London Oxford Airport ACP

Proposal for Revised Airspace and Instrument Flight Procedures

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Executive Summary

London Oxford Airport (LOA) handled the fastest growing volumes of private and business aviation in the UK between 2007 and 2012. Significant investment has taken place in recent years to improve the airport facilities and enhance the safety for those aviators utilising the airport for commercial use, business use, flying training and for recreational flying. Part of this improvement has included the installation and commissioning of Primary and Secondary Surveillance Radars so the Air Navigation Service Provider (ANSP) can provide a significantly improved service capability within and around the Oxford Area of Intense Air Activity (AIAA).

Procedures and airspace designs at LOA and at neighbouring RAF Brize Norton (BZN) are widely recognised as having been devised many years ago when the air traffic demands within the local area were quite different. Modernising airspace is a key requirement of the Civil Aviation Authority's (CAA) Airspace Modernisation Strategy (AMS) under CAP 1711[1], to ensure that airspace is used as efficiently as possible. To do this, modern technologies must be harnessed, and Performance Based Navigation (PBN) arrival, departure and approach procedures implemented, where appropriate, in accordance with the AMS[2]. In collaboration with BZN, LOA aims to introduce new PBN arrival procedures and restructure the local airspace to protect the most critical stages of these procedures. The re-design will enhance levels of safety on the LOA approach and improve efficiency by reducing broken-off approaches and the environmental impact of these extended flights. The new designs will also ensure effective coordination between LOA and BZN.

Frequently, LOA need to break aircraft off from their final approach to ensure safe separation from conflicting traffic. This issue could be avoided if transiting aircraft were known or if an increased level of situational awareness existed. Controllers would then ensure that safe separation between aircraft was maintained or provide traffic information to ensure pilots can visually acquire each other. Managing the appropriate separation is a high-workload activity for aircraft receiving a LOA Air Traffic Service (ATS) when broken off from the final approach.

LOA recognised that aviation and non-aviation stakeholders may have strong views regarding the proposed airspace changes, and in recognition of that fact consulted with local stakeholders to elicit views on the proposed changes. Consultees were encouraged to provide LOA with supportive comments as well as any concerns. 8.7% (66 of 758) of consultees responded and a further 1,641 unsolicited responses were received online.

A Formal Consultation period was held between 15 December 2017 and 5 April 2018 in accordance with the requirements of CAA CAP 725 [Reference 1]. Following the consultation process, LOA undertook a phase of airspace redesign based on the objections and proposed alternatives received during the consultation. The objections and alternative suggestions emphasised the importance of reducing the perceived impact of establishing Class D airspace on the General Aviation (GA) community, and of giving more consideration to alternative solutions discounted during the initial airspace design phase. The final Transponder Mandatory Zone (TMZ) airspace design reflects the compromise that LOA has

[1] The AMS, published in December 2018, was preceded by the Future Airspace Strategy (FAS) which was in place when this ACP commenced. Further information on the FAS can be found here: https://www.caa.co.uk/Commercial-industry/Airspace/Future-airspace-strategy/Future-airspace-strategy/

[2] The AMS states that UK commercial airports are expected to upgrade their routes to PBN by 2024.

made to minimise the impact on GA operations in the Oxfordshire area, whilst still ensuring an enhanced level of flight safety for traffic operating into and out of LOA.

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1 Introduction

1.1 General

London Oxford Airport (LOA) is the sponsor of a proposed change to the current airspace arrangement in the immediate surroundings of LOA, that aims to provide enhanced levels of safety to aircraft in the vicinity of the airport and to protect LOA's new Instrument Approach Procedures (IAPs). As part of the Civil Aviation Authority's (CAA) Guidance on the Application of the Airspace Change Process (Civil Aviation Publication (CAP) 725 [Reference 1], LOA is required to submit a case to the CAA to justify its proposed airspace change and to undertake consultation with aviation and non-aviation stakeholders.

The subject of the consultation was LOA's proposal to establish new arrival and final approach procedures and appropriate airspace to contain the new procedures.

The LOA Airspace Change Proposal (ACP) is seeking to achieve the following aims:

- Create a 'known traffic environment' to enhance the safety of Instrument Flight Rules[3] (IFR) aircraft arriving at LOA from the north to Runway 19 and minimise the number of instances where avoiding action or break-off instructions have an adverse effect on cockpit and controller workload.
- Improve the interactions between RAF Brize Norton (BZN) and LOA flight procedures. The existing procedures are complex, and this creates a more intensive workload for aircrews and Air Traffic Control Officers (ATCOs) at both airports.
- A requirement to future-proof the existing Instrument Flight Procedures in accordance with the CAA AMS.

This will be achieved through the following objectives:

- The introduction of Global Navigation Satellite System (GNSS) approach procedures.
- The introduction of a new airspace structure to protect the new procedures.
- A revised Concept of Operations (CONOPs) Letter of Agreement (LoA) to define the procedures used between LOA and BZN within their common area of interest.

1.2 This Document

This document represents the formal submission to the CAA of the changes that LOA is seeking to the airspace arrangements around the Airport. It is in part technical in nature, as these elements are required for the CAA to assess the proposal, but mindful of the interest we have had in this project, and the wide

[3] Instrument Flight Rules is one of two sets of regulations governing all aspects of civil aviation aircraft operations; the other is visual flight rules (VFR)..It is also a term used by pilots and controllers to indicate the type of flight plan an aircraft is flying in accordance with, such as an IFR or VFR flight plan.

background of the stakeholders, we have tried to use plain English as far as possible. The document, in accordance with CAP 725, explains the ACP from start to finish and comprises twelve main sections:

- Sections 1 and 2 introduce the ACP and give the justification for the change plus an analysis of change options.
- Sections 3 and 4 describe the procedures and airspace options that were consulted upon and provides a summary of the consultation analysis.
- Sections 5 and 6 describe the subsequent review of the procedures and airspace design followed by the modifications resulting from that review.
- Section 7. Safety analysis of the project.
- Section 8. Operational impact of the final proposed airspace design.
- Sections 9 and 10. Supporting infrastructure, resources, and airspace requirements.
- Section 11. Economic and Environmental Impact.
- Section 12. Implementation.

2 Justification for the Change and Analysis of Change Options

2.1 Overview

This section provides the justification and rationale behind the proposed changes, together with a description of the options that were considered and included within the Consultation Document.

2.2 Current Airspace Arrangements

2.2.1 Local Airspace

LOA is situated within Class G (Uncontrolled) Airspace as shown in Figure 1 below. An Aerodrome Traffic Zone (ATZ) surrounds the airfield and measures 2 nautical miles (nm) in radius centred on the Airfield Reference Point (ARP), the mid-point of the main instrument runway, Runway 19.

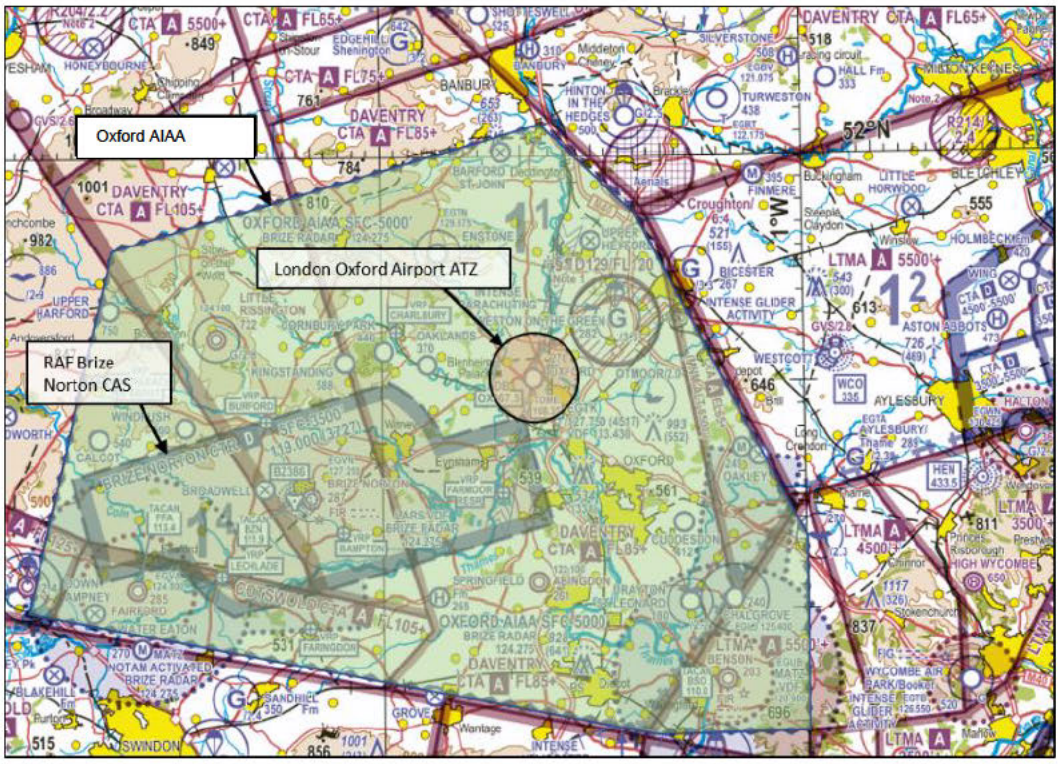


Figure 1 - London Oxford Airport Local Airspace

The ATZ extends from the surface to 2,000 ft above aerodrome level (aal). Figure 1 also shows the relative position of LOA to BZN. The southernmost edge of the LOA ATZ adjoins the Class D Controlled Airspace surrounding BZN. A formal LoA between the two airports ensures that safe separation between aircraft is maintained. The local airspace is complex and supports a wide variety of aviation activities. These include the Danger Area D129 to the north-east, the airfields at

RAF Benson, Enstone, Abingdon and the parachute dropping sites at Weston-on-the-Green and Hinton-in-the-Hedges. It also lies at the heart of the Oxford Area of Intense Air Activity (AIAA).

2.2.2 The Oxford AIAA

The UK Integrated Aeronautical Information Publication (UK IAIP) [Reference 2] ENR 1.1 describes an AIAA as:

> "5.2.2 Airspace within which the intensity of civil and/or military flying is exceptionally high or where aircraft, either singly or in combination with others, regularly participate in unusual manoeuvres.
>
> 5.2.2.1 Intense civil and/or military air activity takes place within the areas listed in ENR 5.2. Pilots of non-participating aircraft who are unable to avoid AIAAs are to keep a good lookout and are strongly advised to make use of a radar service if available; these areas are depicted at ENR 6-5-1-2."

The UK IAIP ENR Section 5.2 provides the following remarks specifically for the Oxford AIAA:

> "***Remarks**: There is intense air activity associated with closely woven civil and military climb out and approach procedures for the many airfields in the vicinity. Pilots flying in this area are advised to keep a constant vigilance particularly during weekdays when military activity is at its peak, and especially in the area 8.5 NM/308° (T) and 6 NM/145° (T) from Oxford/Kidlington aerodrome where aircraft may be holding awaiting clearance to join airways*."

The UK IAIP also contains the following advisory measures:

> "***Advisory Measures**: Radar services are available within this area from Brize Norton ATC on 124.275 MHz. The attention of pilots is also drawn to the Brize Norton Control Zone. (See ENR 2.1)."*

The Oxford AIAA extends from the surface up to 5,000 ft above mean sea level (amsl). Whilst the designation of an AIAA indicates to all aviators that the area is a volume of Class G airspace that may be more congested than other areas, it offers no additional protection to aircraft operating within it. The proximity to so many other aerodromes and aircraft operators means that LOA and BZN ATCOs work in a challenging environment daily. LOA ATCOs are consistent in their application of the requisite safety and separation standards. However, LOA ATCOs frequently need to instruct aircraft to undertake multiple turns to avoid conflicting aircraft that do not choose to make radio contact with LOA and whose intentions are therefore unknown. The unpredictable nature and volume of these unknown flights significantly increases risk, and ATCO workload, which directly affects the Airport's service delivery and environmental footprint.

2.3 Current Operational Issues

2.3.1 RAF Brize Norton (BZN) Interactions

Currently, due to the relative positions of each runway, the LOA and BZN published procedures cannot ensure that standard separation is maintained between aircraft without extensive controller intervention. Aircraft that execute a Missed Approach Procedure (MAP) on Runway 19 at LOA, potentially fly close to the area where aircraft position for a final approach at BZN. Only continuous

monitoring and intervention by ATCOs at each unit currently guarantees adequate separation is maintained. ATCOs routinely resolve conflicts between aircraft operating on the instrument approach to Runway 25 at BZN and aircraft going around or departing from Runway 19 at LOA. BZN aircraft have also been involved in safety related incidents as their aircraft have been unable to remain within the current BZN controlled airspace volume. This has an impact on LOA operations as ATCOs must assume that BZN aircraft may be unable to remain inside the BZN Control Zone (CTR); therefore, avoiding action may have to be taken by aircraft under LOA control.

Because of the issues described above, BZN is also proposing an airspace change and a re-design of their Instrument Flight Procedures (IFPs) as described below in Section 3.3. Whilst there is no certainty of success for the BZN ACP, it is important that LOA capitalises on the proposed BZN change to ensure that the proposed designs for both airfields incorporate better ways of working that reduce the need for controller intervention whilst preserving separation standards.

The combination of the relative positions of LOA and BZN and the UK prevailing winds means that the majority of aircraft arrive at LOA for Runway 19 from the north. Most aircraft also depart from Runway 19 to the south, which can occasionally conflict with aircraft positioning for an arrival to Runway 25 at BZN. ATCOs at both airports resolve any conflictions by coordinating with each other. Figure 2 below shows the existing overlapping patterns and the points at which they cross, indicated by the yellow stars. These are the areas that require specific controller focus; the act of negotiating a coordination agreement is time consuming and reduces controller capacity. The proposed airspace change aims to resolve these potential conflictions.

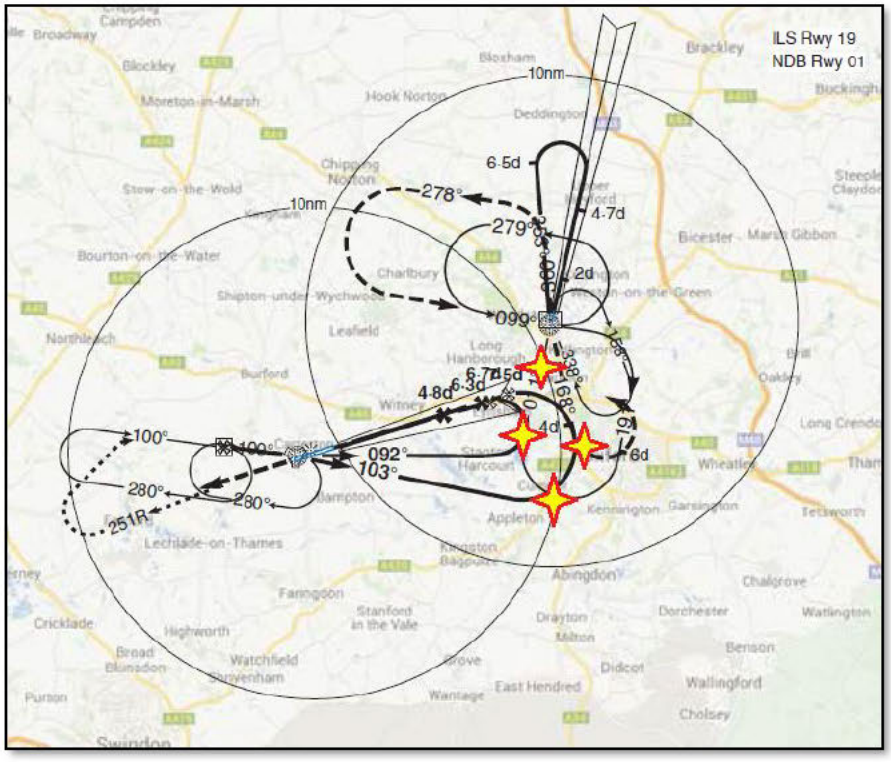


Figure 2 - Current LOA Runway 19 Departures/ Runway 01 arrivals and BZN Runway 25 Arrivals

2.3.2 Installation of Primary and Secondary Radar

Prior to 2012, Air Traffic Control (ATC) at LOA was limited to an Approach Procedural Service[4] (APP) for aircraft flying under IFR. Under an APP, ATCOs are only obliged to provide separation between aircraft operating under IFR who are also under the control of LOA. Without a surveillance system (such as radar) the ATCO would not be aware of other aircraft that may be operating outside of the 2nm ATZ under Visual Flight Rules (VFR) and therefore would not be responsible for providing separation against the unknown aircraft.

In 2012, the installation of Primary[5] and Secondary[6] Surveillance Radar Systems (PSR and SSR) and the associated training of the ATCOs was completed. An Approach Surveillance Service (APS) was then provided to aircraft operating IFR, or in IFR weather conditions, in and out of LOA. Installation of the radar systems gave ATCOs a greatly improved picture of the volume of aircraft operating close to, but outside of the LOA ATZ. It also highlighted the large amount of aircraft that flew within or close to the final approach for Runway 19. Whilst these aircraft can operate autonomously and legitimately within Class G airspace under VFR conditions, ATCOs providing a Deconfliction Service (DS) to other IFR traffic are obliged to ensure that standard separation is achieved. This separation between the LOA aircraft and the unknown aircraft is either 5nm laterally or 3,000 ft vertically. This can be extremely difficult to achieve as Oxfordshire is a popular and congested area for recreational and military flying.

2.3.3 Air Traffic Services (ATS) in Class G Airspace

Many aircraft arriving at LOA currently receive radar guidance to position on to the Instrument Landing System (ILS) for Runway 19. This is approximately between 8 and 10nm to the north of the Airport. At this point, pilots are following their instruments to guide them on to the final approach path and to fly the optimum descent profile; it is a busy time in the cockpit. At the same time, ATCOs need to advise the pilot conducting this approach about any unknown aircraft operating within the vicinity, including those who are not speaking to LOA ATC. If the pilot flying the approach is in receipt of a DS, the controller must pass avoiding action instructions to ensure that prescribed separation minima (normally 5nm laterally or 3,000 ft vertically) is achieved[7].

If the controller believes it is unsafe to allow an aircraft to continue inbound to LOA against unknown conflicting traffic, the controller may instruct the pilot to break off the approach. This is more likely to be the case when the conflicting traffic is not talking to LOA (and has not been positively identified) or if the aircraft is not equipped with a SSR transponder (which would allow the controller to determine the altitude of the conflicting aircraft); this is often the case with gliders.

Within the existing airspace arrangements, it is often the case that aircraft transit the ILS centreline below the cloud base without making radio contact with LOA. LOA ATC is then faced with a scenario where aircraft descending out of cloud on the approach to LOA require a much longer routing to avoid potential conflictions

[4] CAP 493 definitions Section 1 Chapter 12 Para 5A.1.
[5] A Primary surveillance radar (PSR) is a conventional radar sensor that illuminates a large portion of space with an electromagnetic wave and receives back the reflected waves from targets within that space.
[6] Secondary surveillance radar (SSR) is a radar system used in air traffic control (ATC), that not only detects and measures the position of aircraft i.e. bearing, but also requests additional information from the aircraft itself such as its identity and altitude.
[7] Reduced separation may be used in those situations described in CAP 493, Manual of Air Traffic Services (Section 1, Chapter 3).

with transiting traffic. In these situations, ATCOs instruct aircraft to make short-notice, unplanned manoeuvres to avoid the unknown aircraft by the prescribed separation criteria. This complex and high-workload controller intervention may prejudice a pilot's ability to conduct a stabilised approach, as well as delay the aircraft further until the runway approach area is clear of traffic.

To better understand how many aircraft this issue relates to, LOA collated statistics in 2014 and 2015 to ascertain the number of aircraft that operate within the final approach area of Runway 19 without speaking to ATC. The results are provided at Annexes A1 and A2. It can be extrapolated from these samples that there are between 3,600 and 5,000 such transits a year across the LOA approach paths. It is accepted that this figure will be lower if the impact of poor weather is considered.

2.3.4 LOA Based Training

LOA is home to several training organisations that are training the next generation of airline pilots. Therefore, a high proportion of operations include extensive instrument flying training by major commercial flight training academies. This training and associated examination includes practice instrument approaches where students under training or examination candidates fly with a vision-limiting device (typically an instrument hood) to simulate flying at night or during poor weather conditions. In these situations, the instructor or examiner has sole responsibility for lookout. This is vital during all stages of flight, but particularly during the intense final stages of an approach where the aircraft is descending on base turn, and the instructor or examiner is required to closely monitor the student's vertical and lateral instrument flying accuracy.

The published Instrument Approach Procedures (IAPs) at LOA currently extend outside the ATZ into surrounding Class G airspace where normal 'see and avoid' rules continue to apply. Aircraft flying an IAP are conferred no additional protection in Class G airspace, despite the intensity of IAP training carried out at LOA. LOA is an 'aerodrome having one or more instrument flight procedures' (conventional or GNSS) in Class G airspace. The existence of these approaches is indicated on CAA VFR charts using a 'feathered arrow' symbol. Pilots intending to fly within 10nm of any part of the IAP symbol are 'strongly advised' to contact LOA ATC. However, this guidance has proved to be insufficient mitigation against the risks posed to aircraft conducting instrument procedures at this busy commercial training aerodrome. It is assessed by the flying training organisations that additional protection is required to protect aircraft involved in intensive IAP training and examination flights.

2.4 Key Driver for Change

The principal driver for the changes proposed is to enhance the levels of safety for aircraft operating close to LOA by creating a 'known traffic environment' within which appropriate separation can be more appropriately maintained. Whilst current LOA operations are tolerably safe, LOA has identified that the safety risk may no longer be As Low As Reasonably Practicable (ALARP[8]).

Since LOA started providing a radar surveillance service, ATCOs can now see the significant number of aircraft that operate close to the airport without making radio contact, as described above at 2.3.3. This has highlighted those occasions when

[8] ALARP means that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained.

safety margins were eroded and resulted in the filing of AIRPROX[9] reports. One example involved an aircraft flying in the opposite direction to aircraft flying in the LOA visual circuit whilst at the same altitude of 1,500 ft. Whilst this aircraft was outside of the LOA ATZ within Class G airspace, the aircraft flew sufficiently close to the LOA aircraft to cause a safety concern. The details of the AIRPROX were captured from the ATC Radar Display Screen (RDS); this is reproduced in Figure 3 below.

[9] An AIRPROX is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. (ICAO Doc 4444: PANS-ATM).

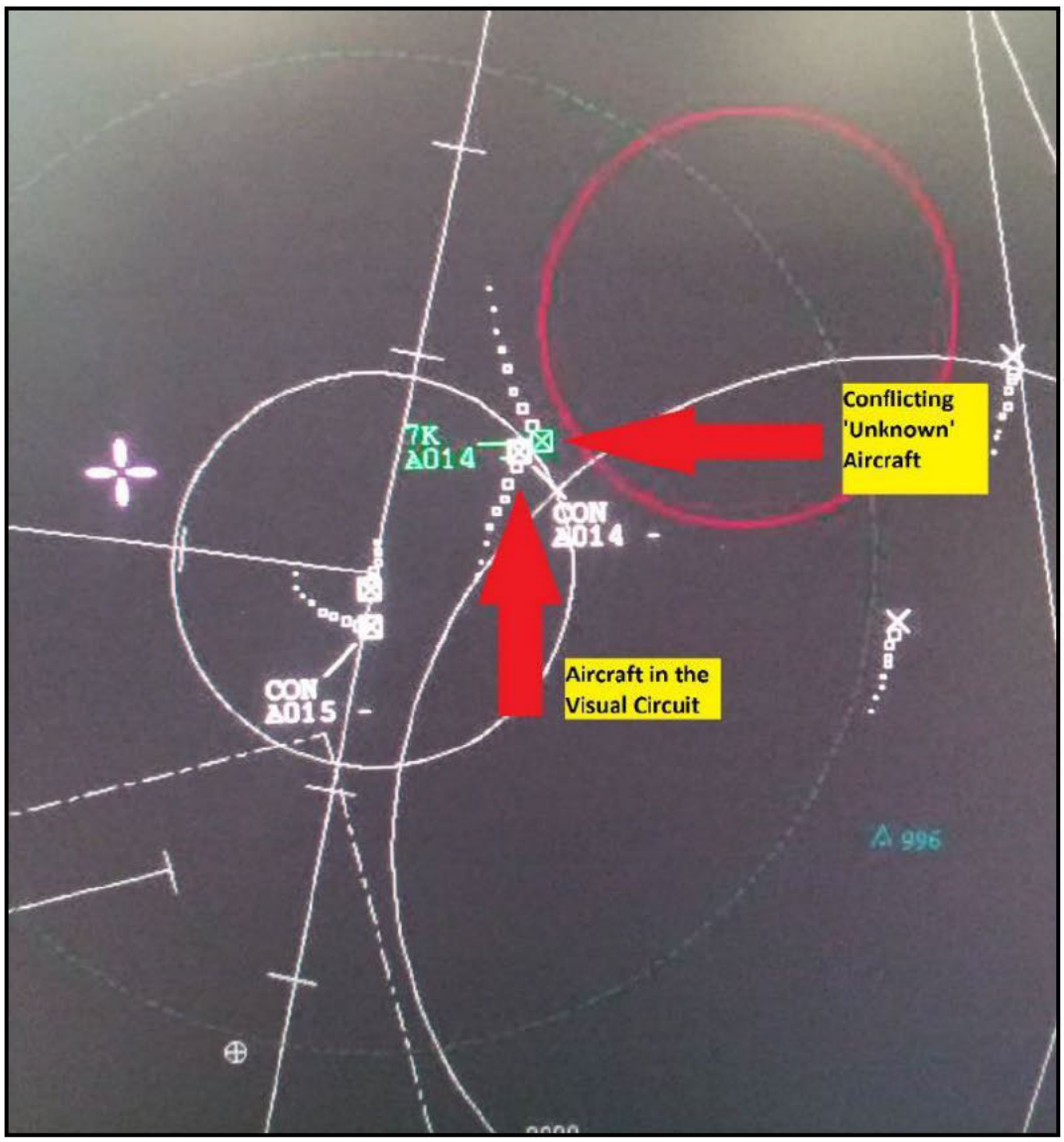


Figure 3 - Current ATC Radar Display Screen Showing AIRPROX Between Two Aircraft

The solid red circle depicted on the radar display screen is the Ministry of Defence (MOD) Danger Area D129 (Weston-On-The-Green). The unknown conflicting aircraft's pilot was careful to avoid the Danger Area (which they are prohibited from entering) and the LOA ATZ. The pilot of that unknown, conflicting, southbound aircraft had very little turning room to complete a manoeuvre against the LOA circuit traffic, if it was required.

This situation was analysed by the UK AIRPROX Board (Report Number 2014065) [Reference 3]. The report assessed that the two aircraft came within 0.2nm of each other at the same altitude. Whilst the report concluded that there was no risk of collision between the two aircraft, this was only as a direct result of ATCOs at LOA taking considerable effort to ensure that the aircraft in the visual circuit visually acquired the conflicting aircraft. ATC controller capacity was consumed trying to contact the conflicting aircraft and passing traffic information

to the Tower Controller who then had to relay information about the position of the conflicting aircraft to the aircraft in the LOA circuit.

Passing such frequent traffic information updates can affect the workload of the pilot as they attempt to locate the conflicting traffic, plus it overly concentrates the attention of the ATCO concerned, leaving very little capacity to monitor other aircraft also under their control. These factors are typical of the significant safety events that the airport is attempting to minimise. A number of similar incidents have been collated as evidence to support this ACP; they are included at Annex A3.

2.5 Why Implement RNAV (GNSS) Flight Procedures

The move to RNAV[10] technology was directed at the 2007 36th International Civil Aviation Organization (ICAO) General Assembly where States agreed to Resolution 36/23 which urged them to implement routes and airport procedures in accordance with the ICAO PBN[11] criteria. EU legislation requires the implementation of RNP1[12] performance through the Common Pilot Project by 2024. ICAO resolution A37-11 also stipulated that by 2016 States complete a PBN implementation plan for en-route and terminal areas. In line with these directions, the AMS sets out the plan to modernise UK and Irish airspace by 2020 in line with the legislative framework of the Single European Sky[13].

There are inherent safety and cost benefits to the use of RNAV technology:

- Safer and more efficient ATC services because fewer controller interventions are required to separate and re-route aircraft that have come into conflict with one another.
- More accurate routes are flown making it easier to predict flight patterns and providing improved stabilisation of aircraft on approach. More stabilised approaches are safer and can generate less noise as aircraft perform fewer corrections to their vertical and lateral flight profile.
- Greater operational efficiency; accurate track keeping means less fuel burned, fewer flying hours, lower CO_2 emissions and an improved chance of a successful first approach during bad weather conditions as the aircraft will be in the optimum position to make a safe landing on the runway when possible.

2.6 Justification for New IFPs

Wherever possible, LOA is committed to reducing by design any detrimental impacts local stakeholders identify because of the proposed changes to the

[10] Area Navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of the station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.
[11] Performance Based Navigation: specifies that navigation performance requirements are specified in terms of accuracy, integrity, availability, continuity and functionality when supported by the appropriate navigation infrastructure.
[12] Navigation performance of 1nm accuracy 95% of the time, with a defined level of integrity and continuous performance; all parameters monitored on board the aircraft with appropriate alerts.
[13] More information on the Single European Sky can be found at http://www.eurocontrol.int/dossiers/single-european-sky

classification of local airspace, or the introduction of the proposed RNAV (GNSS) procedures.

Whilst every care has been taken to balance the needs of all parties during the development of this proposal, LOA accepts that some stakeholders may raise unforeseen issues. To help understand such issues LOA sought the views of the local public, their representative bodies and governing organisations, as well as those involved in the aviation industry during Formal Consultation with the intent to work with these organisations to gain a full understanding of the implications of the proposed changes, recognising that there may be a range of competing priorities raised by different consultees.

To provide the enhanced levels of safety that this project is intended to achieve, LOA has defined a requirement to establish a known traffic environment within which LOA could ensure adequate levels of safety. In determining the optimal proposed solution, several options were considered. These options are detailed in the remaining paragraphs of this section. The airspace design is driven around LOA's requirement to ensure that the aerodrome and its airspace are appropriately safeguarded, and that the new RNAV (GNSS) procedures are appropriately protected.

Additionally, the training syllabi followed by the training academies based at LOA require that RNAV (GNSS) approaches are taught to student commercial pilots. There has been a phased introduction to the syllabi, since August 2018 there has been a requirement to include GNSS approach training for all commercial training schools, it would therefore be a significant benefit to the flight training schools at LOA if PBN approaches were available "on site".

2.7 Defining the Options

The following options were considered prior to consultation:

- Option 1 – Do Nothing
- Option 2 – Do Minimal
- Option 3 – Establish a Radio Mandatory Zone (RMZ)
- Option 4 – Establish Class E Controlled Airspace
- Option 5 – Establish Class D Controlled Airspace

2.7.1 Option 1 – Do Nothing

The airspace around LOA is traditionally a busy volume of airspace. The "do nothing" option would continue to allow unfettered access to all types of GA users and a suitable radar service could be provided to those aircraft that choose to contact LOA.

2.7.2 Option 2 – Do Minimal

LOA sought to consider changes that would have a minimal impact on other aircraft operating in the area, provided the safety objective could be achieved. LOA has actively progressed the implementation of a Listening Squawk and also conducted improved local liaison to mitigate any collision risk on final approach. These initiatives generated some improvement in the situation for LOA and its local flyers but many of the aircraft that operate within the area are transiting aircraft unfamiliar with local issues. Option 2 therefore fails to fully address the safety problem by providing a robust and enduring solution.

2.7.3 Option 3 – Establish an RMZ

LOA considered establishing an RMZ as shown in the Figure 4 below. The size of this airspace volume was designed to be the minimum necessary to achieve the level of protection required.

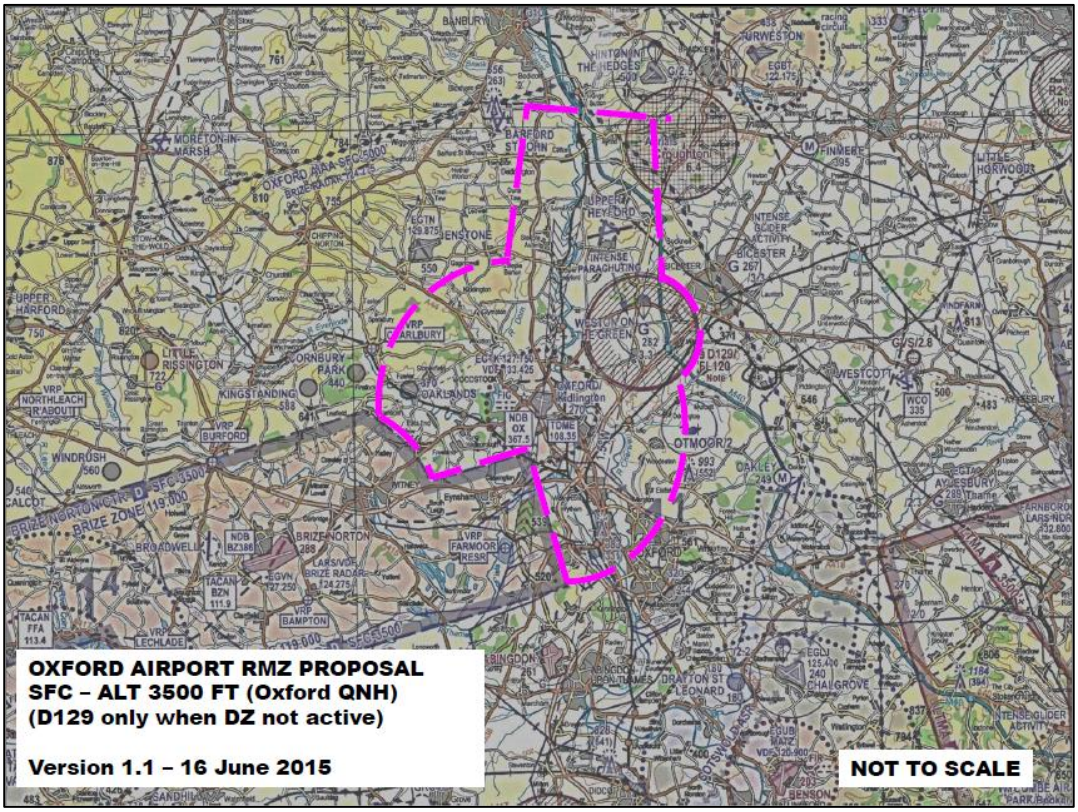


Figure 4 - LOA RMZ Design

To ensure that this option was workable, the area covered by the RMZ would have to be large enough to allow for contact to be made and agreements to be reached before deconfliction minima were compromised.

2.7.4 Option 4 – Establish Class E Controlled Airspace

LOA considered the introduction of Class E airspace as a potential solution. The Class E option means only aircraft operating IFR require ATC clearance to enter the area and separation between IFR traffic will be provided. As far as possible, traffic information would also be provided concerning VFR flights. With the prevalence of other airspace classifications and other aviation activities within the vicinity of BZN, Class E airspace[14], with or without a Transponder Mandatory Zone (TMZ), was not considered an adequate design to resolve the safety issues currently experienced by the aerodrome.

2.7.5 Option 5 – Establish Class D Controlled Airspace

Class D airspace would enable LOA to provide a level of service that would go some way to mitigating the safety issues identified following the introduction of the

[14] Class E cannot extend from the surface within the UK; only Class A or Class D airspace can be used for Control Zones (CTRs) within the UK. Therefore, if Class E were to be used, it could only be used for Control Areas (CTAs) as part of the LOA proposal.

radar and described in Section 2.3.3 above. More detail on this preferred design and its subsequent modification is included in the next Section.

2.8 Summary of Options Considered

The following table summarises the alternative solutions considered prior to consultation that provide the known traffic environment.

No	Proposed Option	Reason Option Discounted
1	Do Nothing	Does not address the fact that risks of operating within this location may no longer be ALARP.
2	Do Minimal	Does not capture non-local aircraft and fails to address the safety concerns.
3	RMZ	Does not address concerns regarding VFR traffic that chooses to operate along the final approach. Also, too complex and a larger volume of airspace would need to be reassigned.
4	Class E Airspace	No clearance is required to enter the airspace under VFR rules. Separation only provided between IFR traffic.
5	Class D Airspace	Preferred option discussed in next Section.

Table 1 - Summary of Options Considered

3 Procedure and Airspace Options - that were consulted upon

3.1 Introduction

This Section describes the new RNAV (GNSS) approach options to Runway 01 and to Runway 19 at LOA. It also describes the Missed Approach Procedures (MAP) and the airspace volumes required to support all the procedure designs.

The adjacent BZN airspace change [Reference 4] also aims to introduce new RNAV (GNSS) approaches and associated airspace; this adds an additional level of complexity to the proposed LOA procedures, as recognised by the CAA at the Framework Briefing[15] stage. The CAA directed that each project should be developed separately, but concurrently and that the proposed changes to airspace and procedures should dovetail by design to ensure effective coordination is always possible[16].

3.2 Flight Procedures Proposal

3.2.1 Runway 01 – RNAV (GNSS) Approach

Figure 5 below shows the draft Runway 01 procedure and its associated MAP. The Initial Approach Fix (IAF) to the south of BZN is within a new volume of airspace proposed in the BZN airspace change. This configuration allows enough distance for aircraft to descend from 5,000 ft to the Intermediate Fix (IF) altitude of 1,500 ft. The route north east remains within the proposed BZN Control Areas (CTA) 4, 3 and 2 and the left turn at the IF marks the entry into BZN CTR 1 and CTA 1A on the final approach track for Runway 01. The relatively low and flat 3-mile intermediate leg to the Final Approach Fix (FAF) was designed to maximise distance from the BZN Runway 25 final approach track.

3.2.2 Runway 01 – MAP

Aircraft conducting a missed approach initially climb straight ahead on runway heading and fly the anti-clockwise route back to the location of the Oxford NDB (as shown within Figure 5 below) that lies slightly to the west of the main runway. It is this MAP, combined with Runway 19 approach protection requirements, that determines the volume of controlled airspace required to the north of LOA when operating on Runway 01.

[15] The first stage of the airspace change process; a meeting between the sponsor of an airspace change and the CAA.

[16] LOA have sub-contracted NATS Procedure Design Group (PDG) to design their IFPs. The NATS PDG report, in support of this ACP, has been submitted to the CAA separately.

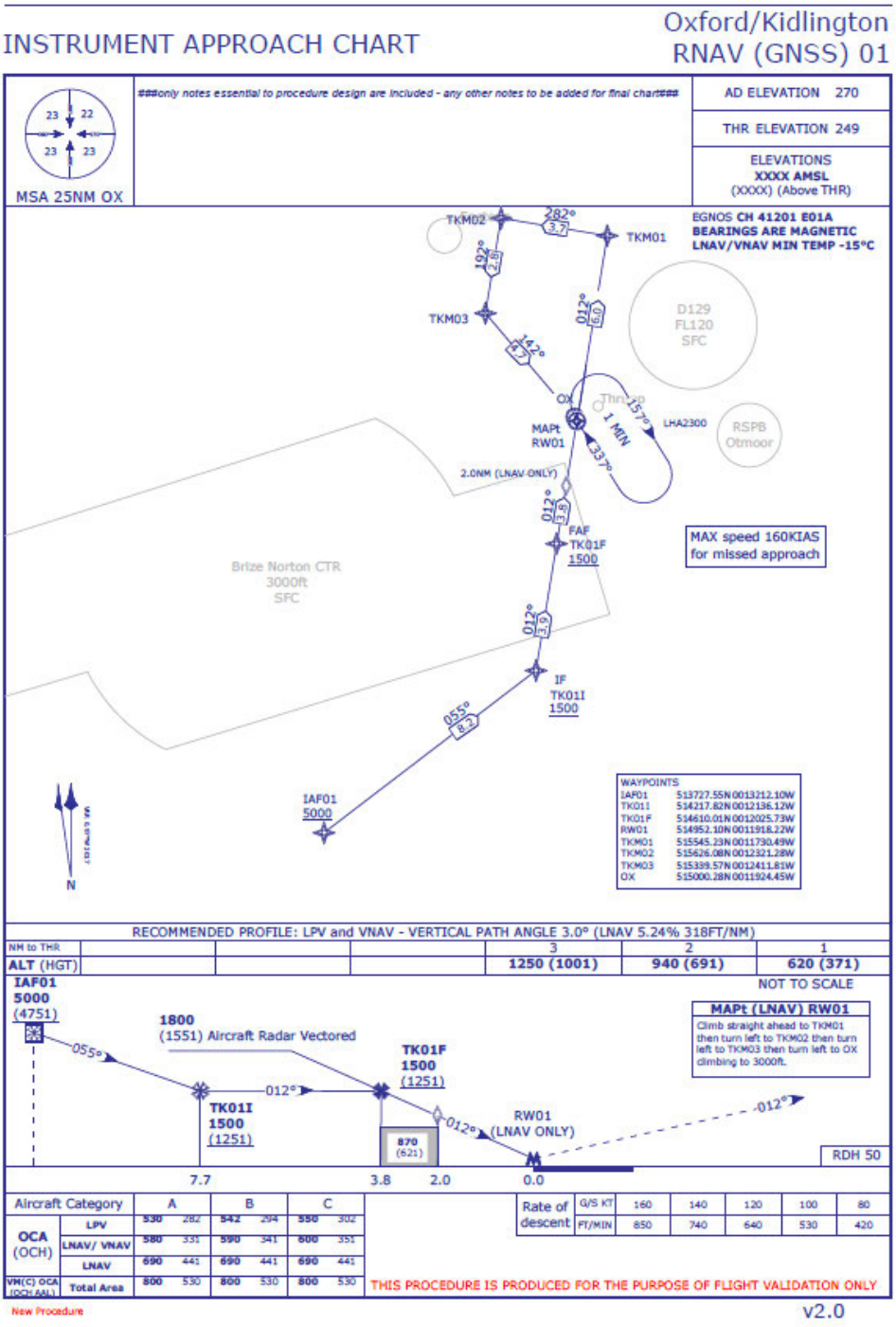


Figure 5 - Runway 01 RNAV (GNSS) Procedure

Figure 6 below shows the RNAV (GNSS) procedure and hold on an Ordnance Survey 1:250,000 map.

London Oxford Airport RW 01 RNAV v2 Approach, Hold and MAP

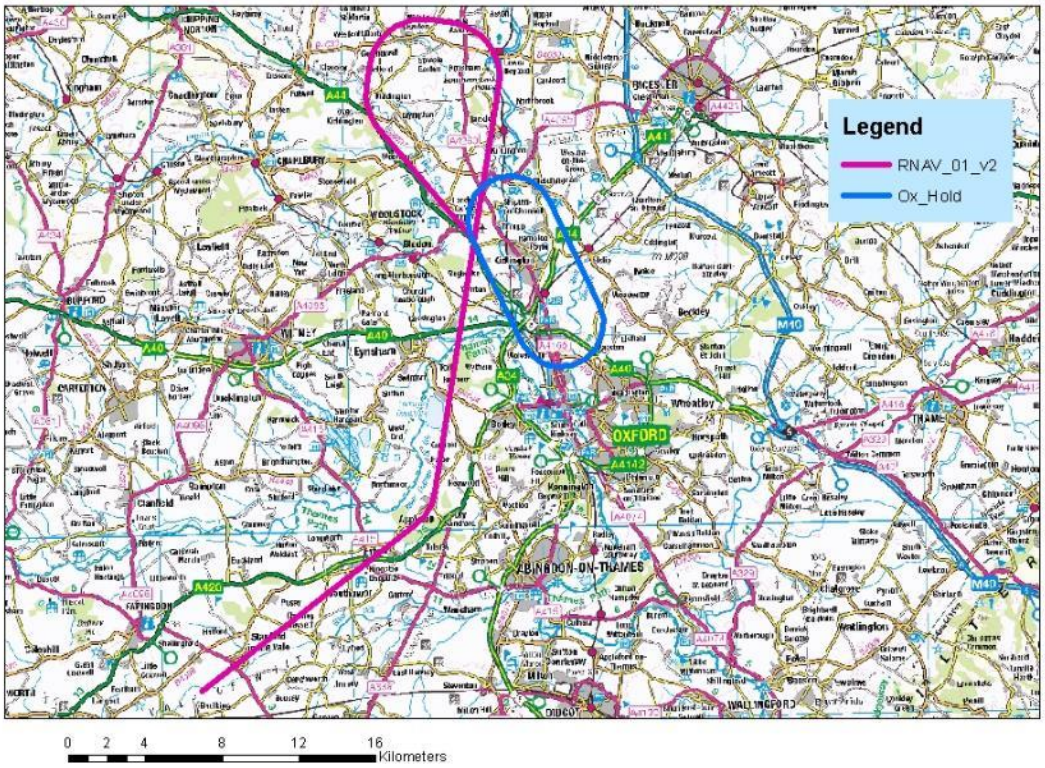


Figure 6 - Runway 01 RNAV (GNSS) Approach Hold and MAP

3.2.3 Runway 19 – RNAV (GNSS) Approach

There are 2 IAFs for this approach (Figure 7) that cater for aircraft approaching the procedure from different directions. The northern IAF (03) is not contained within the proposed controlled airspace volume, but aircraft will enter the LOA CTR 1 shortly after arriving at this point when southbound beginning the approach procedure.

3.2.4 Runway 19 – MAP

Figure 7, Figure 9 and Figure 11 show the three possible designs for the MAP for Runway 19. The consultation specifically sought the views of consultees regarding these three alternatives.

The first option is that shown in the draft plate Figure 7. Aircraft would carry out the MAP, climbing straight ahead to 1,000 ft then turn left and intercept the 168° radial towards TKM04. Aircraft will then follow the procedure in an anticlockwise direction back towards the Oxford NDB and hold. From here aircraft may elect to conduct another approach or depart LOA for another location. This procedure keeps aircraft within the LOA CTR 2 and the BZN CTR 1 and CTA 1A. However, it would be necessary to ensure 1,000 ft vertical separation from any conflicting BZN traffic as lateral separation might not be guaranteed. This option is also shown in Figure 8 below.

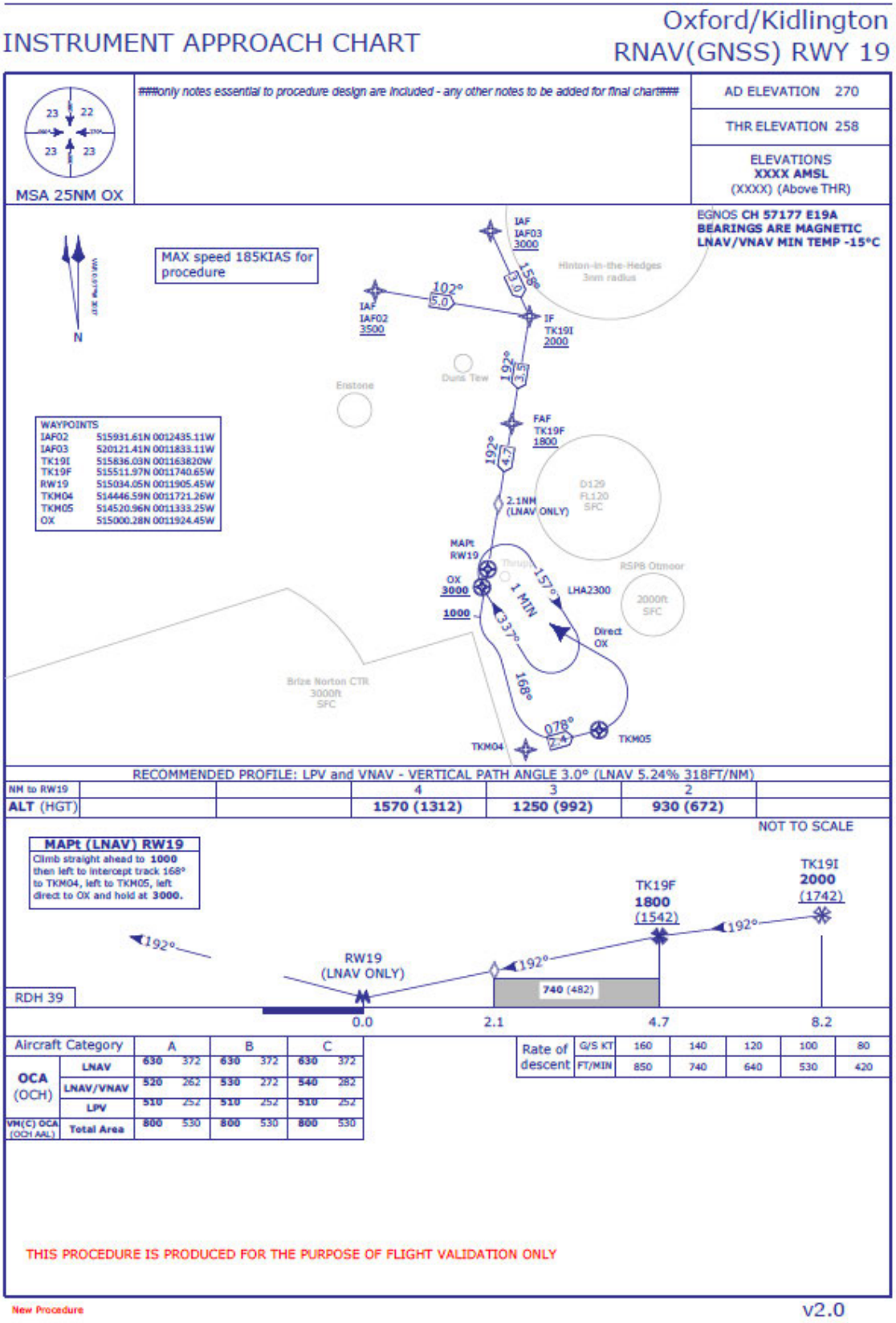


Figure 7 - Runway 19 RNAV (GNSS) MAP Option 1

Figure 8 - Runway 19 Approach Hold and MAP

The second option shown in Figure 9 and Figure 10 takes aircraft to the south east of the aerodrome above the Otmoor Bird Sanctuary, then south of Weston-On-The-Green before returning to the Oxford NDB. This procedure would be outside of the planned LOA controlled airspace and would not be fully protected. It would also be within an area extensively used by transiting GA aircraft.

INSTRUMENT APPROACH CHART

RNAV (GNSS) X RWY 19

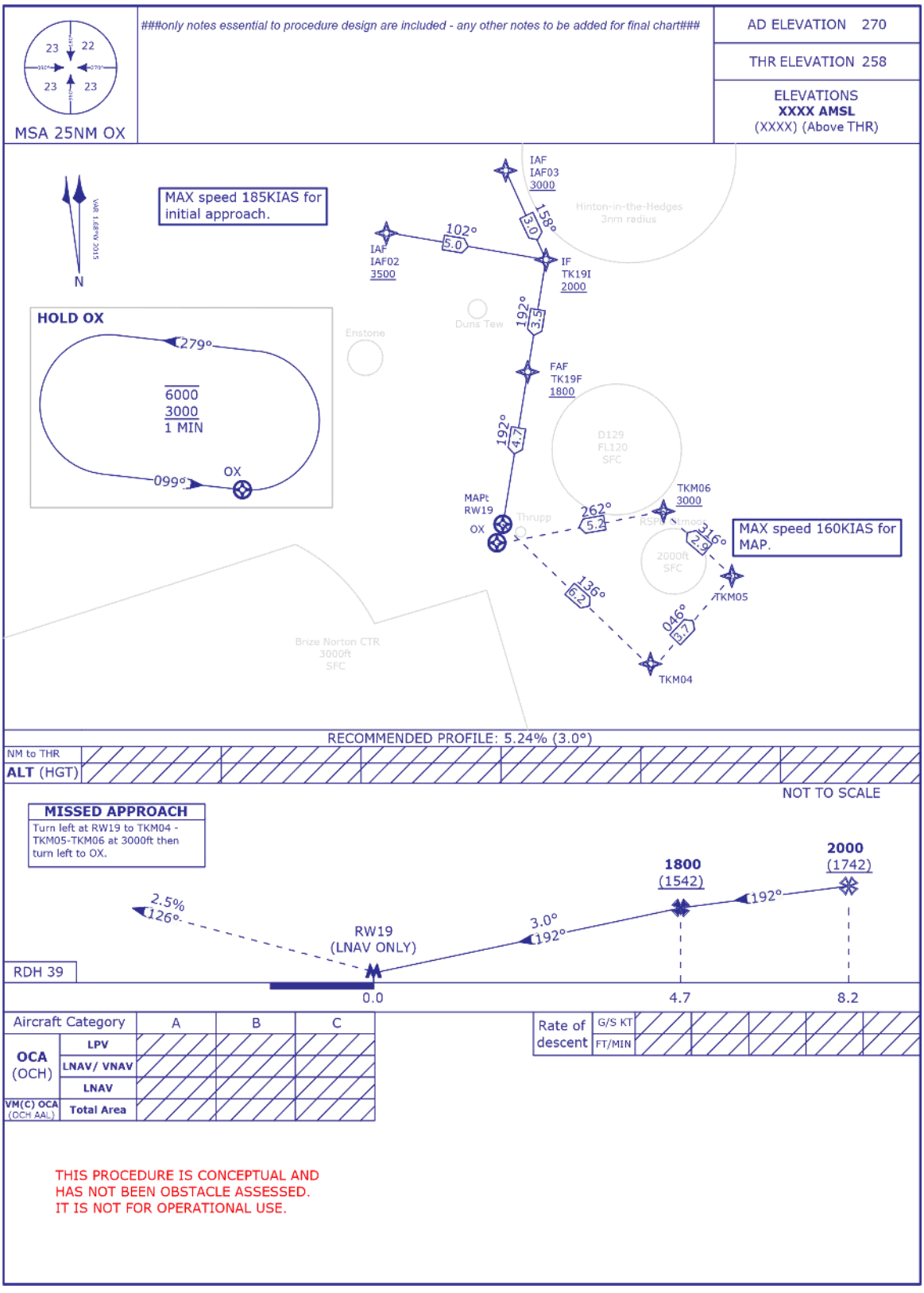


Figure 9 - Runway 19 MAP (East)

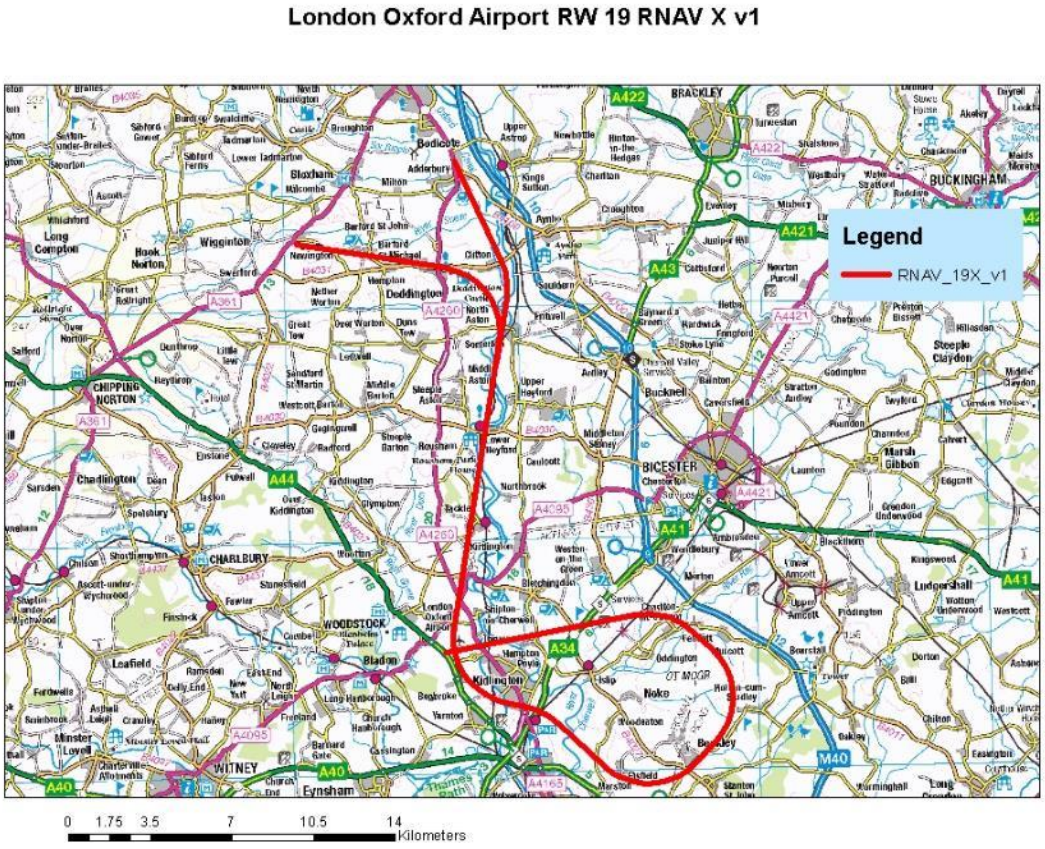


Figure 10 - Runway 19 Approach and MAP (East)

The third option shown in Figure 11 and Figure 12 takes aircraft to west of LOA, routing in a clockwise direction to return to the Oxford NDB. Whilst this procedure would remain inside the LOA CTR/ CTA 1, aircraft following the MAP could potentially interfere with the BZN arrivals from the north. This option would more closely follow the flow of existing aircraft that depart LOA. Aircraft are instructed to turn to the northwest so that they remain clear of the current BZN airspace.

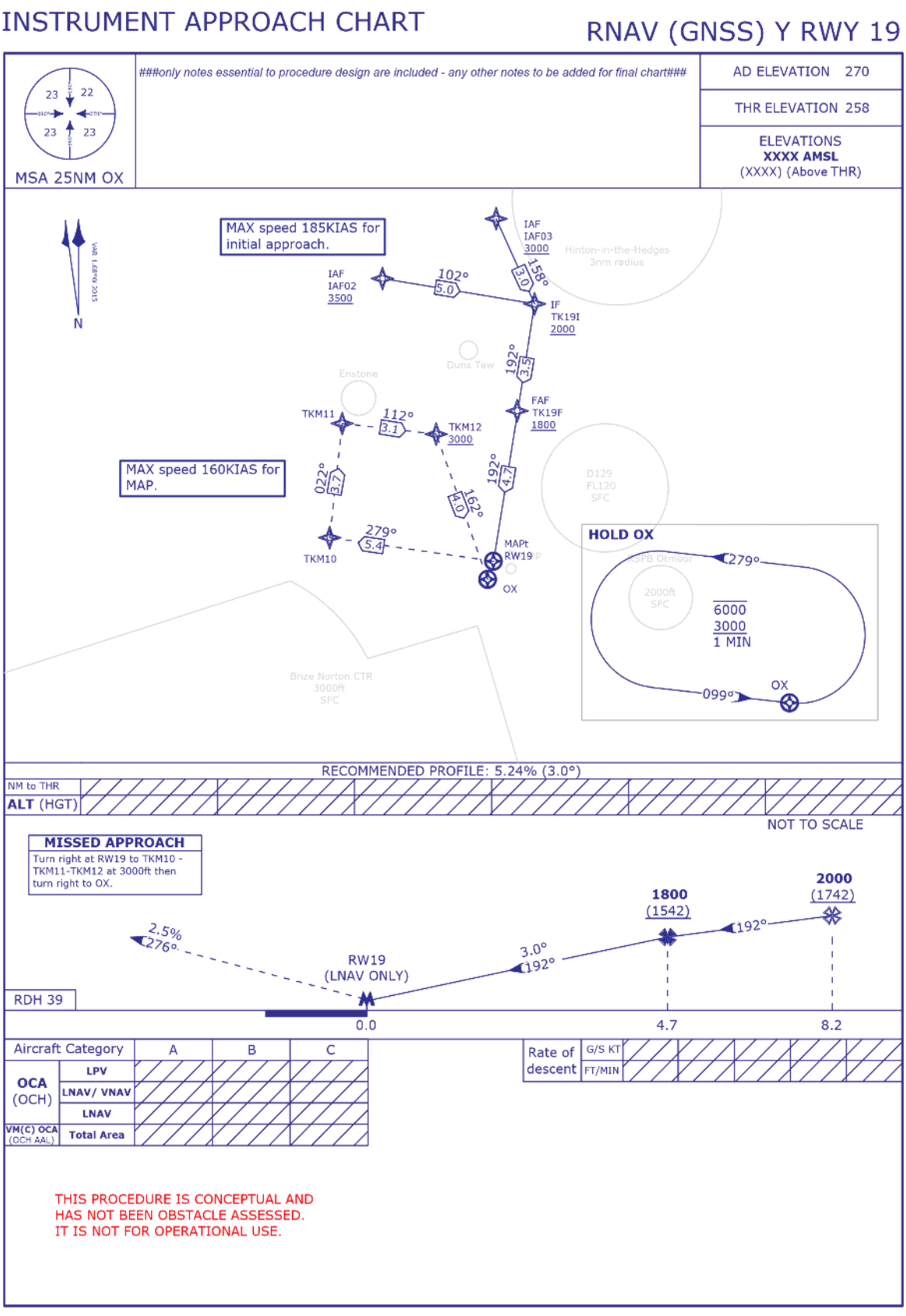


Figure 11 - Runway 19 MAP (West)

London Oxford Airport RW 19 RNAV Y v1

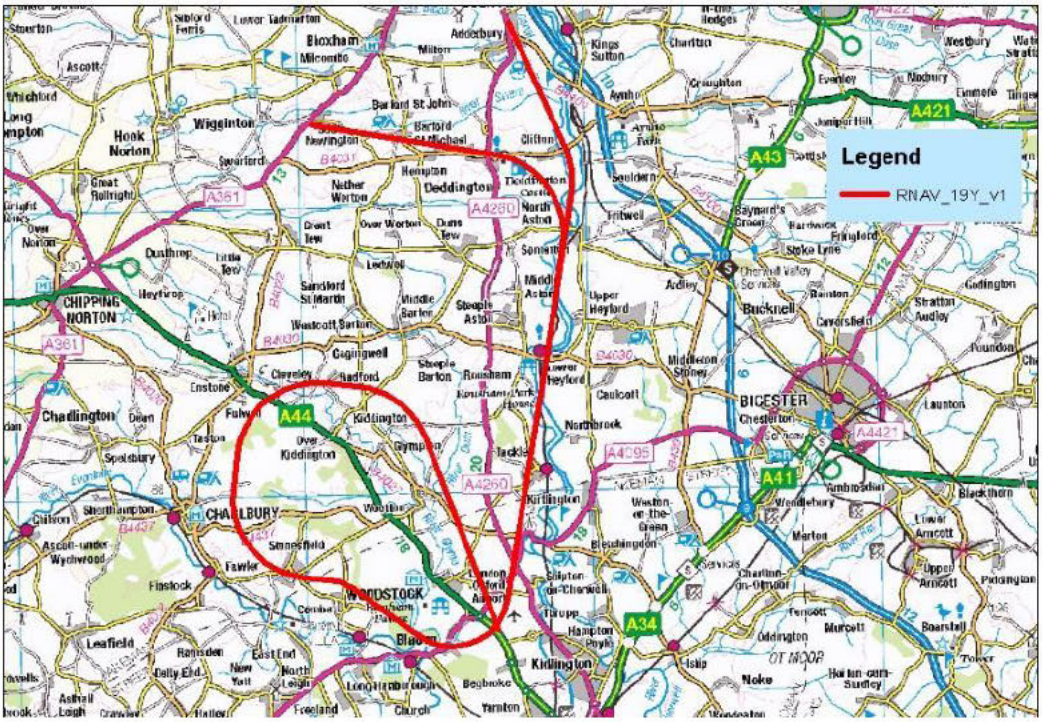


Figure 12 - Runway 19 Approach and MAP (West)

The advantages and disadvantages of each missed approach are summarised in Table 2 - Missed Approach Options for Runway 19 below.

Option	Advantage	Disadvantage
Ahead	Contained in controlled airspace	Vertical separation required as lateral separation from BZN traffic may be compromised
East	Nil	Outside of controlled airspace and in GA traffic area
West	Contained in controlled airspace	Could interfere with BZN arrivals from the north

Table 2 - Missed Approach Options for Runway 19

3.3 Interaction with BZN

BZN has designed a long and a short procedure to Runway 25 that will help maintain either lateral or vertical separation from LOA traffic.

3.3.1 BZN Short Procedures

As can be seen in the Figures below, the proposed new RNAV (GNSS) procedures for LOA interact with those planned at BZN. This is entirely the reason why the CAA advised that both airports should progress their projects in

parallel, to ensure that operations closely coordinated and any safety risks are appropriately mitigated.

BZN has developed its own procedures in close liaison with LOA. To ensure LOA and BZN procedures are safely separated, BZN has developed shortened procedures that will be used as a prime option for the majority of occasions when aircraft are arriving to BZN Runway 25. These short procedures and their interaction with the LOA Runway 01 approach are shown below in Figure 13. This figure shows that on those occasions where BZN large aircraft are conducting the conventional NDB approach (required operational training for overseas deployments) robust coordination procedures would need to be drafted that ensure appropriate separation between the BZN traffic and LOA traffic concurrently making an approach to LOA Runway 01.

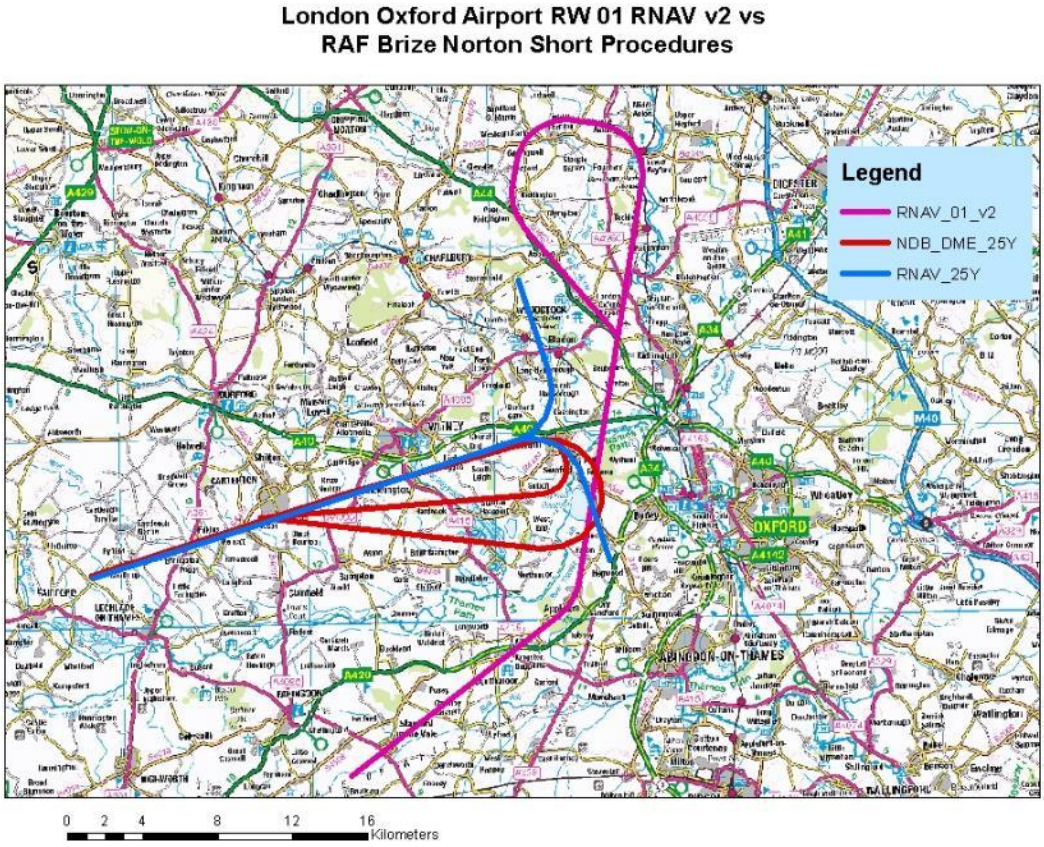


Figure 13 - BZN Short Procedures vs LOA Runway 01 Interaction

When LOA is operating on Runway 19, the BZN and LOA procedures have been designed (including the MAP) to ensure as much lateral separation as possible exists between aircraft whilst also protecting all procedures within the proposed airspace volume. This separation can be seen in Figure 14 below.

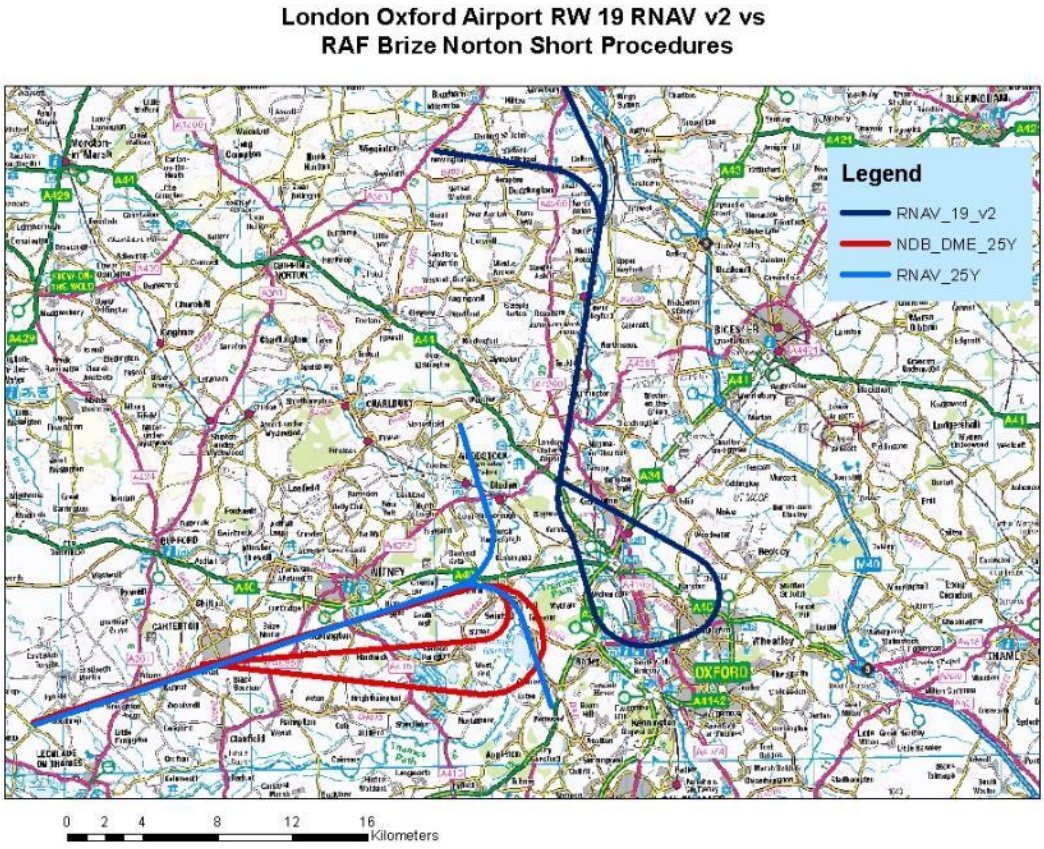


Figure 14 - BZN Short Procedures vs LOA Runway 19 Interaction

3.3.2 BZN Long Procedures

Figure 15 below shows the interaction between the proposed BZN long procedures and the proposed LOA Runway 01 RNAV (GNSS) approach. As can be seen, the LOA Runway 01 procedure and the BZN conventional NDB procedures overlap. Similarly, the proposed BZN RNAV approaches to BZN Runway 25 also overlap with the proposed LOA Runway 01 final approach. LOA and BZN have agreed the principles necessary to underpin the further CONOPs that will be implemented through a covering LoA. These CONOPs ensure that each airport is clear about who will have primacy if there is a conflict between arriving aircraft, how coordination procedures are to be agreed, and how standard separation minima will be achieved.

It can also be seen in Figure 16 that the BZN long procedures (conventional and RNAV arrivals) also overlap with the LOA Runway 19 MAP. The same arrangements discussed in the paragraph above also apply in this situation.

Figure 15 - BZN Long Procedures vs LOA Runway 01 Interaction

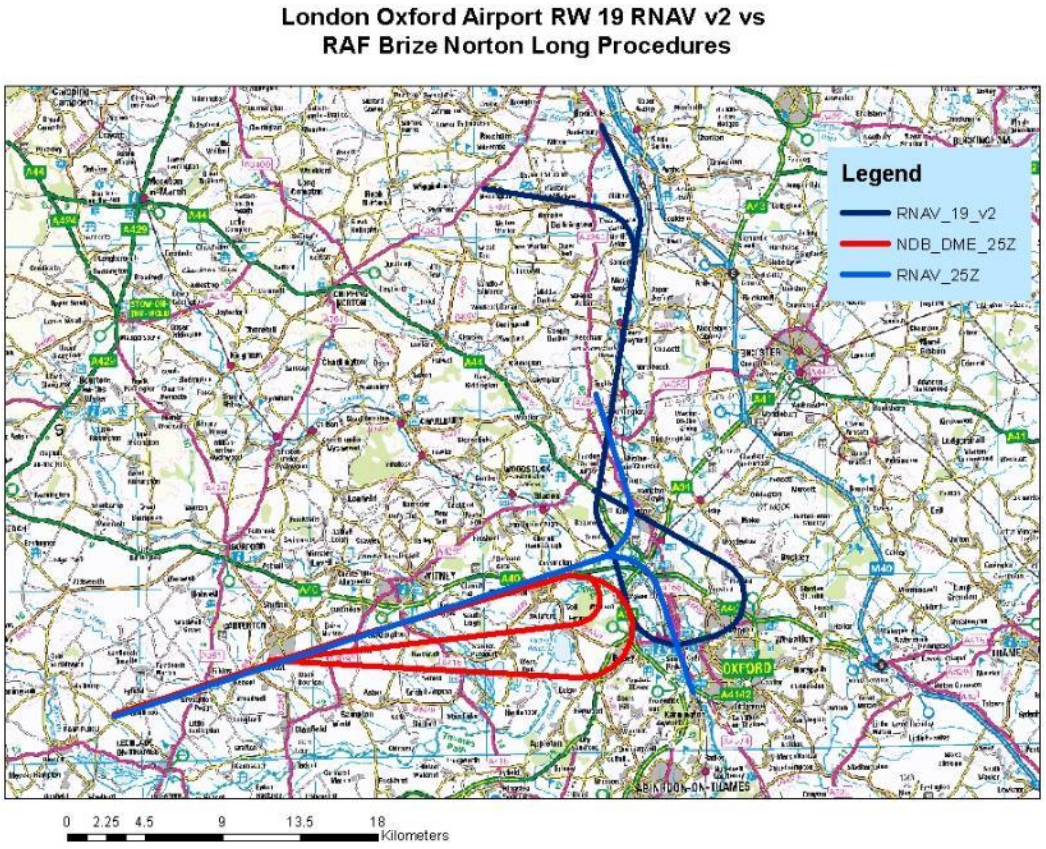


Figure 16 - BZN Long Procedures vs LOA Runway 19 Interaction

3.4 The Airspace Solution

3.4.1 Proposed Airspace Design

The LOA airspace would be classified as Class D to enable the provision of a Deconfliction Service to all aircraft operating within the LOA CTA/ CTR. The basic rules within this airspace volume are:

- All traffic requires clearance from ATC to enter controlled airspace thus creating a known environment to support the safe provision of Air Traffic Services (ATS).
- IFR traffic is separated from other IFR traffic and receives traffic information in respect of VFR traffic.
- VFR traffic receives traffic information in respect of all other flights.

Importantly, other airspace users would not be prevented from entering the airspace. The intention was to improve safety in an area widely acknowledged to be congested. All aircraft can use a radio to gain access and transit the area, remaining compliant with the standard ATC rules. Those aircraft that are not radio equipped could gain access to the area by prior arrangement if required. These structures and procedures would ensure a managed and safe operating environment for all.

Figure 17 below shows the initial design for the Class D airspace. The proposed volume of airspace was driven by the design of the new LOA RNAV (GNSS) procedures. The smallest volumes of airspace were used to still provide the required levels of protection for aircraft operating in and outside of these constructs. Three volumes of airspace are shown in the figure below: CTR 1, CTR 2 and CTA 1.

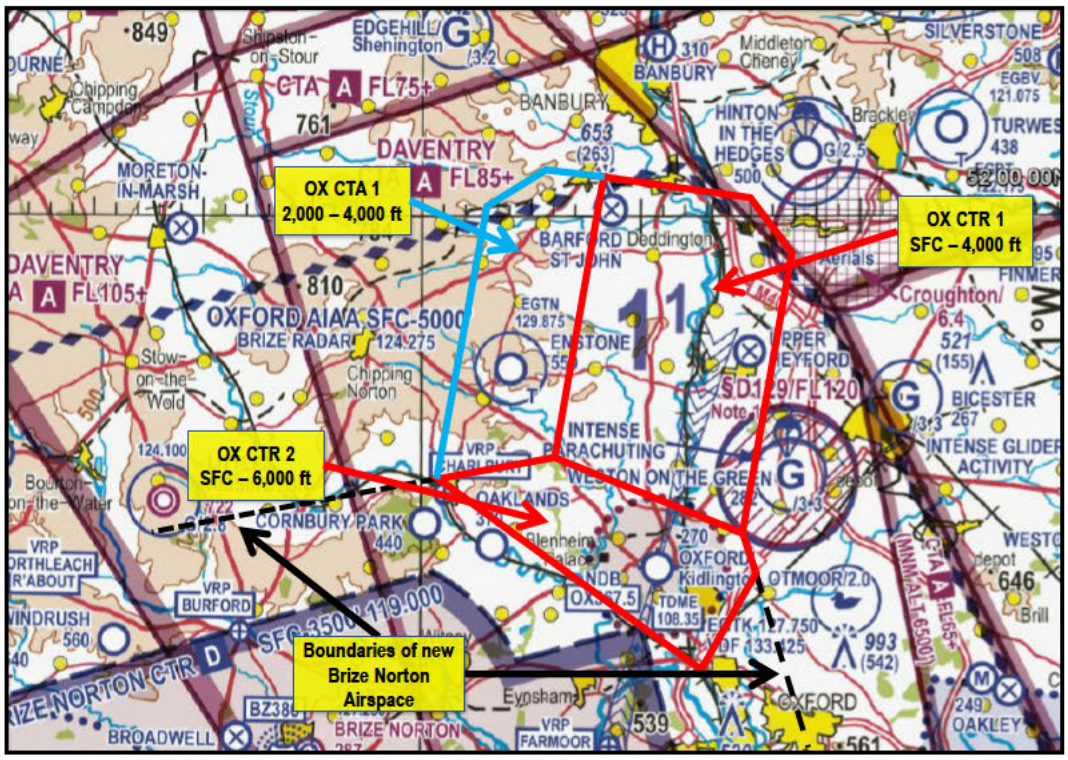


Figure 17 - LOA Class D Airspace Design

The associated vertical limits are also shown. Black dotted lines indicate the proposed boundaries of the BZN Class D airspace that was the subject of a separate consultation.

Following pre-consultation engagement with those aviation stakeholders likely to be affected by the change, this design was slightly modified to take account of concerns raised and incorporate the views of the MOD and LOA regarding provision of a service to Weston-On-The-Green (shown in Figure 18 below).

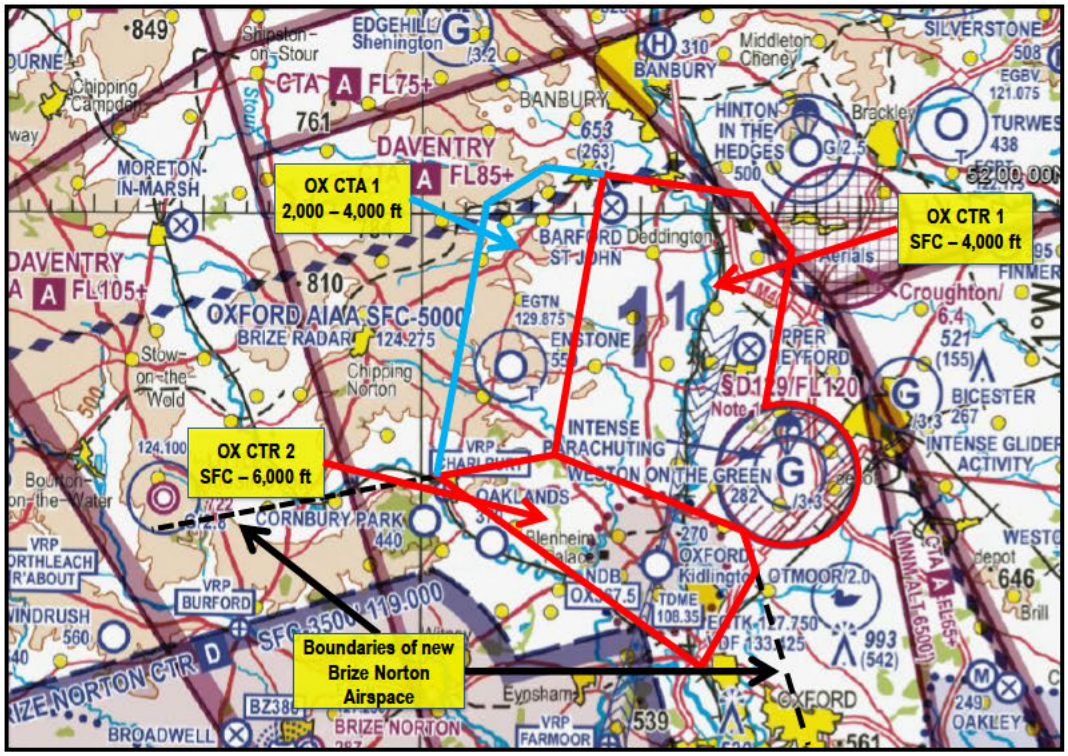


Figure 18 - LOA Modified Airspace Design

3.4.2 Airspace and Procedures

The proposed airspace was designed to contain the new proposed RNAV (GNSS) procedures, as described in Section 3.2. Figure 19 and Figure 20 (below) depict the planned routes within the LOA airspace shown against a map and an aviation chart, respectively. The Runway 01 approach from the south shown in black, and the Runway 19 missed approach shown in blue (over Oxford) would both be contained within the proposed RAF Brize Norton airspace.

Figure 19 - Proposed RNAV (GNSS) Procedures within LOA Proposed Airspace (Map)

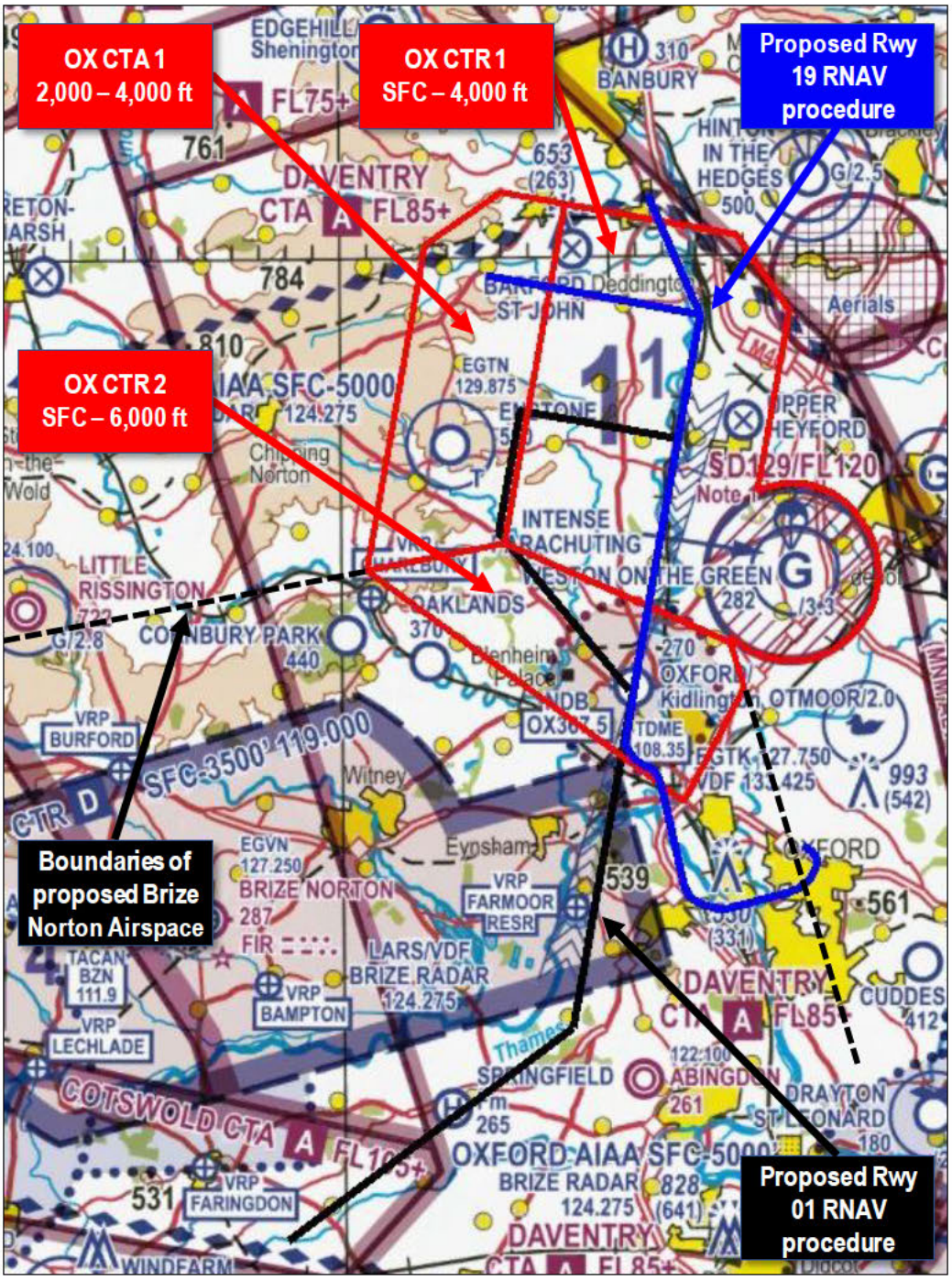


Figure 20 - Proposed RNAV (GNSS) Procedures within LOA Chart (VFR Chart)

3.5 Hours of Operation

LOA's operational hours are 0630 – 2230 Local, 7 days a week. There is no plan to change the hours of operation as a result of this ACP.

3.6 Interaction with En-Route Structure

LOA is not seeking to connect the airport with the airways structure, nor does it intend to increase regulated airspace to the south since most arrivals come from the north. LOA recognises the potential disruption to other aviators caused by the introduction of regulated or restricted airspace. This proposal only seeks to introduce the volume of airspace considered the absolute minimum necessary to achieve the stated aim of creating a 'known traffic environment' to enhance the safety of IFR aircraft arriving at LOA from the north to Runway 19

3.7 Analysis of Impact of Traffic Mix and Complexity and Workload of Operations

This proposal aims to enhance safety by improving the interactions between BZN and LOA flight procedures, through reducing the need for coordination in as many instances as possible. The current requirement to coordinate traffic in an unknown traffic environment is reactive in nature, inefficient, creates avoidable cockpit workload and distraction plus absorbs ATCO capacity. More effectively separating aircraft through the design of the new procedures and airspace will be safer for aircraft on the approach at both airports, as well as for aircraft transiting the new airspace structures. This solution would increase the efficiency of aircraft operations into and out of both airports, whilst at the same time releasing controller capacity to manage aircraft requesting permission to cross the areas concerned.

3.8 Impact on Other Local Aerodromes

The following sections describe LOA's understanding of the effects of the introduction of this volume of Class D airspace on other local aerodromes. The aerodromes are shown in Figure 21 below.

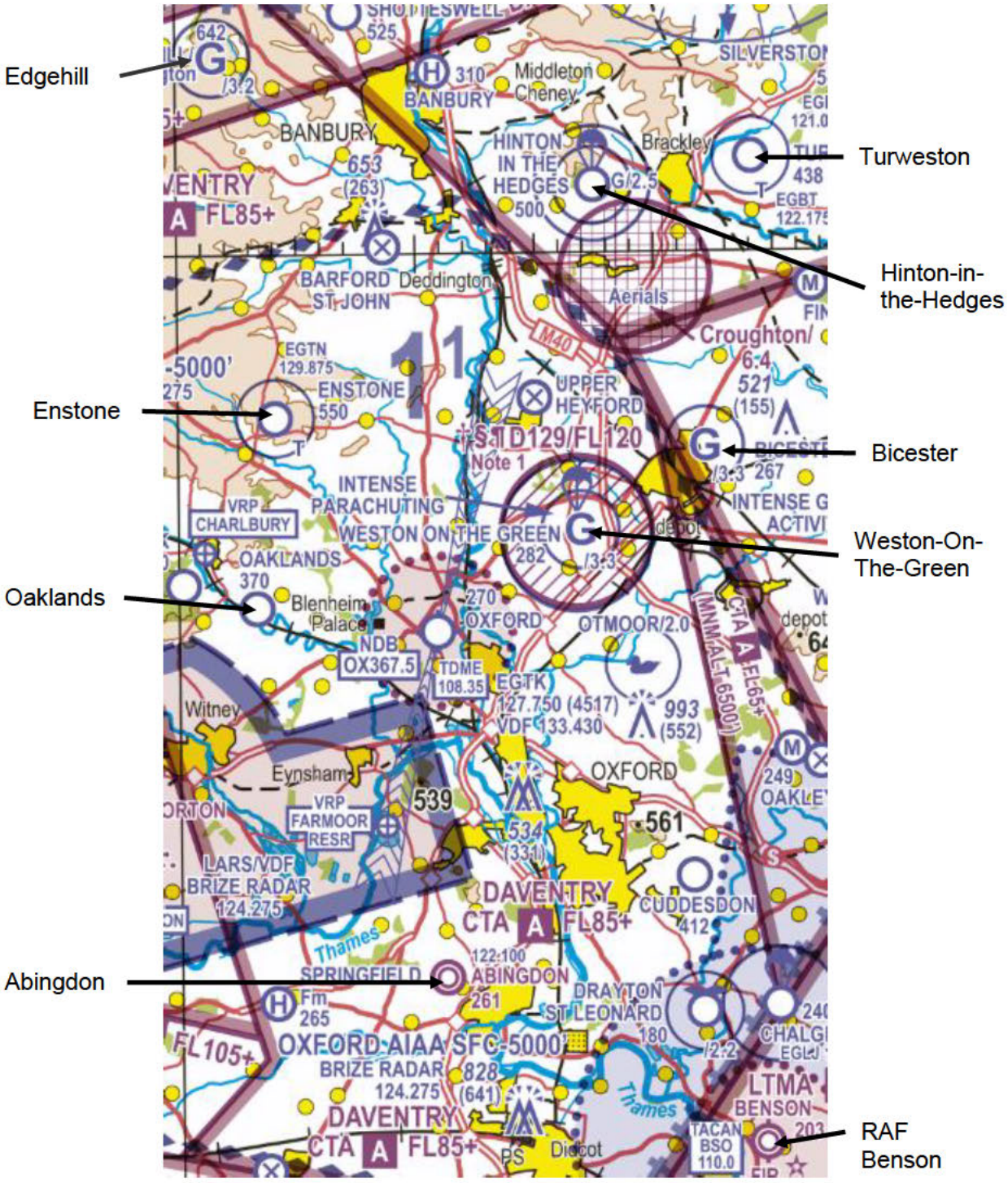


Figure 21 - Local Aerodromes

3.8.1 Enstone

The airfield operates beneath the proposed LOA CTA 1, base 2,000 ft. However, it would be possible to enable users to operate at higher altitudes through the development of an LoA developed between both parties. One initiative that could be developed is that certain Enstone based aircraft with Mode S transponder and Mode C could operate autonomously on a 4517 squawk to cross the CTA / CTR

(but not manoeuvre) without calling. This is the same listening squawk ethos currently used.

LOA already has self-regulating restrictions within unit orders that describe how, subject to traffic conditions and weather, sequenced aircraft will not descend below 3,000 ft amsl within 1nm of Enstone. This would also be the case following introduction of the changes.

3.8.2 Abingdon

This is a disused aerodrome subject to sporadic military use and for specific events LOA would be prepared to develop a temporary Letter of Agreement with event organisers.

3.8.3 Bicester

LOA already has self-regulating restrictions within unit orders. These state that subject to traffic conditions and weather, sequenced aircraft will not descend below 3,300 ft (Oxford QNH) within 1nm of Bicester. Attempts to establish a LoA regarding notification of gliding activity remain ongoing. This initiative will be re-energised as part of the ACP[17]. Following the introduction of the proposed changes it is anticipated that there would be little effect on LOA traffic within the vicinity of the gliding site. However, it is acknowledged that the airspace within the vicinity of LOA aerodrome would no longer be available to non-radio equipped gliders unless agreed by prior arrangement.

3.8.4 Edgehill

LOA traffic sequenced for arrival and departure is normally well clear of this active gliding site. Following the introduction of these changes we expected there would be no effect on LOA traffic within the vicinity of the gliding site. However, it is acknowledged that the airspace within the vicinity of LOA would no longer be available to non-radio equipped gliders unless agreed by prior arrangement.

3.8.5 Hinton-In-The-Hedges

The Runway 19 RNAV (GNSS) design has a northerly IAF that was rotated to the west slightly to remain over 3nm clear of this aerodrome. The proposed airspace was chamfered to avoid the Hinton winch launch area. Liaison was conducted with Hinton Skydive Centre to understand the profile of their parachuting aircraft. LOA has self-regulating restrictions within unit orders that, subject to traffic conditions and weather, ensured that sequenced aircraft would not be vectored within 3nm when the drop-zone was notified as active.

3.8.6 RAF Benson

RAF Benson has several local field sites but access to these is conditional upon liaison with BZN. LOA would need to review the use of the current crossing routes as they conflict with the LOA circuits[18].

[17] Bicester Gliding Centre have ceased to operate from this location, negating the need for an LoA; see paragraph 8.7.3 below.
[18] See paragraph 8.7.6 for commentary post design modification.

3.8.7 Weston-On-The-Green

The MOD and LOA have expressed a desire for an LoA[19] to manage the airspace within this area (D129). The LOA radar capability offers significant advantages when considering Flexible Use of Airspace (FUA) and protection for the parachuting operations. The LoA would need to be reviewed as the conflict point against drop aircraft and the Runway 19 approach would have been within the proposed LOA airspace.

Weston Gliding

Procedures for gliding operations would need to be confirmed and co-ordinated. When D129 is not active but Weston-On-The-Green is active with gliding, LOA would not vector aircraft within the lateral confines of the danger area and the airspace designated to gliders. Transit aircraft would be permitted to cross the area, but only above the height of the winch launch.

LOA has self-regulating restrictions within unit orders that state, subject to traffic conditions and weather, sequenced aircraft will not descend below 3,500 ft (Oxford QNH) within 2nm when the gliding site is active.

3.8.8 Oaklands Aerodrome

Oakland's aerodrome operates non-radio, vintage aircraft within the area of the proposed airspace. An LoA has been established to allow aircraft to operate within the Oakland's visual circuit and transit the CTR. Non-radio/ non-SSR equipped aircraft would be able to do so under specified conditions.

3.8.9 Turweston

LOA has self-regulating restrictions within unit orders that state, subject to traffic conditions and weather, sequenced aircraft will not descend below 3,500 ft (Oxford QNH) within 2nm when the aerodrome is active. This aligns with the protection afforded by the Turweston ATZ before it was withdrawn in August 2015.

[19] A Letter of Agreement exists between LOA and Weston-on-the-Green with effect from July 2019, it was agreed post-ACP consultation. It covers parachuting, danger area crossing services and Weston Gliding.

4 Consultation Analysis Summary

4.1 Overview

LOA is required to undertake consultation with aviation and non-aviation stakeholders as part of its proposed airspace and procedures justification. This ensures that stakeholders who may be directly or indirectly affected by the proposed change have an opportunity to provide comment on the proposal.

4.2 Methodology

The LOA ACP consultation was conducted in accordance with the principles set out in the Cabinet Office Code of Practice on Consultation [Reference 5], as required by the CAA. The publication of the LOA Consultation Document was notified to stakeholders via email, online form and letter to a total of 758 stakeholder consultees, including 31 National Air Traffic Management Advisory Committee (NATMAC) organisations.

Full consultation commenced with wide circulation of the electronic Consultation Document and conceptual airspace designs to all identified stakeholders on 15 December 2017. The required minimum period for formal consultation is twelve weeks; however, following the release of amendments as part of the independent but simultaneous RAF Brize Norton ACP, the consultation was extended by 2 weeks to conclude on 5 April 2018.

4.3 Stakeholder Consultee and Organisations Responses

The aviation consultees included the Ministry of Defence (MOD), airlines, aircraft operators, adjacent aerodromes, local airspace users and the national bodies representing all UK aviation interests who may be affected by the proposed changes. National bodies such as the Light Aircraft Association (LAA), the British Airline Pilots' Association (BALPA), and the Airport Operators Association (AOA) were represented through the auspices of the NATMAC, sponsored by the CAA. A number of military organisations are also members of the NATMAC. Those consulted included:

- AOPA UK
- British Gliding Association
- British Microlight Aircraft Association
- British Parachute Association
- British Rotorcraft Association
- Defence Airspace and Air Traffic Management
- General Aviation Alliance
- Helicopter Club of Great Britain
- Honourable Company of Air Pilots
- Light Aircraft Association
- NATS
- UK Flight Safety Committee

In addition, local authorities at Parish, District and County level were consulted as were the Members of Parliament that represent the Parishes consulted.

The preponderance of organisations listed above objected to the Class D airspace proposal for varying reasons. However, the majority did support further investigation into viable other airspace solutions, the most popular of which was an RMZ, TMZ or RMZ/TMZ alternative.

Of the 1,641 responses to the consultation received from those not in the formal consultee list, the majority were from GA pilots, particularly glider, hang glider and paraglider pilots, many of whom are also members of local flying clubs.

Notwithstanding that their representative organisations may have submitted detailed responses to the consultation on behalf of their membership, all of the additional individual submissions have been documented and analysed by LOA Any new issues identified in the individual submissions which had not already been raised are embraced within the key issues in Section 4.6.

Responses were received from the following flying clubs and airfields:

- Avon Hang gliding and Paragliding Club
- Banbury Gliding Club
- Bath Wilts and North Dorset Gliding Club
- Bicester Gliding Centre
- Bidford Gliding and Flying Club
- Booker Gliding Club
- Buckinghamshire Microlight Club
- Cambridge Gliding Club
- Challow Paramotor Club
- Chiltern Gliding Club
- Cloudbase Microlighting
- Cotswold Gliding Club
- Deeside Gliding Club
- Denham Aerodrome
- Derby Aero Club
- Devon and Somerset Gliding Club
- Dunstable Hang gliding and Paragliding Club
- East of Scotland Microlights
- Enstone Flying Club
- Hinton Skydiving Centre
- Holmbeck Airfield
- Lasham Gliding Society
- London Gliding Club
- North Devon Hang gliding and Paragliding Club
- Owner/Operator of the Northside Grass Runway at Enstone Airfield
- Oxford Gliding Club
- Oxfordshire Sportflying
- Shenington Gliding Club
- South East Wales Hang gliding and Paragliding Club
- Southdown Gliding Club
- Stratford on Avon Gliding Club
- Thames Valley Hang gliding and Paragliding Club
- The Pilot Centre, Denham

- University of Surrey Gliding Club
- Vale of White Horse Gliding Centre
- Vintage Aircraft Club
- XCLent Paragliding Club

4.4 Support Responses

The number of responses supporting the proposal was comparatively small. However supportive responses were received from local residents, members of the GA community, local airspace users and local authorities.

The rationale for support focused on additional levels of safety for IFR operations and included comments supporting the need for change because the current airspace situation was unsustainable. The Airport Operators who supported the proposal indicated that the introduction of Class D would also increase the level of safety for their operations. However, Airbus Helicopters UK was keen to express concern that an overly vigorous imposition of ATC regulations would result in their VFR operations being limited. Additionally, Capital Air Services believed there was a common misconception amongst the GA community that Class D was closed to GA operations.

4.5 Stakeholder Objection Responses

A total of 1,657 objections to the proposal were received throughout the consultation period. The consultee types and respective numbers are given below:

- 1 objection from an Airport Operator.
- 36 objections from local aerodromes/aviation organisation.
- 7 objections from members of the Oxford AIAA Users Working Group.
- 2 objections from Members of Parliament.
- 10 objections from NATMAC consultees.
- 14 objections from local authorities.
- 1564 objections from individuals within the aviation community.
- 18 objections from individuals outside the aviation community.
- 5 objections from other organisations not associated with aviation or based overseas.

4.6 Key Issues

The Consultation produced significant opposition primarily from the GA community supported by local and regional aviation clubs and national organisations such as the British Gliding Association (BGA). There was also a significant number of objections from the local community.

The main emphasis[20] of the concerns from the GA community were as follows:

- The extent of the suggested CAS construct was considered to cause a reduction in the current levels of safety for GA pilots because the new CAS design would produce a funnelling effect as aircraft avoid, and go around,

[20] Due to the scale of responses there were a large number of issues that raised significant numbers of objections. The five most prevalent objections raised are described here.

CAS rather than transit through it. The safety implications centred on an increased risk of mid-air collision (MAC).

- The extent of the suggested CAS construct was considered disproportionate to the requirements of LOA and unjustified based on the number of aircraft movements now and in the future.
- The base of the proposed CTA, in Figure 20, was considered too low to facilitate soaring and to have an impact on cross-country flights. The impact on cross country flying was reflected in the geographical scale of responses received.
- The new CAS design was considered to be too complicated and likely to increase the incidence of airspace infringements.
- The incorrect process had been used to undertake the consultation phase of LOA's ACP due to the CAA's transition from CAP 725 to CAP 1616 [Reference 6]. This was seen by many stakeholders as a cynical use of CAP 725 to deliberately avoid the requirement for enhanced engagement with affected stakeholders.

The proportion of objections from local residents was significantly lower than that of the GA community, however the main emphasis of the concerns in many cases echoed those of the GA community. Additionally, local residents raised concerns regarding:

- An increase in noise and pollution as a result of an increase in number of aircraft operating at LOA; and
- The ACP being part of wider plans to expand LOA, which include the expansion of the runway.

The Consultation raised concerns by the MOD over the increase in CAS. Whilst the MOD considered CAS as a method of managing airspace safely, rather than denying access, they considered that many in the GA community would not view the imposition of CAS in this way and this could lead to the funnelling of GA aircraft. NATS had no objection to the establishment of new PBN procedures and were content that the proposed CAS would have no operational impact on NATS Swanwick. NATS did raise concern that the proposed CAS left an area of Class G airspace between airspace OX CTR2 and the base of DTY CTA[21]. Full details of the analysis are found within the LOA ACP Consultation Feedback Report [Reference 7].

[21] Subsequent design alterations have obviated this NATS concern.

5 Subsequent Procedure and Airspace Design Review

5.1 Introduction

Following the Formal Consultation process LOA have now undertaken a phase of further review based on the feedback provided during and following the consultation phase. This section summarises the discussions and design decisions made as a result.

5.2 Post Consultation Review

Following the 15 December 2017 to 5 April 2018 consultation period, all comments received were thoroughly reviewed by LOA to identify key issues of concern. LOA remains committed to mitigating, as far as is practicable, the principal concerns of those consultees who objected to this proposal.

The approach taken by LOA was to review the consulted airspace design alongside the significant points of objection raised by consultees. Adjustments to the airspace design were identified, where this was possible, to address the issues raised without compromising the initial aims of this airspace change process. The key themes raised from objections were:

- A perceived reduction in safety for aircraft outside of CAS because of an increased risk of mid-air collision. This was a result of increased traffic density in choke point areas.
- The disproportionate size of CAS requested based on the relatively small predicted volumes of aircraft traffic.
- The reduced ability for pilots to conduct cross country flying.
- The incorrect or cynical use of CAP 725 ACP.
- The perceived unfair benefit for aircraft operated by LOA at the expense of the local GA community.
- The restriction on free flying as a result of the reduction of available Class G airspace.

Of note, the RNAV (GNSS) approaches did not attract similar objection. Specifically, it was the airspace designed to provide safe protection for those new procedures that attracted the majority of responses.

LOA recognises that many within the GA community perceive Class D airspace to be a barrier to flight. Other consultees correctly stated that this is not the case. During the consultation process LOA did consider alternative methods of enhancing safety for their operations, whilst limiting the impact on GA operations. These constructs included Class E airspace and the introduction of TMZ or RMZ; suggested alternative options within a number of consultation responses. LOA considered that these options would provide the appropriate level of safety required until the final stages of an instrument approach. If an approach is broken off at a late stage, this would not satisfy the requirement to enhance safety. It was suggested that an area of Class E airspace, with a small area of Class D to protect the final stages of an instrument approach could achieve the aims set out

by the ACP. This design would not result in a reduction in safety for GA aircraft because it would avoid an increase of traffic density due to the creation of choke points. It would also not inhibit VFR cross country flying as Class E airspace does not impose any additional control measures on VFR aircraft. However, this developed alternative would lead to a more complicated airspace design in the Oxfordshire area.

A large number of objections stated that the proposed airspace design was disproportionate to the requirements of LOA. However, LOA considers it critical that the area in which the final stages of an instrument approach is undertaken must be afforded an enhanced level of safety by the creation of a known traffic environment. By reducing the amount of airspace, originally proposed as Class D, LOA has re-considered the **TMZ** alternative and has changed the requested airspace classification accordingly. LOA considers that the redesigned airspace will fulfil the objective of being proportionate to its stated requirement.

A large number of responses stated that LOA were following the incorrect CAP process for airspace change. In most of these cases consultees considered that LOA was following CAP 725 in an attempt to avoid the enhanced level of engagement required within CAP 1616. Prior to the 2 January 2018 transition point the CAA decided that LOA's airspace change process was sufficiently mature to continue under CAP 725.

5.3 Consultation Conclusions

As stated earlier, the Consultation produced significant opposition from the GA community supported by GA clubs around the UK, the BGA, the BPA, the LAA, the GAA, and the All-Party Parliamentary Group on General Aviation.

LOA believe they have exceeded the required levels of engagement in line with the spirit of CAP 1616 and, as evidenced by the post-consultation re-design and classification change, have implemented a final design that fully considers all responses and mitigates the majority of objections in a safe and proportionate manner.

The revised TMZ airspace concept is reviewed in greater detail in Section 6 below.

6 Subsequent Procedure and Airspace Design Modifications

6.1 Introduction

Following the post-consultation review of the procedure and airspace design, LOA have made a number of modifications based on the feedback provided during and following the consultation and subsequent review phase. This section summarises those discussions, procedure decisions and design decisions made as a result.

6.2 Runway 01 – RNAV (GNSS) Approach

Following the formal consultation stage and the subsequent stakeholder engagement, the profile for the Runway 01 Approach was amended to better enable tactical management of traffic with BZN and provide a more noise sensitive approach path to stakeholders.

6.3 Runway 01 – Missed Approach Procedure

Following the formal consultation stage and the subsequent stakeholder engagement it was deemed that LOA did not need to make any changes to the MAP for Runway 01.

Aircraft conducting a missed approach will initially climb straight ahead on runway heading and fly the anti-clockwise route back to the location of the Oxford NDB (as shown within Figure 5 in Section 3 above) that lies slightly to the west of the main runway.

6.4 Runway 19 – RNAV (GNSS) Approach

Following the formal consultation stage and the subsequent stakeholder engagement it was deemed that LOA did not need to make any changes to the Runway 19 Approach.

There are 2 IAFs for this approach (IAF02 and IAF03) that cater for aircraft approaching the procedure from different directions. Both IAFs are not contained within the new proposed TMZ airspace volume, but aircraft will enter the TMZ shortly after passing these points when beginning the approach procedure.

6.5 Runway 19 Missed Approach Procedures

Following a review of the stakeholder engagements, objections, counterproposals received and the options available, LOA propose to utilise two MAPs for Runway 19. The conventional Runway 19 ILS MAP remains extant and was not consulted upon. The MAP for the proposed RNAV (GNSS) approach to Runway 19 offers three alternative MAPs, the MAP LOA are submitting is shown in Figure 23 below.

LOA recognises that a significant number of MAP undertaken at LOA are for training purposes, therefore LOA proposes to establish one “training” Runway 19 MAP that routes to the north west of LOA and one “actual” Runway 19 MAP that routes to the south east. By utilising a training MAP, LOA will reduce the impact of training operations to the south east of LOA, which is recognised as an area of particular importance to the GA community.

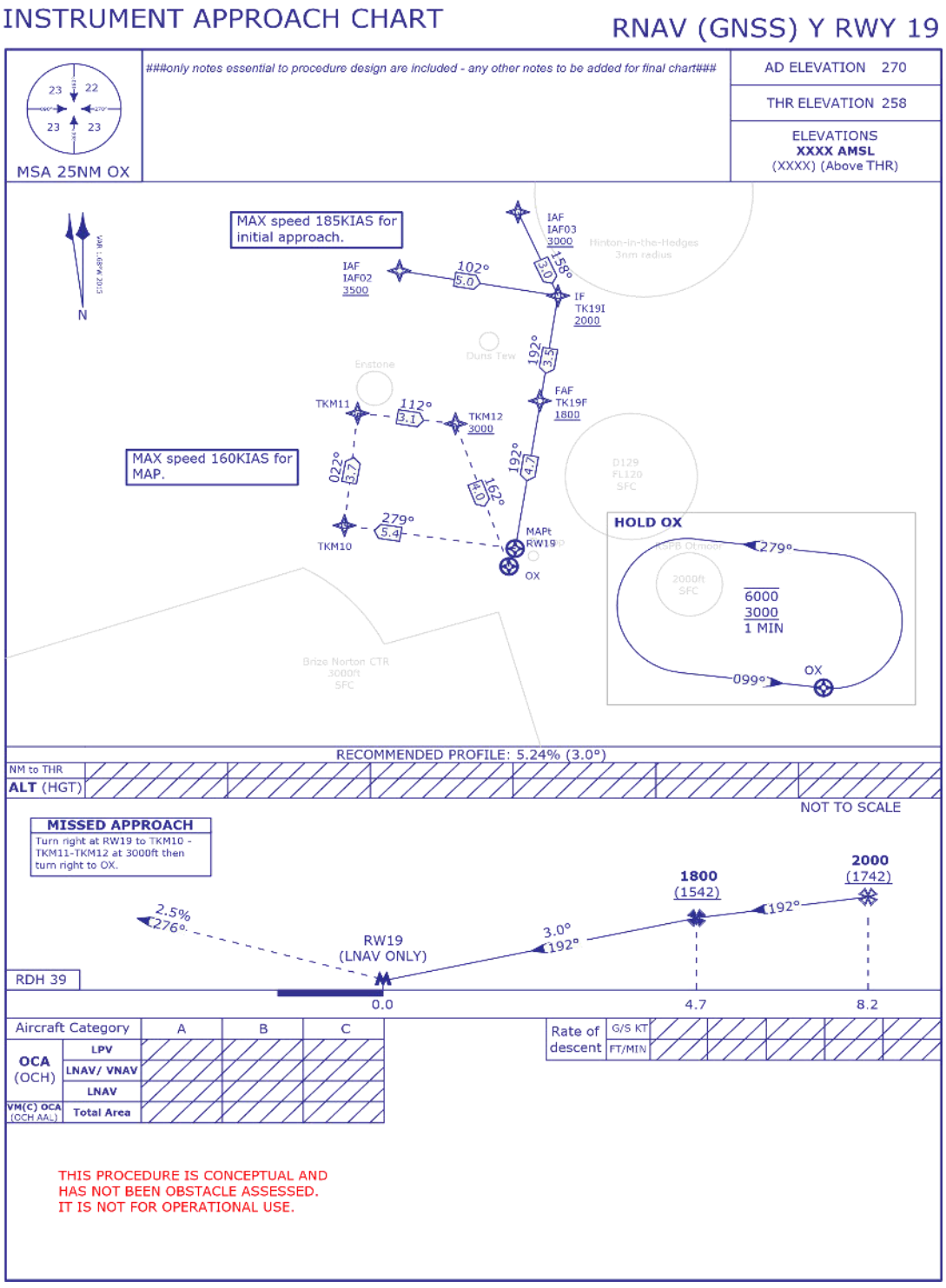


Figure 22 - Runway 19 MAP (West)

6.6 Proposed Airspace Design Modifications

Following a thorough review of the stakeholder engagement feedback, which included objections, counterproposals, and potential alternative options, LOA has modified and is submitting a revised airspace concept. This revised concept reflects the desire for LOA to demonstrate that they have recognised the concerns of those who responded to the Consultation, and those who have since provided constructive feedback through additional stakeholder engagement. LOA actively sought to mitigate those concerns by considering how the project aims could be met in a way that minimises the impact on neighbouring aviation communities. Key members of the GA community were invited to attend a Stakeholder Engagement Event in November 2019, where this revised concept was shared, and feedback was received. This concept differs from that presented within the Consultation Document. The BZN decision to only allow their Runway 25 'Long' Procedures to take place after coordination with LOA, combined with their commensurate reduction in proposed CAS to contain those procedures has allowed LOA to modify their coordination requirements for Runway 01 approaches and Runway 19 missed approaches. Feedback received from key members of the GA community at the November 2019 meeting agreed that it was recognised LOA had made a significant compromise on the final airspace design and LOA is pleased to submit this revised design to the CAA for consideration. The final airspace and procedure designs are detailed in the following sections.

6.7 Airspace Design

During the formal consultation phase, significant objections were raised based on the overall volume of proposed airspace, and the chosen classification of Controlled Airspace (Class D). Whilst other classifications of Controlled Airspace were considered, a Class D solution would have required the smallest volume of airspace that would have met the aims. Whilst it was recognised that Class E airspace would have been less restrictive on the GA community, since they predominantly operate VFR, within the UK Class E cannot be used for CTRs, and therefore, it would not have been suitable to protect the immediate vicinity of the Airport. The first iteration of revised airspace design is shown in Figure 23 below. In this first re-design, LOA sought to further reduce the size of the airspace proposed and to limit the volume of Class D airspace by only surrounding the final approach for Runway 19.

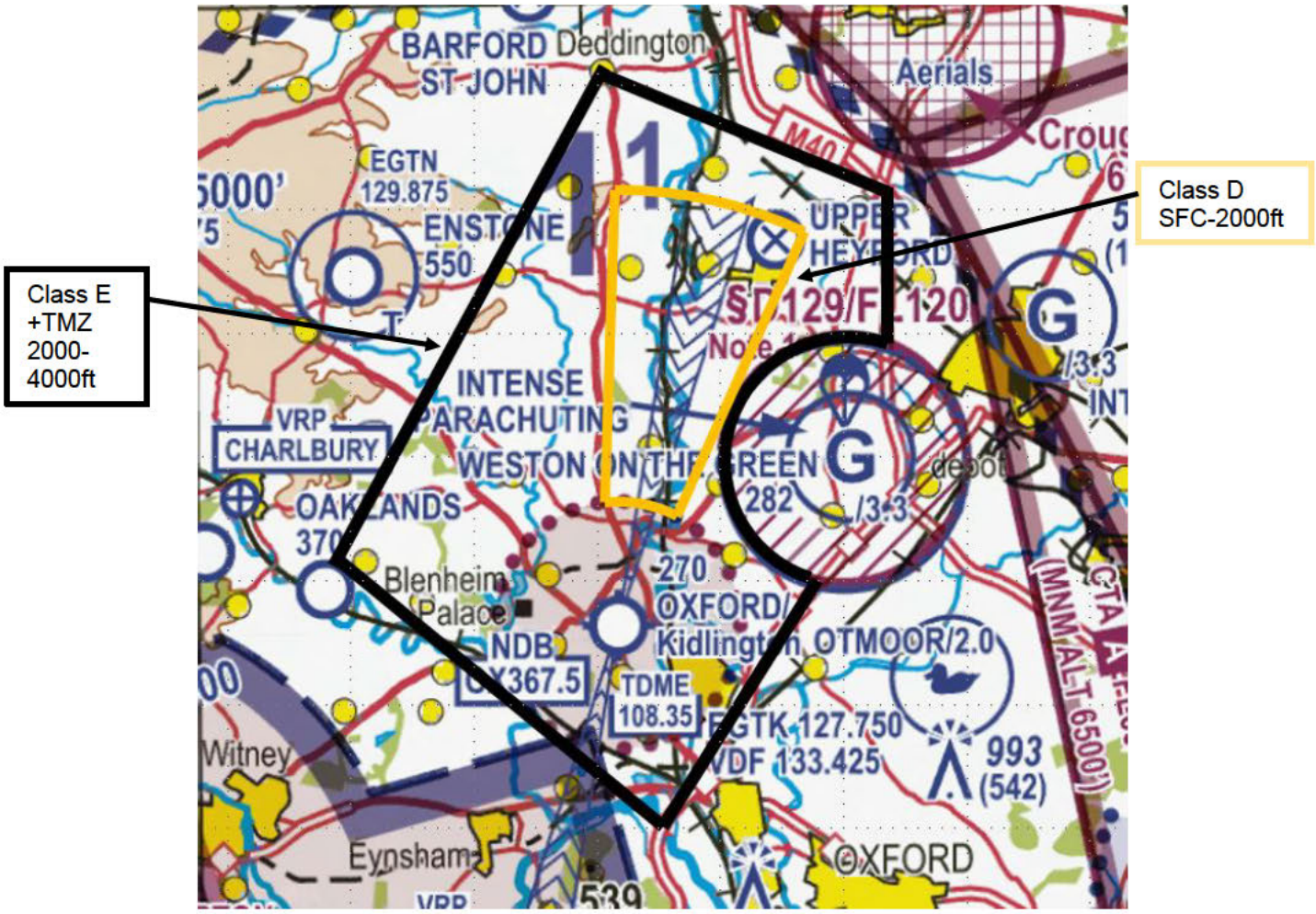


Figure 23 – Revised Class D, E+TMZ Airspace Design

Subsequent stakeholder engagement, in November 2019, and liaison provided opinion that the Class D and Class E+TMZ solution met neither the requirements of other airspace users nor enabled LOA to meet the objectives of this ACP. Earlier engagement raised questions whether LOA was a busy enough airport to warrant any dedicated airspace. The size of the proposed airspace and its classification has been an often-raised discussion point. Accessibility to, and through, the airspace has also been discussed and has highlighted the misconception amongst many minor aerodrome operators, flying clubs and airspace users as to whether and how they can transit through or operate in Class D, Class E, RMZs or TMZs. Throughout this process, LOA has tried to help to educate and improve the knowledge of those who believe that any airspace is a restriction upon their aviation activities. Moreover, LOA believes that the size of all iterations of airspace designs have been sufficient to satisfy the safe protection of the proposed LOA RNAV (GNSS) procedures whilst not being prohibitively large to prevent local flying activity.

In addition, LOA are most willing to have a LoA with any of the airspace users (such as GA, glider clubs, sports flyers) where its use can further improve the coordination and notification procedures between the two (or more) units. The LoA between LOA and Weston-On-The-Green provides evidence of the crossing service provided to aircraft operating in D129 (predominantly flying back and forth

from BZN) and also flexibly utilising the airspace when D129 is not active. LOA, as an ANSP, is willing to have additional arrangements with local glider clubs but this seems to counter to their wishes and has yet to prove fruitful. Nevertheless, the offer stands and will be re-visited, if the proposal is successful, during the post-implementation review. Handling the popular gliding competitions (up to 80 participants) was often raised too; these competitions will continue to be handled by the extant notification methods and access to the TMZ will enable safe and successful simultaneous operations. Much of the discussion focussed upon the comparison between Class D airspace and a combined RMZ/TMZ; the general view from consultees was that only one of an RMZ or TMZ should apply and would be preferable to Class D.

Therefore, the airspace was further revised resulting in a TMZ solution shown in Figure 23 below

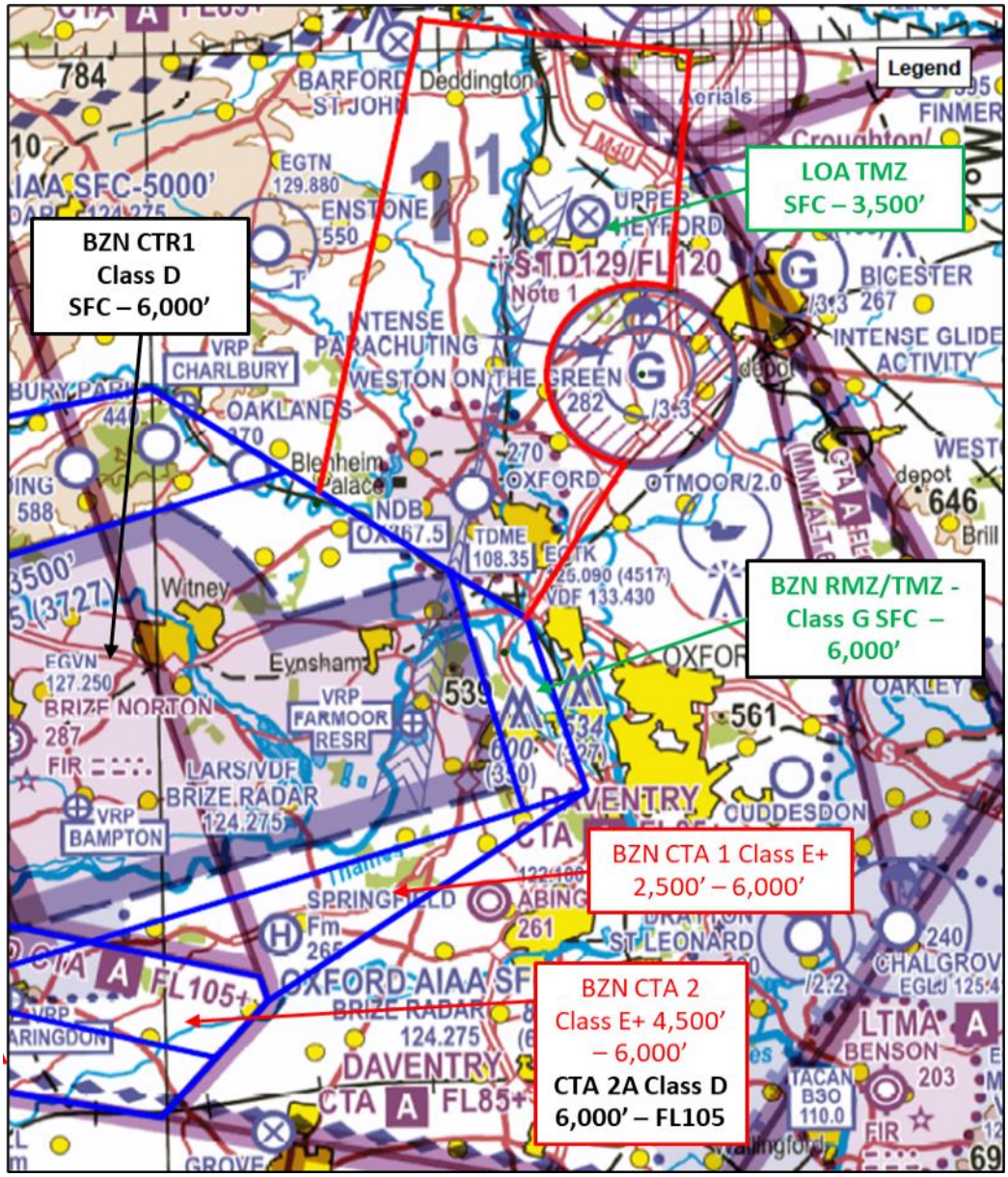


Figure 24 - Final Airspace Design

The dimensions of the proposed TMZ airspace are shown in Table 3 below.

Designation and Lateral Limits	Vertical Limits	Airspace Class
LOA TMZ 51º 59' 49.42N 001º 11' 25.22W - 51º 54' 59.52N 001º 12' 17.78W - thence anticlockwise by the arc of a circle radius 2 nm centred on 51º 52' 46N 001º 13' 20W - 51º 50' 48.75N 001º 14' 00.23W - 51º 46' 43.64N 001º 18' 14.33W – 51º 50' 04.34N 001º 24' 28.51W - 52º 00' 40.28N 001º 20' 33.61W - 51º 59' 49.42N 001º 11' 25.22W	SFC to 3,500ft	Class G

Table 3 - Dimensions of proposed TMZ airspace

7 Safety

7.1 Introduction

CAP 725 provides detailed guidance on the Airspace Change Process. It requires a robust safety management process to be an integral part of any proposed Airspace Change, including the introduction of IFPs.

The CAA Safety and Airspace Regulation Group (SARG) requires assurance that the changes introduced by the introduction of RNAV IFPs and revised airspace arrangements will result in safe air operations at all stages of the project lifecycle; this will be true of LOA and any other stakeholders impacted by the changes.

The form of this assurance is an operationally focused four-part suite of Safety Case reports, in accordance with the LOA Safety Management Manual (SMM). These reports have been completed throughout the process and updated when design modifications have been made. The Safety Documentation has been prepared in accordance with CAP 760 Guidance on the Conduct of Hazard identification [Reference 8].

7.2 ACP Safety Assurance Strategy

7.2.1 Overview

The Safety Assurance Strategy for the ACP is to demonstrate satisfaction of a safety argument with the overarching top-level claim that:

"The revised airspace arrangements will be acceptably safe when introduced into operational use and throughout their in-service usage".

To achieve this, a Systems Engineering approach to safety assurance has been adopted, which included the following main activities.

7.2.2 Hazard Identification

Identification of the hazards associated with the introduction of the revised airspace arrangements at LOA involved a Hazard Identification (HazID) workshop.

The HazID workshop was based on contextual diagrams which were developed to show the boundaries of the study, the physical and functional interfaces associated with the revised airspace arrangements and other interactions that could influence safety e.g. ATCO, pilot, and equipment interfaces.

Hazard review meetings were held when aspects of the proposed airspace designs were modified. This ensured that the identified hazards remained valid and that any new hazards, associated with the design modification, were identified.

7.2.3 Part 1 Safety Case Report

The Part 1 Safety Case Report concerned the development of the Safety Objectives and Requirements.

Analysis of the HazID results led to the identification of key areas for mitigation. The result of the analysis was a list of Safety Objectives and Requirements.

See Reference 9.

7.2.4 Part 2 Safety Case Report

The Part 2 Safety Case Report presented Claims, Arguments and Evidence to support the Safety Argument.

In support of the Safety Argument, the Part 2 Safety Case Report also demonstrated that the designs of the RNAV IFPs and TMZ proposed for LOA, met the Safety Objectives, Safety Requirements and Regulatory Requirements that were set in the Part 1 Safety Case Report.

See Reference 9.

7.2.5 Part 3 Safety Case Report

The development of the Part 3 Safety Case Report will focus on the safe introduction of the RNAV IFPs and the TMZ into initial operational service. The essence of this work will be to demonstrate that LOA is ready to operate with the proposed RNAV IFPs and TMZ.

See Reference 9.

7.2.6 Part 4 Safety Case Report.

The Safety Case Part 4 will detail the processes and procedures (ATC and Air Traffic Engineering (ATE)) associated with the continued day-to-day operation and support of the RNAV IFPs and TMZ and will describe the practical measures by which safety will be managed and ensured through-life.

Further, the Part 4 Safety Case Report will report on full satisfaction of the Safety Argument and full compliance with all derived Safety Objectives and Requirements.

See Reference 9.

7.3 Safety Summary

7.3.1 Satisfaction of Safety Argument

Claims, Arguments and Evidence are presented in the Part 2 Safety Case report in order to support the overarching, top-level Safety Claim, that the proposed RNAV IAPs and the TMZ will be acceptably safe when introduced into operational use and throughout their in-service usage.

Full satisfaction of the Safety Argument will be demonstrated during the Transition into Service (Part 3 Safety Case Report) and the continued safe Operation and Maintenance (Part 4 Safety Case Report) phases of the project. Once the evidence of satisfaction is fully available, Parts 3 and 4 will be signed off.

7.3.2 Compliance with Safety Objectives and Requirements

The successful use of the RNAV IAPs is reliant upon the GNSS providing the assurance, credibility and confidence that the Signal-in-Space continues to meet the requirements listed in ICAO Annex 10 Volume 1 Radio Navigation Aids. The data presented in the Part 2 Safety Case report shows that the applicable requirements of ICAO Annex 10 are met.

At this stage of the project, compliance to all the derived Safety Requirements has not yet been demonstrated, since the evidence of compliance is not yet available. Compliance with the derived Safety Requirements will be demonstrated during the Transition into Service (Part 3 Safety Case Report) and the continued safe Operation and Maintenance (Part 4 Safety Case Report) phases of the project.

7.3.3 Compliance with Regulatory Requirements

LOA has followed the ACP process defined in CAP 725 including compliance with Airspace and Infrastructure requirements in Appendix A, sections 11 to 14 inclusive of CAP 725.

The RNAV IFPs have been designed in accordance with CAP 785 and ICAO Document PANS-OPS 8168 [Reference 10] by CAA approved design organisations.

Compliance with the Safety Objective for the GNSS Signal-in-Space (see "*Compliance with Safety Objectives and Requirements*" above) demonstrates compliance with ATS Requirements for RNAV (GNSS) Instrument Approach Procedures in CAP 670, section NAV07.

8 Operational Impact of Final Proposed Airspace Design

8.1 Introduction

CAP 725 requires an analysis of the impact of the change on all airspace users, airfields and traffic levels, to also include an outline Concept of Operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:

- Impact on IFR General Air Traffic and Operational Air Traffic or on VFR General Aviation (GA) traffic flows in or through the area.
- Impact on VFR operations (including VFR Routes where applicable).
- Consequential effects on procedures and capacity, i.e. on SIDS, STARS, and/or holding patterns. Details of existing or planned routes and holds.
- Impact on aerodromes and other specific activities within or adjacent to the proposed airspace.
- Any flight planning restrictions and/or route requirements.

Evidence of mitigation of the effects of the change on any of the above must also be provided.

8.2 Impact on IFR General Air Traffic and Operational Air Traffic

The volume of IFR movements at LOA is described in more detail in Section 11.3. The volume of IFR General Air Traffic is not expected to increase as a result of the introduction of RNAV (GNSS) approaches.

8.3 Impact on VFR and General Aviation operations

Significant numbers of objections to the original Class D airspace design were raised by members of the GA community and their representative organisations. These concerns were based on the size of the proposed airspace, its classification and the resultant impact on GA operations. LOA consider that the revised dimensions and classification described in Section 6, will result in an acceptable and manageable[22] solution that has minimal impact on GA operations. Additionally, LOA considers that the minimal impact on the GA community will be more than balanced by the additional level of safety provided by a TMZ around IFR traffic on final approach to Runway 19.

[22] In addition to those VFR aircraft operating in accordance with the rules of the TMZ, GA can, in addition gain access to the TMZ by use of their radio. Procedures on how to do this will be clearly explained in the AIP. This will further assist in creating a better-known traffic environment enhancing safety for all participants. Non-radio-equipped aircraft will also be able to gain access to the TMZ by prior arrangement as explained in the AIP.

8.4 Impact on existing procedures and capacity

LOA expects inbound IFR traffic to take advantage of the new procedures and benefit from the safer airspace design around LOA which the TMZ will create. Notwithstanding that participating TMZ traffic will not have to speak to LOA (of course, they will be welcome to call as well as transpond), LOA expects an increase in speaking units as a result of non-transponding, radio-equipped aircraft and gliders wishing to transit the TMZ. Accordingly, LOA will introduce a Director frequency and manned position during busy periods. Watch Supervisors will be introduced with effect from 1st September 2020 and extra controllers have been employed by LOA to ensure full controller manning.

8.5 Letters of Agreement

Situated close to various airports and airfields with a multitude of tasks, aims and objectives, LOA has a requirement to liaise, coordinate and interact with neighbouring and adjacent airspace users. Accordingly, LOA has LoAs with a range of neighbours. These LoAs explain the current coordination and notification procedures between two or more units. Some of them shall remain extant following implementation of the proposed procedures and commensurate airspace, others are in draft for update to reflect new or changed methodology. The key LoAs for the efficient movement of traffic in the Oxfordshire area follow in sub-sections 8.6.1, 8.7.8 and 8.8.1 below.

8.6 Integration with RAF Brize Norton

The CAA has directed that the LOA and BZN ACPs are to be developed in parallel to ensure instrument procedures, airspace and operational procedures are designed efficiently and with a high level of safety oversight.

Each project will be considered separately, but the combined impact of proposed changes to airspace and procedures needs to be considered together. The new PBN procedures and protected airspace developed for both LOA and BZN ACPs have been designed to ensure that operations at each aerodrome can continue in a safe and coordinated manner. Where IFP designs overlap, agreed procedures will be developed to ensure appropriate prioritisation and safe sequencing of the inbound and outbound aircraft at both locations.

8.6.1 LoA between LOA and BZN

LOA and BZN operate in close proximity with airspace and procedures that require close coordination. BZN operates a multitude of SIDs and STARs which are published in the MilAIP as well as providing radar vectored approaches to both instrument runways (Runway 07 and Runway 25[23]). LOA provides instrument approaches to Runway 01 and Runway 19. The Runway 01 instrument approach transits through the BZN Class D CTR. Both units require an operational awareness of each other's procedures and runway in use. Both units have met on numerous occasions to develop the Concept of Operations (CONOPs) and have developed a draft replacement to this LoA, [Reference 11],

[23] The BZN Runway 25 'Long' Procedure will only be used after coordination with LOA.

which will enable the new procedures at both units to operate safely and successfully.

8.6.2 ACP Transition

These procedures have been drafted based upon both the LOA and BZN ACPs being accepted, in their entireties, by the CAA. However, there is a possibility that both proposals require amendment; accordingly, the LOA transition to adopt the new procedures, and/or modify the CONOPs, will remain flexible based upon both ACP outcomes.

8.7 Impact on Local Aerodromes

In Section 3.8, we discussed the potential effects upon the many local aerodromes of the introduction of the Class D airspace design reflected in the LOA consultation. Following consultation and subsequent redesign, we anticipate that the proposed TMZ will have the following impacts on local aerodromes:

8.7.1 Enstone

The TMZ rules will allow Enstone to continue their operations whilst participating in the TMZ and/or speaking to LOA. The development of a Letter of Agreement developed between both parties would still be of benefit and LOA will encourage its development.

LOA aircraft will not descend below 3,000 ft amsl within 1nm of Enstone. This will remain an extant LOA self-regulating restriction within unit orders that describe how sequenced aircraft operate, subject to traffic conditions and weather.

8.7.2 Abingdon

No changes to the comments made in Section 3.8.2 as a result of the procedures and airspace redesign.

8.7.3 Bicester

A more agreeable relationship was anticipated with Bicester Gliding Centre as a result of the redesign and classification changes to the LOA proposal. However, LOA was informed that gliding operations from this location would cease wef 1st July 2020 when Bicester Heritage planned to take over the operation of Bicester Airfield. Nevertheless, in the interests of safety, the self-regulating restrictions within LOA unit orders will remain in place until such time that any further agreement is brokered with the new operator.

8.7.4 Edgehill

LOA traffic sequenced for arrival and departure is normally well clear of this active gliding site. The airspace within the LOA TMZ will only be available to non-transponding, non-radio equipped gliders when agreed by prior arrangement.

8.7.5 Hinton-In-The-Hedges

The Runway 19 RNAV (GNSS) design has a northerly IAF that was rotated to the west slightly to remain over 3nm clear of this aerodrome. The proposed airspace has also been chamfered to avoid the Hinton winch launch area. Liaison has been conducted with Hinton Skydive Centre to understand the profile of their parachuting aircraft. The change to a TMZ is, in part, a result of effective liaison

with this neighbouring airfield. The LOA self-regulating restrictions within unit orders will remain in place.

8.7.6 RAF Benson

RAF Benson has several local field sites but access to these is conditional upon liaison with BZN. LOA will review the use of the current crossing routes as they currently conflict with the LOA circuits.

A TMZ in particular should suit RAF Benson's requirements in the Oxfordshire area, as should the capability to receive an ATS from LOA whilst operating in proximity to LOA patterns.

8.7.7 Weston-On-The-Green

Since consultation, a LoA was developed between LOA and Weston-on-the-Green. It covers parachuting, danger area crossing services and Weston Gliding. The LoA will need to be reviewed as the conflict point against drop aircraft and the Runway 19 approach is currently within the proposed TMZ airspace.

8.7.8 LoA between LOA and Weston-On-The-Green (D129)

LOA has an LoA with the operators of D129, a 2nm radius danger area, active upto Flight Level (FL) 120, in close proximity to LOA in which parachuting regularly takes place. The LoA defines the coordination methods between the two units when D129 is active and also details the procedures, such as a LOA-provided danger area crossing service, to be employed once the danger area is deactivated. Furthermore, the LoA states the procedures employed when Oxford Gliding Club (OGC) operate from the Weston-On-The-Green airfield.

8.7.9 Oaklands Aerodrome

Oakland's aerodrome operates non-radio, vintage aircraft within the area of the proposed TMZ. An LoA has been established to allow aircraft to operate within the Oakland's visual circuit and easily transit the LOA TMZ. Non-radio/ non-SSR equipped aircraft will also be able to do so under specified conditions in the LoA and by prior agreement as detailed in the AIP.

8.7.10 Turweston

No changes to the comments made in section 3.8.9 as a result of the procedures and airspace redesign.

8.8 Flight Planning Restrictions

LOA does not anticipate any flight planning restrictions as a result of the introduction of the proposed procedures and airspace. As stated earlier in Section 3.6, LOA is not seeking to connect the Airport with the airways structure, nor does it intend to increase airspace to the south since most arrivals come from the north.

8.8.1 LoA between LOA and NATS (En Route) PLC

LOA has an LoA with NATS (En Route) PLC which defines the coordination procedures between them. The LoA details how LOA traffic will depart for Sector 23 (S23) and arrive from S23. It also defines who will be responsible for coordinating with BZN and when they are to do so. In addition, the LoA states the methods to be employed when LOA are operating procedurally. This LoA is

unlikely to change as a result of this ACP but may require revision as a result of any airspace changes in the BZN ACP; LOA are aware of this potential future requirement.

9 Supporting Infrastructure and Resources

9.1 Introduction

LOA must demonstrate that the proposed airspace change complies with the Supporting Infrastructure and Resources Requirements stipulated in CAP 725. This section will review the requirements and supply evidence of compliance; alternatively, we will supply evidence that shows the Airport is able to mitigate the requirement.

9.2 Supporting Infrastructure and Resources

Supporting Infrastructure and Resources Requirements	Compliance or Mitigation	Evidence of Compliance or Mitigation of the Requirement
Evidence to support RNAV and conventional navigation as appropriate, including primary and secondary surveillance radar (SSR) and other navigation aid coverage together with details of planned availability and contingency procedures.	Compliance	As described in Section 2.3.2, LOA is equipped with PSR and SSR plus NDB and ILS capability. This infrastructure is fully available for current and proposed procedures and airspace plus the LOA Manual of Air Traffic Services (MATS) Pt 2 details the robust contingency procedures in place.
Evidence of communications infrastructure including R/T coverage, again with availability and contingency procedures.	Compliance	The extant communications infrastructure will enable LOA to provide ATS to aircraft utilising the current and proposed procedures and airspace design. The VHF capacity will enable aircraft transiting the TMZ to operate on a separate frequency (125.090) to IFR traffic (119.980) if workload necessitates. Contingency procedures are in the LOA MATS Pt 2.
The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered.	Compliance	The current LOA Business Continuity Plan provides contingency measures to cover the airspace management in the unlikely occurrence of any failure.

Supporting Infrastructure and Resources Requirements	Compliance or Mitigation	Evidence of Compliance or Mitigation of the Requirement
The Proposal must provide effective responses to the failure modes that will enable the functions associated with airspace to be carried out including details of navigation aid coverage, unit personnel levels, separation standards and the design of the airspace in respect of existing international standards or guidance material.	Compliance	As above
A clear statement on SSR code assignment requirements is also required.	Compliance	The TMZ procedures will build upon the existing Listening Squawk procedure. The existing IFR and VFR SSR allocation plan will continue.
Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change.	Compliance	Annex A4 provides evidence of the ATCO roster. Those suitably qualified personnel shall implement the proposed changes.

Table 4 - Supporting Infrastructure and Resources Requirements

10 Airspace and Infrastructure Requirements

10.1 Introduction

A key element of an ACP is the requirement to demonstrate that the proposed airspace change complies with the Airspace and Infrastructure Requirements stipulated in CAP 725. This section will review the requirements and the evidence that LOA is able to comply with them or are able to mitigate the requirement.

10.2 Airspace and Infrastructure Requirements and Evidence of Compliance or Mitigation

Airspace and Infrastructure Requirements	Compliance or Mitigation	Evidence of Compliance or Mitigation of the Requirement
The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments.	Mitigation	The airspace design has been modified during this process, and arguably, could be greater in size; however, post-consultation analysis has concluded with the presented TMZ design which is sufficient.
Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer. This safety buffer shall be in accordance with agreed parameters as set down in SARG Policy Statement 'Safety Buffer Policy for Airspace Design Purposes Segregated Airspace'.	Mitigation	The Class D airspace design proposal that was consulted upon adhered to the regulatory guidance. However, subsequently the proposed TMZ airspace design does not enable LOA to provide radar control to IFR traffic; nevertheless, it will create a better-known traffic environment in which IFR traffic shall receive an ATS.
The Air Traffic Management (ATM) system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures.	Compliance	Agreements with BZN and NATS enable this.

Airspace and Infrastructure Requirements	Compliance or Mitigation	Evidence of Compliance or Mitigation of the Requirement
Air Traffic Control (ATC) procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures.	Compliance	
Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable.	Compliance	LOA has flexibly changed from an earlier Class D CTR preference resulting in the proposed Class G TMZ.
There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation.	Mitigation	A great deal of emphasis is placed upon the GA and glider community to ensure they embrace the change through active liaison and adherence to the AIP promulgated airspace changes. Access to the TMZ for non-transponding aircraft will be enabled through radio contact or prior coordination methods thereby mitigating the likelihood of unauthorised incursions.
Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified.	Compliance	Current NOTAM methodology shall remain in place.
The notification of the implementation of new airspace structures or withdrawal of redundant airspace structures shall be adequate to allow interested parties sufficient time to comply with user requirements. This is normally done through the AIRAC cycle.	Compliance	Any proposed changes that are authorised shall be AIRAC notified.

Airspace and Infrastructure Requirements	Compliance or Mitigation	Evidence of Compliance or Mitigation of the Requirement
There must be sufficient R/T coverage to support the ATM system within the totality of proposed controlled airspace.	Compliance	The UK Aeronautical Information Publication (AIP) states that the Designated Operational Coverage (DOC) is 40nm up to 10,000 ft. The proposed airspace and procedures fall within these parameters.
Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc.) in the vicinity of the new airspace structure and no suitable operating agreements or ATC Procedures can be devised, the Change Sponsor shall act to resolve any conflicting interests.	Compliance	Continuous engagement with adjacent flying organisations and aerodromes has taken place throughout this process. LOA shall support local engagement hereafter in order to facilitate and improve safe operations with other aviation activity.
There must be sufficient accurate navigational guidance based on inline VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/Eurocontrol Standards.	Compliance	The proposed procedures and airspace shall be assured in accordance with CAP 785.
Where ATS routes adjoin Terminal Airspace there shall be suitable link routes as necessary for the ATM task.	Compliance	
All new routes should be designed to accommodate P-RNAV navigational requirements.	Compliance	The proposed procedures have been designed in accordance with P-RNAV requirements.
If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered.	Compliance	CONOPs, in the form of an LoA, with BZN has been drafted to cater for procedures at LOA and BZN in both proposed sets of airspace. An LoA with D129 (Weston-On-The-Green) details the coordination methods employed for procedures between LOA and D129.

Table 5 - Airspace and Infrastructure Requirements and Evidence of Compliance or Mitigation

11 Economic and Environmental Impact

11.1 Introduction

CAP 725 states that Change Sponsors may develop, where practicable, a short economic impact assessment which includes all categories of operations, users and those likely to be affected by the change. The economic impact should cover both the operational economic impact and the environmental economic impact below. In addition, sponsors are to submit traffic forecasts; an assessment of the effects of noise; an assessment of the change in fuel burn/CO_2; and, an assessment of the effect on local air quality.

11.2 Economic Impact

CAP 725 states that an economic appraisal and valuation should be made to detail the impact of this proposal; however, it acknowledges the difficulties in doing so.

There are no economic benefits to LOA associated with the replacement of the conventional procedures by the proposed PBN approaches. These IFPs do not increase runway or airport capacity although they are expected to safeguard current and future aircraft usage. The commensurate change to airspace will not accrue any economic benefit to LOA although it is anticipated there will be a reduction in wasteful additional miles flown whilst avoiding unknown traffic.

There are no immediate benefits to the LOA supporting infrastructure as a result of this ACP although, it is anticipated that possible communications, navigation and surveillance savings may present themselves as legacy Air Traffic Equipment becomes obsolete.

11.3 Traffic Forecasts

This ACP is not driven by an intent to increase the number of aircraft movements at LOA. If this proposal is successful, the provision of PBN approaches within safer airspace is expected to be attractive to commercial operators which should safeguard the future usage of LOA. Over the last 6 years there have been slight fluctuations in the numbers of aircraft movements, with the biggest increase seen in the number of test/training flights.

Year	Total No of Aircraft Movements	% Change of Total Number	No of Training Flights	% Change in Training Flights	Business Aviation	% Change in Business Aviation Flights
2012	40,485		16,193		4,321	
2013	37,656	-6.98	16,804	+3.77	3,436	-20.48

2014	42,817	+13.70	21,660	+28.89	3,539	+3.00
2015	44,312	+3.49	23,510	+8.54	3,852	+8.84
2016	40,910	-7.68	18,072	-23.13	4,128	+7.17
2017	36,902	-9.80	16,183	-10.45	2,804	-32.07
2018	38,529	+4.41	18,313	+13.16	2,999	+6.95
Average	**40,230**		**18,676**		**3,582**	

Table 6 - Aircraft Movement Data for LOA 2012 – 2018

The number of training flights between 2012 and 2018 have increased by approximately 13.1%. However, the numbers of training flights are predicted to increase more slowly over the next 5 years at a rate of 1 – 2 % per annum. This is based on the capacity of Airport to accept these flights. The Business Aviation aircraft have shown steady increases from 2013 – 2016 but a subsequent decline between then and 2018. The Airport expects this area to continue to grow steadily, irrespective of the success of proposed change in airspace and procedures, by approximately 3 – 5% per annum over the next 5 years.

11.4 Impact of Noise

Conventional noise exposure contours, which are produced regularly for major airports, are calculated for an average summer day over the period from 16 June to 15 September inclusive, for traffic in the busiest 16 hours of the day, between 0700 and 2300 local time. These are known as $L_{Aeq,}$ 16 hours contours. The calculation produces a cautious estimate (i.e. tends to over-estimate) noise exposure. This is mainly because airports are generally busier during the summer and a higher number of movements is likely to produce higher L_{Aeq} values. Aircraft tend to climb less well in higher temperatures, so because they are closer to the ground, L_{Aeq} values will tend to be higher than in colder weather.

Change sponsors are required to produce contours when the proposed change includes changes to arrival and departure routes for traffic below 4,000 ft above ground level (agl). This height of 4,000 ft is used because aircraft operating above this height are unlikely to affect the size or shape of the L_{Aeq} contours.

CAP 725 states that contours must be portrayed from 57 dBA L_{Aeq}, 16 hours at 3 dB intervals. DfT policy is that 57 dBA L_{Aeq}, 16 hours represents the onset of significant community annoyance[24]. Air Navigation Guidance issued in 2014 [Reference 12] suggested that the level that aircraft noise could become 'annoying' starts at levels lower than 57 dBA; therefore, the decision was made to model to 54dBA.

The noise contours below were calculated by the FAA[25] Aviation Environment Design Tool (AEDT) (version 2c SP2) and were based on LOA traffic data for the 92-day summer period (16th June – 15th September 2016, 0700-2300 local time)

[24] Subsequently, in CAP 1616a (December 2017), DfT has further updated this policy.
[25] Federal Aviation Authority (FAA). The US equivalent of the CAA whose tools are regarded by the CAA as appropriate for this type of analysis.

for aircraft utilising runway 19/01 (the longest runway available at the Airport). Aircraft details including available aircraft types were input to AEDT, and differentiation was made between arrival and departure profiles. For those specific aircraft models not contained in the AEDT database, a comparative aircraft model was used. Since LOA does not have any published Standard Instrument Departures (SIDs) or Standard Arrival Routes (STARs), for the purposes of the modelling it has been assumed that inbound aircraft followed the instrument approach profile for the ILS or NDB approach, and that outbound aircraft follow the noise preferential routings as described in the UK AIP EGTK AD 2.21 Noise Abatement Procedures.

The modelling utilised traffic experienced at the airport over three separate weeks during the summer period of 2016 which allowed the calculation of a 100% westerly and easterly average day which allowed an average summer day to be input into AEDT using a modal percentage split of 75/25[26] to reflect which runway is used more frequently. This allowed a production of average mode contours for an average summer day.

LOA does not have any night flights (between 2300 and 0700) as the aerodrome is closed therefore no Sound Exposure Level (SEL) footprints were modelled.

The modelling showed that with the existing flight profiles, and no forecast increase in traffic at LOA because of the introduction of RNAV procedures, the L_{Aeq} noise contours do not extend beyond 2.5nm (approximately 4.3 Kilometres (km)) beyond the end of each runway threshold.

Since aircraft must establish on a final approach path usually within approximately 4nm of the touchdown point to maintain a stable approach, the new RNAV arrival procedures are unlikely to alter the noise exposure levels currently experienced within the vicinity of LOA. The new RNAV procedures replicate the existing flight profiles within 2.5nm of the airport, and therefore specific noise modelling of the new RNAV procedures was not required.

The assessment is shown in Figure 25 below.

[26] Only aircraft utilising either Runway 19 or Runway 01 were considered; aircraft operating in and out of Runway 11 or Runway 29 were not considered when assessing the modal split.

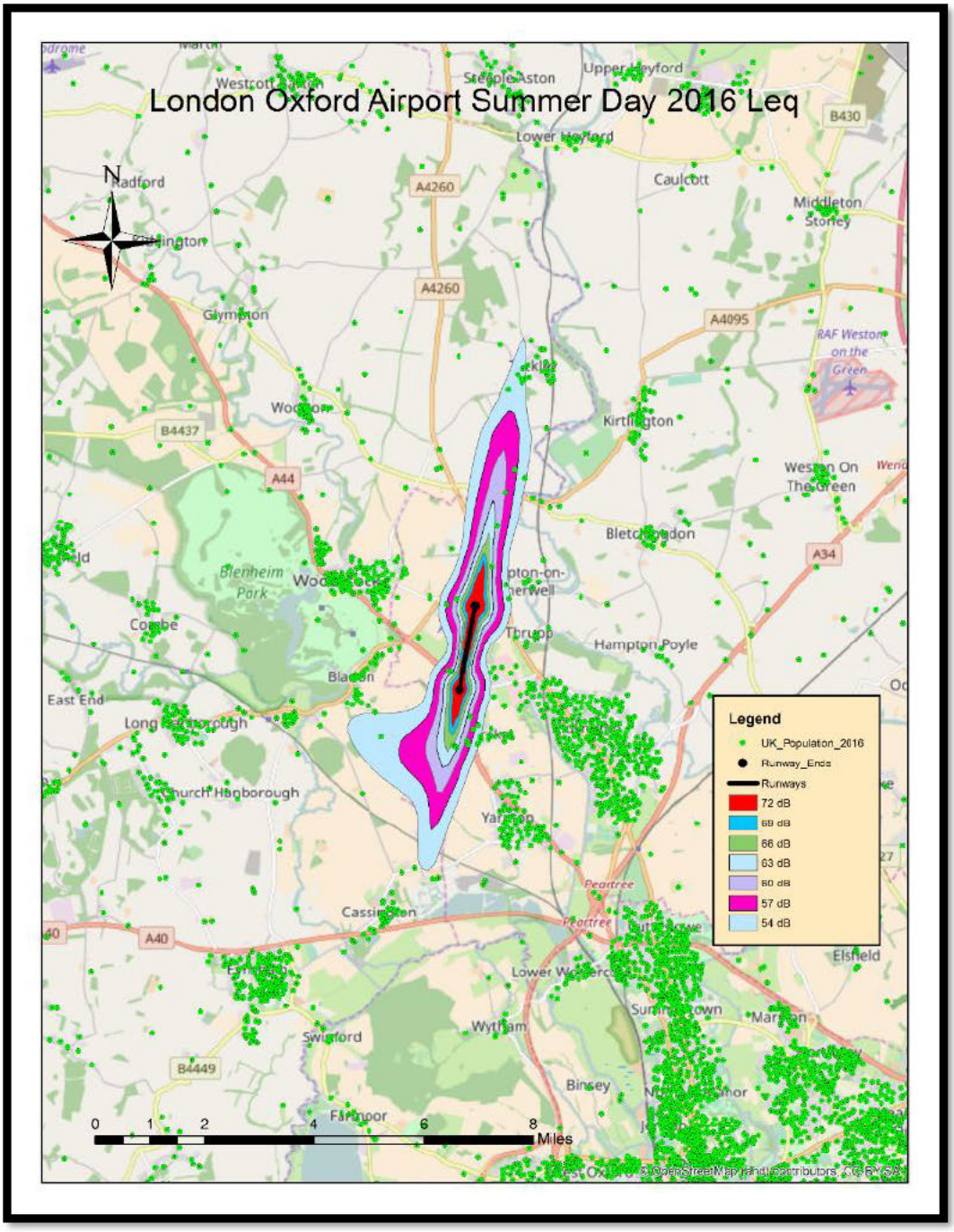


Figure 25 - Noise Contours for LOA based on Summer 2016 traffic

The estimated areas, populations and households within the contours are summarised in Table 7 below. The population database used was a 2016 update of the 2011 Census supplied by CACI Ltd.

L_{Aeq} (dBA)	Population	Households
>54	550	200

L_{Aeq} (dBA)	Population	Households
>57	400	150
>60	250	100
>63	150	50
>66	<50	<50
>69	<50	<50
>72	<50	<50

Table 7 - LOA 2016 L_{Aeq} Contours with existing aircraft flight profiles

The introduction of RNAV (GNSS) procedures at LOA will only introduce new arrival procedures; departures will continue as per existing arrangements. There is also no intention to introduce a change in existing traffic levels or change the type of aircraft operating at the Airport. The new routes were designed to replicate, where possible, existing Instrument Flight Procedures. To maintain a stable approach, aircraft must be established on a final approach path usually within approximately 4nm of the touchdown point.

Transponder equipped aircraft will have access to the proposed new airspace. If the proposal for new TMZ airspace is successful, there is a possibility that some aircraft may choose to route around the airspace, rather than participate and transit through (in accordance with the AIP) This means there may be a slight increase in traffic (likely to be GA or gliders) around the periphery of the airspace; conversely there might be a reduction in activity within the lateral areas of the proposed airspace. LOA will positively encourage non-transponding aircraft to call, if able, and obtain a crossing clearance of the proposed airspace; the creation of a better, known traffic environment will ensure all parties are aware of any potentially conflicting traffic, and a resolution to any conflictions will, where possible, be offered. It is not possible to predict the actual numbers of aircraft that will choose to route around any proposed airspace, nor is it possible to accurately quantify the number of aircraft that might be affected by the change.

It is not possible to accurately predict the likely use of the new procedures, particularly in the first few years after their introduction. However, the current split of runway usage at LOA is in accordance with the prevailing UK wind direction in that the Airport operates on Runway 19 for approximately 70% of the time. The introduction of an IFP to Runway 01 will allow aircraft that are suitably equipped, and whose pilots are qualified to fly RNAV approaches, to utilise this runway rather than accept a tailwind and make an IFR approach to Runway 19.

A high proportion of the number of aircraft utilising LOA are locally based training academy aircraft. These aircraft movements account for approximately 48%[27] of the total number of aircraft movements. The business aviation aircraft account for only approximately 8% of aircraft movements; it is this category of airport user that will most likely utilise the new IFP at the outset. The number of training academy aircraft who will utilise the procedure is likely to increase as training syllabi are

[27] Based on 2018 Aircraft numbers reported on the CAA website for London Oxford Airport

updated to include RNAV approaches although this is not expected the overall number of those flights and approaches.

11.5 Tranquillity and Visual Intrusion

For the same reasons as stated in Section 11.3, there is not likely to be any negative impact.

11.6 Anticipated level of fuel burn/CO_2 Emissions

The Guidance to the CAA on environmental objectives (DfT, 2014) recognises that aviation is a growing contributor to greenhouse gas emissions that causes climate change. The Government's strategy on aviation is to ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions. This airspace change will ensure, as a result of the TMZ providing a known traffic environment, aircraft departing from and arriving into LOA are able to do so using more direct routings and more efficient vertical flight profiles. The reduction in the numbers of approaches that are broken off and conducted again will also contribute to this objective in a positive way.

This positive impact must be balanced against the traffic that may not choose to route through the proposed airspace and would therefore fly a longer route to its intended destination. This additional routing would not need to be flown by those aircraft choosing to participate in the TMZ, or for non-transponding aircraft call LOA to cross the TMZ. At this stage it is not possible to accurately balance these issues, but LOA believes, if any, there will only be a minimal impact.

11.7 Anticipated Effect on Local Air Quality

CAP 725, Appendix B, Annex 8 identifies that local air quality at ground level remains largely unaffected by aircraft emissions that take place above 3,000 ft agl because dispersion reduces concentration levels for these emissions. It is understood that in the context of local air quality, the overall objective under CAP 725 is to determine whether the proposed airspace changes will exceed any statutory air quality standards, and if so, what contribution the airport operations make towards such departures.

The local air quality at LOA is unlikely to worsen because of this proposal. The fact that numbers of aircraft flying locally are not intended to increase because of this change, combined with the more efficient use of the airspace and reduced failed approaches all indicate that if anything, there will be a negligible or net improvement in local air quality.

12 Implementation

12.1 Publication

Should the CAA accept the Airspace Change Proposal without the need for further design optimisation or analysis, it is proposed that implementation of the new IFPs and airspace structure will take place on an agreed date in accordance with the Aeronautical Information Regulation and Control (AIRAC) Cycle, and NATS Aeronautical Information Service (AIS) capacity. The target AIRAC implementation date is:

AIRAC 14 – 31st December 2020

13 References

Reference	Name	Origin
1	CAP 725 CAA Guidance on the Application of the Airspace Change Process Fourth Edition 15th March 2016 https://publicapps.caa.co.uk/docs/33/CAP%20725%20update%20March%202016%20amend.pdf	CAA
2	UK Integrated Aeronautical Information Publication (UK IAIP) https://www.aurora.nats.co.uk/htmlAIP/Publications/2020-06-18-AIRAC/html/index-en-GB.html	CAA NATS/AIS
3	UK AIRPROX Board (Report Number 2014065) https://www.airproxboard.org.uk/uploadedFiles/Content/Standard_content/Airprox_report_files/2014/Airprox%20Report%202014065.pdf	UK Airprox Board
4	RAF Brize Norton Airspace Change Proposal Submission July2020	RAF Brize Norton
5	Code of Practice on Consultation July 2008 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/100807/file47158.pdf	Cabinet Office URN 08/1097
6	CAP 1616 Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information Version 3 dated 22 January 2020 https://publicapps.caa.co.uk/docs/33/CAP1616_Airspace%20Change_Ed_3_Jan2020.pdf	CAA
7	LOA ACP Consultation Feedback Report October 2018 https://www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Commercial_industry/Airspace/Airspace_change/70893%20039%20London%20Oxford%20Airport%20ACP%20Consultation%20Report%20Issue%201.pdf	LOA/Osprey
8	CAP 760 Guidance on Conduct of Hazard Identification First Edition Including Amendment 10th December 2010 https://publicapps.caa.co.uk/docs/33/CAP760.pdf	CAA

9	London Oxford Airport Safety Cases Parts 1-4	LOA/Osprey
10	ICAO PANS Ops 8168 Sixth Edition 2018	ICAO
11	Letter of Agreement between RAF Brize Norton and London Oxford Airport Version 3.0 Draft 9 July 2020	London Oxford Airport/RAF Brize Norton
12	Air Navigation Guidance for the CAA 2014 January 2014 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/269527/air-navigation-guidance.pdf	DfT

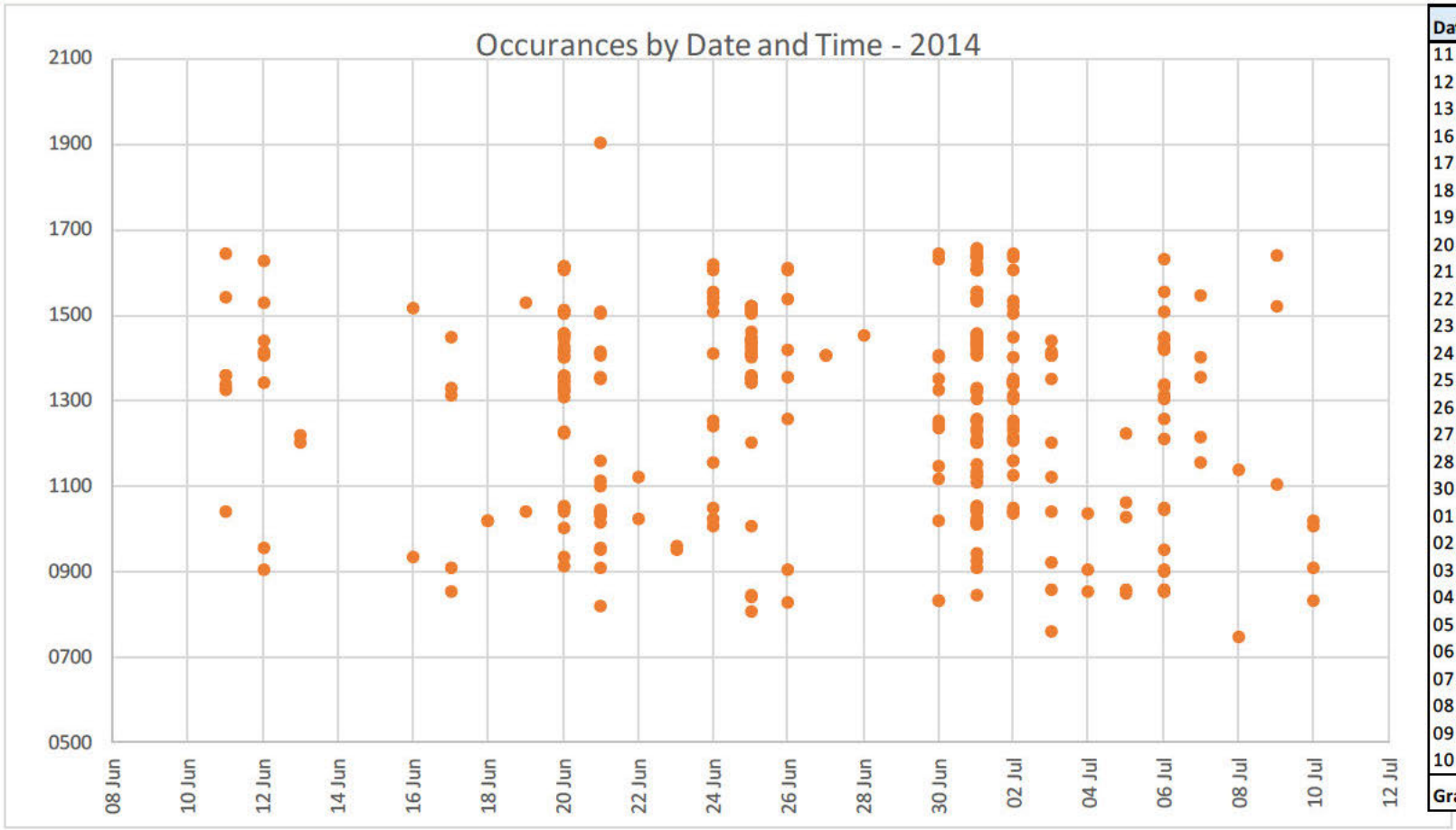
14 Glossary

Acronym	Meaning
AAIB	Air Accident Investigation Board
aal	Above Aerodrome Level
ACC	Airport Consultative Committee
ACP	Airspace Change Proposal
agl	above ground level
AIP	Aeronautical Information Publication
ANSP	Air Navigation Service Provider
AOA	Airport Operators Association
AOPA	Aircraft Owners and Pilots Association
AR	Airspace Regulation
amsl	above mean sea level
ATC	Air Traffic Control
ATE	Air Traffic Engineering
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit
BAA	British Airports Association
BABO	British Association of Balloon Operators
BALPA	British Airline Pilots' Association
BATA	British Air Transport Association
BBAC	British Balloon and Airship Club
BBGA	British Business and General Aviation Association
BGA	British Gliding Association
BHA	British Helicopter Association

Acronym	Meaning
BHPA	British Hand Gliding and Paragliding Association
BMAA	British Microlight Aircraft Association
BMFA	British Model Flying Association
BPA	British Parachute Association
CAA	Civil Aviation Authority
CAP	Civil Aviation Authority Aviation Publication
CAS	Controlled Airspace
CAT	Commercial Air Transport
CO_2	Carbon Dioxide
CTA	Control Area (Class D UK Airspace)
DAATM	Defence Airspace and Air Traffic Management
DAP	Directorate of Airspace Policy (part of the CAA – now SARG)
DIO	Defence Infrastructure Organisation
DfT	Department for Transport
DS	Deconfliction Service
ft	feet
GA	General Aviation
GASCo	General Aviation Safety Council
GAT	General Air Traffic
GAPAN	Guild of Air Pilots and Air Navigators
GATCO	Guild of Air Traffic Control Officers
HCGB	Helicopter Club of Great Britain
IAIP	Integrated Aeronautical Information Package
IFP	Instrument Flight Procedure
km	kilometre
kts	knots

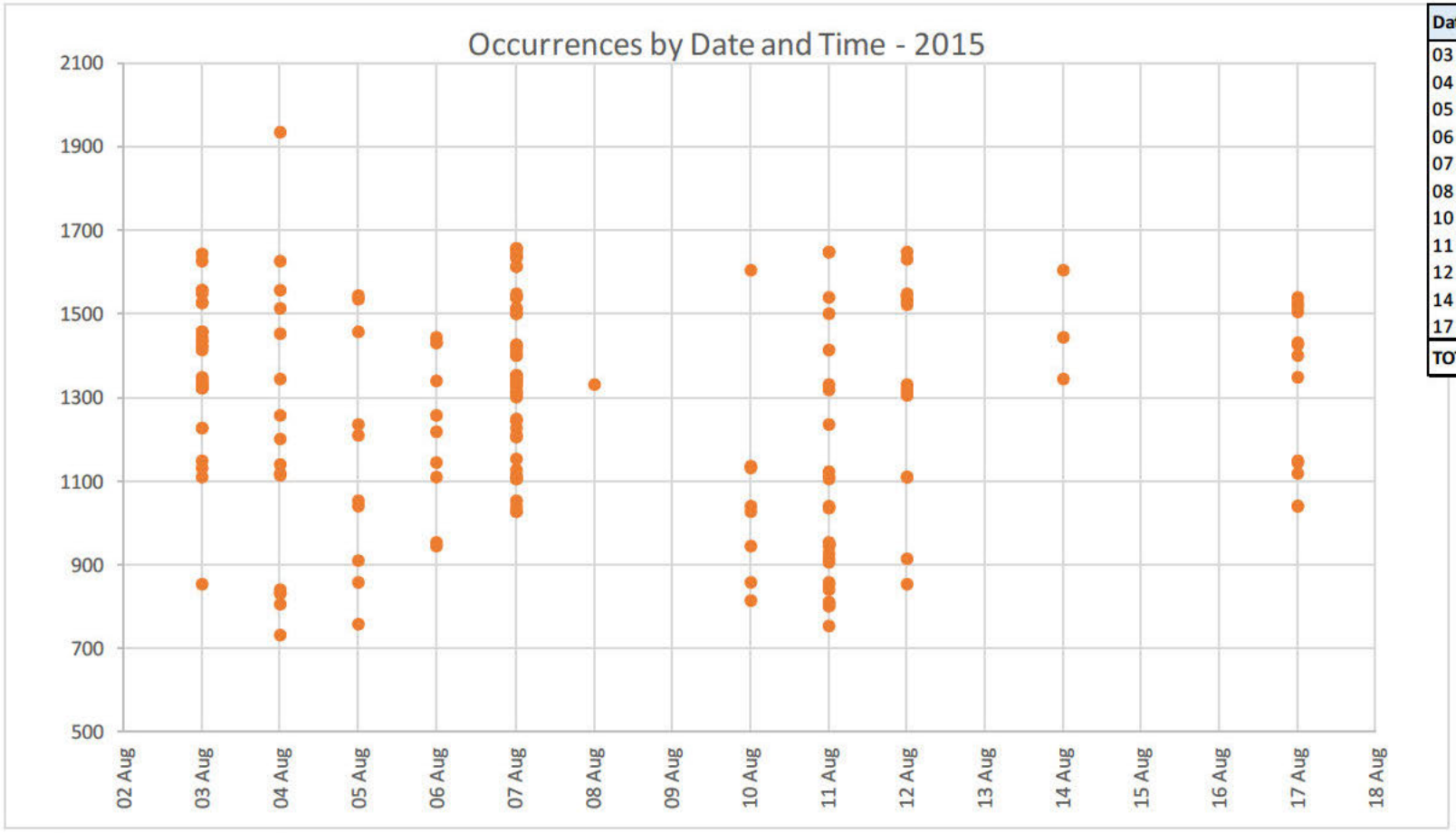
Acronym	Meaning
LAA	Light Aircraft Association
LARS	Lower Airspace Radar Service
LOA	London Oxford Airport
LoA	Letter of Agreement
m	metre
MoD	Ministry of Defence
MTWA	Maximum Total Weight Authorised
NATMAC	National Air Traffic Management Advisory Committee
NATS	National Air Traffic Service *Provider of en-route air traffic services in the Scottish and London Flight Information Regions and at some civil airports.*
NERL	NATS En-Route Ltd
nm	Nautical Mile
NOTAM	Notices to Airmen
OS	Ordnance Survey
PSR	Primary Surveillance Radar
RAF	Royal Air Force
SARG	CAA Safety and Airspace Regulation Group
SSR	Secondary Surveillance Radar
TMZ	Transponder (SSR) Mandatory Zone
UKAB	UK Airprox Board
UKFSC	UK Flight Safety Committee
VFR	Visual Flight Rules
VOR	VHF Omni Directional Radio Range; a type of short-range radio navigation system for aircraft
WOTG	Weston-On-The-Green

A1 Aircraft Operating in Approach Area Runway 19 June/ July 2014



Date	Number
11 Jun	8
12 Jun	8
13 Jun	2
16 Jun	2
17 Jun	5
18 Jun	2
19 Jun	2
20 Jun	35
21 Jun	21
22 Jun	2
23 Jun	2
24 Jun	13
25 Jun	36
26 Jun	8
27 Jun	2
28 Jun	1
30 Jun	14
01 Jul	59
02 Jul	26
03 Jul	11
04 Jul	3
05 Jul	5
06 Jul	22
07 Jul	5
08 Jul	2
09 Jul	3
10 Jul	4
Grand Total	**303**

A2 Aircraft Operating in Approach Area Runway 19 August 2015



Date	Number
03 Aug	32
04 Aug	16
05 Aug	10
06 Aug	11
07 Aug	56
08 Aug	1
10 Aug	8
11 Aug	30
12 Aug	15
14 Aug	3
17 Aug	13
TOTAL	195

A3 Safety Events

The following safety events have been recorded.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
1	31 Aug 2009	E135 Legacy / TB20	5nm final RW 19 ILS	Conflict in on final approach with traffic working Brize.	The TB20 was routing Banbury to Blenheim palace working Brize LARS. The aircraft was 600 ft above but in plan conflict with the Emb 135. A temporary reduction in altitude triggered a TCAS RA for the EMB 135 whom reported the aircraft 150 ft above.
2	19 Feb 2010	C525 / Grob Tutor	Approaching the OX beacon overhead the aerodrome.	Conflict with Grob Tutor flying GH sortie within the vicinity of the Oxford overhead.	Oxford operating procedurally and C525 late release from London inbound to OX from the N/W. C525 had TCAS RA against Tutor aircraft general handling in the vicinity of the holding pattern.
3	12 April 2010	C172 / Merlin Helicopter	South Oxford City	C172 departing VFR from Oxford saw and avoided the Merlin,	The Merlin was being vectored by Benson for an ILS against the stream – Benson operating SSR only. The C172 departed Oxford RW 01 and departed downwind. The C172 transponder was U/S and not working. The C172 sighted the merlin late and took avoiding action, no TI was passed to the Merlin due to the C172 no squawking.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
4	11 Jun 2010	CL60 / EA50 Eclipse jet	South Oxford	Outbound CL60 stopped at 4000ft against the inbound EA50 by Oxf App. Brize LARS climbed the CL60 to FL 50 and into conflict.	Outbound CL60 climbed to 4000ft by Oxford Approach against the EA50. Inbound EA50 was notified to Brize but no mention of the reason for the stop off in level. On first contact the Brize Controller erroneously climbed the CL60 to 5000ft and into conflict with the EA50.
5	10 Jul 2010	FK50 / PA28	NDB / ILS instrument procedure.	PA28 holding off at Upper Heyford to sequence behind a FK 50.	FK50 outbound on the NDB / ILS approach with a PA28 north of the aerodrome. As the FK50 reports beacon outbound the PA28 requests a straight in approach. The PA28 instructed to hold off north of Upper Heyford and has a confliction with the FK50 whilst in the base turn of the procedure.
6	14 Sep 2010	SK76 / Be200	In the vicinity of DTY	Inbound IFR north aerodrome.	Inbound Be200 under a procedural service in conflict with transit aircraft working Birmingham.
7	1 April 2011	C560XLS / Grob Tutor x 2	Joining controlled airspace North of Cpt	Traffic joining controlled airspace released from a procedural service into conflict with unknown traffic.	C560 XLS joining controlled airspace at Cpt was on conflict with 2 Tutor aircraft and TI was passed BY Swanwick and a TCAS RA occurred. Procedural Control from Oxford.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
8	22 Jun 2011	PA31 / PA34	On Final RW19	Inbound PA34 via NDB with PA31 on left base.	Inbound PA34 did not report 4 DME and flew into conflict with CCT traffic despite being told about it.
9	08 July 2011	EMB550 / C130	South of Oxford inside Brize CTR	Oxford APP descended the Emb550 into Brize CTR into conflict with Brize Traffic.	The App controller expected the Emb550 to be routing Cpt OX and thus cleared the aircraft to 2500ft. Aircraft actually routed from KENNET and thus its track took it into Brize CTR
10	22 Aug 2011	PA34 / PA 28	Oxford CCT	Conflict with traffic joining downwind from the north and CCT traffic.	The PA28 was joining downwind from the north and was visual with the PA34.
11	2 Oct 2011	G550 / TB20	Bae turn of the NDB/ILS 19	G550 flying the NDB/ILS approach RW 19 had a TCAS RA with crossing traffic not known to Oxford.	A transiting VFR flight trigger 2 TCAS RAs as the aircraft crossed the flight path of the G550 outbound and then inbound on the NDB/ILS approach for RW 19.
12	3 Oct 2011	Emb505 / PA34	14.5 nm north Oxford	Emb 505 had TCAS RA with unknown VFR traffic	EMB505 wanted to fly the direct HON arrival but was held high by London. Upon clearing controlled airspace, a TCAS RA was received on the PA34 manoeuvring VFR outside controlled airspace.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
13	8 Oct 2011	A330 / C42	6nm south Oxford	C42 entered the CTR without clearance.	The C42 had diverted into Oxford earlier due poor weather. Having planned a route to the south the C42 entered he CTR without clearance and into conflict with the A330.
14	9 Jan 2012	PA34 / SR22	Overhead OX	Conflict between Transit aircraft and PA34 in the hold.	A conflict in Class G between IFR aircraft.
15	25 Feb 2012	HS25 / SR22	NDB01 Procedure	SR22 flew the NDB01 approach and not the 100 as cleared	The SR22 pilot did not fly the cleared procedure and flew into conflict with the HS125.
16	27 May 2012	C560xls / Glider	OX Over-head	Citation 560 entering the hold when they saw the conflicting glider.	Effectively a non-sighting by the C560XLS crew.
17	9 Sep 2012	AS35 / G5	Just north of Oxford on the instrument approach	AS35 working Brize conflicting with the G5 on the instrument approach.	A conflict between Procedural IFR traffic and VFR traffic in the vicinity of the Oxford instrument approach pattern.
18	4 Oct 2013	C550 / Tutor	2.6nm south Oxford	Whilst Operating procedurally the C550 had a conflict with the Tutor which was unknown to Oxford.	A confliction of flight paths resolved by both pilots and ATC.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
19 Radar	16 May 2014	PA34 / RV6	Oxford ATZ Gap with WOTG	Radar spotted the RV6 flying down the ILS toward the gap and informed Twr. TI was passed and the PA34 gained visual contact.	The PA34 pilot did not take sufficient avoiding action on first sighting the RV6.
20 Wide Brize	5 June 2014	A330 / SK76	Eastern Edge of Brize CTR	Wide turn onto the instrument approach at Brize RW 25.	The Voyager's turn took it outside the BZN CTR and, in the absence of Traffic Information, the Voyager pilot was concerned by the proximity of the SK76.
21 Radar	9 June 2014	PA34 / DR10	Base turn of the NDB19 procedure	Conflict with traffic crossing the instrument approach	A conflict in Class G resolved by the PA34 pilot following Traffic Information from ATC.
22 Radar	9 June 2014	PA28 / PC12	North eastern edge of the ATZ.	Aircraft transiting the instrument approach and visual circuit without RTF contact and not squawking altitude.	Whilst the Board felt that the Oxford RAD was correct to apply 'defensive controlling', in this case, with all those involved operating in Class G airspace, it was to be expected that traffic could transit the area remaining outside the ATZ, that they may or may not be squawking or be in RT contact with Oxford, and that pilots may have to take their own separation, (in this case greatly assisted by the provision of Traffic Information). As such, the Board determined that the Oxford Radar controller had perceived a conflict and that

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
					normal procedures, safety standards and parameters had pertained.
23 Radar	19 June 2014	EH101 / PA34	NDB099 procedure	Transit Helicopter conflict with the PA 34 inbound on the 099 procedure.	The PA34 pilot flew into conflict with the Merlin. Contributory Factor(s): 1. Lack of Traffic Information to the PA34 from Oxford ATC. 2. Poor coordination between Oxford Radar and Oxford Tower. Trainee radar controller
24 Radar	25 June 2014	Puma / Glider	Puma Glider event whilst in the instrument hold.	Whilst the Puma was in the hold it saw a glider in close proximity.	Effectively a non- sighting by the Puma pilot. Recommendation(s): The CAA considers producing a chart of UK airfield IFR holding pattern positions. Action not carried forward.
25 Radar	23 July 2014	AC90 / Jet Provost	North and west of the aerodrome.	Jet Provost late call and wrong frequency for overhead transit from the north / west.	The Oxford Radar controller was concerned by the proximity of the Jet Provost and the AC90. Contributory Factor: The Jet Provost pilot did not establish contact with Oxford as he transited close to their ATZ.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
26 Radar	16 Aug 2014	ATR42 / Hinton Para	9nm North Oxford establishing ILS	Hinton dropper left the DZ westerly into conflict with the ATR42	A conflict in Class G. Contributory Factor: The Oxford controller expected the 750XL pilot to remain within the Hinton Designated Area.
27 Radar	14 Aug 2014	RV10 / PA34	1.9nm North Oxford.	RV10 attempting to route through the 'gap' between D129 and WOTG flew into conflict with the visual CCT	The Oxford controller was concerned by the proximity of the RV10.
28 APP	28 Sep 2014	C560 / PA24	In the OX Hold	Transit aircraft reported at 7000ft but was at 4000ft. Triggered TCAS warning.	A TCAS sighting report. Contributory Factor: The PA24 pilot reported the wrong altitude and therefore the Oxford controller was not cued to provide Traffic Information to the C560 pilot.
29 APP	01 Oct 2014	A330 / C182	Eastern edge of Brize CTR	At night, TI passed by Twr on traffic in the Brize radar pattern that left the CTR into conflict with	The Board quickly agreed that this incident represented normal operations in Class G airspace and therefore was deemed to be a sighting report, the risk was assessed as Category E, normal safety standards had pertained.
30 Radar	21May 2015	A109 / C182	2nm south Oxford	Helicopter kept low for Brize CTR transit and released late in	The Oxford controller perceived a conflict.

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
				perceived conflict with Oxford Traffic	
31 Radar	10 Jun 2015	C182 / PA28	Base turn NDB 099 procedure	Traffic transiting to enter the Brize CTR in the vicinity of the base turn conflicting with the NDB099 procedure	A late sighting by the C182 pilot and a non-sighting by the PA28 pilot. Contributory Factor: Oxford ATC did not give Traffic Information to the C182 pilot despite him being in receipt of a Traffic Service.
32 App	22 Sep 2015	DA42 / PA28	Outbound on the NDB099 procedure	During a period of radar off a VFR departure flew into conflict with instrument traffic.	A sighting report. Contributory Factor(s): No traffic information from the Air Traffic Controller.
33 App	31 Oct 2015	AS50 / PA34	Runway 19 threshold	Helicopter continued approach and landed over a departing PA34	The AS350 pilot landed without clearance on an occupied runway Contributory Factor: ATC did not sufficiently monitor the AS350 pilot's approach
34 Rad	16 Jan 2016	B206 / Metroliner	On departure RW19	B206 after failing to contact Brize for a CTR crossing turned into conflict with and entered the ATZ without clearance	The Bell 206 pilot flew into the Oxford ATZ without clearance and into conflict with the Metroliner

EVENT	DATE	AIRCRAFT AFFECTED	LOCATION	NATURE OF EVENT	COMMENT
35 Rad	8 Aug 2016	A400 / C182	East Brize CTR wide base turn for Brize procedure	A400 flew wide on the instrument procedure into conflict with the Oxford MAP and a C182	A conflict in Class G caused by a late turn on to base leg by the A400
36 Twr	5 Dec 2016	DA42 / PA28	Downwind RW 19 CCT	The DA42 flew the go-around from the NDB 099 and despite TI reported a potential conflict with the Downwind departing traffic	Oxford ATC did not integrate the DA42 and PA28. Contributory Factors: 1. The OJTI did not sufficiently mentor the trainee or discuss the likely conflict scenario. 2. The Oxford MATS Part 2 provides inadequate guidance for integration of the NDB/DME099 approach with visual circuit traffic
37 Radar	5 Jan 2017	CH47 / PA34	Final approach RW 19	The CH47 descended rapidly through the RW 19 instrument approach path with traffic on the approach	The PA34 pilot was concerned by the proximity of the Chinook Contributory Factor: The Chinook pilot flew towards the Oxford Approach Path without calling Oxford ATC

Table 8 - Safety Events

The following incidents are those where an approach to Runway 19 was broken off due to an aircraft confliction:

Date	Aircraft Type	Details
21 May 2015	C510 Mustang	Broken off the approach due to unknown aircraft appearing 1 nm west of the LLZ abeam Upper Heyford. Aircraft then squawked 3717 indicating 2200ft mode C. C510 broken off from final approach to be re-positioned behind. Aircraft was inbound to Enstone.
21 May 2015	Global Express	Broken off from base leg due to unknown aircraft tracking inbound to Oxford from Banbury along the final approach track altitude 2000ft. Aircraft was inbound Oxford but called late and the faster Global had to be broken off.
22 May 2015	PA34 x 2 One an Exam C/S	Unknown non transponding aircraft manoeuvring at Upper Heyford. Inbound PA34 reported IMC whilst being vectored (cloud base 1500ft) and was offered to be broken off. Both aircraft were subsequently held off for 5 mins whilst the unknown non transponding aircraft manoeuvred at 6nm final RW 19.
22 May 2015	Citation 525	PA28 C/S ***** was manoeuvring at 6nm final RW 19 not in contact with Oxford. Further non transponding aircraft out of Enstone was manoeuvring in a similar position. The citation was given an extended pattern and delayed until both aircraft cleared the final approach.
28 May 2015	Citation 525	Could not vector the aircraft toward base-leg and final due to a 7K squawk route from Upper Heyford to 5nm final and then turn north toward Banbury various levels between 2500 and 3500ft but not talking to Oxford.
16 June 2015	PA34	PA34 broken off from an NDB approach at base leg due to 2 aircraft crossing the final approach. 1 aircraft east to west and 1 west to east. Both non transponding aircraft both not talking to Oxford.
24 June 2015	PA34 Exam C/S	Aircraft broken off from a radar vectored ILS due to non transponding aircraft routing Upper Heyford west bound.

Date	Aircraft Type	Details
27 June 2015	CL60	Controller operating procedurally. Contact seen on the ATM in the vicinity of Charlbury heading toward the aerodrome. Aircraft acquired with binoculars and TI passed to the CL60 as it approached the OX from the south. Aircraft was seen to turn to the north-west roughly in line with the outbound track of the RW 19 procedure. As the CL60 went both aircraft were visible with the binoculars and furthermore detailed TI was passed. CL60 reported TCAS contact and elected to stop descent at 2500ft. CL60 flew directly overhead the contact (on the ATM) but did not gain visual contact. Aircraft type was identified and was routing to Barford St John and then back to Enstone.
4 July 2015	C560	Aircraft broken off from base leg due to a 7K squawk routing Banbury-Deddington-Upper Heyford at 2300.
5 July 2015	Embraer 135	Aircraft broken off approach due 3 x conflicts. Non transponding microlight east west across final approach; further aircraft east-west at 2000ft and a west-east across final approach at 1500ft. All aircraft not working Oxford.
10 July 2015	GLF6	Broken off from a vector ILS approach at 8nm due to crossing traffic 1nm ahead east-west no height information.
11 July 2015	GLF5	Conflicting traffic crossing the approach working Lon FIS. Many calls made to FIS but phone engaged. TI was passed twice and pilot happy to continue. Once closing heading for the ILS was given the conflict was assessed again and the aircraft broken off.
20 July 2015	PA28	Aircraft broken off from ILS RW 19 due to 7k squawk routing west to east through the final approach at 5 nm. Aircraft not on frequency PA28 did not see conflicting aircraft.
20 Aug 2015	BE20 CAT A Hosp	Vectored by trainee toward the final approach track with TI given on unknown traffic. At 1nm OJTI gave avoiding action after confirming that the aircraft was IMC

Date	Aircraft Type	Details
25 Sep 2015	TBM850	Being vectored for an NDB approach. Had to be broken off due to 2 x unknown contacts at 7 and 7.5nm final. On second approach gliders were just to the east of the final approach track.
10 April 2016	C560 & C560	Both jets being vectored for the ILS approach RW 19. Unknown traffic crossing through the final approach and base leg of the procedure at 8 nm at 2200ft. Both aircraft orbit until the conflictor clears the area.
9 July 2016	Falcon 2000	Unknown 7k squawk north west of Oxford airport tracking east. Squawk code changes to Luton/Stanstead listening squawk and crosses final approach RW 19 at 4 mile final 1800 ft climbing 2200ft. Falcon broken off from approach and repositioned.
13 Aug 2016	Sk76	Vectoring for an ILS in a gap in gliders. The Glider in front stopped crossing the approach and started to thermal, turning into conflict with the SK76. SK76 broken off from the approach.
13 Aug 2016	C560	Citation being vectored for an ILS approach was given 2 x 'long way round turns' onto final awaiting a 7k squawk at 200ft to clear. Squawk changed to Brize as the aircraft climbed to 3800ft.
12 Sep 2016	EC55	Helicopter on a procedural NDB/ILS approach. Advised in the base turn of aircraft crossing the final approach at1600ft just below the cloud base and asked if happy to continue; pilot stated yes. With the helicopter established inbound and the crossing traffic 1 O'clock 1 mile crossing right left 300ft lower the helicopter was broken off from the approach.
12 Sep 2016	Global Express	Aircraft broken off from and ILS approach at 8nm due to non transponding traffic crossing the approach at 5nm final. Tower observed traffic believed to be an SR22 at 1000 or 1500ft.
1 Feb 2017	GLF6	Aircraft broken off and held in Class G airspace due to 2 x 7k aircraft operating within the final approach.
18 Feb 2017	Global Express	Broken Off due to 4 x aircraft manoeuvring within the final approach – aircraft vectored for a further 20 track miles in class G airspace.

Date	Aircraft Type	Details
NOTE: As a result of this survey Oxford has adapted and applies 'defensive' controlling methodologies. When conflicts are likely to the north due to gliding or other GA activity, LOA will operate on Runway 01 with up to a 5 kt tailwind, should weather conditions allow. Runway 01 has a higher weather minimum for approaches than does the Runway 19 ILS. When the potential for conflicts on the final approach are seen, aircraft are held off or delayed west of Enstone until the conflicting traffic has cleared the final approach. Due to the unpredictable nature of GA flying, the final approach can often be clear when the controller commits to vectoring to final approach. Enstone aerodrome is also close to the final approach track. A controller can often commit to vectoring before an aircraft departs from Enstone and itself generates a confliction towards the final approach.		

Table 9 - Runway 19 Approaches Broken Off

A4 ATCO Roster

	Sample London Oxford Airport ATCO Roster																												RADAR
	Issued:							By:																					Y OR N
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	O	O	L14	L14	L14	L14	O	O	M7	M7	L14	L14	O	O	S	S	L12	L12	O	O	M7	M7	S	S	O	O	L14	L14	E9	E9	Y
2	O	O	S	S	R8	R8	O	O	R10	R10	R8	R8	O	O	R8	R8	R10	R10	O	O	S	S	R8	R8	O	O	R8	R8	S	S	Y
3	O	O	O	O	O	O	O	O	R8	R8	R10	R10	O	O	O	O	O	O	O	O	R8	R8	R10	R10	O	O	O	O	O	O	Y
4	O	O	LV	LV	LV	LV	O	O	O	O	O	O	O	O	M7	M7	L14	L14	O	O	O	O	O	O	O	O	M7	M7	L14	L14	N
5	O	O	T8	T8	T8	T8	O	O	T8	T8	T8	T8	O	O	T8	T8	T8	T8	O	O	T8	T8	T8	T8	O	O	LV	LV	LV	LV	N
6	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	N
7	M7	S	M7	M7	O	O	E9	E9	S	S	O	O	M7	M7	L12	L12	O	O	M7	M7	L12	L12	O	O	M7	M7/S	S	S	O	O	Y
8	R8	R8	E12	E12	O	O	R8	R8	L14	L14	O	O	R8	R8	L14	L14	O	O	R8	R8	L14	L14	O	O	S	R8	L12	L12	O	O	Y
9	R10	R10	E9	E9	O	O	R10	R10	E12	E12	O	O	R10	R10	R10	R10	O	O	R10	R10	R10	R10	O	O	R10	R10	R10	R10	O	O	Y
10	T8	T8	T	T	O	O	T8	T8	T	T	O	O	T8	T8	T	T	O	O	T8	T8	T	T	O	O	T8	T8	T8	T8	O	O	N
11	T10	T10	T10	T10	O	O	LV	LV	LV	LV	O	O	LV	LV	LV	LV	O	O	LV	LV	T10	T10	O	O	T10	T10	T10	T10	O	O	N
12	S	M7	O	O	S	S	M7	M7	O	O	S	M7	S	S	O	O	M7	M7	S	S	O	O	LV	LV	LV	LV	O	O	M7	M7	Y
13	E12	E12	O	O	E12	E12	E12	E12	O	O	M7	R8	L12	L12	O	O	S	S	L14	L14	O	O	L14	L14	L12	L12	O	O	LV	LV	Y
14	L14	L14	O	O	E9	E9	L14	L14	O	O	L12	L12	L14	L14	O	O	R8	R8	L12	L12	O	O	L12	L12	L14	L14	O	O	R8	T8	Y
15	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	N
16	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	T	T	O	O	T	T	N
17	O	O	R8	R8	M7	M7	O	O	A	A	A	O	O	A	R8	R8	A	A	O	O	A	A	M7	M7	R8	O	O	A	T8	R8	Y
	8	8	8	8	7	7	7	7	8	8	8	7	7	8	8	8	7	7	7	7	9	9	7	7	7	7	8	9	7	7	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Open	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	06:30	
Close	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	22:30	

Shifts			
M7	06:30	15:00	8.5
R8	08:00	16:30	8.5
T8	08:00	16:30	8.5
T10	10:00	18:30	8.5
R10	10:00	18:30	8.5
E9	09:30	18:30	9
L12	12:30	21:00	8.5
L14	14:30	22:30	8
A	Admin		
S	Supervisor		
T	Training		
LV	Leave		