HIAL Consultation Document

Proposal for the Introduction of Controlled Airspace and Optimisation of Instrument Flight Procedures at Inverness Airport

Sponsor Consultation

Release Date: 19th September 2014

Prepared for: Highlands and Islands Airports Limited (HIAL)
Contract Number: HIAL841
Sponsor Consultation Document

The Forge,
London Road,
Bentley,
Surrey,
GU10 5HY

T: +44 (0) 1420 520200
E: inverness@ospreycsl.co.uk
W: www.ospreycsl.co.uk

Revision History

Issue 7550/021	Change	Date	Information
Issue 001.0			

Distribution

Copy	Organisation
Controlled	HIAL Website

Executive Summary

Inverness Airport provides a vital and effective national and international flight network to both the local community and wider Highlands area. Highlands and Islands Airports Limited (HIAL), owner and operator of Inverness Airport has identified the need for changes to the current arrangements and procedures in the immediate airspace surrounding Inverness Airport. These changes are been driven by advances in Air traffic management (ATM) and airliner navigation and routing procedures. The purpose of such changes is to ensure that environmental and economic benefits are achieved through efficient use of surrounding airspace, providing protection on critical stages of flight following departure and prior to arrival for Instrument Flight Rules (IFR) commercial air transport flights. This document outlines the proposals from HIAL for the enhancement of Inverness Airport's procedures and the establishment of appropriate airspace, to benefit both operators and the local community.

In 2013, Inverness Airport handled over 608,000 terminal passengers (0.3% of UK total)[1] with over 1900 aircraft movements per month and this figure continues to grow[Reference 1]. The airport provides a vital and effective national and international flight network to both the local community and wider Highlands area

HIAL wish to engage with all parties that might be affected by its proposed Airspace Change. Constructive feedback will inform the Proposal development, ensuring any positive impact is enhanced and negative impact is minimised. This also meets the CAA mandatory requirement to undertake stakeholder consultation as part of the submission of an Airspace Change Proposal. This section provides an outline of the consultation process for HIAL's proposal at Inverness Airport. This includes details of why a consultation is undertaken, who has been sought to engage in consultation and how the consultation results will be utilised.

Increased air traffic levels, changes in regulatory guidance, improved aircraft performance and enhanced navigational system accuracy and reliability have all contributed to the emerging need for a re-design of Inverness Airport airspace and the Instrument Flight Procedures (IFPs) operated within it. Although Inverness ATC handles the current operational issues effectively on a tactical basis, any future increase in traffic may result in overload situations as controllers try to accommodate more aircraft in a limited volume of airspace to the west of the Airport.

The surrounding uncontrolled airspace at Inverness Airport results in ATC being regularly required to intervene and re-route Inverness Airport in-bound and out-bound aircraft to avoid potential conflictions with other aircraft operating legitimately in the area which are not always aware of commercial traffic, in particular, operating into and out of Inverness Airport. This detrimentally impacts on the local environment, leading to increased aircraft track miles flown and the undesirable potential for flights over densely populated areas at low altitudes, resulting in extra tonnes of fuel burn and CO_2 production (the volume of which is dependent on aircraft type), and noise pollution to a wider area.

HIAL has considered a variety of classification options for airspace surrounding Inverness Airport to meet the needs of the Airport, other aviation and non-aviation stakeholders. In developing the proposal for change, HIAL have considered the impact of making no changes to the present situation. The projected growth[2] (5% year on year) in commercial air transport movements (atm), basing of Typhoon (Summer of 2014), a highly agile fighter aircraft, at RAF

[1] CAA UK Airport Statistics www.caa.co.uk
[2] Inverness Airport Master Plan, July 2007, available at www.hial.co.uk/inverness-airport

Lossiemouth, which will escalate aircraft interactions, present increasingly significant, potentially unpredictable and challenging airspace management implications.

The document explains the implementation of Controlled Airspace (CAS) proposed by HIAL to the airspace located within 40 nm of the Airport (figure below) to align with future airspace changes in Scotland. The proposal will enable HIAL to continue to provide a effective and expeditious Air Traffic Services (ATS) to the current and increased levels of air traffic expected in the future close to Inverness Airport.

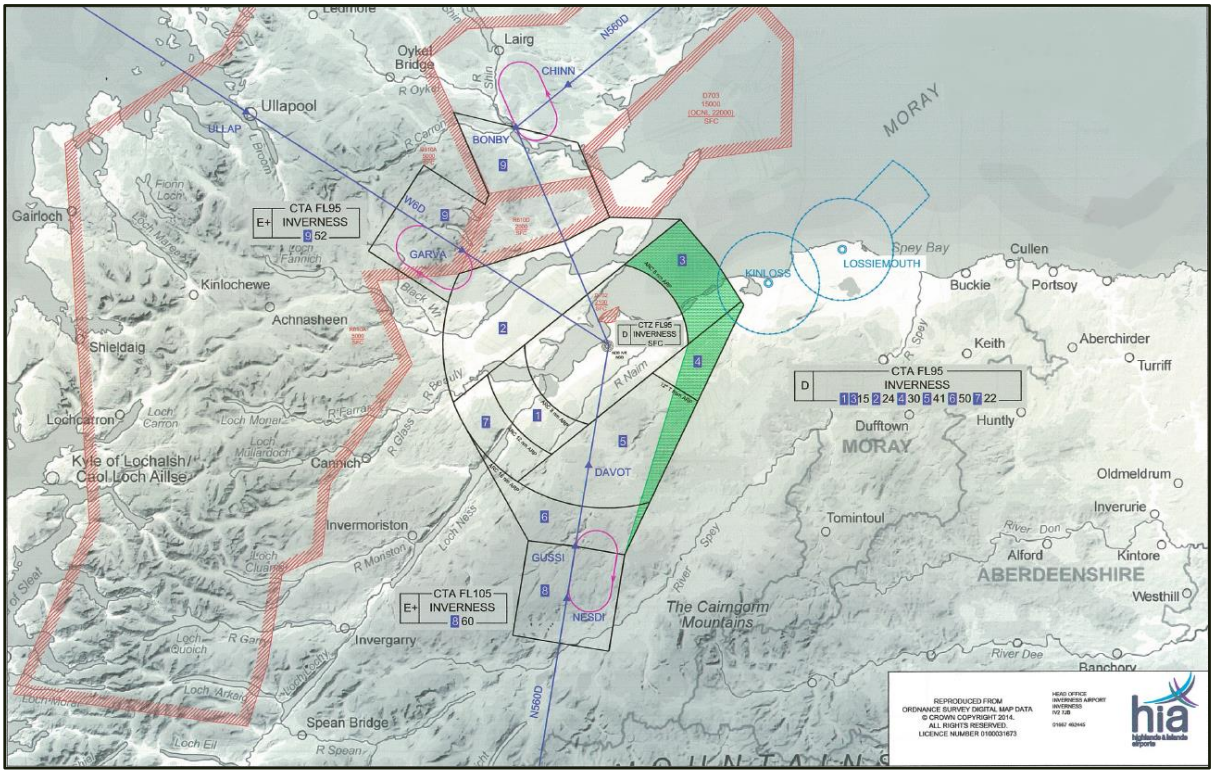

Figure 1: Proposed Inverness Class D Control Zone (CTR), Class D and Class E+TMZ Areas (CTA)

This document contains information from which consultees in this process can gain an understanding of the proposal, how it will affect their operations and how they are able to provide an informed feedback.

The consultation follows a process agreed by the UK Civil Aviation Authority (CAA) in the Civil Aviation Publication (CAP) 724, Appendix F [Reference 1]. In accordance with the guidance provided in CAP 725 [Reference 2], HIAL will consult with Aviation Stakeholders including members of the National Air Traffic Management Advisory Committee (NATMAC).

This consultation runs from **29 September 2014 to 4 January 2015**.

Please make use of the feedback form on the HIAL website:

www.hial.co.uk/inverness-airport/jet-centre/nats-nautical-information-service/

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1 Introduction

1.1 General

In 2012, Inverness Airport handled over 603,000 terminal passengers (0.3% of UK total) with over 1900 aircraft movements per month [Reference 1] and plays a crucial role in supporting economic growth and prosperity, particularly for in The Highlands; for business, international trade and leisure, flying is central to today's fast-moving lifestyle. The airport provides a vital and effective national and international flight network to both the local community and wider Highlands area.

The expertly controlled passage of aircraft above us ensures our safety and keeps aircraft flowing efficiently. The more efficient the air traffic network can be made, the more we can potentially enhance safety and reduce the environmental impact. This means that, from time to time the organisations responsible for managing the airspace will make proposals for changes to the airspace structures in order to enhance safety and improve efficiency. These proposals are always subject to consultation with relevant stakeholders, including members of the public. Transport Scotland recognises that the provision of air services in the Highlands and Islands is vital to the social and economic welfare of the areas they serve. This provision of airport services through HIAL contributes to the general objective of maintaining the region's population and promoting sustainable economic growth, whilst supported by subsidies from the Scottish Government.

Highlands and Islands Airports Limited (HIAL) is a public corporation, wholly owned by the Scottish Ministers. The company is responsible for the operation and management of 11 airports (Barra, Benbecula, Campbeltown, Inverness, Islay, Kirkwall, Stornoway, Sumburgh, Tiree and Wick) in the Highlands and Islands, and Dundee.

HIAL's Board of Directors is accountable to the Scottish Ministers. The Board is responsible for the determination of the Company's strategic plan and direction; security, safety and operational matters; commercial and route development; investment in the maintenance of HIAL's airports and in its wider estate; financial management; risk assessment and management; health and safety; and a range of important responsibilities including pay, pensions and employment issues.

HIAL, owner and operator of Inverness Airport, identified the need for changes to the current arrangements and procedures in the immediate airspace surrounding the Airport. The purpose of such changes is to ensure that environmental and economic benefits are achieved through efficient use of surrounding airspace and consequently that current efficiency and effectiveness is preserved for all aircraft, providing protection on critical stages of flight following departure and prior to arrival for commercial air transport flights.

Updating the airspace design gives HIAL the opportunity to improve efficiency, and better match it to the improved performance capabilities of more modern aircraft. The net effect of these proposals would be to enhance the overall efficiency of airspace management for Inverness Airport, and to achieve connectivity to the wider air route network. This document outlines the proposals from HIAL for the enhancement of Inverness Airport's procedures and the establishment of appropriate airspace, to benefit both operators and the local community.

1.2 Background

The UK Civil Aviation Authority (CAA) is directed by parliament in the Transport Act 2000 (produced by the Department of Transport) [Reference 3] and the Civil Aviation (Air Navigation) Directions to manage UK airspace [Reference 4]. As a result, airports are bound by a multitude of regulatory documents sponsored by the CAA. For HIAL to request alterations to

UK airspace and flight procedures at Inverness Airport, an Airspace Change Proposal must be produced and formally submitted for consideration by Airspace Regulation (AR – formerly The Directorate of Airspace Policy, DAP) of the CAA. CAP725 [Reference 2] is a CAA published document, which contains the CAA Regulatory Requirements for the proposal and implementation of an Airspace Change. This CAP is derived from International Civil Aviation Organisation (ICAO) Standards and Recommended Practices, and in adherence with CAP725 [Reference 2], HIAL must undertake consultation of all aviation and non-aviation stakeholders. HIAL will use the results of this consultation to finalise proposed airspace and procedure designs, and the consultation responses will form part of the document submission (the Proposal) to the CAA for consideration in the regulatory decision for Airspace Change.

1.3 Purpose and Scope

This consultation document is produced in accordance with CAP725. It contains information regarding the consultation process, options considered for the Inverness Airport airspace introduction and procedure evolvement, and details of the proposed changes with the associated environmental benefits. It is the responsibility of HIAL to consult with the airspace users and general public who may be directly or indirectly affected by the proposal. The purpose of this document is to enable stakeholder engagement and response to HIAL's proposal within the defined consultation period. Contact details for responses and further enquiries are provided along with the response deadline.

1.4 The Document Structure

This document is divided into eight main sections and seven annexes as outlined below for your convenience:

- Section 1 introduces the document;
- Section 2 provides an overview of the consultation process;
- Section 3 details the background and justification for change;
- Section 4 provides an assessment of the different options considered;
- Section 5 details the changes proposed by HIAL;
- Section 6 gives an assessment of the impacts of the proposed change on Airspace Use;
- Section 7 details the Environmental Aims and Assumptions and Economic Implications;
- Section 8 provides a summary and information on the next stages of consultation.

References are provided following Section 8.

There are seven Annexes:

- Annex A provides the Consultee list;
- Annex B provides a Glossary of Terms;
- Annex C gives a brief introduction of new navigational technologies;
- Annex D provides the proposed CTR/A data;
- Annex E provides the VRP data.

2 The Consultation Process

2.1 Overview

HIAL wish to engage with all parties that might be affected by its proposed Airspace Change. Constructive feedback will inform the Proposal development, ensuring any positive impact is enhanced and negative impact is minimised. This also meets the CAA mandatory requirement to undertake stakeholder consultation as part of the submission of an Airspace Change Proposal. This section provides an outline of the consultation process for HIAL's proposal at Inverness Airport. This includes details of why a consultation is undertaken, who has been sought to engage in consultation and how the consultation results will be utilised.

2.1.1 Consultation Topic

This consultation is about a proposal to establish Controlled Airspace (CAS), Class D[3] and Class E[4]+Transponder Mandatory Zone (TMZ)[5], surrounding Inverness Airport. CAS will provide additional protection for Commercial Air Traffic (CAT) during arrival and departure (both vulnerable phases of flight for airliners) on current and proposed new Instrument Flight Procedure (IFPs), to optimise the airspace with efficiency and environmental benefit for all Airport users and the local community in general. The re-design of operating procedures includes the development of new aircraft routes both into the airport and out of the airport. The routes detailed in the Proposal allow for the future introduction of technological developments to provide reduced commercial passenger and cargo aircraft track miles flown; consequently reducing unnecessary aircraft emissions and the over-flying of local communities whilst at the same time enhancing safety. In addition, the new routes introduce Continuous Climb Departures (CCD) and Continuous Descent Approaches (CDA) to the CAT aircraft operations. These environmentally friendly procedures lead to reduced aircraft emissions and noise levels within both the initial and latter stages of flight, further minimising disruption near Inverness Airport. A full description of the proposed airspace and aircraft flight procedures are detailed within this document in section 5.

This consultation is not about Inverness Airport future development or aspects of Government Aviation Policy. It is not about the Noise Abatement Procedures for departing aircraft or Noise Preferential Routes. The proposed airspace arrangements are compatible with the existing Noise Abatement Procedures. HIAL will note any comments on these issues included in your responses but they will be discounted from the Inverness Airport airspace change analysis.

This consultation is not about the current CAA proposal addressing the Future Application of Class F[6] Airspace in the UK FIR to change the status of Advisory Routes (ADRs), though it has been necessary to discuss certain aspects of that project with NATS and the CAA due to the influence it has on the Inverness Airport airspace change. The result of this consultation can be viewed at Replacement of Class F Airspace in UK Flight Information Regions. HIAL will note any comments on this issue included in your responses but they will be discounted from the Inverness Airport airspace change analysis.

[3] Class D airspace cannot be entered without Air Traffic Control (ATC) clearance and an air traffic service is mandatory. Class D is the most common airspace class established for the protection of airports in the UK, mainly consisting of CTRs and CTAs (CTR/A).
[4] Class E airspace cannot be entered by IFR traffic without Air Traffic Control (ATC) clearance, VFR traffic does not require a clearance; however, pilots are encouraged to contact ATC and comply with instructions.
[5] A TMZ is airspace of defined dimensions wherein aircraft wishing to enter or fly within the defined area, will be required to have and operate Secondary Surveillance Radar (SSR) equipment or receive ATC clearance to enter.
[6] Class F airspace can be entered without ATC clearance.

This consultation is not about the Consultation on the Implementation of Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012, Standardised European Rules of the Air (SERA) in the United Kingdom. The status of this consultation can be viewed at SERA Consultation. HIAL will note any comments on this issue included in your responses but they will be discounted from the Inverness Airport airspace change analysis.

2.1.2 Consultation Involvement

This consultation allows all parties affected, directly or indirectly, by the Airspace Change Proposal to state their opinion on the impact of such changes. The CAA requires that where a change to the airspace status or a change to procedures near an Airport is proposed then the Airport Operator must carry out a consultation. All replies concerning the Proposal, either in support or in objection, are documented. HIAL forward the consultation results to the CAA for consideration in the regulatory decision process. Stakeholders for consultation comprise of both aviation and non-aviation parties. Aviation consultees include affected aviation parties such as the MoD, airlines, aircraft operators, adjacent aerodromes and all local airspace users. Although predominantly an aviation-related consultation, the views of members of the public are valued and they are invited to contribute to the consultation process; a full list of consultees, developed in discussion with the CAA, is given at Annex A. The Airport Consultative Committee (ACC), established under Article 35 of the Civil Aviation Act 1982, comprises organisations covering both aviation and non-aviation interests. The ACC has been informed throughout the development of this proposal and its constituent members, through its Chairman, are consultees. Non-aviation stakeholders for consultation comprise environmental and heritage organisations, and the general public who are to be overflown. The Regional and Community Councils of affected areas are to be consulted and public engagement meetings undertaken. Fundamentally, the consultation will enable HIAL to obtain or confirm views and opinions about the impact of the proposed airspace change and consultees have a crucial role in providing relevant and timely feedback to HIAL, giving their views and opinions on the impact of the proposed Inverness Airport airspace change.

2.1.3 Method of Consultation

The consultation is being conducted in accordance with the Cabinet Office Code of Practice on Consultation, as required by the CAA in CAP725 [Reference 2]. HIAL is responsible for conducting the consultation for the Inverness Airport airspace change and any associated costs, and for the collating and analysing of all responses. The consultation period is 14 weeks, commencing on the (**29th September 2014**). In this time period, all stakeholders are invited to review the proposals outlined in this document and submit a response in writing or via email to the HIAL Consultation Contact as detailed in this section. Consultees should note that in the development of the proposed airspace arrangements HIAL has involved, and will continue to involve, local aviation and non-aviation stakeholders using Focus Groups, as specified by the CAA in CAP 725.

This consultation document is made widely available and can be viewed on the HIAL website at (www.hial.co.uk). The aim of this document is to provide a clear and concise explanation of the airspace proposal and associated environmental benefits for all stakeholders. A glossary of technical terminology and relevant terms is provided in Annex B. If further clarification is required please address these to the HIAL Consultation Contact via email or post.

2.1.4 Consultation Results

All consultee responses received by HIAL will be recorded prior to consultation closure on **4 January 2015**; this allows an extra two weeks consultation beyond the statutory requirement to account for the Christmas and New Year period. HIAL may contact consultees if response clarification or additional information is required. Following the closure deadline, all responses

will be analysed. The purpose of this consultation is to engage all stakeholders to obtain their views on the proposed airspace changes. As such, any appropriate design modifications, which improve operations without detrimental environmental effects, will be considered. Feedback for consultees on the responses received and the decision on the final proposal option selected will be published on the HIAL website. The Feedback Report will highlight the key themes that arose and how HIAL will incorporate those concerns into its airspace change proposal.

The records of consultation correspondence and the analysis of the results will be presented in the Consultation Report, which will be presented to the CAA as part of the overall airspace change submission.The consultation results will be included in any formal proposal submission to the CAA and, therefore, considered in the CAA regulatory decision. HIAL will be monitoring responses and where clarification is needed on comments made, we will contact you. Individual responses will not be acknowledged unless you ask for an acknowledgement and we will not respond to individual responses during the consultation.

The CAA requires that all consultation material, including copies of responses from consultees and others, are included in any formal submission to the CAA for an Airspace Change Proposal. In order to provide a meaningful response, we need to know your name, home address or business address, and for online responses we need the email address to which the automatic copy of your response should be sent. All the feedback from the consultation will be made available to the CAA as part of our airspace change proposal. This will allow the CAA to assess independently whether HIAL have drawn appropriate conclusions in the development of the proposed design.

Responses will be treated with due care and sensitivity by HIAL, by the consultation specialists, and by the CAA. Apart from the CAA, HIAL undertake not to disclose personal data to any other party without prior permission.

2.2 Consultation Contacts

2.2.1 Consultation Responses

All consultation responses should be submitted to HIAL, using the automated response form on the HIAL website where further information is available:

www.hial.co.uk

Written responses sent to:

Osprey CSL (ACP Response), Think Tank, Ruston Way, Lincoln, LN6 7FL

For the consultation to be effective it is essential for consultees to be able to express their relevant viewpoints and therefore HIAL Management kindly ask for responses to be submitted in a timely manner. For any clarification or queries, please make it clear that you are requesting further information in the email subject.

2.2.2 Consultation CAA Oversight

The consultation process for the Inverness Airport airspace change is managed by HIAL, in compliance with CAP725 [Reference 2]. In the case of complaints relating to the adherence of HIAL to the consultation process, CAA AR is to be contacted by the details below. Please note; the CAA is responsible for overseeing the consultation process only and will not comment on the proposed changes.

Airspace Business Coordinator
Airspace, ATM and Aerodromes
CAA House
45-59 Kingsway
London WC2B 6TE E-mail: airspace.policy@caa.co.uk

It should be noted that the CAA is responsible for overseeing the consultation process and will therefore not comment on the proposed changes.

3 The Need for Change

3.1 Overview

It is the responsibility of the CAA to regulate UK airspace. Airspace designs aim to facilitate safe and efficient operations whilst meeting the requirements of all airspace users as far as reasonably possible. In addition, the CAA is required to take into account any international obligations and act in accordance with government environmental objectives. assessing the merits of an airspace change proposal. The CAA's primary obligation is to ensure that air navigation service providers (HIAL in this case) exercise their air navigation functions so as to maintain a high standard of safety in the provision of air traffic services. This duty, which is imposed on the CAA by the Transport Act 2000, takes priority over all of the CAA's other duties.

In addition to the duties imposed by the Transport Act, the CAA is obliged to take into account the need to reduce, control and mitigate as far as possible the environmental effects of civil aircraft operations, and the need for environmental effects to be considered at the earliest possible stages of planning, designing, and revising airspace procedures and arrangements.

For an airspace change, it is necessary to outline the need for change. Increased air traffic levels, changes in regulatory guidance, improved aircraft performance and enhanced navigational system accuracy and reliability have all contributed to the emerging need for a re-design of Inverness Airport airspace and the IFPs operated within it. Although Inverness ATC handles the current operational issues effectively on a tactical basis, any future increase in traffic may result in overload situations as controllers try to accommodate more aircraft in a limited volume of airspace to the west of the Airport.

There are four principle areas of concern regarding the current operations at Inverness Airport, which have led to the requirement to establish appropriate Class D, Class E + TMZ airspace and update the flight procedures to be contained within this airspace. These include the limited protection currently afforded to commercial aircraft operating near the airport, outdated approach procedures, lack of Standard Instrument Departure procedures (SIDs) and the lack of Standard Arrival procedures (STARs). An explanation of how these areas are negatively affecting the airport's operations in terms of efficiency, effectiveness, environment and capacity are given in the following section.

3.2 Environmental Concerns

The surrounding uncontrolled airspace at Inverness Airport results, as previously mentioned, in ATC being regularly required to intervene and re-route Inverness Airport in-bound and out-bound aircraft to avoid potential conflictions with other aircraft operating in the area. This detrimentally impacts on the local environment, leading to increased aircraft track miles flown and the undesirable potential for flights over densely populated areas at low altitudes, resulting in extra tonnes of fuel burn and CO_2 production (the volume of which is dependent on aircraft type), and noise pollution below 4,000 feet (ft) to a wider area.

Additional to the absence of CAS, the uncertainty and lack of standardisation of arrival and departure aircraft flight routing, which arises from the current absence of IFPs in terms of standard routes, contributes to this environmental impact. CAT pilots in particular are prevented from efficient flight under the current conditions; they are unable to minimise both emissions and noise near the airport. It is anticipated that the update of existing and establishment of new IFPs would lead to environmental benefits allowing CAT to operate to optimum performance. IFPs would allow earlier turns on track, optimum routing to save fuel, minimise noise and introduce the fuel-efficient flight procedures of CDAs and CDDs. Additionally, the introduction of IFPs has the likely potential to change the way that airlines fuel

plan as track miles become more predictable, potentially reducing fuel load requirements and therefore increasing payload or reducing fuel burn.

3.3 Airport Capacity

Despite present economic pressures in Europe, the Inverness Airport Master Plan, July 2007 [Reference 5] reports that Inverness Airport passenger numbers have increased by 13% between 2010/11 and 2011/12 with the introduction of new routes, which will continue to be added to next year. The current situation is handled effectively on a tactical basis by controllers at Inverness Airport; however, any future increase in traffic may result in overload situations as controllers try to accommodate more aircraft within a complex airspace environment, without the protection that CAS would provide, with consequential environmental disadvantages and additional complications resulting from a lack of published procedures. The Inverness Airport airspace change has been designed with the intention to protect current day-to-day operations, whilst providing the flexibility to incorporate, effectively and efficiently, projected growth [Reference 5], (5% year on year to the end of this decade,) in commercial air transport movements (atm) at Inverness Airport.

3.4 Flight Procedures

The safety, operational and navigational requirements of HIAL, RAF Lossiemouth and the operators at Inverness Airport influence the proposed airspace design. Accompanying the proposed establishment of CAS, an update and standardisation of Instrument Flight Procedures (IFPs) is also proposed to provide adequate protection to Inverness' operations.

CAA Policy recommends that Public Transport flights are conducted, wherever possible, within CAS, in line with airline operators' desire that CAS be provided throughout the airspace in which Public Transport flights take place. CAP493, MATS (Manual of Air Traffic Services) Part 1, Section 1, Chapter 5, 13.1.3, along with Reference 6, states:

> "Unless an aircraft has planned to leave controlled airspace, it is not to be vectored outside the horizontal or vertical limits…."

Inverness Airport does not publish Standard Instrument Departures (SIDs), leading to a degree of unpredictability due to the lack of standardised procedures. HIAL consider this inappropriate for a strategically significant Regional Airport to meet the needs of modern operations. SID procedures are normally retrievable from the aircraft Flight Management System (FMS) database, which reduces crew workload during a busy period and improves safety. At present, Commercial Air Transport (CAT), predominantly passenger and cargo airliners, is subject to interrupted departure, given headings to fly and avoiding action. Departure routes currently require ATC intervention for deconfliction with inbound aircraft, and deconfliction with military fast jets and other General Aviation (GA) near the airport. Additionally, avoiding action can be problematic when the CAT is climbing or descending close to Inverness Airport but below the altitude of the surrounding hills and *Munros*. Although Inverness ATC, normally employing radar vectors and additional instructions, currently handles these issues effectively on a tactical basis and the introduction of CCDs will provide a standard, predictable routing and will contribute to airspace effectiveness by reducing both ATC and pilot workload.

Furthermore, Inverness Airport has no Standard Terminal Arrival Route (STAR) Procedures. In order to sequence aircraft efficiently for arrival, as well as departure, CDAs are required. These procedures would enhance efficiency by de-conflicting arriving aircraft with those departing on a SID, further reducing controller and flight deck ('pilot') workload.

Therefore, in the interests of maintaining appropriate levels of safety into the future, as traffic densities increase, it is proposed that the routes and procedures used by commercial aircraft flying to or from Inverness Airport, or in its vicinity at lower altitudes, are regularised.

Regularised CAT provides predictability and repeatability, reducing airspace traffic interactions, flight deck workload as well as ATC workload whilst providing higher integrity, predictability and efficiency to other airspace users and better management of attendant aircraft noise effects on the local population.

3.5 Safety

Safety is of concern for all involved in aviation, but development of a 'known air traffic environment' around the Airport is the driver for the Inverness Airport airspace change. The proposed changes to airspace and procedures enable Inverness Airport controllers to maintain a high degree of flight effectiveness and efficiency by providing adequate protection to aircraft, along with other associated environmental and capacity benefits. In recognising the need for the introduction of CAS and an update of the flight procedures, HIAL has considered the current airspace environment surrounding Inverness Airport. The mix of operations near Inverness Airport is almost unique in UK airspace and includes many different types of operation with very different levels of capability in challenging terrain. The airspace environment includes commercial passenger fixed wing and helicopter operations, glider, micro-light and fixed wing light aircraft operations, as well as military training operations. The closure of RAF Kinloss as a Main Operating Base (MOB), but retained as an emergency diversion option and Relief Landing Ground (RLG), has also complicated arrangements in that portion of airspace to the northeast of Inverness Airport. The local terrain adds further complexities to the airspace environment, as there are fewer options for Inverness Airport departure or arrival separation[7] from other aircraft compared to an aerodrome with no significant surrounding mountainous terrain. Hence, Commercial Air Traffic (CAT) is much closer to military low-level fast jet traffic just above ground level, in an area that is important to Ministry of Defence (MoD) low-level training as the terrain squeezes the low-level airspace available above ground level, up towards the CAT levels near Inverness Airport.

3.5.1 Airspace Considerations

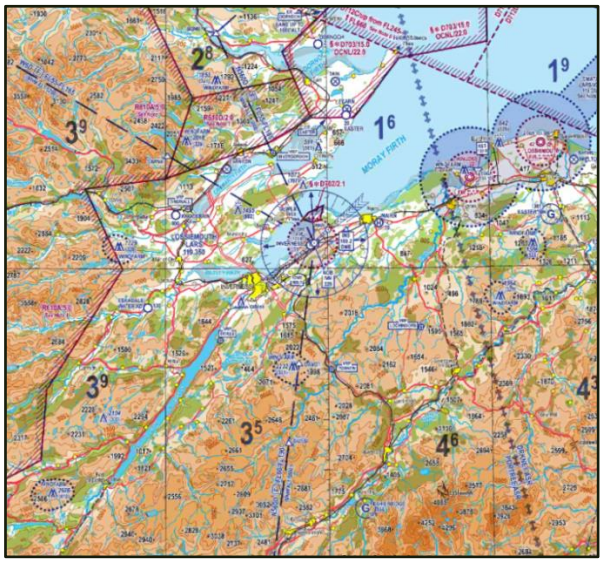


Figure 2: Inverness Airport and surrounding Airspace

UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

[7] The distance by which an aircraft avoids obstacles or other aircraft is termed separation.

Inverness Airport is located within uncontrolled Class G airspace, where aircraft are not subject to mandatory compliance with Air Traffic Control (ATC) instruction (only a small set of compulsory flight rules) and can enter, leave and transit the airspace without ATC permission. An Aerodrome Traffic Zone (ATZ), which is also Class G, of radius 2.5 NM centred on the Inverness Airport Aerodrome Reference Point (ARP), expanding from ground level to 2000 ft above aerodrome level (aal) is the only airspace established to provide Inverness Airport with any protection. Pilots of aircraft within the ATZ are required to make their presence known to Inverness ATC and comply with instructions. Due to local airspace restrictions and prevailing wind conditions, Runway (Rwy)23 is used approximately 60% of the time and Rwy06 used 40% of the time.

The current operations of commercial and passenger carrying aircraft inbound and outbound from Inverness Airport in Class G airspace requires recurrent ATC tactical intervention, re-routing arriving or delaying departing commercial passenger traffic to ensure the safety of all airspace users. The majority of CAT approaches arrive via the Advisory Routes (ADRs), Class F, (the three dashed blue lines that radiate to the south and northwest from Inverness Airport in the centre of Figure 2 above) which offer a small degree of protection to CAT flying under Instrument Flight Rules (IFR)[8]. CAT is then vectored off these routes into Class G uncontrolled airspace, to subsequently descend and make an approach to Inverness Airport. This practice inevitably brings CAT into potential conflict with military fast jets below Flight Level 60 (FL60, approx. 6,000 ft) operating into/out of RAF Lossiemouth, EG R610 (the Highlands Restricted Area, HRA) and/or EG D703 (Tain Range), within this critical stage of flight. Given the speeds, rates of climb/descent, and manoeuvrability of military FJs (potentially compounded by the proposed arrival of Typhoon at RAF Lossiemouth in 2014), the ability of Inverness ATC to intervene with traffic avoidance, or for airline pilots to respond to Airborne Collision Avoidance System (ACAS) Resolution Advisories (RA), is limited. This difficult environment has led to reportable safety events, with unknown airspace users interacting with Inverness arriving and departing traffic, resulting in 20 Air Proximity (AIRPROX)[9] and ATZ infringement reports over a six-year period (2006 - 2012). These incidents are a significant workload and distraction to ATC from the task of providing a service in Class G airspace. Additionally, the arrival and departure phase of flight is a busy time on the flight deck, unexpected ATC interventions (often at very short notice) add significantly to pilot workload too and adds uncertainty into CAT operations. While current operations are safe, there have been occasions where the lack of CAS airspace and out-dated procedures could have potentially led to a degradation of safety.

Routine Airline Safety Reports demonstrate that the immediate reaction of a pilot to urgent radar vectoring instructions can detract from the otherwise optimal operation of the aircraft. Interruptions during critical, high workload, phases of flight (approach and departure from airports) are clearly undesirable and should be obviated if the means to mitigate the situation (e.g. the provision of controlled airspace) exists. The UK Aeronautical information Circular (AIC) 99/2006 (Pink 102) details the necessity for pilots to react promptly and decisively to such urgent instructions.

Additionally, CAT aircraft inbound to Inverness Airport are frequently kept high to de-conflict against military FJs at low level within the vicinity of the Airport. This results in extra track distance for the aircraft inbound to Inverness Airport whilst reducing height on the approach, once handed to Inverness ATC. Keeping CAT aircraft high is undesirable and can lead to an unstable approach which is a factor in heavy landings, risks of a 'go-around', and CAT runway overrun accidents; hence, delayed descents can be a landing safety issue.

[8] The most important concept of IFR flying is that separation is maintained regardless of weather conditions.
[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.

HIAL believes that CAS is necessary to improve the levels of protection for commercial and other aircraft operating to and from Inverness Airport in the critical stages of flight on approach and immediately after departure. A projected increase in air transport movements (atm) [Reference 5], Inverness radar service provision, Ministry of Defence (MoD) operations in the UK Low Flying System (and Danger Areas (DAs)) in the vicinity of the Airport, changes in regulatory guidance and enhanced aircraft performance have all contributed to the emerging need for Class D CAS at Inverness Airport. The introduction of CAS intends to enhance the safe management and integration of operations near Inverness Airport by implementing a known environment.

4 Options Considered

4.1 Overview

Inverness Airport lies within uncontrolled, Class G airspace. The Inverness ATZ (para 3.5.1) provides the only airspace within which all aircraft are required to make their presence known, by radio, to Inverness ATC and comply with instructions.

The safe operation of aircraft, particularly passenger aircraft, in the unknown and uncontrolled environment of Class G Airspace, is provided using radar or a Procedural Service (PS) to IFR traffic. Inverness ATC provides a Radar Deconfliction Service (DS) in core hours (approximately 0830 local to 1800 local daily) to all known aircraft or a PS (when radar is unavailable outside the core hours) to inbound and outbound IFR passenger aircraft at Inverness Airport. Therefore, outside core hours separation is only provided between participating IFR traffic. Such services are required for Inverness Airport passenger flights, as it is the only accepted form of mitigating the vulnerabilities of operating in Class G Airspace. It requires the controllers to provide vectors to the aircraft under their control to keep them away from other known or unknown aircraft on the radar display when radar is available, or to provide separation between known aircraft when radar is unavailable.

The principle objectives for the design of CAS surrounding an airport are:

- Provide protection to public transport passenger aircraft in the critical stages of flight prior to landing and after departure;
- Be of the minimum practicable dimensions, commensurate with the regulatory and environmental requirements and the safe and efficient use of airspace;
- Provide for access to the maximum extent practicable by all classes of aircraft.

In designing new CAS or flight procedures the effectiveness and efficiency of the design must not adversely impact safety. The designs must also consider the needs of all airspace users and the environmental impact of the proposed changes. The aim is to determine the optimum airspace and efficient, procedural design whilst minimising disruption to local aerodromes, residents, General Aviation (GA) activities and MoD operations,. In accordance with the CAA document CAP725, the airport must justify the need for changing its airspace and procedures, and provide details of the variety of options considered in the development of the proposed designs. HIAL has considered a number of options to determine how best to meet the needs of Inverness Airport, other aviation and non-aviation stakeholders, and this section outlines the options that HIAL considered in determining the proposed changes, the reasoning behind such changes with an explanation as to why options have, or have not, been discounted.

4.2 Option 1 – Do Nothing

In developing the proposal for change, HIAL have considered the impact of making no changes to the present situation. If Inverness ATC were to continue with their current operations, it is likely that the concerns raised in Section 3 would continue if not worsen. The projected growth (5% year on year) in atm, basing of Typhoon, a highly agile fighter aircraft, at RAF Lossiemouth, present increasingly significant, potentially unpredictable and challenging implications for Inverness ATC.

There is already an increasing demand for Inverness ATC intervention as aircraft are regularly re-routed on departure and there is a lack of current procedures to enable efficient de-confliction (separation) of arriving and departing aircraft. Additionally, CAT is operating outside the protection of CAS when arriving or departing Inverness Airport. There are regular occurrences where Inverness traffic has received radar vectors to avoid unknown (to Inverness

ATC) aircraft operating in Class G airspace. Incidents of loss of separation are only prevented by the vigilance and abilities of the Inverness ATC staff and pilot awareness. This results in a large volume of liaison between HIAL, NATS Prestwick Centre (NPC), RAF Lossiemouth ATC and aircrews to ensure aircraft safety. The potential for differing arrival routing on each occasion, coupled with the failure to fly a complete, pre-briefed procedure (due to a lack of procedure establishment) and the increasing volume of liaison required for rising traffic levels, creates workload related issues for controller and pilot alike.

With effectiveness and efficiency, being adversely affected by current operations and the mitigation provided by controller ability and vigilance already being maximised, HIAL discounted Option 1.

4.3 Option 2 – Minimal, RAF Lossiemouth Improved ATSU Coordination

RAF Lossiemouth is Inverness Airport's closest MoD Main Operating Base (MOB) for flying operations. In order to mitigate some of the above issues, with regard to RAF Lossiemouth traffic **only**, an unofficial Inverness Terminal Control Zone (TCZ), of 15 NM approximate radius around Inverness Airport is agreed between HIAL ATC and RAF Lossiemouth. RAF Lossiemouth-based crews are not to enter this TCZ without being in contact with Inverness Radar, Lossiemouth ATC or NPC. Although this arrangement has provided mitigation for RAF Lossiemouth aircraft and its FJs in the short-term, under the current terms, RAF Lossiemouth FJs would contact Inverness ATC *near* the Airport; this does not provide unambiguous guidance, direction to aircrews nor provide for ATC separation standards. Thus, this agreement does not provide a 'known' or 'informed', but not mandatory, airspace environment and does not address any further operational concerns of controller workload.

A review of current procedures, extended to improve coordination between Inverness Airport and wider MoD flight operations (including a Letter of Agreement, LoA) in close proximity to Inverness Airport, particularly the Highlands Restricted Area (HRA, EG R610) and the Tain Weapons Range (EG D703) might improve the overall outcome of improved Air Traffic Service Unit (ATSU) coordination.

Despite the introduction of speed-dial telephones and the Lower Airspace Radar Service (LARS) provided by RAF Lossiemouth ATC, in order to preserve safety, Inverness ATC is regularly required to intervene. Frequently, inbound CAT is handed over in a position that conflicts with GA or military FJs operating below the en-route base of NATS Prestwick Centre (NPC) radar cover, near the Airport or under the Advisory Routes (ADRs). Mitigation measures have had some success in the short-term but have not been enduring; military operational, tactical and strategic issues evolve and legacy improvement fails as requirement changes. It is expected that increased traffic levels associated with the move of Typhoon from RAF Leuchars to RAF Lossiemouth, this year, will exacerbate the operational issues.

Additionally, it must be noted that military operations in the UK Low Flying System and ranges in the vicinity of Inverness Airport are of a diverse nature and operations might be carried out by aircraft that are not based at RAF Lossiemouth and, equally, might not be 'known' to RAF Lossiemouth ATC. Whilst such operations may be authorised by the MoD, minimal or no co-ordination is carried out with consequential effects on civilian ATSUs.

Despite the benefits of improved coordination with MoD and RAF Lossiemouth FJ operations, this option does not address the wider military tactical aircraft community and leaves several of the recognised safety and efficiency issues unresolved. It does not fully resolve the Inverness ATS deconfliction issues nor provide protection to CAT in vulnerable phases of flight, arriving or departing the Airport, outside the Inverness ATZ.

The current situation whereby CAT is unable to follow standard routes either into or out of Inverness Airport ensures that indiscriminate noise and visual intrusion experienced by the

local population would continue. Furthermore, the opportunity to reduce emissions associated with CAT fuel burn would be missed producing a detrimental environmental impact.

Therefore, it is believed that solely establishing civilian/military operating agreements in the Class G airspace surrounding Inverness Airport with all individual airspace user groups, which would improve the necessary level of airspace safety and thus reduce the level of concern, is not practically feasible. HIAL discounted Option 2.

4.4 Option 3 – Introduce Alternate Airspace Constructs

In order to address the weaknesses in the previous options and the issues that would be unresolved, including the Inverness Airport current IFPs, controller workload and interrupted CAT routing, HIAL has considered the following alternative airspace constructs.

The European Commission has mandated EUROCONTROL to develop, in close co-operation with the European Aviation Safety Agency, common and Standardised European Rules of the Air (SERA). SERA allow Radio Mandatory Zones (RMZ) to be included within the UK airspace design. A RMZ is airspace of defined dimensions wherein the carriage and operation of suitable/appropriate radio equipment is mandatory [Reference 7]. The requirement for communications within a RMZ in the vicinity of Inverness Airport, would mean that all aircraft (both those operating under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR)) are to establish two-way communication before entering the dimensions of the RMZ. Following this, aircraft must maintain continuous air-ground voice communication watch as necessary, on the appropriate communication channel, unless in compliance with alternative provisions prescribed for that particular airspace by the Air Navigation Service Provider (ANSP) [Reference 9].

A TMZ is airspace of defined dimensions wherein aircraft wishing to enter or fly within the defined area, will be required to have and operate secondary surveillance radar (SSR) equipment [Reference 10]. This is a system that not only supplies ATC with the range and bearing of an aircraft, but can provide height and identity information. A TMZ may be established for overriding safety reasons, where the airspace classification would not ordinarily require aircraft to carry a transponder. The SSR equipment must include a pressure altitude reporting transponder capable of operating in Mode A and Mode C, and has the capability and functionality prescribed for Mode S Elementary Surveillance. Currently, many General Air Traffic (GAT) operators at the Airport are not suitably equipped, although such aircraft may be granted access to a TMZ subject to specific ATC approval.

However crucially, operation of a suitably equipped aircraft within a RMZ or TMZ is not subject to an ATC clearance and potential confliction with Inverness CAT will not be mitigated. Therefore, a RMZ or TMZ alone, associated with Inverness Airport may only provide a patchy 'informed' ATS environment and given the surrounding terrain, the speeds, rates of climb/descent, and manoeuvrability of military FJs, the ability of ATC to intervene with traffic avoidance is already limited. The majority of conflictions requiring Inverness Airport controller intervention are between military aircraft (unable to establish 'two-way' radio contact, primarily due to terrain masking) and CAT that is subsequently redirected.

The potential issues currently posed by the confliction of CAT within 15 NM of Inverness Airport on approach or departure, and military traffic through Class G airspace, along with the detrimental environmental effects caused by interrupted routing below FL60, would not be resolved by a RMZ, TMZ or combination of the two; therefore Option 3 has been discounted.

4.5 Option 4 – Establish Controlled Airspace (CAS)

HIAL has considered a variety of classification options for airspace surrounding Inverness Airport to meet the needs of the Airport, other aviation and non-aviation stakeholders. The basic requirement for the development of a Control Zone (CTR) and associated Control Area

(CTA) for Inverness Airport Controlled Airspace (CAS), based on the regulatory requirements, is to:

- Contain Hold and Approach Procedures established at the Inverness VHF Omni-directional Range navigational equipment (INS VOR), including holding area and primary area containment;
- Provide for effective/efficient radar vectoring and sequencing of IFR flights to the final approach track (FAT); and
- Facilitate the integration and safe operation of departing flights in the initial phases of flight.

The airspace design must facilitate the effective integration of VFR flights operating to and from Inverness Airport and other small airfields in the vicinity, transiting flights and access to the maximum extent practicable of other flights (including, microlights, gliders and military aircraft). In this respect, HIAL considers that a combination of Class D and Class E + TMZ CAS would adequately meet the basic requirement, but not be overly restrictive to other airspace users.

Class D is specified for locations where a known traffic environment is necessary, in which both VFR and IFR flights are permitted. Importantly, Class D airspace permits access, on clearance, by other airspace users under conditions that will enable the safe and expeditious flow of traffic and preserve the known environment that is important to IFR traffic, where the volume of traffic is at a level that requires the provision of a known environment. ATC provides separation between IFR flights (including Special VFR flights) and provides adequate management of VFR flights to permit effective integration of traffic and collision avoidance. CAA Policy is that the volume of CAS should be the minimum necessary to achieve the safety, environmental and operational objectives. Class D airspace is the normal classification used for CAS near aerodromes.

Class E + TMZ is appropriate for locations where a 'cooperative' traffic environment is necessary, in which both VFR and IFR flights are permitted. Importantly, only IFR flights are subject to ATC clearance. VFR flights do not require ATC clearance and, subject to compliance with the notified TMZ requirements[10], do not require two-way communications. ATC provides management of VFR flights to permit effective integration of traffic and collision avoidance and VFR flights not complying with the notified TMZ SSR requirements require approval to enter the airspace.

A CTR, from the surface to a specified Flight Level (FL) in isolation would provide protection to aircraft on final approach, initial departure phases of flight at Inverness Airport and the published Instrument Approach Procedures (IAPs) based on the INS VOR/Distance Measuring Equipment (DME). However, the CAS would only extend to an approximate range of 10 NM (18.5 km) and outside of this, no protection would be provided. However, National Air Traffic Services (NATS) undertook a National Air Traffic Management Advisory Committee (NATMAC) consultation in 2009, approved by the CAA, the impact of which is the removal of the Inverness Airport INS VOR/DME in 2016 (Section 5.3.1). New IFPs would therefore be required to replace these INS VOR/DME dependant procedures, founded on the technological advancements of Area Navigation and Required Navigation Performance criteria (RNAV/RNP) through Performance Based Navigation (PBN). This is a novel concept not currently in widespread use in the UK; its imminent expansion is in-line with the Future Airspace Strategy (FAS) of the CAA [Reference 11] and subject of a CAA Consultation with aviation stakeholders. An explanation of the technological advancements for navigation is given in Annex C. These new procedures may

[10] The requirements for the carriage of Secondary Surveillance Radar (SSR) transponder equipment are contained in Article 39, article 40 and Schedule 5 to the Air Navigation Order 2009.

require augmented airspace to incorporate airspace and obstacle *containment* (clearance) requirements.

CAA Policy recommends that Public Transport (paying passenger carrying) flights, predominantly CAT, be conducted, wherever possible, within CAS, in line with airline operators' desire that CAS be provided throughout the airspace in which Public Transport flights take place [Reference 12]. However, the CAA recognises that for various reasons such flights may not at all times, be able to operate within CAS.

To cover the network of routes used by Inverness Airport CAT, linkage would be necessary to the existing ATS route structures (airways) at BONBY (N560D), GARVA (W6D) and DAVOT (N560D), Figure 3 below, employing extensions to the CTR called Control Areas (CTAs). CTAs are Class D airspace but do not attach to the earth's surface allowing other air traffic unhindered access below. It is clear that CAT efficiency and airspace effectiveness in the immediate vicinity of Inverness Airport, at its present density, is adversely affected by current external operations. The mitigation provided by controller ability and vigilance is already being maximised; any future increase in traffic density of all types will challenge Inverness ATC ability to maintain the current grades of effectiveness and efficiency. Hence, HIAL view CAS connectivity to the air route system as essential. HIAL is not considering this in isolation as Inverness Airport ATC will continue to liaise and coordinate operations with RAF Lossiemouth and Tain Range.

4.6 Option 5 – Establish Controlled Airspace (CAS) with Class E Extensions

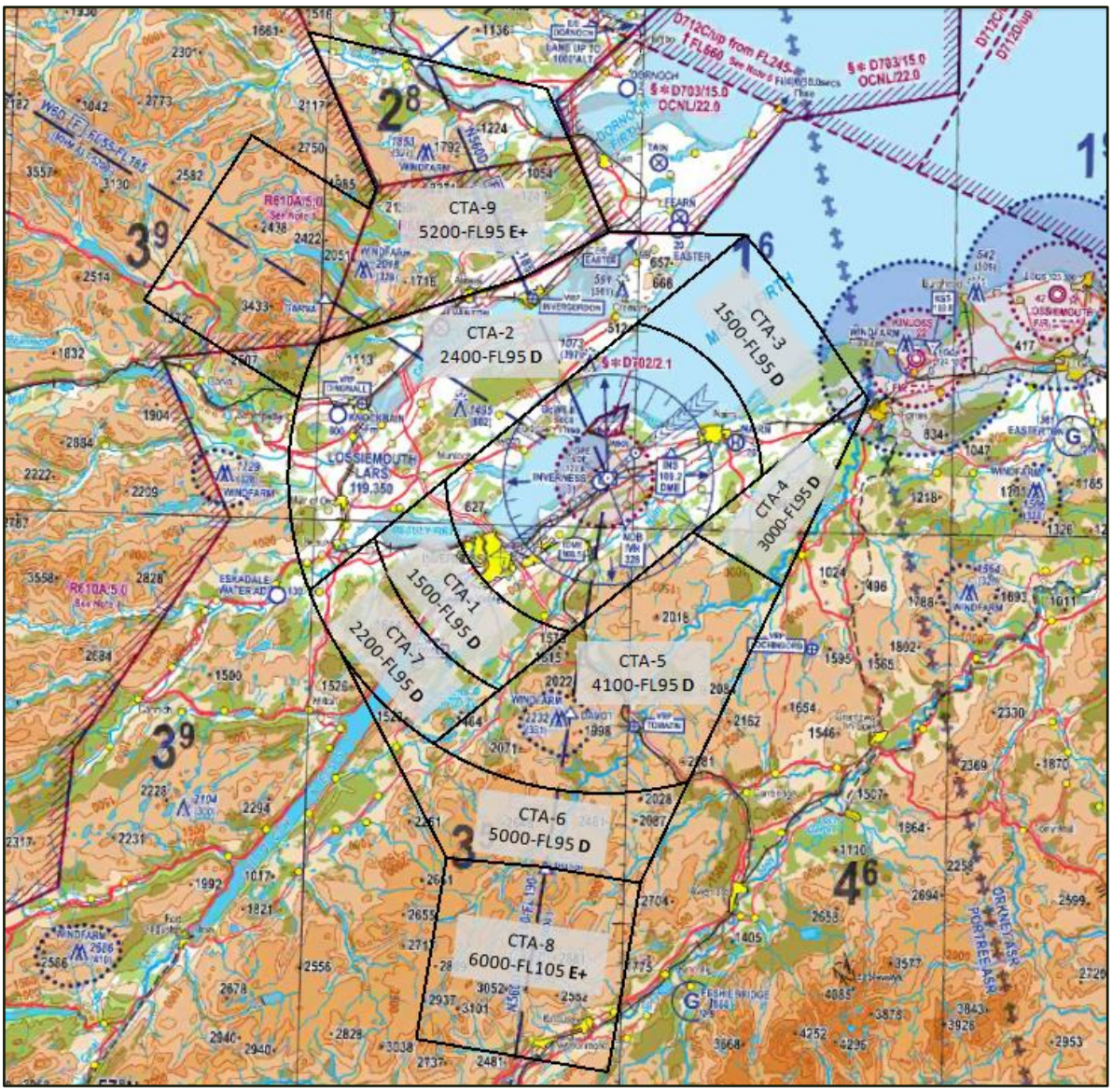


Figure 3: Proposed Inverness Airport CAS (base altitudes, top levels and airspace classification shown)

UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

The CAA intends to reclassify and re-designate the air routes (Advisory Routes, ADRs) connecting Inverness Airport to the UK airways structure by the end of 2014, this timeframe is coincident with this Inverness Airport Airspace Change Proposal. HIAL is fully supportive of the CAA's fifth Option[11]:

- Replacement of all existing Class F airspace by Class E airspace designated Transponder Mandatory airspace (Class E + TMZ) in accordance with CAA AR policy for TMZs [Reference 7], without increase to the lateral or vertical dimensions of current ADRs. Where justified, and in exceptional circumstances, reduce vertical limits, disestablish specific ADRs or reclassify ADRs to a more restrictive classification.

[11] CAA Consultation on the replacement of Class F Airspace in UK Flight Information Regions, 8 Apr 2013.

In ATS provision terms, the change to Class E will guarantee the provision of an 'air traffic control service' to IFR traffic. This option is considered the most appropriate; it will lead to the timely application of an airspace classification best suited to the needs of Inverness Airport and other airspace users. When notified as Transponder Mandatory airspace, Class E + TMZ, (resulting in a co-operative environment), this option represents the minimum level of change from Class F (as currently established and serviced by Deconfliction or Procedural services). It also ensures that IFR traffic receives an Air Traffic Control Service (ATCS) with surveillance from Inverness Airport in transit or at the upper levels of the Inverness Airport Preferred Departure Routes (PDRs) and Preferred Arrival Routes (PARs), enhancing CCDs and CDAs with the associated environmental benefit.

The airspace classification to applied to a particular volume of airspace depends principally upon:

- The number of Air Transport Movements (atm) operating within it;
- The complexity of IFR operations within it;
- The safety hazards posed to IFR passenger air transport traffic by other surrounding airspace activities [Reference 15]; as well as
- The availability of the requisite navigational infrastructure.

The Inverness Airport Airspace Change Proposal is not reliant upon any particular ADR status. However, HIAL anticipates that with greater service clarity and consistency to IFR traffic this proposed change would wholly complement the Inverness Airport Airspace Change Proposal by providing uninterrupted protection to commercial aircraft operating from Inverness Airport, particularly those commercial IFR passenger flights using the new CCDs and CDAs.

The benefits of Class E + TMZ status include the following:

- It incurs minimal impact upon adjacent IFR and VFR operations (however, special/unique procedures might be required for glider and micro-light operators), whilst creating a 'known' traffic environment for IFR traffic.
- As an ICAO airspace classification, it is recognizable to both regular and non-regular domestic and foreign airspace users, including users of adjacent airspace, and is compliant with SERA. It avoids the need for bespoke solutions (both complex and unfamiliar) that in themselves could adversely affect flight safety.
- Autonomous access to VFR aircraft is permissible and therefore offers operational flexibility.
- All users would recognise Class E airways since they are ICAO standard. Being a class of CAS, they allow flight planning as usual and they allow the use of standard procedures for the tactical co-ordination of traffic.
- Military exercise planners and other airspace users will take account of Class E airways because of their CAS status.
- Aircraft crossing Class E airways under IFR would do so under the control of the appropriate controlling authority, in accordance with an appropriate crossing clearance, or in accordance with an appropriate operating agreement between affected airspace users and the airspace controlling authority.
- Aircraft crossing Class E+TMZ airways routes under VFR would not require a clearance to cross but must be carrying and operating a suitable SSR transponder. Aircraft crossing Class E+TMZ ATS routes under VFR without a functioning suitable SSR transponder would either be required to be in radio contact with the controlling authority (but would not require a clearance to cross) or in accordance with published crossing procedures appropriate arrangements for non-radio access will need to be developed.

It is emphasised that this Inverness Airport consultation is not about the Future Application of Class F Airspace in the UK FIR or any airspace arrangements associated with it.

In order to resolve all the issues identified in Inverness Airport's surrounding airspace and current absence of modern Instrument Fight Procedures (IFPs), allowing the optimal overall design in terms of safety, efficiency and the environment, HIAL propose the introduction of a CTR, CTA, and route connectivity (utilising Class E + TMZ airspace) with published IFPs in the form of preferred arrival and departure routes. IFPs would be required to augment the existing conventional INS VOR/DME dependant procedures and to compensate for their removal coincident to withdrawal of the INS VOR, designed to ensure minimal 3D changes, in a conversion to IFPs founded on RNAV Satellite-based Augmentation Systems (SBAS),. This will facilitate the enhancement of the airport's procedures and accompanying airspace to benefit commercial, military and general aircraft operators, Inverness ATC and the local community. This is the option that HIAL supports and proposes for the Airspace Change Proposal.

The following section 5 details the proposed CAS and new IFPs.

5 Proposed Design

5.1 Overview

This section provides details of the CAS changes surrounding Inverness Airport and associated IFPs, which are required to support current and future Airport operations; forming the Inverness Airport Airspace Change Proposal. It outlines the aims of the proposed changes, the options considered in their determination and implementation of the changes. The design of CAS is a careful balance between the competing needs of all of the various airspace users and must also take into account the environmental impact of the aircraft operations whilst maintaining safe operations.

The CAA recommends that in the development of the proposed airspace arrangements, including the design of CAS, the sponsor should involve local aviation and non-aviation stakeholders using Focus Groups. In the development of this proposal, HIAL has established or utilised the following groups:

- The Airport-based and Local Aerodromes Users Group, the Inverness General Aviation Focus Group (IGAFG) which includes the local members of the Light Aircraft Association and Highland Strut;
- The RAF Lossiemouth Airspace Users Group (AUG);
- The Military Users Airspace Consultation Team (MUACT) via the Defence Airspace and Air Traffic Management (DAATM) team.

The role of the IGAFG is to contribute to the development of design options, identify issues that will be considered important by stakeholders and identify areas that need clarification or additional information. Other groups including the RAF Lossiemouth AUG have provided invaluable support and information.

HIAL has also apprised the Military Airspace Users Co-ordination Team (MUACT) of the proposals. Additionally, the Airport Consultative Committee (ACC), including members with local non-aviation interests, has been briefed at each stage.

5.2 Aims

The overall aim of the Inverness Airport Airspace Change Proposal is to enhance effectiveness and improve the efficiency of Inverness Airport's operations whilst minimising adverse effects to GAT and the environment. The proposed designs will achieve this through:

- The introduction of optimal arrival and departure routes improving efficiency whilst reducing the noise impact of arriving and departing airliners;
- The introduction of CDAs and CCDs to reduce environmental impact through reductions in fuel emissions;
- The establishment of IFP which incorporate the use of new technical navigational developments;
- The design of airspace to adequately contain these IFPs, provide national route connectivity and provide protection for all aircraft operating near Inverness Airport whilst improving flexibility away from the Airport's immediate vicinity.

5.3 Flight Procedures Proposal

5.3.1 VOR Rationalisation

A NATS VOR Rationalisation and Replacement Programme is underway. NATS will withdraw the Inverness Airport (INS) VOR before the end of 2016, the obvious consequence of which is

the loss of the primary Inverness Airport arrival and departure aid, particularly important when the Inverness Airport radar service is unavailable.

HIAL understand that the CAA supports the NATS strategy for rationalisation; however, CAA AR has advised NATS that the INS VOR cannot be removed without CAA AR's approval and this will not be forthcoming until the alternatives are approved (Annex C).

NATS current position is that the INS VOR will be not be removed until after new GNSS approaches have been approved and implemented at Inverness Airport and subject to minimum 'twelve month notice period'. It is envisaged that RNAV GNSS instrument approaches will be available at Inverness Airport in August 2015 and operational in Winter 2015/16. Proposed IFPs would therefore be required to replace the INS VOR/DME dependant procedures and link to these instrument approaches, founded on the technological advancements of RNAV and RNP through PBN. These procedures will require validation prior to CAA AR approval for RNAV Procedural Separation in the meantime. Preferred arrival and departure routes are an essential part of this transition from aviation ground based navigation to space based (satellite based) navigation.

5.3.2 Preferred Departure Routes (PDRs)

The initial concept within the established Class D and E + TMZ CAS is for the design of a set of three Preferred Departure Routes (PDRs) or Standard Instrument Departures (SIDs) for each runway. These routes accommodate departures as direct as possible, taking into account underlying terrain and urban areas, to each of the three exit air routes, one to Glasgow and two to the northern and western isles. The design of the departure routes provides more direct flight, therefore reducing the overall flown track miles and reducing fuel emissions. In addition, this should decrease the inherent noise footprint with benefits to the Airport's local community. The PDRs incorporate CCDs to reduce further the environmental impact through minimal fuel burn during the climb into the ATS en-route system. Section 7 contains a full explanation of the potential environmental benefits. Other routings were also considered, but HIAL studied departure statistics and discarded probable low frequency departure routes in order to minimise the impact on other airspace users.

5.3.3 Preferred Arrival Routes (PARs)

The initial concept within the established Class D and E + TMZ CAS is for the design of a set of three Preferred Arrival Routes (PARs) or Standard Arrival Routes (STARs) for each runway. These routes accommodate arrivals as direct as possible. The PARs take into account underlying terrain and urban area, without the requirement for a procedural hold (further reducing fuel burn), to the runway in use from each of the three entry air routes from Glasgow and the isles. The design of these arrival routes provides more direct flight, therefore reducing the overall flown track miles and reducing fuel emissions. In addition, this should decrease the inherent noise footprint with benefits to the Airport's local community. These routes also take advantage of CDAs leading to further environmental benefits, as fuel emissions are reduced in the descent to the runway. Additionally, the arrival routes are designed to take advantage of new technological developments in RNAV through PBN; this will future-proof the procedures at Inverness Airport and ensure compliance with National and International Air Management Programmes. The PARs can be flown by conventional means but provide for the anticipated aircraft navigational equipment upgrades to accommodate RNAV procedures. Annex C provides an explanation of RNAV and the benefits of its imminent implementation. The proposed Inverness CTR/A design encompasses the present, conventional IFPs; the regulatory approval and acceptance by airlines of future, technically advanced IFPs might allow a small reduction in the size of the Inverness CTAs.

5.4 The Airspace Solution

5.4.1 Airspace Ceiling

The high ground surrounding Inverness Airport means that the Airport has the highest minimum terrain safe levels in the UK. The minimum level available is weather dependent, but it is common for the minimum terrain safe level to be FL65 or FL70. A proposed airspace ceiling of FL95 allows vertical separation of three aircraft, a traffic level experienced daily. A lower ceiling would lead to a 'gap' between the CAA proposed Class E+TMZ route above the Airport and its CTR/A providing challenging ATM procedures and processes to Inverness Airport ATC as CAT cross into and out of CAS in a very short period. A lower ceiling would also lead to frequent problems of insufficient allocation levels for aircraft prior to the establishment of alternative separation in arrival or departure. This would result in extra co-ordination with adjacent units, a consequential increase in controller workload, undesirable economic and environmental impact as efficiency is impacted, and delays begin to accumulate. Furthermore, with a low ceiling, it is likely that high performance departing airliners will need to level off to remain inside the CAS before they have climbed through the level of an inbound airliner or slower outbound aircraft incurring additional economic and environmental penalties.

The ceiling of the proposed CAS is FL95 (approximately 9,500ft); HIAL propose that RAF Lossiemouth has coordinated entry to the proposed CAS. This has been discussed with the MoD and accepted in principle, and will subsequently be placed in an Inverness Airport/RAF Lossiemouth LoA. This will also facilitate uninhibited, day-to-day, planned FJ access to the Tain Bombing Range for medium level close air support training. Flexible use of the airspace is essential and this aspect will be seamless to CAT and GAT, so full details are unlikely to be published within the UK IAIP.

The ceiling of the proposed CTR/A overlaps with the current Air to Air Refuelling Area (AARA) 14, currently in Class G airspace where it's base extends to FL80[12]. However, this AARA is being moved further west to match MoD future requirements and no impact on the new AARA is foreseen due to the proposed CTR/A.

5.4.2 Proposed Airspace Design

The Inverness ATZ provides the only airspace within which all aircraft are currently required to make their presence known, by radio, to Inverness Airport ATC and comply with instructions. The ATZ provides limited protection to aircraft operating from Inverness Airport, in particular CAT in vulnerable phases of flight, or limited accommodation for future IFPs to ensure the provision of a safe and expeditious service. HIAL's proposal for the Class D Inverness CTR/A is shown in Figure 3 (Section 4.6). The design will provide, as a minimum, protection of the present Inverness Airport conventional IFPs and provide protection for the proposed PDRs and PARs described in section 5.3.

The Airport undertook an extensive period of Pre-Consultation in order to gain early knowledge of airspace user and non-aviation groups' concerns and to take into account ideas and suggestions to accommodate all stakeholder needs within the early designs. Despite the structure and classification of the airspace being designed to allow access by all classes of aircraft (including, by arrangement, non-radio operators) concerns arose from elements of the GA, Sports and Recreation airspace user community, including the Highland Strut, flying schools and individual aviators. The concerns were based upon the perceived curtailment of their freedom of airspace access and utilisation. The dimensions of the CAS were carefully

[12] UK IAIP ENR 5.2

considered in response to these concerns. In some areas, it has not been possible to reduce substantially the lateral dimensions of the proposed CTAs, but the base altitudes of CTAs 2, 4 and 5 have been significantly revised and raised in response to the comments received.

A detailed review of the initial concept, held in conjunction with the RAF Lossiemouth Operations Wing and Tain Range Control resulted in a further reduction in the overall volume of CAS required. Primarily, this has been achieved by raising the bases of the CTAs, which has in part, mitigated the concerns of '*head room'* between the base of some CTAs and the underlying terrain.

The establishment of Class D airspace surrounding Inverness Airport would require pilot clearance from Inverness ATC before entering, providing a known, safe traffic environment with expeditious and efficient traffic management of all aircraft, general and commercial with capacity and flexibility for future technological advances in Air Traffic Management (ATM) .

It is proposed that the CTR/A and ATZ is active during the published hours of the Airport to cover the day and night commercial operation:

- **Winter,** 0200-2200 Local; and
- **Summer,** 0200-2300 Local.

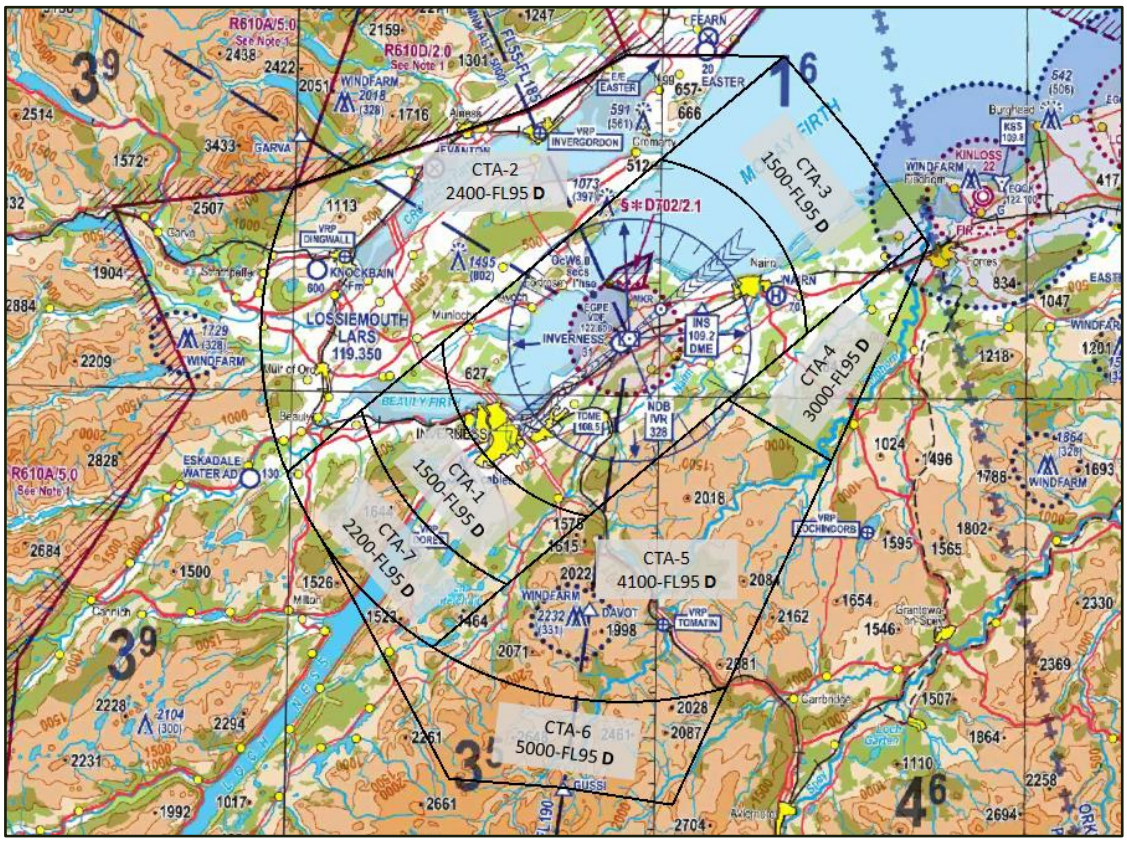


Figure 4: Proposed Inverness Class D CTR/A

UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

The Transition Altitude (TA) within the proposed Inverness CTR/A will be 6,000 ft, in line with the present CAA policy for TA within CAS [Reference 13].

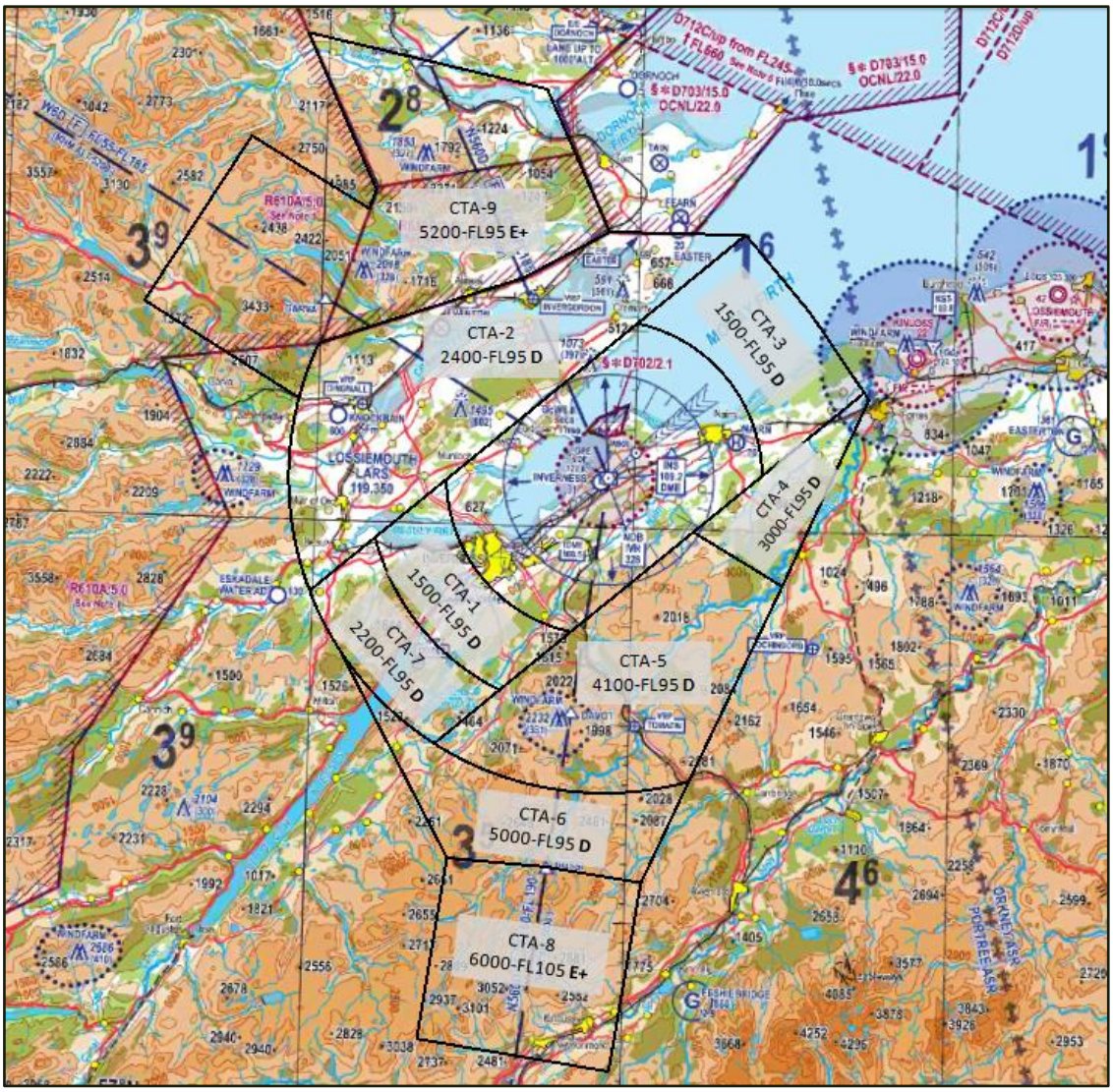


Figure 5: Proposed Inverness Class D and E+TMZ CAS

UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

The proposed Class D CAS (Figure 4) comprises:

- Inverness Control Zone (CTR) of radius 8 nm centred on the Aerodrome Reference Point (ARP), approximately the runway centre, and extending to 5 nm either side of the extended Rwy centrelines, surface to FL95, approximately 9,500 ft above mean sea level (amsl);
- Seven Class D Control Areas (CTAs) with a common ceiling of FL95 to the CTR;
    - CTA-1, 1,500 ft amsl base altitude, extends from the CTR to the southwest, 12 nm from the ARP, 5 nm either side of the Rwy centreline. The base altitude provides protection for Rwy05 IAPs in the final approach;
    - CTA-2, 2,400 ft amsl base altitude, extending beyond the CTR to the northwest, aligning with the southern boundary of Highlands Restricted Area (HRA, R610D), following this boundary northeast and thence following the southern boundary of Tain Bombing Range (D703). The base altitude is constrained by the maximum demanded climb gradient allowed by the SIDs / PDRs regulation compliant design;
    - CTA-3, 1,500 ft amsl base altitude, extends from the CTR to the northeast, 13.5 nm from the ARP, the northern boundary 5 nm to the north, and parallel to the Rwy centreline. The base altitude provides protection for Rwy23 IAPs in the

final approach, notwithstanding this, the use of certain current conventional will have to be limited;
    - CTA-4, 3,000 ft amsl base altitude, an approximate triangle linking CTA-3 with CTA-5. The base altitude is defined by the Inverness ATC radio, radar coverage and RAF Lossiemouth traffic paterns;
    - CTA-5, 4,100 ft amsl base altitude, extending beyond the CTR to the southeast of the Airport. The base altitude is defined by the Inverness ATC radio & radar coverage and the maximum demanded climb gradient allowed by the SIDs / PDRs regulation compliant design;
    - CTA-6, 5,000 ft amsl base altitude, extending beyond the CTR to the south, connecting CTAs-1, 5 and 7 to the southern air traffic route section at the GUSSI Reporting Point (RP). The base altitude is defined by the Inverness ATC radio, radar coverage and the maximum demanded climb gradient allowed by the SIDs / PDRs regulation compliant design; and
    - CTA-7, 2,200 amsl base altitude, extending southwest beyond CTA-1 and linking with CTA-6. The base altitude provides protection for Rwy05 IAPs in the final approach.
- Two Class E+TMZ CTAs (shown in Figure 5) to align with the CAA intention[13] to reclassify and re-designate the air routes (Advisory Routes, ADRs) at the end of 2014;
    - CTA-8, 6,000 ft amsl base altitude with top level of FL105. The base has been defined to align with the current base of the Class F ADR (N560D) in that area but raised by 200 ft to ensure full Inverness ATC radar coverage; and
    - ;
    - CTA-9, 5,200 ft amsl base altitude with top level of FL95 above the Highlands Restricted Area (HRA, R610D). The base has been defined to align with the current base of the Class F ADRs (N560D and W6D) in that area.

The details and co-ordinates for the proposed Inverness Airport CTR/A are provided at Annex F.

The CTR contains the flight path of aircraft on the final approach tracks (FAT) where these are below 2,000 ft amsl and climb profiles of departing aircraft are contained until they are above 2,000ft amsl. The width of the CTR (5NM either side of centre-line) provides adequate lateral containment and protection for aircraft below 2,000 ft amsl.

The CTAs-1, 2, 3, 4 and 7 contain the majority of flight paths and associated Primary Areas[14] for the current Direct Arrivals IFPs (based on the INS VOR) and IAPs to Runways 05 and 23.

The CTAs-4, 5, 6 and 7 contain the flight paths and associated Primary Areas for the proposed PDRs and PARs (depicted at Annex D) providing connectivity to the air routes through the Class E + TMZ CTAs-8 and 9.

5.5 Airline operators

The introduction of Class D CAS, a known and managed air traffic environment, and Class E + TMZ, a cooperative air traffic environment, would facilitate growth for the CAT aviation sector without detriment to safety. Managing conflict proactively and effectively would reduce the occasions when visual avoidance of other flights by CAT flights is required.

[13] CAA Consultation on the replacement of Class F Airspace in UK Flight Information Regions, 8 Apr 2013.
[14] *Primary Areas* constructed in accordance with ICAO Doc 8168 Vol are associated volumes of airspace protected by CAS or from physical intrusion and obstruction (CAP725).

The provision of an ATS in a known and managed traffic environment would streamline the interface to and from the overlying route structure without the requirement for Inverness Airport ATC to create the deconfliction barriers, and associated low-altitude manoeuvring, required under the Class G airspace Deconfliction Service. This would facilitate earlier climb profiles and, for arriving aircraft, would facilitate more direct routings to approach without the need to manoeuvre around "unknown" airspace activities.

5.6 RAF Lossiemouth Operations

The greatest impact of the proposed Class D airspace introduction is likely to be on MoD operations. The relatively close proximity of RAF Lossiemouth and Kinloss Airfield to the proposed CTR/A has resulted in extensive consultation to determine an agreeable way forward. Potential for an impact on Tain Bombing Range (D703) operations, the provision of LARS and access to Kinloss Airfield by RAF Lossiemouth has also been considered. An assessment, along with RAF Lossiemouth Operations Staffs and the Defence Airspace and Air Traffic Management (DAATM) group, has been made on how the proposed Inverness Airport CTR/A might affect overall military low-flying operations in the adjacent airspace.

In order to meet the needs of other airspace users to the maximum extent practicable airspace sharing arrangements are being developed, and formalised in LoAs between Inverness Airport, RAF Lossiemouth and Tain Range Control. These LoAs would allow the existing military air activity focussed on Tain Bombing Range (D703) and RAF Lossiemouth use of their Rwys 05 and 10 to continue to the maximum extent practicable proportionate with Inverness Airport operations.

Much of the proposed CAS to the north and northeast of Inverness Airport is required for the protection of aircraft and containment of IFPs (connecting to BONBY, GARVA and GUSSI) for Inverness Rwy05 departures and Rwy23 arrivals. Arrangements are being developed, which will permit delegated access for RAF Lossiemouth ATC to proposed CTAs 3, 4 and 5 for control of approaches to RAF Lossiemouth Rwy 05 or 10[15] (in use approximately 40% of the time). An LoA will detail the airspace sharing arrangements and will provide sufficient flexibility to accommodate Inverness Airport departures and arrivals. It will be as flexible as possible in the use of the airspace, in the context of Flexible Use of Airspace (FUA)[16] [Reference 16] at an operational state, to allow real-time safe use of airspace for Operational Air Traffic (OAT) and GAT operations, as defined in Regulation EC No 2150/2005 [Reference 14].

5.7 Other Local Aerodromes

For the Airspace Change Proposal, the needs of all airspace users must be considered, with the objective of establishing the optimum design whilst minimising disruption to the MoD, local aerodromes, aviation sites and GA activities. Any change to an airport's airspace, departure or arrival procedures, is likely to have some effect on en-route connectivity and adjacent airspace. However, in order to maintain safety levels and enhance the efficiency of Inverness Airport's operations, it is necessary to integrate more effectively with neighbouring traffic.

Light aircraft operators based at Inverness Airport are used to operating in an ATC managed environment, albeit Class G airspace and their operations within the proposed Class D airspace would continue as previously. They would benefit from a known and managed traffic environment throughout their normal local flying training areas. Special VFR clearance would be available within the Inverness Airport CTR (in accordance with the UK post-SERA application

[15] In particular the Rwy05 TAC to Visual (based on the KSS TACAN).
[16] The basis for the FUA Concept is that airspace should not be designated as either military or civil airspace but should be considered as one continuum and used flexibly on a day-to-day basis.

of Special VFR) to enable access to and from the Airport in poor weather conditions whilst being effectively separated from all other aircraft.

Inverness Airport ATC is committed to providing access to any revised CAS, when safe and appropriate, with continued provision of the current level of service provision both within and outside any revised airspace. It is intended that the revised constructs should not be detrimental to airspace users as a whole.

HIAL anticipate that Kinloss Airfield will remain in Class G airspace, within its associated ATZ. Light aircraft, including non-radio aircraft and gliders, are based at Kinloss Airfield. The establishment of Inverness Airport CAS will have an effect on Moray Flying Club operations; a Memorandum of Understanding (MoU) between RAF Lossiemouth ATC and the Moray Flying Club, supported by tri-partite LoA between Inverness Airport ATC, RAF Lossiemouth ATC and Tain Range will detail integration of Club traffic operating in the area and CAS access arrangements.

Easter aerodrome (unlicensed) is a grass strip approximately 13 nm north northeast of the Airport on the southern boundary of Tain Bombing Range (D703). HIAL anticipate that the strip will remain in Class G airspace, the major influence upon Easter being Tain Bombing Range operations, and the establishment of Inverness Airport CAS will have no effect on the Easter airstrip.

Culbokie (unlicensed) is a grass strip approximately 9 nm west of the Airport. It is anticipated that the strip will remain in Class G airspace and the establishment of Inverness Airport CAS will have no effect on the airstrip.

Dornoch aerodrome (unlicensed) is a grass strip approximately 22 nm north of the Airport near the north-western boundary of Tain Range. HIAL anticipate that the strip will remain in Class G airspace, the major influence upon Dornoch being Tain Bombing Range operations, and the establishment of Inverness Airport CAS will have no effect on the Dornoch airstrip.

Knockbain aerodrome (unlicensed) is a privately owned grass strip approximately 14 nm west of the Airport. HIAL anticipate that the strip will remain in Class G airspace, under the proposed CTA-3 (base 1,500 ft amsl) and the establishment of Inverness Airport CAS will have little effect on the Knockbain airstrip.

Eskadale Water aerodrome (unlicensed) is a privately owned grass strip approximately 17 nm southwest of the Airport. HIAL anticipate that the strip will remain in Class G airspace, under the proposed CTA-3 (base 1,500 ft amsl) and the establishment of Inverness Airport CAS will have little effect on the Eskadale Water airstrip.

Easterton aerodrome (unlicensed) is a privately owned glider site approximately 24 nm east of the Airport. HIAL anticipate that the site will remain in Class G airspace and the establishment of Inverness Airport CAS will have no effect on the Easterton site operations.

Feshiebridge aerodrome (unlicensed) is a privately owned glider site approximately 26 nm south southeast of the Airport. HIAL anticipate that the site will remain in Class G airspace and the establishment of Inverness Airport CAS will have no direct effect on the Feshiebridge site operations. However, the Class E+TMZ (CTA-8) to the south between the Reporting Points GUSSI and NESDI may impact on gliders, not equipped with a radio, in accessing the CTA and airspace west of route N560DA. HIAL recognises that there might be an indirect effect upon general glider operations from Feshiebridge. Arrangements between Inverness ATC and the operator of the Feshiebridge site will detail integration of traffic operating in the area along with CAS access arrangements; expecting that access arrangements will be similar to those employed elsewhere in UK CAS. HIAL is in close liaison with NATS and CAA following the CAA Consultation on the replacement of Class F Airspace in UK Flight Information Regions, Section 4.6.

Alturlie Point paraglider site, at approximately 3 nm southwest of the Airport, will lie within the proposed Inverness CTR; a MoU between Inverness ATC and the operators at Arturlie Point site will enhance the safety of CAT in mixed fixed wing (FW) CAT and GA paraglider operations.

A number of helicopter operations are currently active within or underneath the proposed Inverness CTR/A. Operations to and from the nearby Hospital Helicopter Landing Site at Inverness City are complemented by commercial helicopters operating just outside the airport boundary to the northeast by PDG Helicopters and HG Helicopters operating from Nairn Heliport and Gollanfield. A MoU between Inverness ATC and the Helicopter operators will detail integration of helicopter traffic along with CAS access arrangements.

Peripheral aerodromes that lie well outside the boundaries of the proposed Inverness CTR/A are not directly affected by the proposal and it considered LoAs and MoUs are not necessary. Flights operating to/from these aerodromes will, when necessary, be given ATC clearance through the proposed Inverness CTR/A in accordance with the normal rules for Class D airspace; HIAL will provide access to its associated CAS environment 'to the maximum extent practicable by all classes of aircraft', which Class D permits as detailed below.

All proposed LoAs and MoUs will be submitted to the CAA AR as part of the formal airspace change proposal on completion of the consultation.

5.8 VFR Flights and Visual Reference Points (VRP)

HIAL wish to make as little impact as is practicable on the extant operation of VFR flights at and near Inverness Airport, including operations to and from the peripheral aerodromes detailed in section 5.7. Inverness ATC does not envisage any capacity problems in integrating VFR flights, including transit flights, into the proposed CTR/A traffic flow.

HIAL has reviewed the current Inverness Airport Visual Reference Points (VRPs)[17]. Inverness Airport propose to retain the current VRPs, reflecting current operating practice for locally based light aircraft and other VFR operations and to assist navigation in and around the proposed CTR/A. Annex E contains detail on the proposed VRPs, shown graphically by yellow VRP markers in Figure 2. Inbound and outbound routings/clearances to and from Inverness Airport would utilise the proposed VRPs although, whenever practicable, direct routing will be approved.

A local Light Aircraft Association (LAA) and Highland Strut[18] member has visually checked the current and additional VRPs from the air for suitability, both day and night, and convenient location with regard to the CTR VFR routes.

5.8.1 Special VFR Flights

Special VFR (SVFR) clearances are applicable only within CTRs and under conditions which would usually require aircraft to comply with IFR (i.e. in IMC or at night) and are normally available to those types of light aircraft operations which are conducted with visual reference to the ground[19]. HIAL has considered the current Single European Rules of the Air (SERA) Implementing Regulation[20] and understands that, as presently proposed, SERA will change the VFR access requirements to Class D CTRs. The CAA is requesting clarification on 'clear of cloud' definitions for Class C and D airspace. SVFR clearances require standard IFR separation both between such flights and between SVFR and IFR flights. HIAL proposes to establish visually

[17] The CAA principles for the establishment and use of VRPs are detailed in AIC Y 006/2013.
[18] The Highland & Islands Strut of the Light Aircraft Association is a membership of pilots and enthusiasts living mainly in the Highlands & Islands region of Scotland.
[19] Rules for SVFR flights are detailed in the UK AIP (ENR 1-2-1, paragraph 2).
[20] No 923/2012.

referenced Clearance Limits for inbound SVFR flights (including PDG helicopter operations), which will provide adequate geographical separation, in accordance with MATS Part 1, for the purposes of IFR separation in time or space, from Final Approach and Departure tracks. The routing within the CTR to the SVFR clearance limits will normally be with reference to the proposed VRPs (Figure 5) and associated VFR routes.

The pilot shall determine the flight meteorological conditions under which s/he intends to operate. However, currently for flights in Class D airspace the pilot is required to take the reported meteorological visibility for the aerodrome (as passed by ATC) as being the flight visibility and conducts her/his flight accordingly.

5.8.2 Transit Flights and Visual Reference Points (VRP)

Transit flights through the proposed Inverness CTR/A, by both VFR and IFR, will be accommodated on direct routings to the maximum extent practicable. Exceptionally it may be necessary to specify ATC clearance with reference to the notified VRPs, or by radar vectoring, or refuse transit clearance through the CTR/A. HIAL expects that refusals are only likely in exceptional circumstances.

Aircraft crossing the Class E+TMZ CTAs under VFR would not require a clearance to cross but must be carrying and operating a suitable SSR transponder. Aircraft crossing Class E+TMZ ATS areas under VFR without a functioning suitable SSR transponder would normally be required to be in radio contact with the controlling authority (but would not require a clearance to cross). In accordance with published crossing procedures appropriate arrangements for non-radio access will be developed for Feshiebridge operations.

A number of paraglider and hang-glider operations take place routinely near Inverness Airport from the previously mentioned Alturlie Point. HIAL intends to accommodate such flights to the maximum extent practicable within the proposed Inverness CTR/A, subject to prior co-ordination with Inverness ATC. The capability for two-way RTF communication with Inverness ATC would be a distinct advantage to such accommodation. HIAL is developing a MoU between Inverness ATC and the operators at Alturlie Point site to enhance mixed CAT and GA paraglider operations in this area.

5.8.3 Secondary Surveillance Radar (SSR) Frequency Monitoring Code

The introduction of an Inverness Airport SSR Frequency Monitoring Code[21] Procedure, along with the use of VRPs, is likely to reduce significantly the volume of RT traffic, and increasing controller capacity, particularly with GAT. Instead of pilots, who have no intention of entering the CTR/A, having to contact Inverness Airport ATC on RT to advise of their proximity to the CTR/A, pilots can select the monitoring squawk to demonstrate they can be contacted if necessary, but do not require an ATS and will remain outside CAS.

The resultant reduction in RT will provide Inverness controllers with the capacity to deal with GAT Class D transit requests. HIAL anticipates, as there is currently airport-based GAT, that there will not be a substantial increase in GAT associated RT.

[21] IAIP ENR 1.6, paragraph 2.2.5.

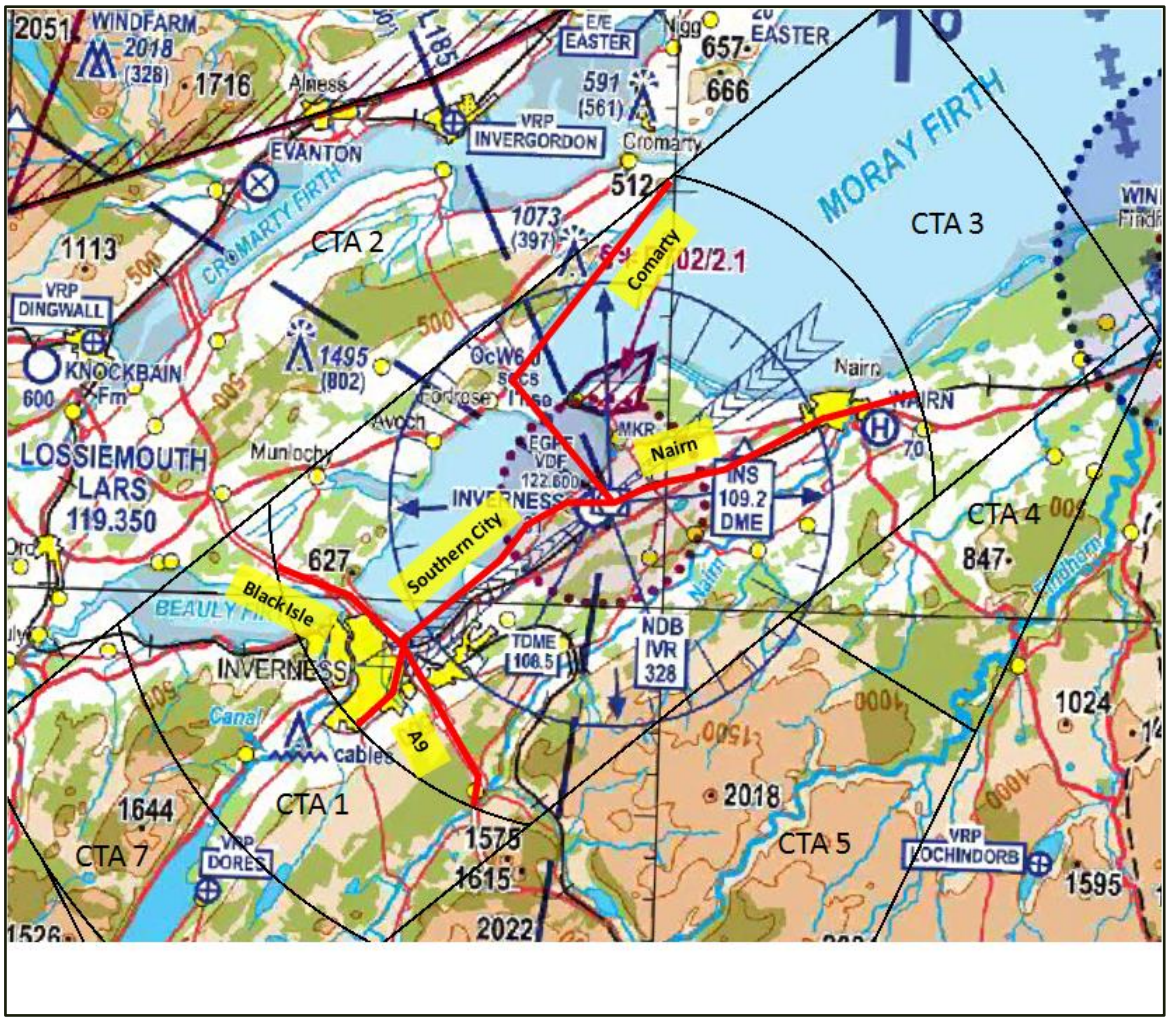


Figure 5: Proposed VFR Routes and current VRPs

6 Environmental and Economic Benefits

6.1 Overview

HIAL welcomes the incorporation of aviation emissions into the European Union Emissions Trading Scheme from 2012, and at a local level, Inverness Airport is committed to reducing aviation emissions for local airspace users. One of the primary aims of the Inverness Airport Airspace Change Proposal is to minimise the impact of aviation activities on the environment and improve the quality of life for local communities. Figure 4 (Section 5.4) shows the overlay of the proposed Inverness Airport CTR/A on an OS map, demonstrating the relationship of local towns and villages to the proposed CAS. HIAL recognises that there are wide ranges of impacts associated with airports; it intends to support growth in air travel while demonstrating due consideration for neighbours and the unique environment in which we all live and work. HIAL recognises the responsibility to work with Government and all stakeholders locally to promote a balance between the positive impacts, such as jobs and inward investment, and the attendant negative effects of noise, air quality and emissions that may arise from operations at Inverness Airport [Reference 17].

This section provides the results of the detailed environmental assessment required by the ACP, in accordance with the CAA (Air Navigation) Directions 2001 and as detailed by CAP725. In any airspace decision-making, the CAA must consider the environmental impact of aviation and the disturbance caused to the public. The environmental assessment has been conducted in accordance to CAA policy and with CAA Airspace Regulation (AR) advisors, to examine the implication of the airspace design in terms of noise, climate change and local air quality. Throughout the development of this airspace change proposal, HIAL's aim is to leave the current, conventional routing (based on the INS VOR) unchanged, but by introducing future new departure and arrivals to help reduce the general, local environmental impact of aviation, subject to the overriding requirements for flight safety. The current, conventional routing (based on the INS VOR) will be phased out during 2015 removing the noise and emissions associated with these routes.

Environmental benefits for the Inverness Airport Airspace Change Proposal would see reductions of aircraft emissions and noise with improvements in local air quality and tranquillity. The tracks across the ground of arriving and departing airliners within 10 miles of the Airport do not change because of this airspace change and the requirement to fly overhead the Airport on some occasions, which is very inefficient, is removed. The tracks to/from each runway work well and are compatible with the changes proposed to the airspace arrangements. Farther afield, the proposed changes to tracks are at higher altitudes with avoidance of more densely populated areas reducing further the impact of noise.

The proposals enable navigation to be carried out more effectively for all aircraft operators within and around the proposed CTR/A; there is no noise impact arising from this airspace change close to Inverness Airport and efficiencies are made with reduced fuel usage for CAT aircraft with associated reductions in harmful emissions of CO_2.

Access to the proposed CTR/A, within the access rules applicable to Class D and Class E+TMZ airspace, by light aircraft would continue and the traditional areas of operation of training and other recreational flights would be respected by HIAL. In order to meet the needs of other airspace users to the maximum extent practicable airspace sharing arrangements are being developed, and formalised in LoAs or MoUs between local airspace users and Inverness Airport. In this aspect, the environmental impact of the proposed CTA/R would be neutral.

It is therefore considered that, overall, the introduction of the CAS will be environmentally beneficial; any minor impacts that manifest themselves will be balanced out by small benefits

gained elsewhere. Should VFR traffic choose to route around the airspace to avoid communication with ATC there might be a small increase in fuel burn and change in noise distribution (around the periphery of the CTR) below 4,000 ft. However, this is counter-balanced by the commercial passenger and cargo traffic operating to/from the Airport with more regularity and extended routing within the CTR/A would be rare. Moreover, there would also be unquantifiable environmental benefits that would accrue from the more efficient use of airspace and the operation of aircraft.

6.2 Impact of Noise

The aircraft noise impact immediately after implementation is not likely to be significantly different from the pre-implementation situation. Based upon Sound Exposure Level (SEL) footprints and the frequency of departures at night, there is unlikely to be an increase in sleep disturbances because of the airspace change and it is unlikely that there will be a net increase in the population overflown. There is little discernible difference in the Inverness Airport aircraft noise footprint (Figure 6) for a projected 2019 period, with CAS established, and the present situation.

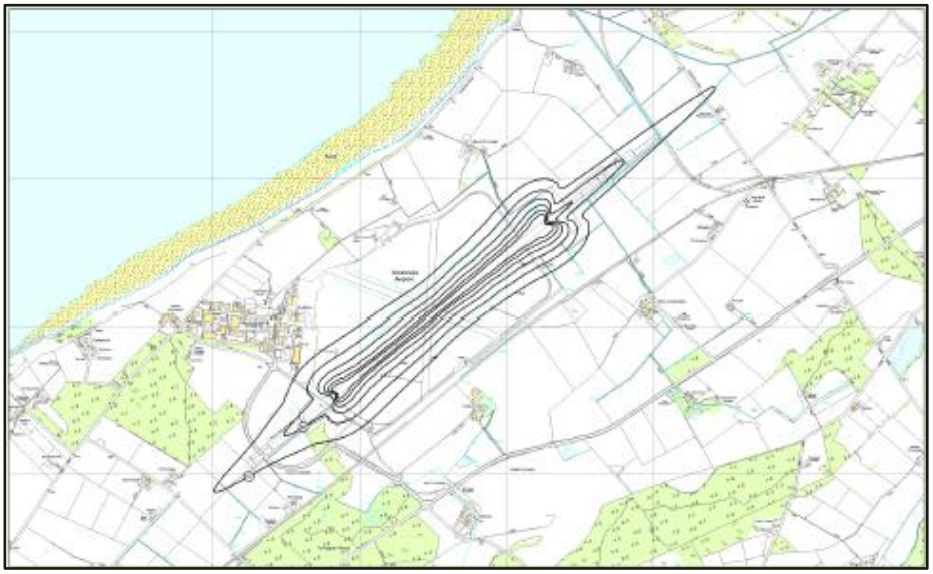


Figure 6: Inverness 2013 Leq noise contours (with airspace change)

The implementation of PDRs, highlighted in 5.3.2, with associated CCD, and a higher TA, 5.4.2, would result in aircraft achieving greater height much earlier in their departure than is currently the case, reducing noise impacts. The proposed PARs and CDAs are expected to further reduce noise levels experienced on the ground, as described in CAP725 [Reference 2], Appendix B Annex 5.

It is acknowledged that some noise from aircraft is currently encountered by elements of the local population in both Inverness and Nairn and this is unavoidable as both towns lie on the extended centre-line of the Airport's main runway.

With respect to VFR operations by light aircraft, VRPs[22] are selected to minimise over-flight of communities at low level and reflect current practice as much as possible. Pilots have a duty to minimise the noise and disturbance they cause through visual avoidance of sensitive areas and

[22] The CAA principles for the establishment and use of VRPs are detailed in AIC Y 006/2013.

this will not change. Inverness ATC will endeavour to keep routing restriction of flights to the minimum necessary to facilitate the effective and efficient integration of VFR flights with other airspace activity.

6.3 Climate Change - Fuel Burn/CO_2 Emissions

One of the aims of the new IFPs is to improve efficiency of operations and ensure aircraft are routing to their destination as soon as possible, or arrive at the airport in as direct a manner as possible. HIAL's intention is, therefore, to reduce the overall fuel burn for the majority of Inverness Airport operators. Under the existing airspace arrangements, as explained in Section 3, Inverness Airport traffic frequently has to be deviated from the direct routing, optimum climb, or descent profile in order to maintain the prescribed separation from unknown traffic operating near the Airport. The introduction of CAS will reduce the need to re-route aircraft in the immediate vicinity of, or overhead, the airport, although some re-routing might still be required in respect of unknown traffic operating outside the proposed CAS. The implementation of CCDs and CDAs would further reduce fuel burn.

Within the ACP, it must be demonstrated how the design and operation of the airspace will impact on emissions of carbon dioxide (CO_2), primarily on the basis of fuel burn. To achieve this, a quantitative assessment of climate change impacts has been undertaken. The overall reduction in route lengths and periods within each flight mode in the landing and take-off (LTO) cycle, results in a reduction in fuel use and CO_2 emissions from the current baseline.

6.4 Local Air Quality

In the context of local air quality, the overall objective under the CAA published document CAP725 [Reference 2] is to determine whether the proposed airspace change will exceed any statutory air quality standards. CAP725, Appendix B, 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. Therefore, the basis to ascertain whether an ACP influences local air quality is determined by the LTO-cycle and aircraft routing below 3,000 ft agl. With the implementation of CCDs it is anticipated aircraft will achieve 3000 ft or greater as quickly as possible, thus increasing the likelihood of dispersal of emissions. CDAs allow aircraft engines to operate more efficiently and will prevent aircraft having to level-off at lower heights, thereby reducing the likelihood of air pollution.

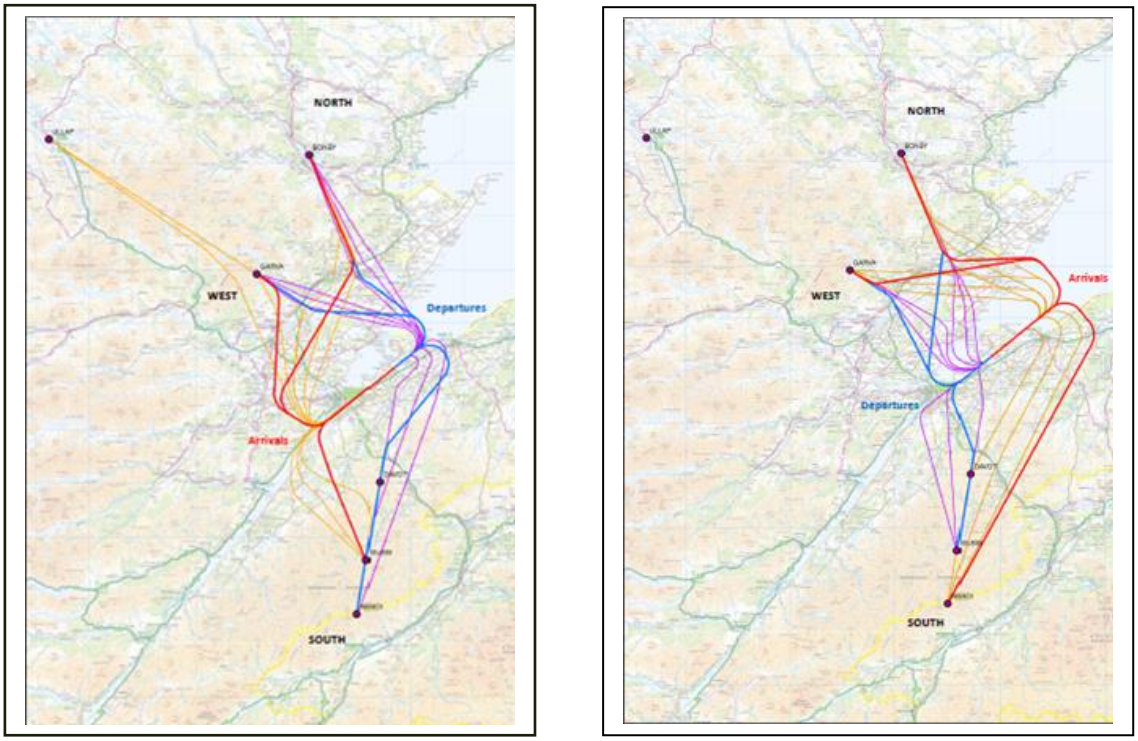
The Air Quality Standards will not be breached based on future airport operations undertaken as a result of the airspace change. The Highland Council, within whose administrative area Inverness Airport is located, has not declared any Air Quality Management Areas (AQMAs) related to forecast departures of the annual mean nitrogen dioxide (NO_2) or sulphur dioxide (SO_2) objective based on emissions from road traffic. The Highland Council has previously assessed and determined that air quality effects from operations at Inverness Airport would not be significant based on the nature and scale of airport operations [Reference 17].

6.5 Visual Impact and Tranquillity

Although difficult to measure, the potential visual intrusion and impact to tranquillity is recognised. The Instrument Flight Procedures (IFP) are being changed to introduce the CCDs and CDAs and remove current IFPs in 2015 (based on the INS VOR). The level of visual intrusion and impact to tranquillity from IFR traffic is expected to reduce slightly, as commercial airliners remain higher, or reach transit heights quicker. The new IFPs do not overfly any areas of the dense community. VFR flights will be integrated in essentially the same manner as they are under the current airspace arrangements unless a conflict with IFR traffic is foreseen by Inverness Airport Controllers, then then VFR routing will be offered.

It is anticipated that the proposed CAS will not have a greater visual impact nor affect the tranquillity of the countryside any more than that experienced today. Importantly, the

reduction in avoiding action against unknown aircraft near Inverness Airport and the associated repositioning of aircraft at low level would be an unquantifiable benefit due to the present random nature of the hazards to which flights are currently exposed.



Runway 05	Runway 23
Proposed and Current Departures Proposed and Current Arrivals	Proposed and Current Departures Proposed and Current Arrivals

Figure x: Inverness Current and Proposed Departure and Arrival Tracks

6.6 Economic Benefit

The requirement for the establishment of CAS surrounding Inverness Airport is predicated on the effective and flexible use of airspace and HIAL's commitment to continued enhancement of flight safety within its designated airspace; and thus no economic factor for or against the proposal has been considered. However, HIAL expects some peripheral economic benefits to accrue to commercial aircraft operators principally in reduced delay and fuel burn. The elimination of persistent avoiding actions and at the critical stages of flight at lower levels will ease traffic flow and improve efficiency.

The Airport provides a vital national and international connection to Inverness and the wider Highlands region, providing travel connections for both business and leisure travellers. The availability of CAS, as outlined in the Airport Master Plan [Reference 5], does not establish forecast traffic growth at Inverness Airport. However, should significant traffic growth take place without the operational benefits of CAS, then the rate of avoiding action, occurrence reports, airline safety reports and general operating delay would inevitably be likely to increase commensurately. The introduction of the proposed changes detailed in Section 5 would not only improve the immediate operational situation, but accommodate for predicted traffic growth should this occur.

As a result, the Inverness Airport Airspace Change Proposal is likely to accrue economic benefits, and additionally provide for safe future growth in air transport movements at Inverness Airport.

7 Next Stages

7.1 Overview

This document has been compiled and distributed in accordance with the CAA document CAP725, which contains the Regulatory Requirements for the proposal and implementation of an airspace change and is derived from International Civil Aviation Organisation (ICAO) Standards and Recommended Practices, Single European Sky Regulations, EUROCONTROL requirements and UK specific requirements as determined by the CAA [Reference 2]. In adherence with CAP725, the document has been published to enable consultation and engagement of all aviation and non-aviation stakeholders. HIAL will use the results of this consultation to finalise proposed airspace and procedure designs, and the consultation responses will form part of the document submission to the CAA for consideration in the regulatory decision for airspace change.

7.2 Consultation Summary

The introduction of Class D and Class E + TMZ CAS would afford the necessary protection required for aircraft operating in the vicinity of Inverness Airport, and negate the current efficiency, effectiveness and environmental concerns associated with the regular need to re-route CAT due to unknown aircraft. The establishment of CAS and IFPs proposed by HIAL would result in a reduced ATC and pilot workload, within the critical stages of flight following departure and on approach. Liaison with the MoD has been undertaken to ensure the minimum possible impact on military operations. Additionally, HIAL desires to reduce the impact as far as practicably possible on surrounding aerodromes and GAT, especially the sports and recreational airspace user; seeking to establish a number of VRPs in the vicinity, provide access to its associated CAS environment 'to the maximum extent practicable by all classes of aircraft' and establish an SSR monitoring code.

The environmental benefit of the proposed changes at Inverness Airport are detailed at Section 6, with advantages which include reduced fuel burn, CO_2 emissions and noise footprints to the local community.

7.3 Consultation Response

We are seeking your feedback on our proposed designs. We will consider making changes to the design once we have analysed everyone's responses. Where HIAL decide to change the design, and the change is significant, there would be the possibility of additional consultation in accordance with CAA guidance. The CAA, as the Regulator, would provide guidance HIAL on what a 'significant change' would be.

All consultee responses received by HIAL will be recorded prior to consultation closure as detailed in Section 2. Feedback for consultees on the responses received and the decision on the final proposal option selected will be published on the HIAL website and the consultation results will be included in any formal proposal submission to AR for consideration in the regulatory decision. HIAL invites all stakeholders to submit their responses via the details provided at Section 2.

7.4 ACP – Moving Forward

Following consultation and the finalisation of proposed designs, the ACP will be submitted to the CAA Airspace Regulator. The CAA then requires a 16-week period to conduct its own internal analysis of the final proposal and consultation results, before arriving at a Regulatory Decision. Should the Inverness Airport Airspace Change Proposal be accepted by the CAA,

without the need for further design optimisation or analysis, it is suggested that implementation of any changes would be on a single date; all new IFPs and new airspace would be activated simultaneously, on a double Aeronautical Information Regulation and Control (AIRAC) cycle. This approach would not create an overly large training burden for Inverness Airport ATC, RAF Lossiemouth ATC and NPC personnel or for operator FMS updates.

References

Ref	Title	Origin
1	CAA UK Airport Statistics, 2012 Available: www.caa.co.uk	CAA
2	CAP725 CAA Guidance on the Application of the Airspace Change Process Third Edition (corrected) April 2007	CAA ISBN 978 0 11790 739 3
3	Transport Act 2000. Part 1, Chapter 1. Available: www.legislation.gov.uk	UK Government
4	Civil Aviation (Air Navigation) Direction 2001 (incorporating Variation Direction 2004). Available: www.caa.co.uk	Department for Transport, UK Government
5	Inverness Airport Master Plan Dated July 2007 Available: www.hial.co.uk/inverness-airport	HIAL
6	CAP493 CAA Manual of Air Traffic Services (MATS) Part 1 Fifth Edition (amended) October 2013 Available: www.caa.co.uk	CAA ISBN 9780117928497
7	DAP Policy Statement Dated 19 Nov 2012	CAA
8	Standardised European Rules of the Air (SERA) Article 2 http://www.eurocontrol.int	EUROCONTROL
9	Standardised European Rules of the Air (SERA) 6005 Dated 26 September 2012 Available from the Official Journal of the European Union: http://eur-lex.europa.eu	Official Journal of the European Union
10	DAP Policy: Transponder Mandatory Zones (TMZs) Dated 17 April 2009 Available: www.caa.co.uk	CAA
11	CAA Future Airspace Strategy for the UK; 2011 to 2030 Dated 30 June 2011 Available: hwww.caa.co.uk/	CAA
12	CAA Policy Statement: Flight Outside Controlled Airspace Dated 20 Jan 03 Available: www.caa.co.uk	CAA

Ref	Title	Origin
13	CAA Policy Statement on the Harmonisation of Transition Altitude in CAS, Dated 4 June 2010	CAA
14	Commission Regulation (EC) No 2150/2005 laying down common rules for the flexible use of airspace Dated 23 December 2005	Official Journal of the European Union
15	Consultation on the Replacement of Class F Airspace in UK Flight Information Regions Available: www.caa.co.uk	CAA
16	CAP740 UK Airspace Management Policy Fourth Issue, March 2013 Available: www.caa.co.uk	CAA
17	HIAL Environmental Policy Dated 2 June 2009 Available: www.hial.co.uk/inverness-airport	CAA

Annex A –Consultee List

AVIATION CONSULTEES

A.1 Airport Users

Airport

Airport Consultative Committee
Highland Jet Centre
Air ITM
Benair
Capital Trading Aviation
Dinair
Eastern Airways
EasyJet
Edinburgh Air Charter
Flybe
Gamma Aviation
Helvetic/Falcontravel
Highland Strut
KLM
LEA
Loganair
NOMAD
PDG Helicopters
RVL Group

Local

Arboyne Glider Site / Deeside Gliding Club
Alturlie Hang Glide Site
Culbokie Airstrip
Dornoch Airstrip
Easter Airstrip
Eskadale Water Airstrip
Feshiebridge Glider Site / Blackmill Airstrip
Knockbain Airstrip
Moray Flying Club / No 663 Volunteer Glider Squadron (VGS)
Nairn and Gollanfield Heliports / HG Helicopters

A.2 National Organisations (NATMAC)

3 AF-UK/A3
AEF
Airport Operators Association
AOA
AOPA UK
Aviation Division NCHQ
Aviation Environment Federation

BA
BAE Systems
BALPA
BATA
BBAC
BBGA
BGA
BHPA
BMAA
BMFA
BPA
British Helicopter Association
CAA
CAA SRG
DAATM
GASCo
GATCO
HCGB
Heathrow Airport
Heavy Airlines
HQ DAAvn
LAA
Light Airlines
Low Fares Airlines
Military Aviation Authority (MAA)
Ministry of Defence
MOD Flight Test Regulator
NATS
PPL/IR Europe
SRG
UAVS Association
UKAB
UKFSC/GAPAN

A.3 Civil Aviation Authority CAA)

SARG

NON-AVIATION CONSULTEES

A.4 National Bodies

UK Association of National Park Authorities
Cairngorms National Park, Planning Department
National Trust for Scotland
Scottish Natural Heritage
Friends of the Earth
Association for the Protection of Rural Scotland

A.5 Regional Council Authorities

Highland Unitary Council
Moray Unitary Council

A.6 Highland Unitary Community Councils

Inverness, Nairn, Badenoch and Strathspey Area Wards

Aird and Loch Ness
Badenoch and Strathspey
Culloden and Ardersier
Inverness Central
Inverness Millburn
Inverness Ness-Side
Inverness South
Inverness West
Nairn

Caithness, Sutherland and Easter Ross Area Wards

Cromarty Firth
Tain and Easter Ross

Ross, Skye and Lochaber Area Wards

Black Isle
Dingwall and Seaforth

A.7 Members of Parliament

UK Parliament

Mr J Thurso	Caithness, Sutherland and Easter Ross
Mr D Alexander	Inverness, Nairn, Badenock and Strathspey
Mr A Robertson	Moray
Mr C Kennedy	Ross, Skye, Lochaber

Scottish Parliament

Mr D Thompson	Skye, Lochaber and Badenoch
Mr R Lochhead	Moray
Mr F Ewing	Inverness and Nairn
Mr R Gibson	Caithness, Sutherland and Ross

Annex B – Glossary of Terms

Organisational Terms

Abbreviation	Term	Comment
AR	Airspace Regulation	The section of the CAA which is responsible for the regulation of changes to UK airspace and airspace agreements.
CAA	Civil Aviation Authority	A specialist body appointed by the Government to regulate and oversee all aviation activities within the UK. The CAA has the responsibility to develop and monitor airspace to provide for safe and sustainable usage.
DAATM	Defence Airspace and Air Traffic Management	An MoD organisation tasked with the role to monitor and influence international and domestic Air Traffic Management issues, anticipating the risks and opportunities arising from these issues and identifying and coordinating a common Defence response.
EUROCONTROL	European Organisation for the Safety of Air Navigation	An intergovernmental organisation consisting of 39 member states. EUROCONTROL seeks to support its member states in achieving safe, efficient and environmentally-friendly aviation operations throughout Europe, through the harmonisation of air navigation services for both civil and military operators.
ICAO	International Civil Aviation Organisation	A United Nations agency consisting of 191 member states. The ICAO aims to support the safe and sustainable growth of international civil air transport through the establishment of common worldwide standards, recommended practices and procedures.
NATMAC	National Air Traffic Management Advisory Committee	A non-statutory advisory body sponsored by CAA AR, providing consultation and guidance on airspace management within the UK. The committee membership is drawn from the whole spectrum of the UK civil and military aviation community.
NATS	National Air Traffic Services	NATS is the UK civil Air Navigation Service Provider (ANSP) responsible for providing radar and air traffic services under a Government licence, to en-route UK air traffic. NATS additionally provides air traffic services to several UK civil airports, under contact to the airport operators.
SES	Single European Sky	A European Commission initiative which aims to restructure European airspace as a function of traffic flow rather than according to national boundaries, to meet future safety, capacity and efficiency needs at a European level.
SARG	Safety and Airspace Regulation Group	A section of the CAA, the group is responsible for the oversight of all aspects of air and airspace safety within the UK.
Consultee (Stakeholder)		Comprises of both aviation and non-aviation parties. Aviation consultees include any potentially affected aviation parties, such as airlines, aircraft operators, adjacent aerodromes and all local airspace users. Non-aviation stakeholders comprise of environmental and heritage organisations, and the general public who are to be overflown. It is these people and groups who HIAL are seeking to engage through this consultation document.

Documents

Abbreviation	Term	Comment
AIC	Aeronautical Information Circular	These are official notices relating to safety, navigation, technical, administrative or legal matters.
AIRAC	Aeronautical Information Regulation and Control	A system that defines a series of common effective dates and an associated worldwide standard aeronautical information publication procedure, established to ensure advanced notification of changes to operating practices.
CAP	CAA Publication	The CAA publishes documentation in the form of CAPs, which contain information, guidance and regulatory material relating to UK airspace.
FOB	Flying Order Book	A Military regulatory document, which contains all agreed local, administrative and operational requirements and instructions relevant to the safe and expeditious operations of aircraft at an aerodrome.
MATS	Manual of Air Traffic Services	A regulatory document consisting of two parts. Part 1 is a CAA published document (CAP 493) which stipulates instructions and procedures for UK air traffic services at civil ATC Units. Part 2 contains local instructions and application of Part 1 for each ATC unit and is subject to individual approval by the CAA, as part of the Regulatory process.
UK AIP	UK Aeronautical Information Package	A CAA publication, produced in accordance with ICAO requirements, which provides aeronautical information and procedures applicable to UK civil aircraft operations. The UK AIP is amended in-line with the AIRAC system.

Measurement Terms

Abbreviation	Term	Comment
aal	Above Aerodrome Level	The vertical displacement of an aircraft above the level of an aerodrome is referred to as height. The aircraft altimeter is set to the barometric pressure at the aerodrome (QFE).
amsl	Above Mean Sea Level.	The vertical displacement of an aircraft above mean sea level is referred to as altitude. The aircraft altimeter is set to an adjusted barometric pressure, which accounts for the elevation of the aerodrome (QNH).
dBA	A-Weighted Decibel	A unit of measurement for sound exposure; dB meaning 'decibel' and A meaning 'A-Weighted', which matches the frequency response of the human ear.
FL	Flight Level	The vertical displacement of an aircraft based on a standard barometric pressure setting of 1013.25 Mb is referred to as the Flight Level. This is a standard level reference used for aircraft operations above the Transition Altitude.
NM	Nautical Mile	A unit of length used in aviation, where 1 NM is equivalent to 1.85 km or 1.15 statute miles.
SEL	Sound Exposure Level Footprint	A sound metric used to portray the impacts of aircraft noise in the vicinity of an airport. SEL is effectively a 1-second equivalent continuous sound level; the sound energy from a single event is normalised to a reference time of 1 second.

Airspace Terms

Abbreviation	Term	Comment
ADR	Advisory Route	Established and recognised routes which are regularly transited by aircraft, but do not have sufficient traffic levels to be deemed an airway. The routes are designated Class F uncontrolled airspace, however air traffic services are provided for participating IFR traffic.
AIRPROX	Aircraft Proximity Report	A report following an event in which a controller or pilot believes that the distance between aircraft, as well as their relative positions and speeds, have been such that the safety of the aircraft involved was or may have been compromised. AIRPROX reports are assessed by the independent UK AIRPROX Board and categorised by the degree of risk of collision, dependant on circumstances, as follows: Cat A: Risk of Collision: an actual risk of collision existed; Cat B: Safety Not Assured: the safety of the aircraft was compromised; Cat C: No risk of collision: no risk of collision existed; Cat D: Risk not determined: insufficient or inconclusive information was available to determine the risk involved.
Airspace		Airspace in the UK is divided into six categories, A-G, defined by the ICAO Airspace Classifications. Classes A-E are designated as controlled airspace; aircraft cannot enter without ATC clearance and ATC compliance is mandatory. Class A airspace requires the mandatory operation of all flights under IFR, with Classes B-E permitting VFR operations with differing levels of compliance and application of separation by ATC. Classes F and G are uncontrolled and as such, any aircraft may use the airspace on the provision they comply with a small set of mandatory rules.
Airspace - Class D		VFR and IFR flights must obtain ATC clearance to enter and transit Class D airspace; an air traffic service is mandatory. Class D is the most common airspace class established for the protection of airport operations in the UK, mainly consisting of CTRs and CTAs.
Airspace - Class G		Uncontrolled airspace, where IFR and VFR flights are permitted to operate without an air traffic service, on the provision they comply with a small set of mandatory rules. Air Traffic Services Outside Controlled Airspace (ATSOCAS) may be available to pilots on request.
AQMA	Air Quality Management Area	A recognised area where it has been acknowledged that air pollution levels are likely to exceed National Air Quality Objectives.
ATM	Air Transport Movement	Landings and take-offs by aircraft operating to provide the commercial transport of passengers or cargo. All scheduled movements, including those operated empty, loaded charter and air taxi movements are included.
ATS	Air Traffic Service	A generic term used to describe several different services, including; flight information services, alerting services, air traffic advisory services and air traffic control services (area control services, approach control services and aerodrome control services).
ATZ	Aerodrome Traffic Zone	An ATZ is Class G airspace of defined dimensions, dependent on runway length, established surrounding an aerodrome to provide protection to the aerodrome's operations.

Avoiding Action		An air traffic controller instruction requiring immediate pilot action and compliance to ensure aircraft safety and avoid collision risk. Pilots are required to give these instructions priority, except when responding to a Resolution Advisory instruction.
CAS	Controlled Airspace	CAS is established for the protection of aircraft during various phases if flight, facilitating a safe and expeditious air traffic flow. Aircraft operate within CAS following ATC clearance and in receipt of an ATC service, with mandatory compliance of controller-issued instructions at all times.
CCD	Continuous Climb Departure	A technique for departing aircraft where following take-off, under ATC supervision, aircraft continuously climb with no segment of level flight. This is the environmentally preferred technique; aircraft have greater fuel efficiency and reduced noise impacts at higher altitudes.
CDA	Continuous Descent Approach	This is a noise abatement technique for inbound aircraft. When given descent clearance by ATC, the pilot descends the aircraft at a suitable rate within ATC speed control requirements, so to join the glidepath at the specified height for the distance without any level flight. This is the environmentally preferred technique, leading to reduced fuel burn and noise.
CTA	Control Area	Controlled Class D airspace typically located above a CTR, which extends vertically from a specified lower limit above the ground's surface to a specified upper limit.
CTR	Control Zone	Controlled Class D airspace established around major airports, extending vertically from the ground's surface to a specified upper limit.
DA	Danger Area	Airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times. Danger areas are established to caution operators and pilots.
FAS	Future Airspace Strategy	A strategy to modernise the UK Airspace System through increased flexibility, introducing the latest technologies and European integration.
GA	General Aviation	General Aviation is a term used to encompass activities such as private flying, aerial work and recreational flying involving all types of aircraft.
Hold		A hold or holding pattern is an aircraft manoeuvre, which is designed to delay an aircraft in flight whilst containing it within specified airspace dimensions. It is typically a racetrack-shaped pattern based on a holding fix navigational aid.
HRA	Highland Restricted Area	Airspace of defined dimensions within which flight is restricted. Aircraft entry is prohibited between 1500-2300 local Monday-Thursday, except on Scottish public holidays as listed in UK AIP. Authorisation to enter during active hours, in exceptional hours, in exceptional circumstances and subject to military operational requirements, may be obtained on request.
IAP	Instrument Approach Procedure	A prescribed series of aircraft manoeuvres, commencing from a predetermined arrival route to a point from which a landing can be completed or, if a landing is not completed, to a position at which holding or en route obstacle clearance criteria apply. Safe flight is enabled by reference to flight instruments, with specified protection from obstacles.

IFP	Instrument Flight Procedure	A prescribed series of aircraft manoeuvres to support flight along predetermined routes, where flight is enabled by reference to aircraft instruments and can be conducted in Instrument Meteorological Conditions (IMC).
IFR	Instrument Flight Rules	Consisting of Rules 32 to 37 of the Rules of the Air Regulations. To be obeyed by pilots when it is not possible for an aircraft to be flown in Visual Meteorological Conditions, or when operating in airspace which requires IFR adherence.
IMC	Instrument Meteorological Conditions	Meteorological conditions expressed in terms of visibility, distance from cloud, and cloud ceiling, when conditions are below the specified minima for Visual Meteorological Conditions. Flight in IMC is performed by aircraft operating under IFR or Special VFR where permitted.
LARS	Lower Airspace Radar Service.	Advisory service available for aircraft flying in uncontrolled airspace, up to and including FL100. The service is normally provided within approximately 30 NM of each participating air traffic services unit, subject to workload and availability.
MATZ	Military Aerodrome Traffic Zone	Class G airspace of defined dimensions in the vicinity of a military aerodrome, to provide protection to aircraft operations at the aerodrome.
MoR	Mandatory Occurrence Report	A safety enhancement scheme to enable safety information to be reported to, and collated by, the CAA, with the aim of accident and incident prevention.
NPR	Noise Preferential Route	This is a designated aerodrome departure route, used by aircraft to the maximum extent practicable, which has been designed for noise abatement purposes to result in the minimum possible level of disruption to local residents.
PIR	Post Implementation Review	Following the introduction of an airspace change, a review is undertaken by CAA AR twelve-months following the change implementation.
RA	Resolution Advisory	An aircraft Traffic Collision Avoidance System (TCAS) warning, indicating a threat of aircraft collision and issuing pilot avoidance instructions.
Radar Vectoring		Aircraft navigational guidance provided by controllers in the form of specified headings, by means of radar.
RMZ	Radio Mandatory Zone	Airspace of defined dimensions wherein the carriage and operation of suitable specified radio equipment is mandatory.
RNAV	Area Navigation (compliance)	A technological advancement in aircraft navigation methods which allows aircraft to route more directly and with greater accuracy. Through RNAV, direct over-flight of ground navigational aids is no longer a necessity, with aircraft routing through the use of waypoints, defined in terms of latitude and longitude.
SERA	Standard European Rules of the Air	EUROCONTROL has been mandated by the European Commission to develop, in close co-operation with the European Aviation Safety Agency (EASA), a common and standard set of rules to enable European integration and enhance safety.
SID	Standard Instrument Departure	A designated instrument departure route for outbound aircraft, connecting the runway with a specified point from which the aircraft continue enroute.
STAR	Standard Instrument Arrival	A designated instrument arrival route for inbound aircraft, connecting a point at the end of the enroute stage of flight with the

		aerodrome's runway.
Special VFR	Special Visual Flight Rules	A flight made in a CTR under circumstances normally requiring compliance with IFR, but is made under special conditions with permission from the air traffic services unit. The aircraft must remain clear of cloud at all times and in sight of the surface.
TA	Transition Altitude	The altitude at and below which, the vertical position of an aircraft is determined by reference to altitude, and above which is determined by reference to Flight Level.
TMA	Terminal Control / Manoeuvring Area	A Control Area normally established at the confluence of a number of airways and air traffic service routes, in the vicinity of one or more major aerodromes.
TMZ	Transponder (SSR) Mandatory Zone	Airspace of defined dimensions wherein aircraft wishing to enter and operate within the defined area, will be required to have and operate secondary surveillance radar (SSR) equipment.
VFR	Visual Flight Rules	Comprising of Rules 25 to 31 of the Rules of the Air Regulations. VFR flight is permitted in Visual Meteorological Conditions (VMC) during daytime within UK airspace (except that which is designated as Class A airspace).
VMC	Visual Meteorological Conditions	Meteorological conditions expressed in terms of visibility, distance from cloud and cloud ceiling, which are equal to or above specified minima. VMC minima are determined by airspace class, altitude and airspeed, defined for the UK in Rule 27 of the Rules and Air Regulations.
VRP	Visual Reference Point	A reference point consisting of a prominent natural or manmade feature, which is easily identifiable from the air. VRPs are often established in the vicinity of aerodromes located within CAS, in order to enable access to and from aerodromes located within, and transit of, CAS by VFR traffic.

Infrastructure

Abbreviation	Term	Comment
ACAS	Airborne Collision Avoidance System	An independent aircraft system which operates to warn pilots of aircraft collision treats, including the Traffic Collision Avoidance System (TCAS).
DME	Distance Measuring Equipment	A ground-based aircraft navigational aid, which transmits Omni-directional pulse pairs. Typically co-located with VORs, the aid allows suitably equipped aircraft to determine their slant range distance from the navigation aid.
FMS	Flight Management System	Aircraft computer system for the management of navigation, performance and aircraft operations. Multi-functional, including access to a large database of pre-programmed flight routes.
GNSS	Global Navigation Satellite System	A navigation infrastructure using satellite based navigational data.
NPC	NATS Prestwick Centre	An en-route Air Traffic Control centre based at Prestwick, Ayrshire. The operations room combines Manchester Area Control Centre, Scottish Area Control Centre, Oceanic Area Control Centre and RAF Prestwick, to provide en-route civil and military services to aircraft operating across the north of the UK.
SSR	Secondary Surveillance Radar	A radar system that utilises ground interrogators and airborne transponders within the aircraft, to determine its position in terms

		of range and azimuth. When certain modes and transponder codes are used, information such as aircraft height and identification can be determined and shown on the controller's radar display.
TACAN	TAC(tical) A(ir) N(avigation)	An ultra-high frequency military navigation aid to provide equipped aircraft with navigational information.
VOR	V(HF) O(mni-directional radio) R(ange)	A type of ground-based short-range radio navigation system for aircraft, operating at 108-118 MHz to transmit a two-phase, Omni-directional signal. On-board equipment allows the pilot to determine the aircraft's bearing to/from the navigational aid.

Annex C – Navigational Advancements

The proposed IFP route design takes advantage of new technological improvements in area navigation RNAV-1 through Performance Based Navigation (PBN). This is a novel concept not currently in use in the UK, extensively investigated and its imminent introduction is in-line with the Future Airspace Strategy of the CAA [Reference 11].

Following the CAA-approved, NATS led National Air Traffic Management Advisory Committee (NATMAC) consultation in 2009, it was agreed that the removal of the INS VOR/DME would be undertaken in 2014. Whilst it is acknowledged that the INS VOR will be removed, this cannot happen until an 'alternative' means of providing procedural en-route separations between non-surveillance airports has been approved. It is understood that the CAA supports the NATS strategy for rationalisation; however, the INS VOR cannot be removed without AR's approval and this will not be forthcoming until the alternative procedural service is approved. Therefore, new IFPs are required to replace the INS VOR/DME dependant procedures, likely to be founded on the technological advancements of Area Navigation and Required Navigation Performance criteria (RNAV/RNP) through Performance Based Navigation (PBN). NATS current position is that the INS VOR will be not be removed until after new GNSS approaches have been approved and implemented at Inverness Airport

Therefore the ability to adapt the proposed Inverness Airport IFPs to incorporate the use of such new navigation techniques when appropriate, will future-proof the procedures at Inverness Airport and ensure compliance with National and International Air Management Programmes. The EUROCONTROL training course *Area Navigation in European Terminal Control: P-RNAV*[23] outlines the PBN concept and details the benefits of RNAV procedures to include:

- Flexible SID/STAR designs as a result of aircraft no longer having to over-fly ground-based navigational aids;
- Less RT required between ATC and pilots of inbound aircraft;
- Tactical flexibility, with ATC being able to give fly 'DIRECT TO' instructions;
- Reduced ground track of aircraft as a result of more direct routings;
- Environmental benefits in terms of both noise and emissions;
- Track keeping performance is very accurate, with benefits for noise critical paths.

Aircraft have conventionally navigated to over-fly ground based navigational aids, such as the INS VOR. The new navigation concept allows controllers the flexibility to route aircraft by the most efficient course possible, depending on the air traffic situation. The input from ATC will be minimal once aircraft have been informed of the procedure they are required to follow, as separation between aircraft on each procedure is built in and the rate of descent will be calculated by the aircraft's FMS to allow continuous descent; there should be no need for inefficient levelling off during the approach. This also has economic benefits of reduced fuel burn and environmental advantages in terms of lowering emissions and noise.

Consideration must be given to the navigational equipment fit of aircraft operating and the use of PBN. Not all aircraft currently operating at the Inverness Airport have RNAV capabilities, and therefore the Inverness Airport IFPs will accommodate both RNAV-1 and conventional operations in the short-term to allow for a graduated aircraft equipage.

[23] www.ecacnav.com

Annex D – Proposed CTR/A DATA

D.1 CTR/A Design (Reproduction of Figure 5)

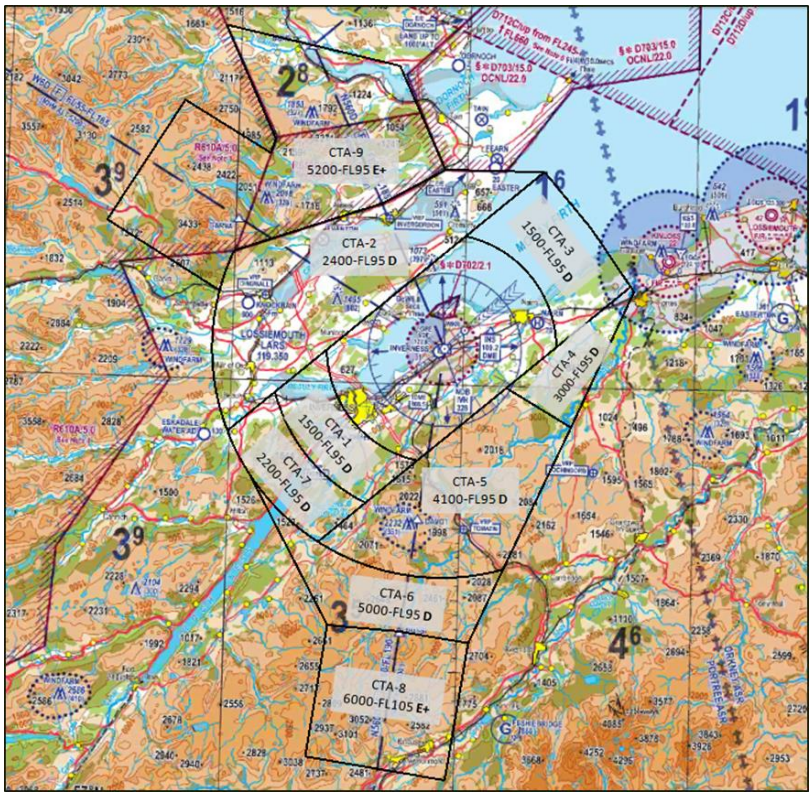


Figure D1: Proposed Inverness Class D and E+TMZ CAS

UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

D.2 Co-ordinate List

D.2.1.1 The latitude and longitude co-ordinates may be subject to minor adjustments at notification of the airspace by AR due to slight differences in mapping models and projection.

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTR	280746.7	866594.3	N 57 40 23.6	W 004 00 04.0
CTR	292357.0	852148.8	N 57 32 47.7	W 003 48 00.5
CTR	274329.3	837649.4	N 57 24 42.4	W 004 05 37.2
CTR	262722.0	852080.6	N 57 32 16.6	W 004 17 41.4
CTA-1	262722.0	852080.6	N 57 32 16.6	W 004 17 41.4
CTA-1	274329.3	837649.4	N 57 24 42.4	W 004 05 37.2
CTA-1	267600.6	832236.2	N 57 21 40.6	W 004 12 09.6
CTA-1	255993.7	846668.3	N 57 29 14.2	W 004 24 14.1

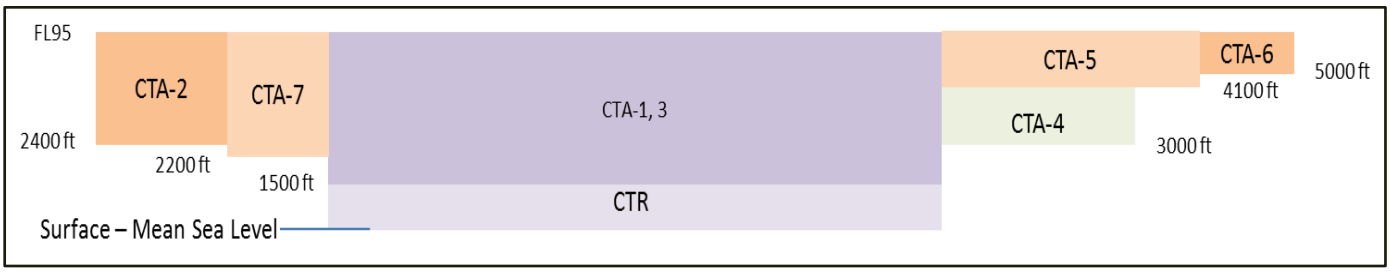
Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-2	291009.2	874833.3	N 57 44 59.7	W 003 49 58.4
CTA-2	249804.1	841688.8	N 57 26 26.1	W 004 30 14.4
CTA-2	250902.9	864984.5	N 57 39 00.0	W 004 30 00.0
CTA-2	270076.3	870945.4	N 57 42 34.0	W 004 10 56.0
CTA-2	278188.8	875210.1	N 57 45 00.0	W 004 02 54.0
CTA-3	291009.2	874833.3	N 57 44 59.7	W 003 49 58.4
CTA-3	297015.8	867785.0	N 57 41 17.0	W 003 43 44.4
CTA-3	302046.8	859944.0	N 57 37 07.6	W 003 38 29.3
CTA-3	292357.0	852148.8	N 57 32 47.7	W 003 48 00.5
CTA-3	280746.7	866594.3	N 57 40 23.6	W 004 00 04.0
CTA-4	302710.6	860902.5	N 57 37 39.1	W 003 37 50.7
CTA-4	302372.8	861139.6	N 57 37 46.5	W 003 38 11.4
CTA-4	293896.7	842037.5	N 57 27 22.2	W 003 46 12.1
CTA-4	285958.2	846961.4	N 57 29 54.4	W 003 54 16.4
CTA-5	285958.2	846961.4	N 57 29 54.4	W 003 54 16.4
CTA-4	293896.7	842037.5	N 57 27 22.2	W 003 46 12.1
CTA-6	285199.3	823523.2	N 57 17 16.2	W 003 54 22.5
CTA-5	261411.3	827257.5	N 57 18 53.1	W 004 18 09.6
CTA-6	285199.3	823523.2	N 57 17 16.2	W 003 54 22.5
CTA-6	280776.9	814020.4	N 57 12 05.0	W 003 58 30.0
CTA-6	263047.8	816274.8	N 57 13 00.0	W 004 16 10.0
CTA-6	251509.1	837955.2	N 57 24 27.5	W 004 28 24.1
CTA-7	255993.7	846668.3	N 57 29 14.2	W 004 24 14.1
CTA-7	267600.6	832236.2	N 57 21 40.6	W 004 12 09.6
CTA-7	261411.3	827257.5	N 57 18 53.1	W 004 18 09.6
CTA-7	251509.1	837955.2	N 57 24 27.5	W 004 28 24.1
CTA-7	249804.1	841688.8	N 57 26 26.1	W 004 30 14.4

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-8	263047.8	816274.8	N 57 13 00.0	W 004 16 10.0
CTA-8	280776.9	814020.4	N 57 12 05.0	W 003 58 30.0
CTA-8	277918.0	796829.5	N 57 02 46.7	W 004 00 50.0
CTA-8	261435.4	799295.4	N 57 03 49.6	W 004 17 12.1
CTA-9	248330.0	895560.1	N 57 55 24.6	W 004 33 44.8
CTA-9	273319.2	887615.6	N 57 51 36.0	W 004 08 12.0
CTA-9	278188.8	875210.1	N 57 45 00.0	W 004 02 54.0
CTA-9	270076.3	870945.4	N 57 42 34.0	W 004 10 56.0
CTA-9	250902.9	864984.5	N 57 39 00.0	W 004 30 00.0
CTA-9	248939.6	859739.3	N 57 36 08.2	W 004 31 46.5
CTA-9	234623.7	868977.2	N 57 40 48.5	W 004 46 30.6
CTA-9	244858.1	884622.5	N 57 49 27.0	W 004 36 49.9
CTA-9	255606.3	877585.0	N 57 45 52.6	W 004 25 43.8
CTA-9	256404.3	879642.6	N 57 47 00.0	W 004 25 00.0

D.3 Inverness Airport Data

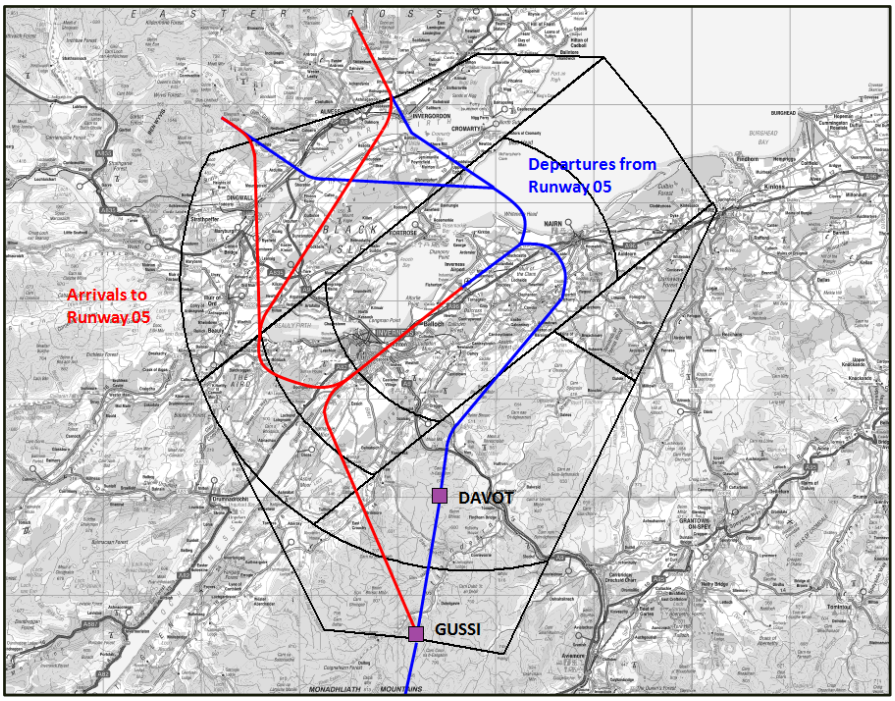
Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
ARP	277540.8	852114.0	N 57 32 33	W 004 02 51
Thld 05	276854.5	851563.8	N 57 32 14.55	W 004 03 31.24
Thld 23	278273.1	852705.0	N 57 32 52.81	W 004 02 08.05

D.4 Side Elevation of the Proposed Class D viewed from the South



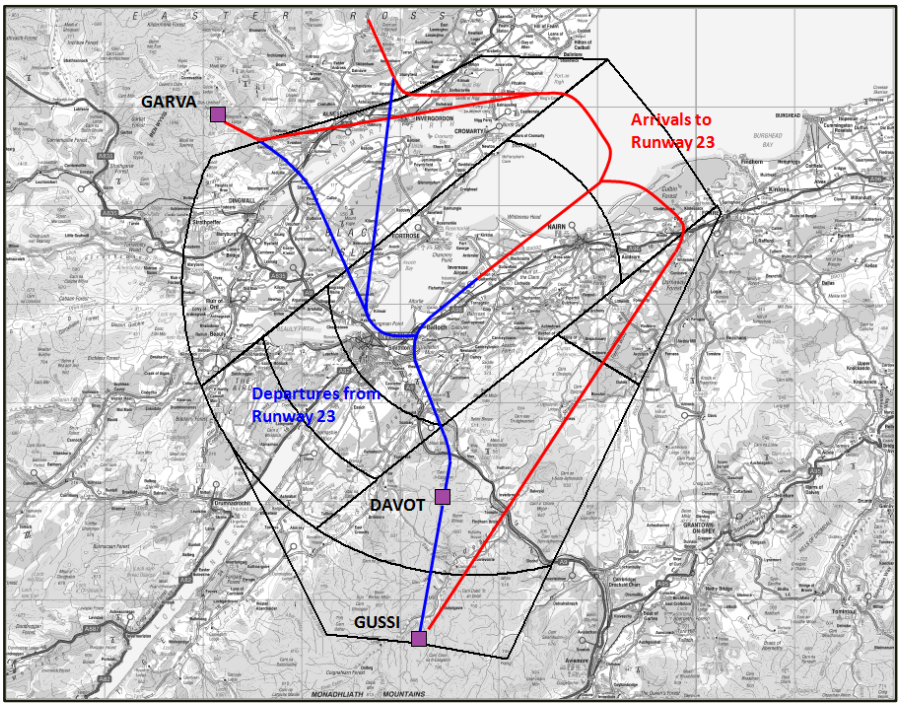
D.5 Proposed Class D CTAs

D.5.1 Runway 05 RNAV-GNSS Ptocedures in the proposed Class D CTR/A



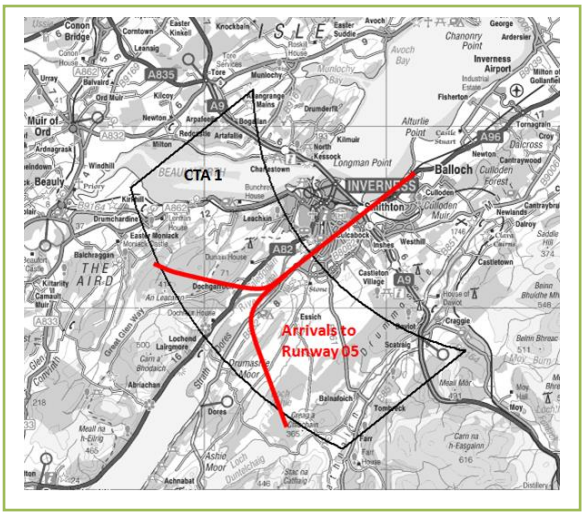
Proposed RWY05 GNSS Tracks

D.5.2 Runway 23 RNAV-GNSS Ptocedures in the proposed Class D CTR/A



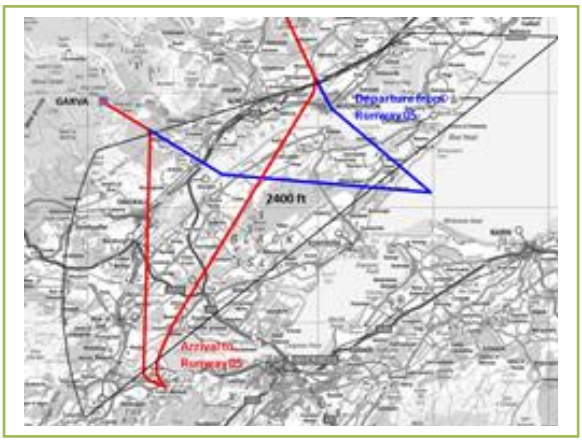
Proposed RWY23 GNSS Tracks

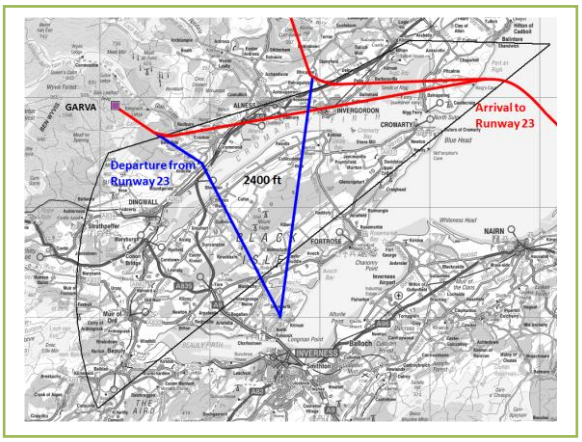
D.5.3 CTA-1 Base altitude 1,500 ft



Proposed Runway 05 Arrival Tracks

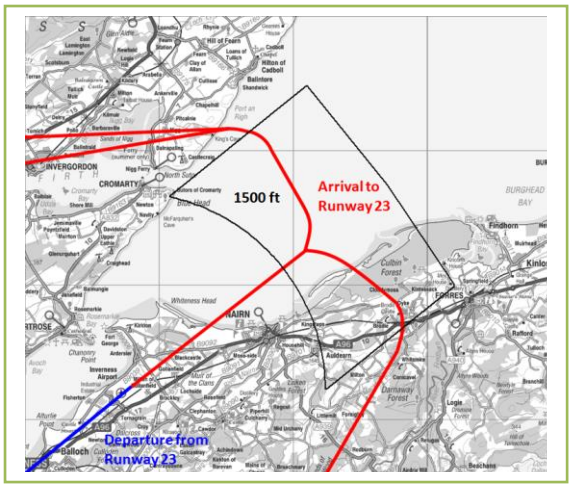
D.5.4 CTA-2 Base altitude 2,400 ft





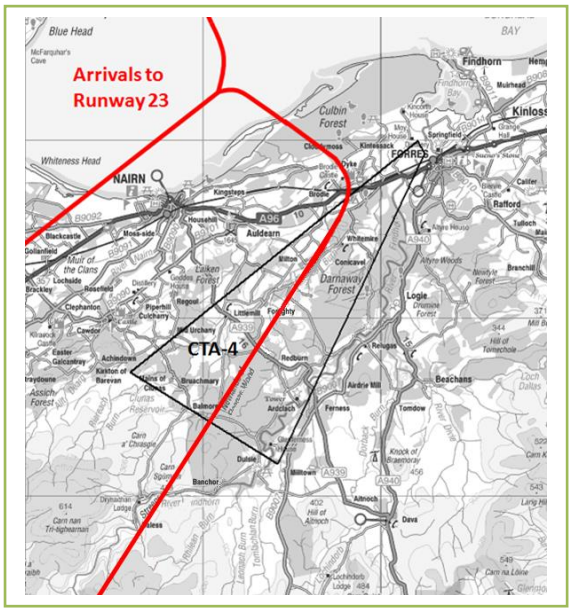
Proposed Arrival and Departure Tracks for Runways 05 and 23

D.5.5 CTA-3 Base altitude 1,500 ft



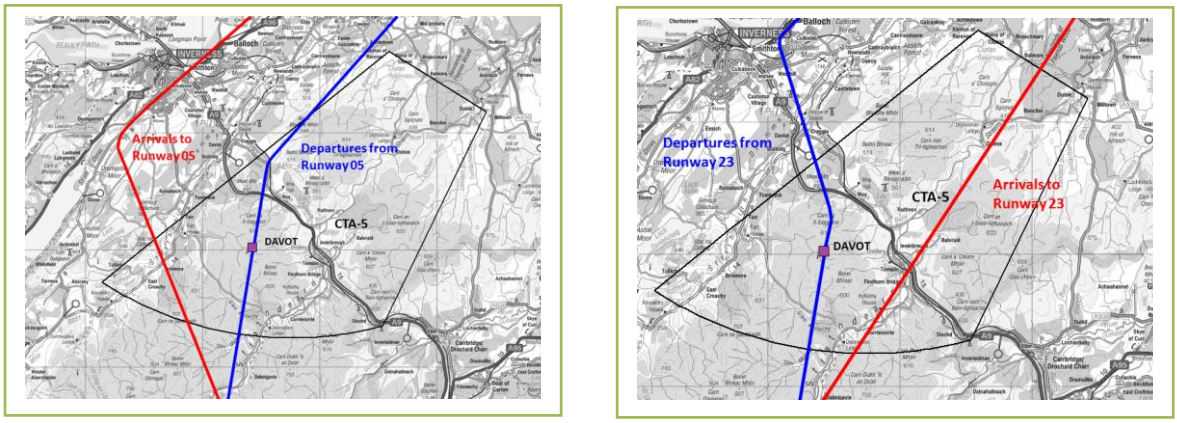
Proposed Runway 23 Arrival Tracks

D.5.6 CTA-4 Base altitude 3,000 ft



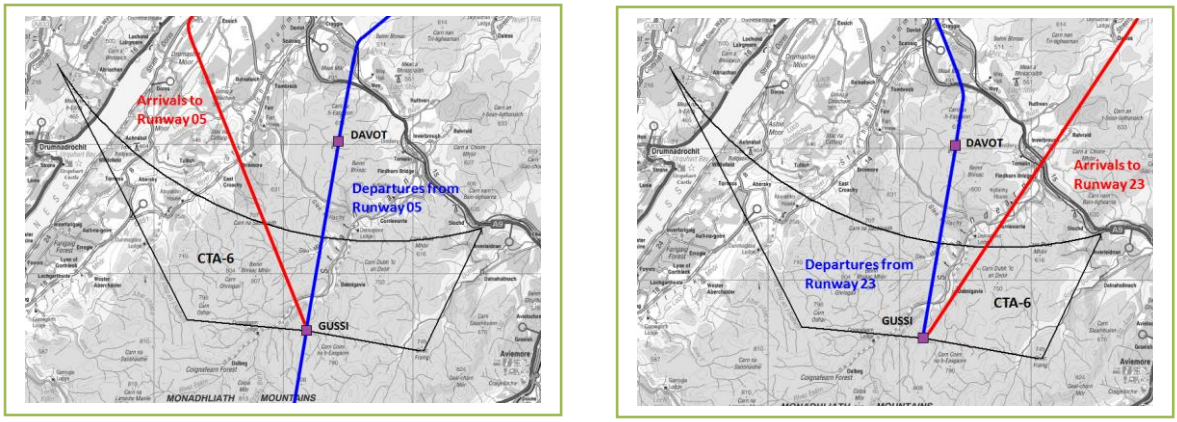
Proposed Runway 23 Arrival Tracks

D.5.7 CTA-5 Base altitude 4,100 ft



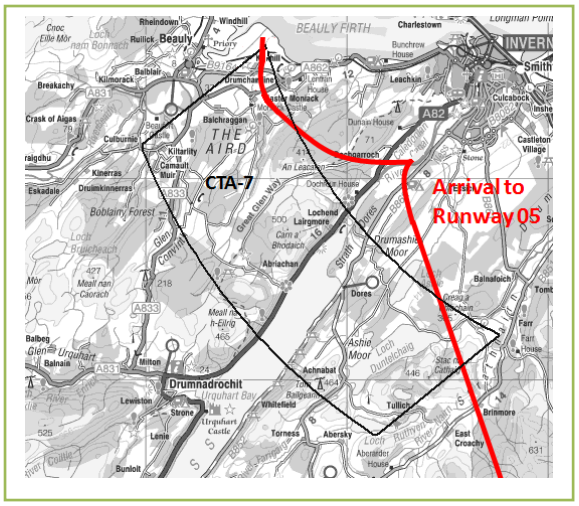
Proposed Arrival and Departure Tracks for Runways 05 and 23

D.5.8 CTA-6 Base altitude 5,000 ft



Proposed Arrival and Departure Tracks for Runways 05 and 23

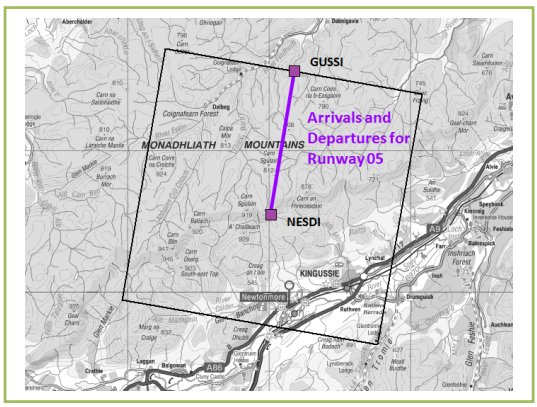
D.5.9 CTA-7 Base altitude 2,200 ft



Proposed Runway 05 Arrival Tracks

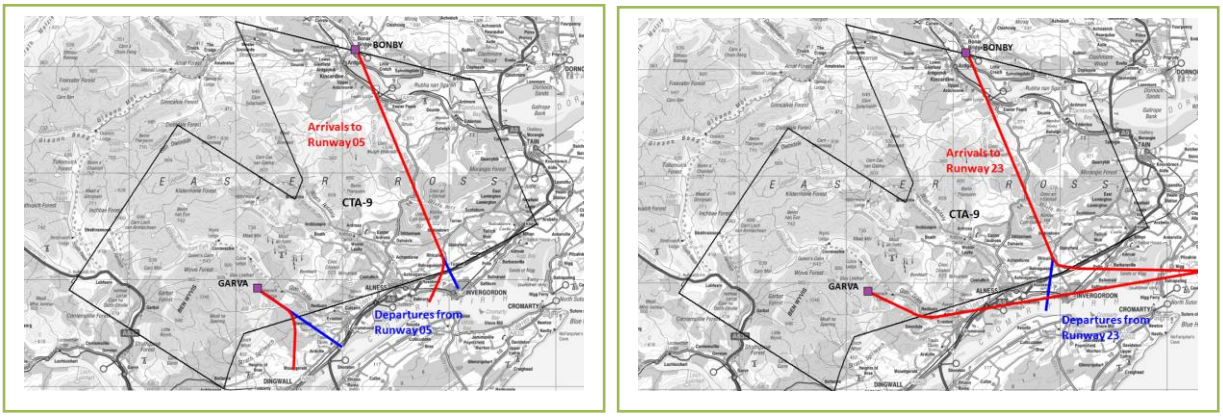
D.6 Proposed Class E + TMZ CTAs (lateral dimensions of each route match the current ADRs)

D.6.1 CTA-8 Base altitude 6,000 ft with top level of FL105



Proposed Arrival and Departure Tracks
for Runways 05 and 23

D.6.2 CTA-9 Base altitude 5,200 ft with top level of FL95



Proposed Arrival and Departure Tracks for Runways 05 and 23

Annex E – VRP List

E.1 Current Visual Reference Points

VRP	Description	WGS84 Position	
		Latitude	Longitude
Invergordon	Storage tanks	N 57 41 32	W 004 10 03
Lochindorb	Centre of Loch	N 57 24 10	W 003 42 57
Tomatin	Small viaduct to north of Tomatin	N 57 20 02	W 003 59 30
Dores	Dores Inn on bay shore	N 57 22 55	W 004 19 55
Dingwall	Dingwall Library	N 57 35 58	W 004 25 53

E.2 Proposed VFR Routes and current VRPs

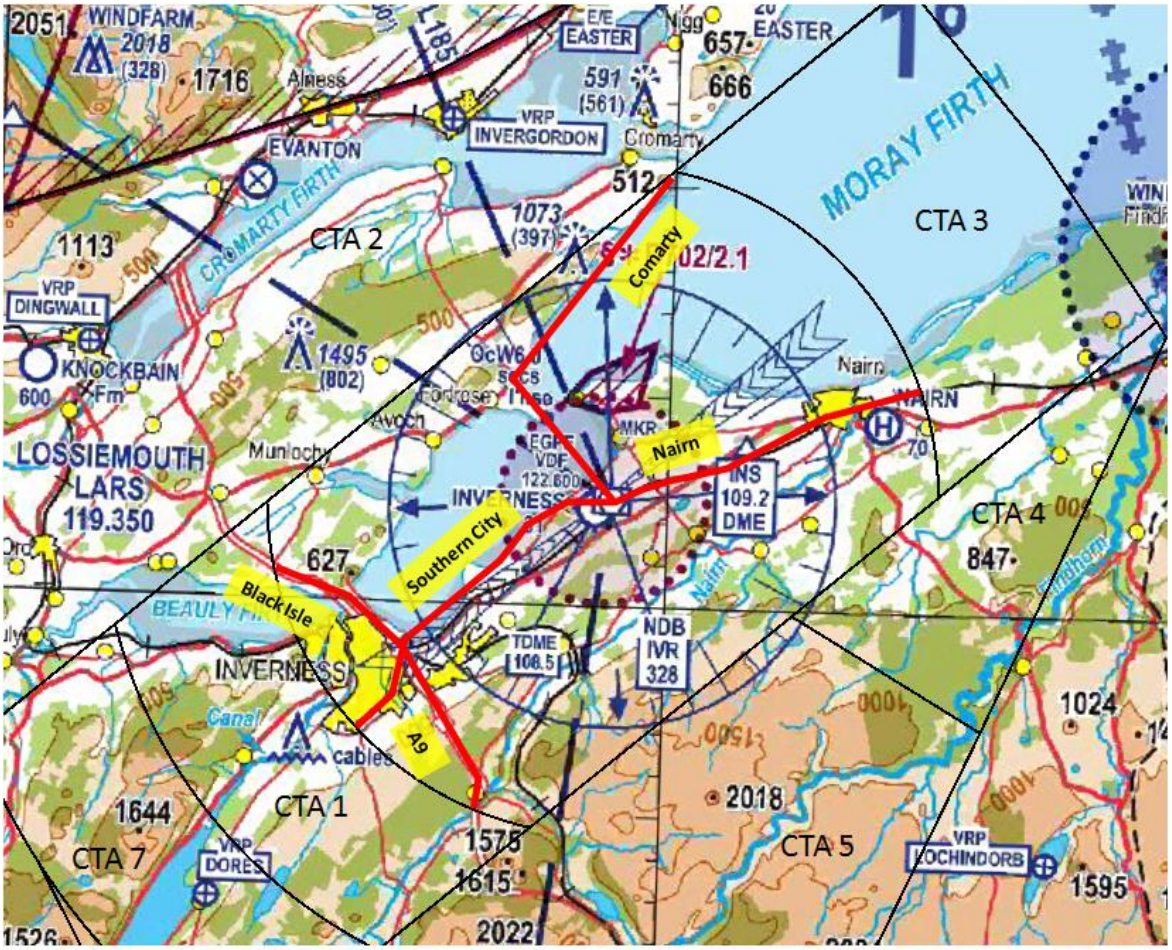


Figure E1: Proposed VFR Routes and current VRPs