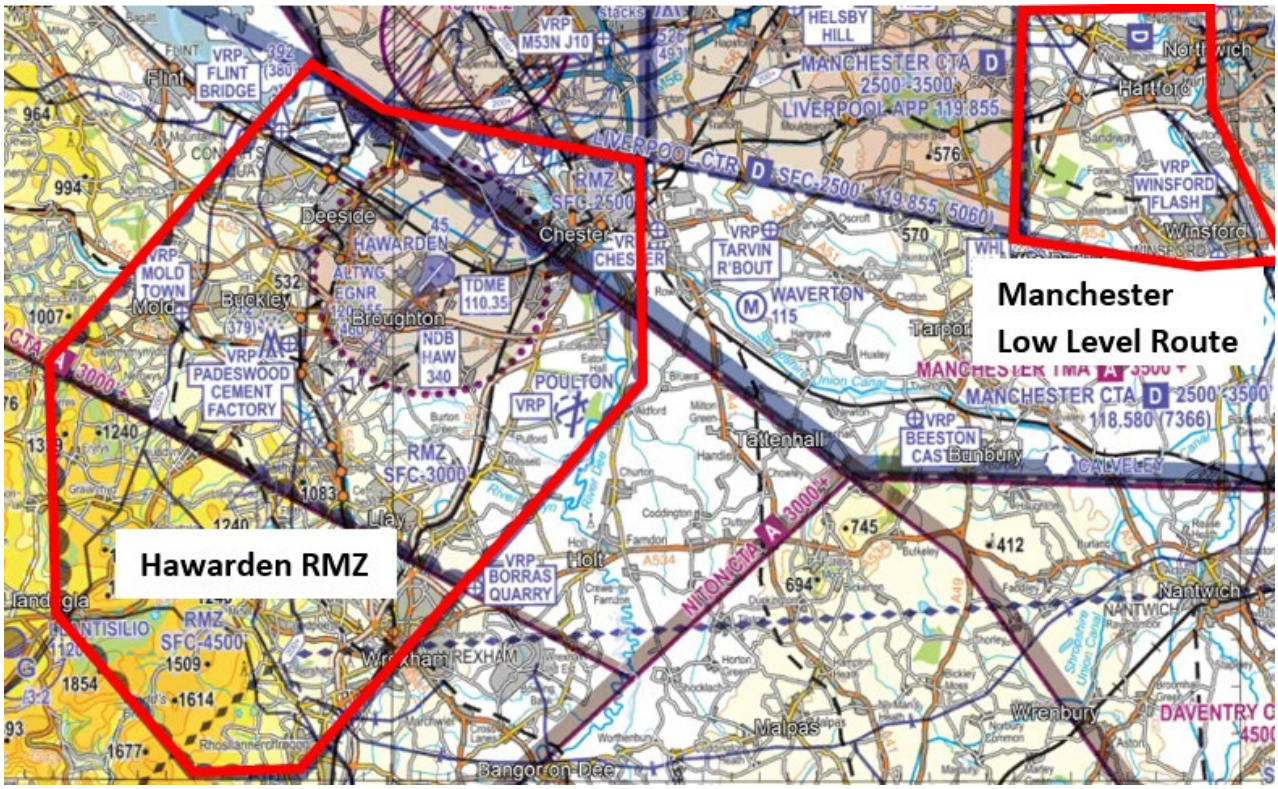

Figure A415 Map Showing Hawarden proposal - MLLR is partially shown in top right of image

A-12. Hawarden's ACP was approved in early 2017. For more information please check the Airspace Change Decision Document.

Hawarden Airport – GNSS (Global Navigation Satellite System) RNAV (Required Navigation) Approaches & Conventional IFP (Instrument Flight Procedure) Review (ACP-2017-30)

A-13. Hawarden submitted a CAP 725 ACP to introduce a new type of instrument approach procedure to both runways at Hawarden Airport. This ACP also looks to review the existing instrument approach procedures at Hawarden Airport, which are published in the Aeronautical Information Publication.

A-14. Hawarden's ACP was submitted in early 2018. For more information please check the Airspace Change Page.

Upper Airspace Change Proposals

A-15. There is also a lot of ACP activity that covers the airspace above 7000ft. The Airspace Classification Team is monitoring these proposals as part of the wider review into the Barnsley Region. However, for the purpose of this report focussing on the lower airspace structure around the Manchester Low Level Route, it has not been deemed necessary to specify them here.

APPENDIX B – GLOSSARY OF TERMS

Term	Definition
Above Mean Sea Level (AMSL)	The vertical position of an object or geographic point in relation to average sea level, used to indicate the **altitude** of an aircraft or geographical features like mountains.
Aeronautical Information Publication (AIP)	This is static information, updated every 28 days, which contains information of lasting (permanent) character essential to air navigation.
Air Traffic Control (ATC)	A service provided by air traffic controllers who coordinate the movement of aircraft on the ground and in the air to ensure their safe and efficient operation.
Airspace Analyser Tool (AAT)	Software used by the **CAA** to assess the usage and classification of airspace in the UK, which provides a view of current and historic airspace usage by user type. The tool collects and allows for analysis of data on the types of aircraft using airspace and the profile of their flights.
Airspace Change Proposal (ACP)	Proposals that suggest changes in the usage or classification of airspace.
Airspace Controlling Authority (ACA)	The designated authority responsible for the administration and control of a specific area of airspace.
Airspace Modernisation Strategy (AMS)	The CAA and the Department for Transport's program aimed at updating the UK's airspace infrastructure to accommodate increasing and changing air travel demands. The strategy's objectives include increasing airspace efficiency, improving flight punctuality, reducing CO2 emissions, minimizing noise pollution, and ensuring adequate future capacity.
Altimeter Setting Region (ASR)	A designated geographical area in which a common barometric pressure setting is used by aircraft for **altitude** reference.
Altitude	A term used to define the vertical position of an aircraft in relation to sea level (see also **AMSL**)
Automatic Dependent Surveillance-Broadcast (ADS-B)	A surveillance technology that allows aircraft to determine their position via satellite navigation and periodically broadcast it, enabling it to be tracked.
Controlled Airspace (CAS)	Airspace in which air traffic control services are provided to ensure the safe and orderly flow of aircraft.
Civil Aviation Authority (CAA)	A government body responsible for regulating civil aviation in the UK and the proposer of this amendment to airspace.
Civil Aviation Publication (CAP)	Civil Aviation Publication: Publications produced by the **CAA**.

Term	Definition
Control Area (CTA)	A block of **controlled airspace** that provides protection to a specific part of an airway.
Electronic Conspicuity (EC)	Technology that helps pilots, unmanned aircraft operators, and air traffic services be aware of other aircraft in their vicinity. EC includes devices on aircraft and unmanned systems that transmit information, as well as the supporting infrastructure to make the system work. The goal of EC is to improve the "see-and-avoid" principle by adding the ability to "detect-and-be-detected."
FLARM	An electronic system used to prevent collisions between aircraft, particularly in uncontrolled airspace and in glider aircraft.
Flight Level	A term used to define the vertical position of an aircraft in relation to worldwide average atmospheric pressure at sea level (1013.25 hPa)
Flight plan	A document that outlines the planned route and details of a specific flight.
Future Airspace Strategy Implementation (FASI)	An AMS initiative to modernise and improve the efficiency and capacity of UK airspace.
General Aviation (GA)	All non-commercial, non-military aviation activities, including private and business flying, flight training, and various other aviation services. It encompasses a wide range of aircraft and operates from a variety of airports and airstrips.
Height	A term used to define the vertical position of an aircraft in relation to ground level. Often used to provide clearance above ground based obstacles such as radio masts etc.
Indicated Airspeed (IAS)	The airspeed read directly from the aircraft's airspeed indicator. It is the speed relative to the air mass in which the aircraft is flying.
Instrument Approach Procedure (IAP)	These are predetermined flight paths and procedures that planes follow when approaching an airport to land
Instrument Flight Procedure (IFP)	A series of manoeuvres by reference to instruments for departure from, approach to, or landing at an aerodrome.
Instrument Flight Rules (IFR)	Rules that govern the procedure for conducting flight under instrument meteorological conditions (IMC). IFR is intended for navigation with the sole reference to instruments in the cockpit therefore visual aids and cloud avoidance are not required.
Instrument Landing System (ILS)	A ground-based instrument approach system that provides precision guidance to aircraft approaching and landing on a runway.
Level	A term used to define the vertical position of an aircraft either using **height**, **altitude** or **flight level**.
Multilateration (MLAT)	A surveillance technique used in air traffic control that uses the time difference of arrival of signals from an aircraft to multiple ground stations to determine the position of the aircraft.

Term	Definition
ORS4	A series of exemptions and permissions to the standard regulations provided by the CAA. It is used when it would not be appropriate to amend regulations for a short-term or unique situation.
QNH	An aeronautical shorthand code used by pilots and air traffic control that refers to the atmospheric pressure at sea level in an area.
Radiotelephony (RTF)	A system of communication using telephony equipment to transmit speech or other sounds between aircraft and ground stations.
Regional pressure setting (RPS)	A common altimeter setting for aircraft outside **CAS** and below the **transition altitude** in defined geographical areas of the UK. Does not apply to aircraft flying beneath a **CTA**.
Special VFR (SVFR)	A set of visual flight rules (VFR) under which a flight is permitted to operate in a controlled airspace when the weather conditions are less than those required for regular visual flight rules (VFR).
Standard Instrument Departure (SID)	A standardised flight path that an aircraft follow after take-off. It is designed to safely manage traffic in the airspace around airports.
Traffic Information Service-Broadcast (TIS-B)	A service that provides pilots with a display of select ATC radar traffic data on compatible cockpit displays to enhance the pilot's situation awareness and aid in visual acquisition of other traffic.
Transition Altitude	The level above which aircraft cease flying with reference to local sea level barometric pressure (altitude) and start flying with reference to worldwide sea level barometric pressure (flight level). In the UK this is 3000 feet **AMSL** unless beneath specifically notified areas notified in UK **AIP** ENR1.7 section 4.1.
Transponder Mandatory Zone (TMZ)	A specified region of airspace where all aircraft must be equipped with a functioning transponder; a device that receives and transmits radio/radar signals for identification and location.
UK Standardised European Rules of the Air (SERA)	Aviation regulations adopted by the UK from the European Union to standardise the rules of the air across member states for safety and efficiency.
Visual Flight Rules (VFR)	Visual Flight Rules that govern the procedure for conducting flight under visual meteorological conditions (**VMC**). VFR is intended for navigation with the visible reference to the ground.
Visual Meteorological Conditions (VMC)	Conditions under which visual navigation and control of the aircraft are possible. They are the weather conditions in which **VFR** flight is permitted.
Visual Reference Point (VRP)	A specific geographical location that is used by pilots to navigate under **VFR**.