Inverness Airport – Airspace Change Proposal

Proposal to CAA SARG

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Executive Summary

Inverness Airport supports 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 being driven by advances in Air Traffic Management (ATM), airliner navigation and routing procedures plus General Aviation (GA) navigation. The purpose of the changes being proposed is to ensure that environmental and economic benefits are achieved through efficient use of surrounding airspace and procedures, providing protection on critical stages of flight following departure and prior to arrival for Instrument Flight Rules (IFR) commercial air transport flights and arrival for Visual Flight Rules (VFR) flights.

HIAL proposes to introduce a system of aRea NAVigation (RNAV) Standard Instrument Departures (SIDs) and RNAV1 Transitions (connecting a Standard Arrival (STAR) to the destination Initial Approach Fix (IAF). These new routes will take advantage of improved navigational capability which will allow enhanced systemisation and enable more efficient use of the airspace. The efficient use of airspace will also enable the environmental impact of aircraft to be lowered by reducing average CO_2 emissions per flight.

If the proposal is approved by the UK Civil Aviation Authority (CAA), implementation of these changes will occur at an appropriate opportunity after 1st March 2018.

The Issue

In 2016, Inverness Airport handled over 830,000 terminal passengers (a 24% year-on-year rise in passenger numbers from 2015), thanks in part to continued interest in European routes to Geneva, Zurich and Dublin and increased traffic to UK airports such as Manchester. Greater connectivity to hub airports including London Heathrow and Schiphol, Amsterdam contributed to its success.

The Airport is situated low ground at the north end of The Great Glen, with significant high ground to the northwest and southeast. Inverness has, in common with Scotland, an oceanic climate[1]. Its sheltered location makes it one of the driest areas in Scotland. In terms of snowfall Inverness sees around 18.3 days of falling snow per year. When atmospheric low pressure dominates the environment the Airport can suffer extended periods of dense, low fog (*haar*), trapped and cooled between the high ground, which typically affects Airport movements but transit air traffic above 500 feet (ft) above ground level (agl) can remain unaffected and

[1] A climate typical of west coasts in higher middle latitudes of continents, and generally features cool summers (relative to their latitude) and cool but not cold winters, with a relatively narrow annual temperature range and few extremes of temperature.

continue to operate to Visual Meteorological Conditions (VMC). The Airport also lies to the south and east of major military aviation restricted areas; the Highlands Restricted Area used for low-flying training and the Tain Weapons Area used predominantly for air-groundweapons release. To the east of the Airport is RAF Lossiemouth, a Main Operating Base (MOB) for the Eurofighter fast jet aircraft. These factors of climate, terrain and military aviation activity mixed with airliner and GA movements provide a challenging air traffic environment for the Airport's ir Traffic Control (ATC).

HIAL identified some time ago the need for changes to the current arrangements and procedures in the immediate airspace surrounding the Airport. Inverness Air Traffic Control (ATC) currently operates in a Class G airspace environment where frequent radio communication intervention is required to enable Instrument Flight Rules (IFR) traffic, predominantly commercial airliners, to arrive and depart the Airport. The purpose of the change is to ensure future efficient use of surrounding airspace and that current effectiveness is preserved for all aircraft.

Updating the airspace design gives HIAL the opportunity to improve airspace efficiency (through proactive, rather than reactive, ATM), and better match the airspace and procedures therein 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 Air Traffic Control (ATC), 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.

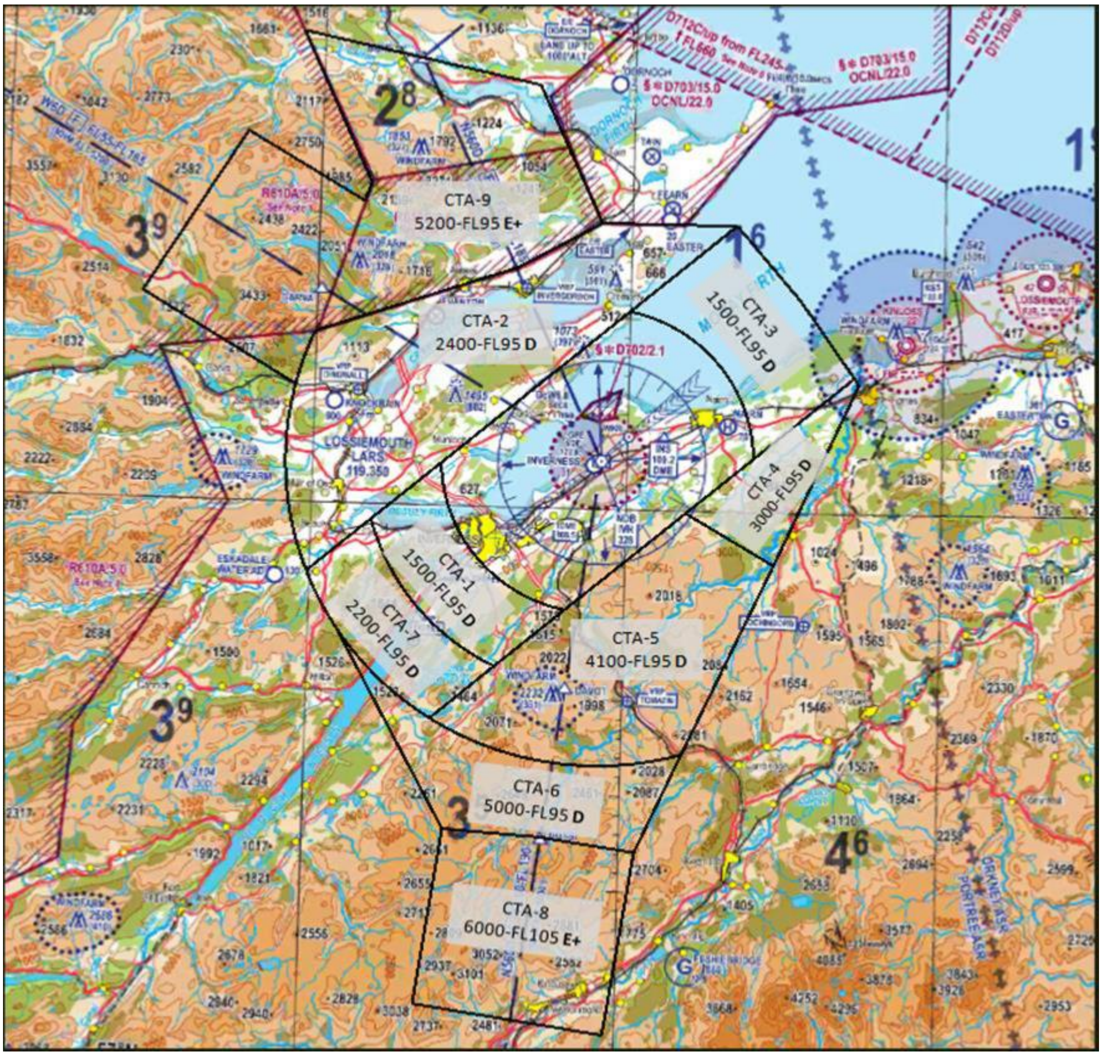

Figure 1 - Geographic extent of the Inverness Control Zone (CTR) and Control Areas (CTA)
UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

Consultation

HIAL undertook two periods of consultation;

- The first consultation took place from 29th September 2014 to 19th April 2015 (a period of 29 weeks) and requested feedback on the airspace design, the initial Consultation Document is Enclosure 1, the feedback was analysed and the Feedback Report is included as Enclosure 2;
- The second consultation (Addendum, Second Consultation Document is Enclosure 3), took place from 15th August 2016 to 6th November 2016 (a period of 12 weeks) and requested further feedback Addendum, Second Feedback Report is included as Enclosure 4.

Local aviation stakeholders were directly consulted through the General Aviation (GA) focus group and email messages (providing an attached consultation document or details of the consultation webpage) sent directly to the National Air Traffic Management Advisory Committee (NATMAC), airport operators, Regional, Highland Unitary Community Councils and local Members of the UK and Scottish Parliaments. A number of National heritage and environmental organisations were also contacted. In addition, general public consultation was undertaken by publication of the consultation material on the HIAL website. The consultation, which we believe was proportionate, solicited comment from a wide, but dispersed community, on the proposal and helped to refine this accordingly prior to any implementation.

Proposed Solution

In developing the plans to resolve the issues described above, HIAL has considered a variety of options in the two phases of Consultation to determine how best to meet the needs of Inverness Airport, as well as other aviation and non-aviation stakeholders. The initial consultation was based on the airspace design in Figure 1.

The major changes incorporated in the new proposed design, Figure 2 above, respond to comment and concern, the majority from the local GA community to the initial design (Figure 1). The major changes to the airspace design include:

- Reduction in the lateral extent of the Class D airspace;
- Reduction in the number of Class D Control Areas (CTAs) from seven to six;
- Reduction in the vertical limit of the Class D Control Zone (CTR), previously from surface to Flight Level (FL)95, now surface to 2,000 ft above mean sea level (amsl);
- Reduction in the common ceiling altitude of the Class D CTAs from FL95 to 5,500 ft amsl;
- Class E + Transponder Mandatory Zone (TMZ) CTAs have replaced some previous Class D CTAs, the total now four, to be contiguous with the Class E + TMZ airways above the Airport forming part of the UK en-route airways structure.

This document outlines the proposal from HIAL to maintain the effectiveness and efficiency of the airspace surrounding Inverness Airport based upon radar surveillance in and around the proposed Controlled Airspace (CAS).

The revised extent of the airspace design for this proposal is shown in Figure 2 below.

Figure 2 - Geographic extent of the Inverness Control Zone (CTR) and Control Areas (CTA)
UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

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1 Glossary

Table of abbreviations and acronyms.

Acronym	Meaning
ACP	Airspace Change Proposal
amsl	Above mean sea level
APCH	Approach
ARP	Aerodrome Reference Point
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CAT	Commercial Air Traffic
CCD	Continuous Climb Departure
CDA	Continuous Descent Approach
CTA	Control Area (Class D UK Airspace)
CTR	Control Zone
DME	Distance Measuring Equipment

Acronym	Meaning
DS	Deconfliction Service
EASA	European Aviation Safety Agency
FIS	Flight Information Service
FPL	Flight Plan
ft	Feet
GA	General Aviation
GAT	General Air Traffic
GNSS	Global Navigation Satellite Service
HIAL	Highlands and Islands Airports Ltd
HRA	Highlands Restricted Area
IAIP	Integrated Aeronautical Information Package
IAP	Instrument Approach Procedure
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
IGAFG	Inverness General Aviation Focus Group
IMC	Instrument Meteorological Conditions
LAA	Light Aircraft Association
LoA	Letter of Agreement
MoD	Ministry of Defence
NATMAC	National Air Traffic Management Advisory Committee

Acronym	Meaning
NATS	The National Air Traffic Service Provider
NDB	Non Directional Beacon
NM	Nautical Miles
NPA	Noticed of Proposed Amendment (EASA)
PANS-OPS	Procedures for Air Navigation Services - Operations
PBN	Performance Based Navigation
RAF	Royal Air Force
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP AR	RNP Authorization Required
RNP RP	RNP Reporting Point
Rwy	Runway
SARG	CAA Safety and Airspace Regulation Group
SBAS	Satellite Based Augmentation System
SERA	Standard European Rules of the Air
SID	Standard Instrument Departure
SSR	Secondary Surveillance Radar
SVFR	Special Visual Flight Rules
TMZ	Transponder (SSR) Mandatory Zone
VFR	Visual Flight Rules

Acronym	Meaning
VMC	Visual Meteorological Conditions
VOR	VHF Omni Directional Radio Range; a type of short-range radio navigation system for aircraft
VRP	Visual Reference Point

Table 1 - Glossary

2 Introduction

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.

2.1 General

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.

2.2 Justification

HIAL identified some time ago the need for changes to the current arrangements and procedures in the immediate airspace surrounding the Airport. Inverness Air Traffic Control (ATC) currently operates in a Class G airspace environment where frequent radio communication intervention is required to enable Instrument Flight Rules (IFR) traffic, predominantly commercial airliners, to arrive and depart the Airport. The purpose of the change is to ensure future efficient use of surrounding airspace and that current effectiveness is preserved for all aircraft.

HIAL seeks to upgrade arrival and departure routes to take advantage of the improved navigational capabilities of RNAV1 and improve the efficiency and capacity of the airspace around Inverness Airport by utilising CAS. The changes will:

- Minimise the impact to people on the ground and minimise the number of people impacted by aircraft noise from overflights below 4,000ft;
- make improvements to departure routes utilising RNAV1 capabilities;
- make efficiency improvements to the arrival routes based on RNAV1 arrival transitions; and
- position IFR passenger carrying airliners more accurately allowing arrival and departures routes to be flown more accurately (hence impacting fewer people).

HIAL's aim is to meet these requirements, maximising benefits to Inverness, The Highlands and Scotland whilst minimising any negative impacts. HIAL is seeking to minimise the population impacted under the routes by rationalising the current 'vectored' or 'procedural' approach and departures made in the existing Class G airspace environment. CAS and improved track keeping means that there will be less dispersal of aircraft either side of route nominal centrelines over sparsely populated areas. This would mean a reduction in the overall area regularly overflown (but a corresponding increase in the concentration of over-flights in some areas, predominantly close to the Airport and its extended runway centrelines).

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..

Introduction of RNAV1 SIDs and arrival transitions at Inverness Airport would improve systemisation and upgrade the navigation capability in accordance with the CAA Future Airspace Strategy (FAS) recommendations.

2.2.1 Enclosures

Enclosed with this proposal are the following documents:

1. Initial, First Consultation Document
2. Initial Feedback Report
3. Addendum, Second Consultation Document
4. Second Feedback Report
5. ERCD Reports
    A. Noise
    B. Emissions
    C. Emissions v2
    D. Emissions Supplemental
6. Safety Assessment
    A. Safety Case Part 1
    B. Safety Case Part 2
    C. Safety Case Parts 3 and 4
7. SID05 v 1
8. SID23 v1
9. Transition05 v 4
10. Transition23 v 5
11. GNSS App05
12. GNSS App23
13. RAF Lossiemouth/Tain Range/Inverness ATC LoA
14. Inverness ATC Example Watch Roster
15. HGC Letters
16. CGC Letters

17. PDG/Inverness ATC LoA
18. Inverness ATC/NATS (Prestwick ACC) LoA
19. Inverness ATC CAS Training Plan
20. Inverness ATC CAS Simulator Programme
21. Procedures Flight Validation Plan
22. Inverness Airport Air Traffic Forecast
23. Inverness ATC Radio Coverage
24. Inverness ATC Communications Contingency Plan
25. Inverness PSR Coverage
26. Draft AD 2.EGPE-1 amendment

2.3 Background

The initial Consultation on this proposal was carried out by HIAL between 29th September 2014 and 19th April 2015 in accordance with the requirements of CAA Civil Aviation Publication (CAP 725). In that Consultation a total of 116 responses were received; 5 consultees supported the proposal; 99 consultees objected to the proposal; and 12 consultees provided a neutral response, whereby the consultee did not object or provided no comments on the proposal.

The Consultation produced a significant opposition from the local GA community supported by the GA Alliance and the Light Aircraft Association (LAA) Highland and Islands Strut. The foci of concern are as follows:

- The extent of the suggested CAS is disproportionate to density of commercial activity at Inverness Airport;
- Access arrangements to the CAS;
- The base level of some Control Areas within the overall CAS design; and
- The future impact of the Standardised European Rules of the Air (SERA), specifically the changes to visual flight requirements within CAS.

An extensive design iteration took into account comments received during the initial consultation. Significant changes have been made to the design (in geographic extent, volume and type) of the proposal for Inverness Airport CAS. HIAL believes the revision has increased the flexibility for VFR operations, both for GA and the Ministry of Defence (MoD), within and around the designed CAS and increased the integrity of information readily available to VFR aircraft commanders in 'two-way', air-ground, radio contact with Inverness Airport ATC.

2.4 Addressing Concerns

In some areas, it has not been possible to reduce substantially the lateral dimensions of proposed CTAs, but it has been possible to change the classification and vertical dimensions, predominantly aimed at increasing VFR access, with transponder carriage, to the CAS.

A detailed review of the initial concepts, held in conjunction with the RAF Lossiemouth Operations Wing, the Inverness General Aviation Focus Group (IGAFG) and Tain Range Control resulted in a further reduction in the overall volume of CAS required. Primarily, this has been achieved by removing a CTA from above EG R610D. Extensive use of Class E + TMZ airspace for CTAs 2, 6, 8 and 10 has significantly increased flexibility for VFR operations above 5,500 ft within the designed Inverness Airport CAS core (CTA 10), above 2,400 ft in CTA 2, above 5,000 ft in CTA 6 and above 6,000 ft in CTA 8 . The inclusion of the Class D CTA-11 above a 'capped' Control Zone (CTR) of ceiling 2,000 ft has increased VFR flexibility in poor weather conditions at the Airport. Furthermore, the change to Class E + TMZ airspace in CTAs-2 and 6 has mitigated the concerns regarding VFR, Class G 'head room' between the base of these CTAs and the underlying terrain and VFR operations from GA aerodromes near or underneath these CTAs.

Comment has also been received stating that a local Community Council was not consulted. It is acknowledged that a direct email was not sent to some Council Secretaries at the time of the second consultation. This has been addressed and emails have been sent (4th August 2017) to all Moray Community Council Secretaries reminding the Councils of the recent consultation and requesting a response by 18th September 2017 (providing a 6 week window for responses).

2.4.1 Airspace Adjustment following the First Consultation

The major changes incorporated in the new proposed design reflect comment and concern, the majority from the local GA community to the initial design The major changes to the airspace design include:

- Reduction in the lateral extent of the Class D airspace;
- Reduction in the number of Class D Control Areas (CTAs) from seven to six;
- Reduction in the vertical limit of the Class D Control Zone (CTR), previously from surface to Flight Level (FL)95, now surface to 2,000 ft above mean sea level (amsl);
- Reduction in the common ceiling altitude of the Class D CTAs from FL95 to 5,500 ft amsl;
- Class E + Transponder Mandatory Zone (TMZ) CTAs have replaced some previous Class D CTAs, the total now four, to be contiguous with the Class E + TMZ airways above the Airport forming part of the UK en-route airways structure.
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2.5 Environmental Issues

Currently the predominant environmental issue is the impact of aircraft noise on local populations due to overflight below 4,000ft that occurs near the Airport and close to the runway centrelines. As outlined in the Consultation Documents (Enclosures 1 and 3) Section 6, the highest priority environmental objective for this change is to minimise cumulative track miles flown by airliners into and out of Inverness Airport. This is achieved through uninterrupted procedures, using continuous descent and climb operations. Implementing these objectives would relieve the local populations, overflown below 4,000ft and away from the runway centrelines, of excessive noise intrusion from airliners. Other environmental objectives are to minimise the population overflown by aircraft between 4,000 and 7,000ft.

Detailed analysis of the environmental impact of the proposed new routes is given in the Environmental Reports Enclosures 5A-D. This includes analysis of the current 'vectored' environment against the proposed routes for the impact on CO_2 emissions, fuel burn, track mileages, noise impact, tranquillity and local air quality.

2.6 Safety

There are no specific safety issues in the current operation. Ensuring the safety of proposed changes is a priority for Inverness Airport. Safety Assessments are enclosed (Enclosures 6A-C).

All proposed procedures have been designed in accordance with ICAO Procedures for Air Navigation Services (Operations) PANS-OPS RNAV procedure design criteria (Reference 1).

3 CAS Design Requirements

This Section reviews the aviation-related requirements for the CAS design.

3.1 Overview

The design of CAS is a careful balance between the competing needs of all of the various airspace users, but in particular the GA (Sports & Recreation) stakeholders. Any design must take into account the environmental impact of aircraft and ensure the preservation of safe operations. Following comments received during the first consultation period, extensive changes have been made to the proposed new airspace surrounding Inverness Airport. This Section provides full details of the current proposed airspace and procedures.

3.2 Aims

The overall aim, as a consequence of the objectives at Section 2.5, of the Inverness Airport Airspace Change Proposal (ACP) is to enhance effectiveness and improve the efficiency of Inverness Airport's operations whilst minimising adverse effects to General Air Traffic (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 Continuous Descent Approaches (CDAs) and Continuous Climb Departures (CCDs) to reduce environmental impact. Reductions in fuel emissions will be achieved through the establishment of Instrument Flight Procedures (IFPs), which incorporate the use of the new technical navigational developments of Satellite-Based Augmentation Systems (SBAS);
- The establishment of Instrument Approach Procedures (IAPs)(Global Navigation Satellite System (GNSS) final approaches) which incorporate the use of new technical navigational developments through SBAS;
- 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.

Additionally, there is an undeniable airline perception that CAS provides a greater degree of protection to its operations than Class G airspace and business plans are influenced by this perception. In HIAL's specific experience, as recently as winter 2016/17 the airline Flybe suspended its flights between Dundee and Amsterdam. The airline stated that *due to topography and high levels of light aircraft activity (in Class G airspace), it became clear that enhanced radar coverage is required to accommodate large passenger aircraft*. Dundee is unable to provide this *enhanced* radar coverage, resulting in the airline suspending its operation of larger aircraft. Inverness lies within similar topography with high levels of fast jet (from RAF Lossiemouth) and light aircraft activity in the surrounding airspace, albeit with the provision of UK Flight Information Services (FIS) from Inverness ATC. However, this means that Inverness ATC is bound (contractually) to provide a Deconfliction Service (DS under UK FIS) to IFR airliners operating, to and from Inverness Airport, in the Class G airspace surrounding the Airport. This is a reactive and high workload service, which frequently results in an inefficient routing for airliners.

The European Aviation Safety Agency (EASA) consultation for Air Traffic Services (ATS-20161114) implied that aerodrome radar surveillance based ATS provision should only be made in CAS. HIAL supports this assertion, supplementing the Inverness Airport ATS provision with CAS protection for Commercial Air Transport operations (CAT) into and out of the Airport Class G airspace.

3.3 Supporting Infrastructure

RNAV1 navigation is GPS derived rather than reliant on ground based infrastructure. RNAV1 requires that any proposed route shall have excellent, reversionary / secondary Distance Measuring Equipment (DME) coverage. Inverness has several of these facilities within close range; thus allowing for contingency should any ground based facility fail. A DME (coding – ILN/X) is located at Inverness Airport, with operational coverage of 40 NM.

The Airport ATC system would initially recognise a VOR or DME failure via its monitoring equipment. Inverness APP/Radar would be informed and this failure would then be subject to promulgation via NOTAM. Information relating to a local failure would be broadcast via the Airport ATIS. The Highlands area is within good satellite coverage for Global Navigation purposes. Any RNAV1 departure would be strictly monitored by Inverness radar using both primary and secondary radar as an additional safeguard. Standard radar separation would apply at all times, 1000 ft vertically and/or 3 NM laterally, regardless of whether the departure was conducted via RNAV1 or radar vectors.

The RNAV1 SIDs and Transitions will only be available to aircraft which are equipped and operated in accordance with the requirements of JAA TGL-10 or equivalent, and approved by their State of Registry for RNAV1 (formally P-RNAV) operations. This requires aircraft to be GNSS equipped or to have DME/DME and INS/IRU with an automatic runway update capability. Additionally flight crews have to complete appropriate RNAV1 training and be approved by the appropriate state authorities to conduct RNAV1 operations. The majority of aircraft currently using Inverness Airport are anticipated to be able to utilise the RNAV1 SIDs and Transitions if they come into operation, and the number of users is expected to rise over the coming years.

RNAV SIDs and Transitions will be differentiated from conventional procedures by the designator and will be published on separate charts in the UK Integrated Aeronautical Information Package (IAIP). Crews of approved operators requesting a RNAV1 procedure will request this when obtaining their clearance from ATC. Aircraft without an approval from ATC to fly the procedure will be issued with the current conventional radar clearance plus vectors clearances even where suitably equipped in accordance with JAA TGL-10. Conventional radar vector procedures will therefore remain in force, and these will be used for those aircraft/airlines that are not equipped to fly RNAV1 procedures, or for when an ATC clearance cannot be issued for the use of the RNAV1 procedures.

3.4 Procedures Justification

The Inverness Airport VHF Omnidirectional Radio (VOR) (coding - INS) is due to be withdrawn in 2019 under the National Air Traffic Services (NATS) VOR Rationalisation and Replacement Programme. This will result in the loss of the primary Inverness Airport arrival and departure aid. It is therefore intended to introduce Area Navigation (RNAV) GNSS IAPs, which replicate the current final approach tracks, coincident with the implementation of the airspace change. IFPs, founded on the technological advancements of RNAV and Required Navigation Performance (RNP) through Performance Based Navigation (PBN), are needed to link to these IAPs, allowing transition from ground-based navigation to satellite-based navigation.

3.4.1 SIDs

Overview diagrams of the proposed SIDs are given in Figures 3 and 4 below (detailed designs Enclosures 7 and 8). It is intended to introduce a set of three SIDs for each runway. These routes accommodate direct departures that account of underlying terrain and urban areas on each of the three exit air routes; one to Glasgow and one each to the northern and Western Isles. The departure routes reduce track miles flown and consequently reduce fuel emissions. In addition, shorter routes will decrease the inherent noise footprint for the benefit of the Airport's wider community.

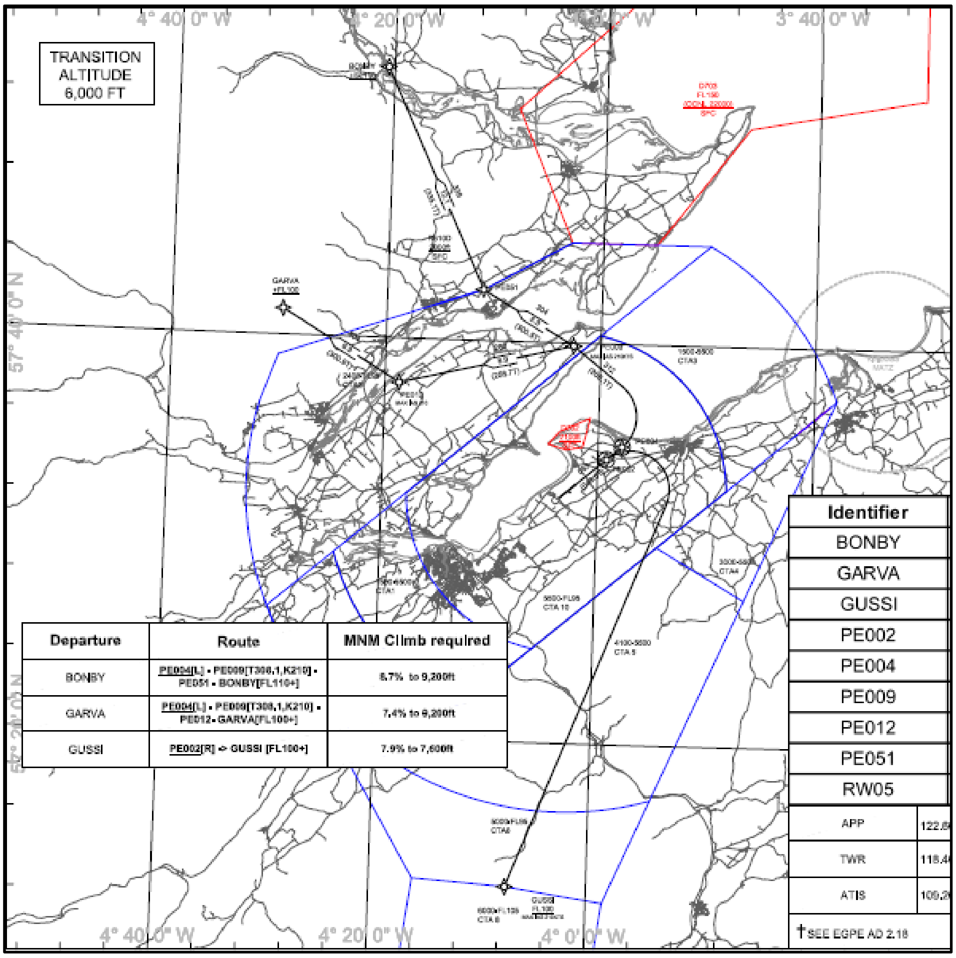

Figure 3 – Inverness Runway 05 SIDs, CTR and CTAs

The SIDs incorporate CCDs that reduce the environmental impact by minimising the fuel burn when climbing into the en-route airways structure. Additional routings were also considered, but HIAL studied departure statistics and discarded probable low frequency departure routes that would add complexity, and potentially not reduce cumulative track miles, in order to minimise the impact on other airspace users. The proposed SIDs are unchanged from those presented in the consultation of 2014/15.

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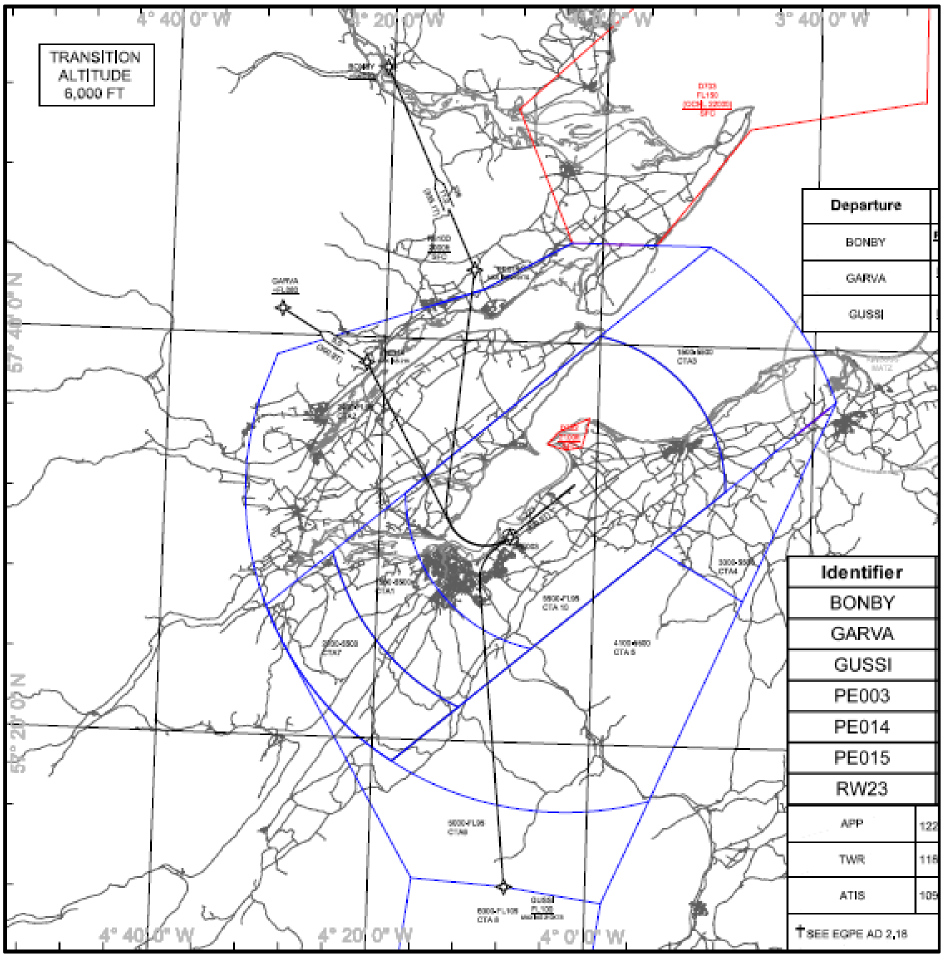

Figure 4 – Inverness Runway 23 SIDs, CTR and CTAs

3.4.2 Transitions

Overview diagrams of the proposed Transitions are given in Figures 5 and 6 below (detailed designs Enclosures 9 and 10). It is intended to introduce a set of three Transitions for each runway. These routes accommodate direct arrivals. The Transitions take into account underlying terrain and urban areas, without the requirement for a hold at BONBY, GARVA or GUSSI (further reducing fuel burn), to the runway in use from each of the three entry air routes from Glasgow, the Northern and Western 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. The Transitions can be flown by conventional means, but provide for the anticipated aircraft navigational equipment upgrades to accommodate RNAV procedures; these routes are unchanged from those proposed in the consultation of 2014/15.

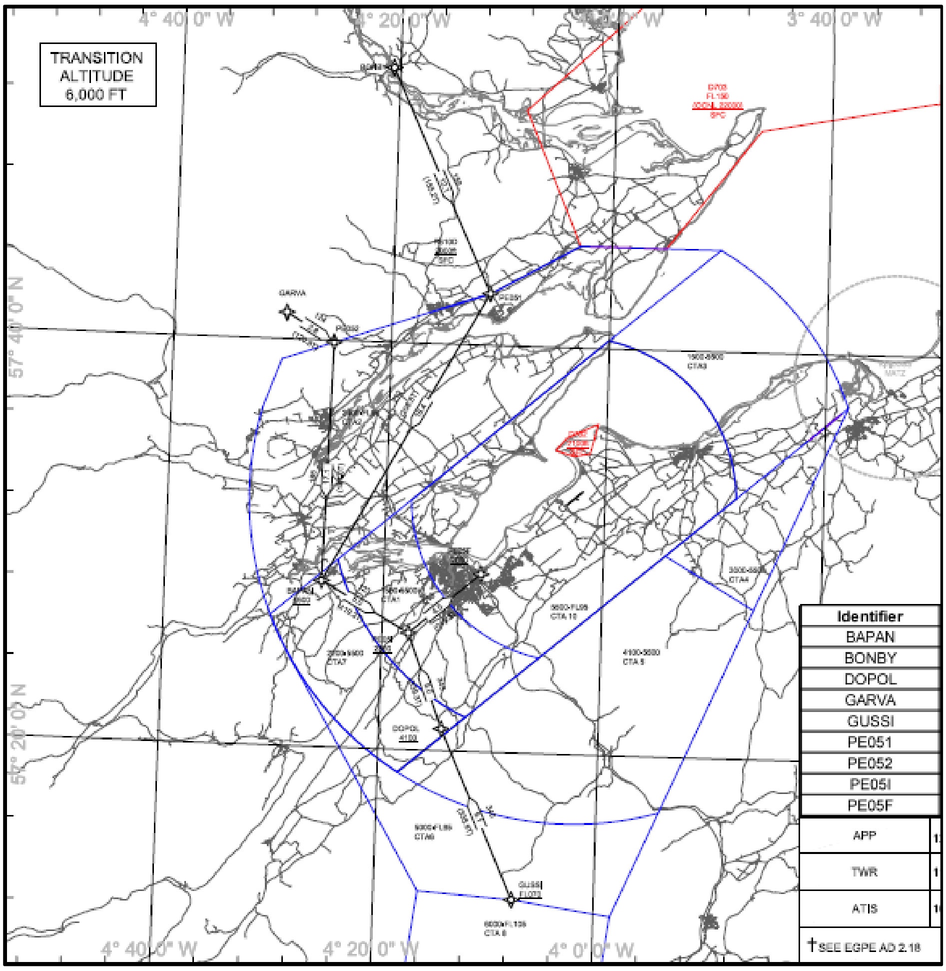

Figure 5 – Inverness Runway 05 Transitions, CTR and CTAs

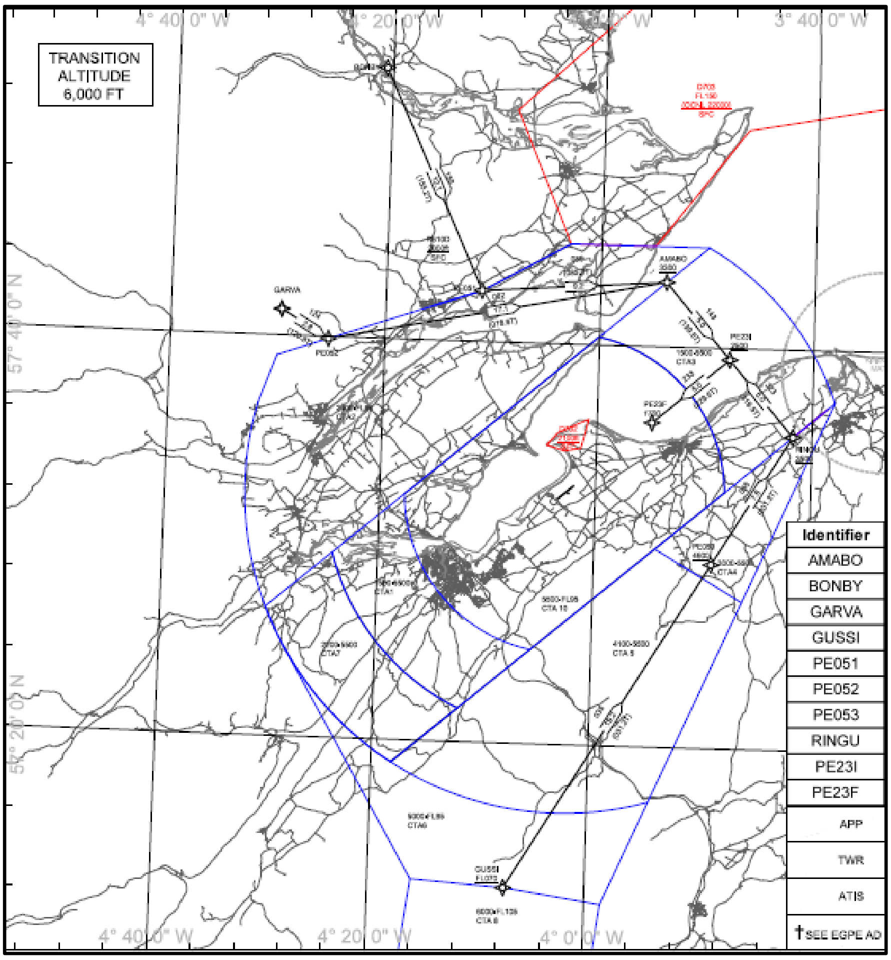

Figure 6 – Inverness Runway 23 Transitions, CTR and CTAs

3.4.3 Final Approaches

Approach Applications which are classified as RNP Approach (APCH) in accordance with International Civil Aviation Organisation (ICAO) Doc 9613 Performance Based Navigation (PBN) Manual (and ICAO state Letter SP 65/4-10/53) give access to minima (on an Instrument Approach Procedure) for all suitably equipped aircraft. The instrument approach procedures associated with RNP APCH are entitled RNAV (GNSS) to reflect that GNSS is the primary navigation system. With the inherent onboard performance monitoring and alerting provided by GNSS, the navigation specification qualifies as RNP, however these procedures pre-date PBN, so the chart name has remained as RNAV. These types of RNAV (GNSS) are being introduced by HIAL at Inverness Airport in 2018.

The procedures adopt a T-bar or Y-bar approach, with the IAF positioned at approximately 10 NM finals, as shown in Figures 7 and 8 below, and in greater detail in Enclosures 11 and 12.

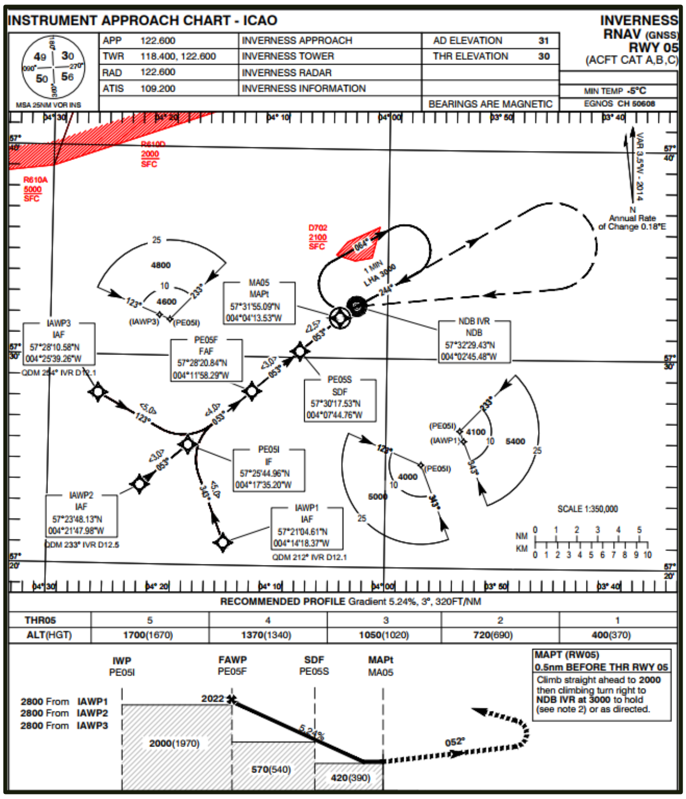

Figure 7 – Draft Inverness Runway 05 RNAV (GNSS) Final Approach

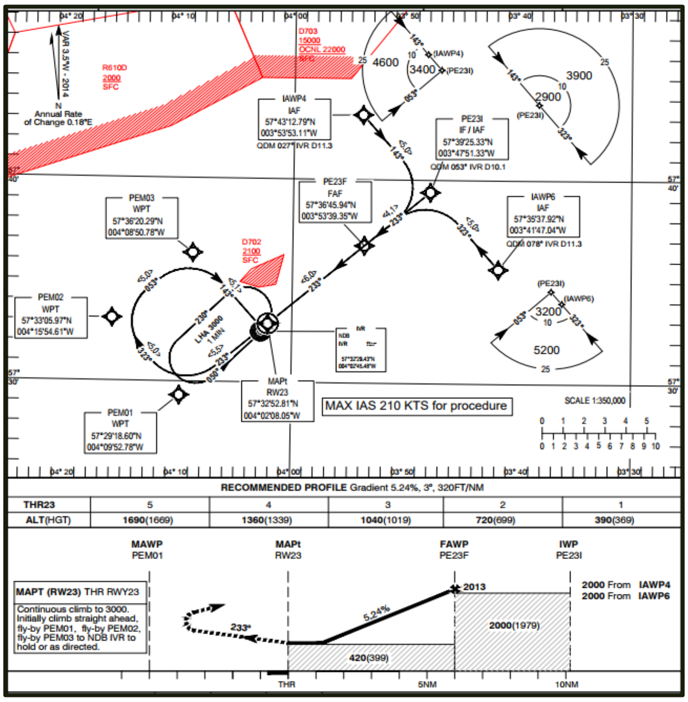

Figure 8 – Draft Inverness Runway 23 RNAV (GNSS) Final Approach

4 Other Design Requirements

4.1 Environmental Considerations

4.1.1 Noise and Population Impacted

The new SIDs and Transitions are flown over sparsely populated areas of The Highlands and mimic as far as possible the current 'vectored' routes. It is anticipated that reduced ATC intervention would reduce the unpredictable scatter of air traffic noise (in Class G airspace) over a wider area. Even with any significant growth in traffic forecast, the number of people within the Leq 51dBA contour for the proposed airspace would be almost the same as for today. The new routes have been deliberately positioned, where possible (runway centrelines excepted) to avoid population centres, ERCD Report (Enclosures 5A). The night noise impact will not change as there are few IFR flights in the hours 2300-0700 Local.

4.1.2 Traffic Concentration

When following RNAV1 routes, aircraft follow the routes more consistently than when using conventional radio navigation aids. This is due to the improved track-keeping ability of RNAV1. Improved track-keeping means there will be less dispersal of aircraft either side of the route nominal centrelines. This will result in a reduction in the overall area regularly overflown (reduced ATC intervention would reduce the unpredictable scatter). Where possible, the new routes over-fly the lowest number of people. This is in accordance with DfT guidelines[2] which recommend concentration vs dispersal.

4.1.3 Biodiversity

The change does not adversely affect any designated sites protected by either Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") or Council Directive 2009/147/EC on the conservation of wild birds (codified version) ("the Birds Directive").

4.1.4 Local Air Quality

There is little change to flight profiles below 1,000ft.

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[2] DfT Guidance to the Civil Aviation Authority on Environmental Objectives Relating to the Exercise of its Air Navigation Functions (Jan 2014).

4.1.5 CO_2 Emissions and Fuel Burn

CO_2 emissions and fuel burn have been analysed in the ERCD Report (Enclosures 5B-D). The analysis forecasts that the proposed changes would result in a small reduction in fuel burn and CO_2 emissions.

Some of the proposed routes are longer and some shorter with better climb/descent profiles. On aggregate, a reduction in the average fuel burn & CO_2 emissions per flight is forecast.

4.1.6 Tranquillity and Visual Intrusion

Tranquillity and visual intrusion are required to be considered where proposals change the flight paths of aircraft above a National Park or Area of Outstanding Natural Beauty. The routes proposed herein do not impact any National Parks or AONBs.

4.2 User Impact

4.2.1 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; between Commercial Air Traffic (CAT) inbound to Inverness Airport and CAT in the airways structure above (FL95-105). A lower ceiling would lead to a 'gap' between the en-route structure 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 within 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 and a consequential increase in controller workload. There would also be an undesirable economic and environmental impact due to suboptimal efficiency and accumulating delays. Furthermore, a low ceiling is likely to entail high performance departing airliners needing to level off to remain inside CAS before climbing through the level of an inbound airliner or slower outbound aircraft incurring additional economic and environmental penalties.

The ceiling of the proposed CAS in the core area is FL95 and FL105 at the CTA 8 extended stub to the south of the Airport.

4.2.2 Military Users

HIAL proposes 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 a Tripartite Letter of Agreement (LoA), draft is Enclosure 13, between RAF Lossiemouth ATC, Inverness ATC and Tain Range Control, in accordance with the CAA Policy Statement (27th April 2016) '*ATS Provision Within Controlled Airspace by Units not Notified as the Controlling*

Authority'. This will also facilitate uninhibited, day-to-day, planned fast jet access to the Tain Range for medium level close air support training. Flexible use of the airspace is essential and this aspect will be invisible to CAT and GAT, so full details are unlikely to be published within the UK IAIP.

4.2.3 GA (Sports & Recreation)

The primary concerns for GA respondents to the consultation could be grouped as follows;

A. Creation of *choke points* around CAS;
B. Potential lack of access to CAS; and
C. The base altitudes of CTAs.

In addressing points A and B; HIAL has introduced extensive Class E + TMZ airspace into the design mitigating any *choke point* creation by removing the 'ATC clearance' requirements in these volumes for VFR pilots operating a serviceable transponder. The CTR ceiling has also been limited to correspond to the aerodrome Traffic Zone (ATZ) ceiling; alleviating VFR transit constraints above 2,000 ft amsl. The RADAR/APP frequency will be operational 0500-2100 Greenwich Mean Time (GMT) throughout the year and during CAS operation. An example Watch Roster is provided in Enclosure 14. HIAL is awaiting responses to individual letters (Enclosures 15 and 16) addressed to the two gliding organisations at the local aerodromes (the Cairngorm Gliding Club (CGC) at Feshiebridge Aerodrome and the Highland Gliding Club (HGC) at Easterton Aerodrome) requesting further information on their access requirements, supplementary or complimentary to the use of VHF radio, to the proposed Inverness CAS.

The floors of the CTAs are based upon retaining a 500 ft clearance from the lowest expected levels/altitudes by aircraft using the associated IFPs .

4.2.4 PDG Helicopters

The PDG Helicopters main operating base lies within the ATZ but not on Inverness Airport. Access to the base requires PDG helicopters to enter the ATZ. When Special VFR applies access to the CTR will be possible; however, this will be very much more restricted than at present in Class G and a proposal for operational procedures is attached at Enclosure 17.

4.2.5 Impact on Aviation Safety

Ensuring the safety of proposed changes is a priority for HIAL. The Safety Cases are attached at Enclosures 6.

4.2.6 Other ATC Units Affected by the Proposal

NATS Prestwick Centre (PC) was identified as a stakeholder in the proposed changes. NATS PC was supportive of all the proposed routes, but requested clarification of their designation which will be addressed in the Inverness/NATS LoA (draft Enclosure 18). The interface requirements will be addressed in the LoA; engagement is ongoing between Inverness Airport and NATC PC.

4.2.7 Commercial Air Transport Impact & Consultation

The following airlines supported the airspace change programme, KLM are providing flight simulation facilities and crew to test fly the proposed procedures as part of the flyability validation programme:

- British Airways;
- EasyJet;
- FlyBe;
- KLM; and
- LoganAir.

NATMAC stakeholders representing commercial air transport were also involved in the consultation.

5 Proposed Airspace Design

5.1 Introduction

HIAL's proposal for a Class D Inverness CTR and Centre Line CTAs is shown in Figure 9 below. The design will provide, as a minimum, protection of the present Inverness Airport conventional IFPs and provide protection for the proposed IAPs, described in Section 3.3.3 and shown in Enclosures 7 - 12.

The RADAR/APP frequency will be operational 0500-2100 Z, Greenwich Mean Time (GMT) throughout the year and during CAS operation.

5.1.1 Sponsoring Unit Training Requirements

See Enclosures 19 and 20 for draft training and simulator plans.

Figure 9 - Proposed Inverness Airport Class D CTR and Centre Line CTAs Only (ceiling altitude of 5,500 ft shown)

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

5.1.2 Procedure Flight Validation (Flyability)

The draft Flight Validation Plan (Enclosure 21) details the flight validation planned once design approval is undertaken. The Flight Validation Report will detail the results of the flight validation programme.

5.1.3 CAS Spine

The establishment of Class D airspace surrounding Inverness Airport would require pilot clearance from Inverness Airport ATC before entering; satisfying the requirements for an abbreviated VFR Flight Plan (FPL) in CAS.

The limit of the CTR ceiling to 2,000 ft allows greater flexibility for VFR operations above the Airport, reducing the requirements for a Special VFR clearance when crossing the Airport's CAS, particularly when the reported visibility in the Airport's CTR[3] is reduced.

Figure 10 - Proposed Inverness Airport Class D (Ceiling 5,500ft) and E+TMZ CTAs
UK Civil Aviation Authority (CAA) / NATS Digital Data. VFR Chart Scotland, 500,000, June 2013

[3] For the purpose of taking off or landing within a CTR, the actual meteorological visibility reported by ATC shall be taken as the flight visibility. (Rule 26 of the UK Air Navigation Order). ATC will not issue a Special VFR clearance to any fixed wing aircraft intending to depart from an aerodrome in a CTR when the official meteorological report indicates that the visibility is 1800 m or less and/or the cloud ceiling is less than 600 ft

5.1.4 Outer Areas

The establishment of supplementary Class E + TMZ airspace surrounding Inverness Airport Class D would not require pilot clearance from ATC before entering, providing the aircraft is carrying an operating transponder. The combination of both types of airspace in the Inverness Airport CAS proposal would provide a 'better 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 ATM.

It is proposed that the CTR/As and ATZ are active during the published hours of radar operation; Winter 0600-2200, Summer 0500-2100. Outside the published hours the airspace would revert to Class G and the ATZ removed. The Transition Altitude (TA) within the proposed Inverness CTR/A will be 6,000 ft.

Figure 11 - Proposed Inverness Airport Class E+TMZ CTAs Only

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

5.1.5 Area Description

The proposed CAS, shown within Figure 10 (the CTR lays below CTA-11), comprises the following areas:

Area	Airspace Classification	Base Altitude/FL	Ceiling Altitude/FL	Purpose
CTR	D	Surface	2,000 ft	Radius 8 NM centred on the Aerodrome Reference Point (ARP), approximately the runway centre, and extending to 5 NM either side of the extended Runway (Rwy) centrelines. Lies below CTA-11.
CTA-1	D	1,500 ft	5,500 ft	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	E+TMZ	2,400 ft	FL95	This area extends beyond the CTR to the northwest, aligning with the southern boundary of the Highlands Restricted Area (HRA, R610D), following this boundary northeast and thence following the southern boundary of Tain Range (D703). The base altitude is constrained by the maximum demanded climb gradient allowed by the SIDs' compliant design.
CTA-3	D	1,500 ft	5,500 ft	Extends from the CTR to the northeast, 13.5 NM from the ARP, 5 NM either side of the Rwy centreline. The base altitude provides

Area	Airspace Classification	Base Altitude/FL	Ceiling Altitude/FL	Purpose
				protection for Rwy23 IAPs in the final approach, notwithstanding this, the use of certain current conventional procedures will have to be limited.
CTA-4	D	3,000 ft	5,500 ft	An approximate triangle linking CTA-3 with CTA-5. The base altitude is defined by the Inverness Airport ATC radio and radar coverage and RAF Lossiemouth traffic patterns.
CTA-5	D	4,100 ft	5,500 ft	This area extends beyond the CTR to the southeast of the Airport. The base altitude is defined by the Inverness Airport ATC radio and radar coverage and the maximum demanded climb gradient allowed by the SIDs' compliant design.
CTA-6	E+TMZ	5,000 ft	FL95	This area extends beyond the CTR to the south, connecting CTAs-1, 5 and 7 to the southern air traffic route at the GUSSI Reporting Point (RP). The base altitude is defined by the Inverness ATC radio and radar coverage and the maximum demanded climb gradient allowed by the SIDs' compliant design.
CTA-7	D	2,200 ft	5,500 ft	This area extends southwest beyond CTA-1 and linking with CTA-6.

Area	Airspace Classification	Base Altitude/FL	Ceiling Altitude/FL	Purpose
				The base altitude provides protection for Rwy05 IAPs in the final approach.
CTA-8	E+TMZ	6,000 ft	FL105	The ceiling has been defined to align with the current base of the Class E airway (N560) in that area and the base defined to ensure ensure full Inverness ATC radar coverage.
CTA-10	E+TMZ	5,500 ft	FL95	This area lies above CTAs-1, 3, 4, 5, 7 and 11 (Figure 11). The ceiling aligns with the base of the overlying UK en-route airways structure.
CTA-11	D	2,000 ft	5,500 ft	This area allows greater flexibility for VFR transit traffic through the CAS.

Table 2 – Inverness Airport CAS Areas

CTA-9 has been removed / renamed following the first consultation. The structure of the proposed Class E+TMZ airspace is shown at Figure 11. Purpose of the CTR and CTAs

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 2,000 ft amsl. The width of the CTR (5 NM 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 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 SIDs and Transitions providing connectivity to the air routes through the Class E + TMZ CTAs-8 and 11.

5.2 VFR Flights and Visual Reference Points (VRP)

HIAL wishes 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 nearby aerodromes. Inverness ATC does not envisage any capacity problems in integrating VFR flights, including transit flights, into the proposed CTR/A traffic flow.

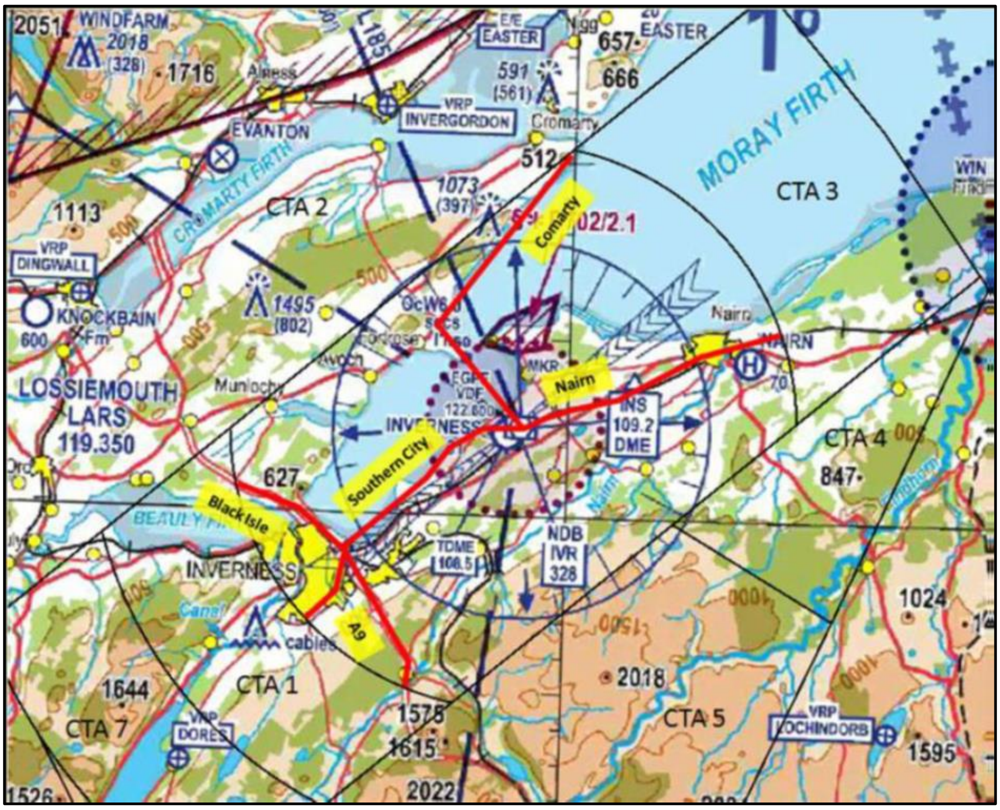

Figure 12 - Proposed VFR Routes

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

HIAL has reviewed the current Inverness Airport VRPs. 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. The proposed VFR routes are shown graphically by red lines (with proposed names highlighted with a yellow box) in Figure 12.

Inbound and outbound routings/clearances to and from Inverness Airport would utilise the current VRPs and proposed VFR routes although, whenever practicable, direct routing will be approved. A local Light Aircraft Association (LAA) and Highland & Islands Strut member has visually checked the current VRPs from the air for suitability, both day and night, and convenient location with regard to the CTR VFR routes.

5.2.1 Special VFR Flights

Special VFR (SVFR) clearances are applicable only within control zones and under conditions which would usually require aircraft to comply with IFR (i.e. in Instrument Meteorological Conditions (IMC) or at night). Within the proposed airspace, this would be in the Inverness Airport CTR, airspace below 2,000 ft. They are normally available to those types of light aircraft operations which are conducted with visual reference to the ground. HIAL has considered the current SERA Implementing Regulation[4] and understands that, as presently proposed, SERA will change the VFR access requirements to Class D CTRs. SVFR clearances require standard IFR separation both between two SVFR flights, and between SVFR and IFR flights. HIAL proposes to establish visually referenced Clearance Limits for inbound SVFR flights (including PDG helicopter operations (Section 4.2.4)), 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 current VRPs (Figure 12) and proposed VFR routes.

The pilot shall determine the flight meteorological conditions under which s/he intends to operate. Currently for flights in Class D control zones the pilot is required to take the reported meteorological visibility for the aerodrome (as passed by ATC) as being the flight visibility and conduct her/his flight accordingly[5]. This requirement, and changes in SERA, dictated the decision to limit the ceiling of the Inverness Airport CTR to 2,000 ft allowing pilots flying in the proposed Inverness Airport CAS above 2,000 ft greater flexibility when ground visibility[6] is less than the Visual Meteorological Conditions (VMC) minimum.

5.2.2 Transit Flights and Visual Reference Points (VRP)

Transit flights through the proposed Inverness CTR, 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, recorded and provided to the CAA, are only likely in exceptional circumstances.

Aircraft crossing the Class E+TMZ CTAs under VFR would not require a clearance to cross if they are carrying and operating a suitable SSR transponder. Aircraft crossing Class E+TMZ CTAs under VFR without a functioning suitable SSR transponder would normally be required to be in 'two-way', air-ground radio contact with the controlling authority and require a clearance to cross. In accordance with published crossing procedures appropriate arrangements for non-radio access will be developed for Feshiebridge and Easterton glider operations (see para 4.2.3).

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[4] No 923/2012.
[5] For the purpose of taking off or landing within a CTR, the actual meteorological visibility reported by ATC shall be taken as the flight visibility. (Rule 26 of the UK Air Navigation Order). ATC will not issue a Special VFR clearance to any fixed wing aircraft intending to depart from an aerodrome in a CTR when the official meteorological report indicates that the visibility is 1800 m or less and/or the cloud ceiling is less than 600 ft.
[6] ground visibility' means the visibility at an aerodrome, as reported by an accredited observer or by automatic systems.

A number of paraglider and hang-glider operations take place routinely near Inverness Airport from 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', air-ground radio communication with Inverness ATC would be a distinct advantage to such accommodation. An LoA is in draft between Inverness ATC and the operators at Alturlie Point site to enhance mixed CAT and GA paraglider operations in this area.

5.2.3 Secondary Surveillance Radar (SSR) Frequency Monitoring Code (FMC)

The introduction of an Inverness Airport SSR Frequency Monitoring Code[7] (FMC) Procedure, along with the use of VRPs, is likely to significantly reduce the volume of RT traffic, particularly with GAT, and increase controller capacity. Pilots who have no intention of entering the CAS CTR/As do not have to contact Inverness Airport ATC on air-ground radio 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. Inverness Airport ATS will continue to be available to aircraft outside CAS on request.

The resultant reduction in 'two-way', air-ground, radio 'chatter' will provide Inverness Airport controllers with greater capacity to deal with GAT Class D, and Class E + TMZ transit requests when the aircraft is not carrying an operating transponder. HIAL anticipates, as there is currently airport-based GAT, that there will not be a substantial increase in GAT associated air-ground, radio 'chatter'.

[7] IAIP ENR 1.6, paragraph 2.2.5. In order to both prevent and mitigate the consequences of airspace infringements, pilots operating close to the peripheries of certain controlled airspace and monitoring the relevant frequency (but not requiring an Air Traffic Service) should select a local SSR conspicuity code and the Mode C pressure-altitude mode (if available) as specified to indicate they are monitoring the promulgated ATC frequency.

6 IAIP Amendment

> *Change and amendment will be required within CAP032The UK Aeronautical Information Publication.*

6.1 ENR 1.4

Section 2.4.1 Notifications

Inverness Control Zone / Control Area (**Notes 1 and 3**)

Note 3

(x) Inverness Control Zone and Control Area**.**

The Aerodrome Traffic Zone and the entry/exit lanes at Inverness Airport, are hereby notified for the purposes of Schedule 7 of the Air Navigation Order 2009, Part A, Private Pilots' Licence (Aeroplanes), sub-para 2 (c) (ii) and Basic Commercial Pilots Licence (Aeroplanes) sub-para 3 (g) (ii), when there is a flight visibility of at least 3 km.

Section 2.5.1.1

(x) Parts of the Inverness Control Area (See AD 2-EGPE-5-2).

6.2 ENR 2.1

No change.

6.3 ENR 3.1, 3.2, 3.3

ENR 3.1 – No change;

ENR 3.2 – No change;

ENR 3.3 – No change.

6.4 ENR 4.4

New name-code designators (PD approval)

6.5 ENR 6 Charts

ENR 6.1.4.1 – Depiction of Inverness CTR/CTA

6.6 VFR CHARTS

1:250,000 – Sheet 1 Northern Scotland West;

1:500,000 – Scotland.

6.7 AD-2-EGPE-8-w-z

Two new SID charts/plates;

Two new Transition charts/plates; and

Two new GNSS instrument approach (finals) charts/plates.

6.8 AD 2.EGPE-1

See Enclosure 26 (Textual Data)

.

References

Reference	Name	Origin
1	ICAO Document 8168 PANS-OPS Vol I & II	ICAO

Table 3 - Table of References

A1 Airspace Coordinates

A1.1 CTR and CTA-11

The latitude and longitude co-ordinates (corner points) 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

Table 4 – CTR Coordinates

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
	Overlays the CTR and has identical corner coordinates			
CTA-11	280746.7	866594.3	N 57 40 23.6	W 004 00 04.0
CTA-11	292357.0	852148.8	N 57 32 47.7	W 003 48 00.5
CTA-11	274329.3	837649.4	N 57 24 42.4	W 004 05 37.2
CTA-11	262722.0	852080.6	N 57 32 16.6	W 004 17 41.4

Table 5 – CTA-11 Coordinates

A1.2 CTAs

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
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

Table 6 – CTA-1 Coordinates

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

Table 7 – CTA-2 Coordinates

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-3	291009.2	874833.3	N 57 44 59.7	W 003 49 58.4
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

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-3	280746.7	866594.3	N 57 40 23.6	W 004 00 04.0

Table 8 – CTA-3 Coordinates

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-4	302046.8	859944.0	N 57 37 22.9	W 003 37 22.9
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

Table 9 – CTA-4 Coordinates

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-5	285958.2	846961.4	N 57 29 54.4	W 003 54 16.4
CTA-5	293896.7	842037.5	N 57 27 22.2	W 003 46 12.1
CTA-5	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

Table 10 – CTA-5 Coordinates

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-6	285199.3	823523.2	N 57 17 16.2	W 003 54 22.5

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
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

Table 11 – CTA-6 Coordinates

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
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

Table 12 – CTA-7 Coordinates

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

Table 13 – CTA-8 Coordinates

CTA-9 has been removed / renamed following the first consultation.

Sector Point	OSGB36 Position		WGS84 Position	
	Easting	Northing	Latitude	Longitude
CTA-10	291009.2	874833.3	N 57 44 59.7	W 003 49 58.4
CTA-10	249804.1	841688.8	N 57 26 26.1	W 004 30 14.4
CTA-10	285199.3	823523.2	N 57 17 16.2	W 003 54 22.5
CTA-10	302046.8	859944.0	N 57 37 07.6	W 003 38 29.3

Table 14 – CTA-10 Coordinates

A1.3 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

Table 15 – CTA-10 Coordinates

A2 Airspace Description Requirement

Item	CAA CAP725, Appendix A paragraph 5 Requirement. *"The proposal should provide a full description of the proposed change including the following:"*	Description in this Proposal
A	The type of route or structure; e.g. Airway, UAR, Conditional Route, Advisory Route, CTR, SIDs/Transitions, Holding Patterns, etc;	See Section 5
B	The hours of operation of the airspace and any seasonal variations;	See para 5.1
C	Interaction with domestic and international en-route structures, TMAs or CTAs with an explanation of how connectivity is to be achieved. Connectivity to aerodromes not connected to CAS should be covered;	See Section 5 and current Inverness-NATS LoA (Enclosure 18). LoAs will be updated pre-implementation, presuming approval.
D	Airspace buffer requirements (if any);	CTA-2 abuts Tain Range (D703). Activity is contained within D703 and the draft Tripartite LoA (Enclosure y) addresses the coordination requirement.
E	Supporting information on traffic data including statistics and forecasts for the various categories of aircraft movements (Passenger, Freight, Test and Training, Aero Club, Other) and Terminal Passenger numbers;	Enclosure 22
F	Analysis of the impact of the traffic mix on complexity and workload of operations;	Safety Case (Enclosure 6)
G	Evidence of relevant draft Letters of Agreement, including any arising out of consultation and/or Airspace	Enclosures 13, 17 and 18

Item	CAA CAP725, Appendix A paragraph 5 Requirement. *"The proposal should provide a full description of the proposed change including the following:"*	Description in this Proposal
	Management requirements;	
H	Evidence that the Airspace Design is compliant with ICAO Standards and Recommended Practices (SARPs) and any other UK Policy or filed differences, and UK policy on the Flexible Use of Airspace (or evidence of mitigation where it is not);	APD of procedures and Reference 1
I	The proposed airspace classification with justification for that classification;	See paras 2.2 and 2.5
J	Demonstration of commitment to provide airspace users equitable access to the airspace as per the classification and where necessary indicate resources to be applied or a commitment to provide them in-line with forecast traffic growth. 'Management by exclusion' would not be acceptable;	Enclosure 14
K	Details of and justification for any delegation of ATS.	N/A

Table 16 – airspace Requirements

A3 Supporting Infrastructure and Resources

Item	CAA CAP725, Appendix A paragraph A6, General Requirement.	Evidence of Compliance/Proposed Mitigation
A	Evidence to support RNAV and conventional navigation as appropriate with details of planned availability and contingency procedures.	See para 3.3
B	Evidence to support primary and secondary surveillance radar (SSR) with details of planned availability and contingency procedures.	See para 5.1
C	Evidence of communications infrastructure including R/T coverage, with availability and contingency procedures.	Enclosures 23, 24 and 25
D	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered.	See para 5.1 & Enclosure 14
E	The Proposal must provide effective responses to the failure modes that will enable the functions associated with airspace to be carried out including details of navigation aid coverage, unit personnel levels, separation standards and the design of the airspace in respect of existing international standards or guidance material.	See para 5.1
F	A clear statement on SSR code assignment requirements is also required.	No change except request for FMC

Item	CAA CAP725, Appendix A paragraph A6, General Requirement.	Evidence of Compliance/Proposed Mitigation
G	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change.	Enclosure 14

Table 17 – airspace Requirements

A4 Operational Impact

Item	CAA CAP725, Appendix A paragraph A7 requirements. *"An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:"*	Evidence of Compliance/Proposed Mitigation
A	Impact on IFR General Air Traffic and Operational Air Traffic or on VFR General Aviation (GA) traffic flow in or through the area.	Safety Case (Enclosure 6)
B	Impact on VFR operations (including VFR Routes where applicable).	See para 5.2
C	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds.	See para 3.4
D	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace.	See para 4.2
E	Any flight planning restrictions and/or route requirements.	See paras 3.3 and 3.4

Table 18 – airspace Requirements

A5 Airspace and Infrastructure Requirements

Item	CAA CAP725, Appendix A paragraph A11 General Requirements.	Description in this Proposal
A	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments;	See Section 5
B	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer. This safety buffer shall be in accordance with agreed parameters as set down in SARG Policy Statement 'Special Use Airspace - Safety Buffer Policy for Airspace Design Purposes';	CTA-2 abuts Tain Range (D703). Activity is contained within D703 and the draft Tripartite LoA (Enclosure y) addresses the coordination requirement.
C	The Air Traffic Management (ATM) system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures;	The ATM system in the airspace is currently adequate for tactical vectoring at standard radar separation; 1000 ft vertically and/or 3 nm laterally. The ATM system is currently adequate for maintaining separations within the airspace and safe management of the interfaces. The proposed systemised route structure will improve the safe management of the airspace. See paras 3.3 and Enclosure 6
D	Air Traffic Control (ATC) procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or	See para 3.3

Item	CAA CAP725, Appendix A paragraph A11 General Requirements.	Description in this Proposal
	other new airspace structures;	
E	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable;	See para 5.1.3
F	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation;	See para 5.1.3
G	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified;	See para 3.3
H	The notification of the implementation of new airspace structures or withdrawal of redundant airspace structures shall be adequate to allow interested parties sufficient time to comply with user requirements. This is normally done through the AIRAC cycle;	See para 5.1.3
I	There must be sufficient R/T coverage to support the ATM system within the totality of proposed controlled airspace;	Enclosure 23
J	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered;	CTA-2 abuts Tain Range (D703). Activity is contained within D703 and the draft Tripartite LoA (Enclosure y) addresses the coordination requirement.
K	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc.) in the vicinity of the new airspace structure and no suitable operating agreements or ATC Procedures can be devised, the Change	See paras 4.2.2, 4.2.3 and 4.2.4

Item	CAA CAP725, Appendix A paragraph A11 General Requirements.	Description in this Proposal
	Sponsor shall act to resolve any conflicting interests.	

Table 19 – Airspace Requirements (A11)

Item	CAA CAP725, Appendix A paragraph A12 ATS Route Requirements.	Description in this Proposal
A	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/EuroControl Standards;	See para 3.3
B	Where ATS routes adjoin Terminal Airspace there shall be suitable link routes as necessary for the ATM task;	See Section 5 and current Inverness-NATS LoA (Enclosure 18). LoAs will be updated pre-implementation, presuming approval.
C	All new routes should be designed to accommodate P-RNAV navigational requirements.	See para 3.3

Table 20 – Airspace Requirements (A12)

Item	CAA CAP725, Appendix A paragraph A13 Terminal airspace Requirements.	Description in this Proposal
A	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas;	See Section 5
B	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking	See Section 3

Item	CAA CAP725, Appendix A paragraph A13 Terminal airspace Requirements.	Description in this Proposal
	to designated runways and published IAPs;	
C	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure;	See Section 5 and current Inverness-NATS LoA (Enclosure 18). LoAs will be updated pre-implementation, presuming approval.
D	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace;	See Section 3
E	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by Change Sponsors upon implementation of the change in question (if these do not already exist);	See Section 3, paras 5.1 and 5.2
F	Change Sponsors shall ensure that sufficient VRPs are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic;	See para 5.2.2
G	There shall be suitable availability of radar control facilities;	See para 5.1, Enclosure 14 and current AD 2.EGPE-1 UK IAIP entry
H	Change Sponsors shall, upon implementation of any airspace change, devise the means of gathering (if these do not already exist) and of maintaining statistics on the number of aircraft transiting the airspace in question. Similarly, Change Sponsors shall	Post Implementation Review

Item	CAA CAP725, Appendix A paragraph A13 Terminal airspace Requirements.	Description in this Proposal
	maintain records on the numbers of aircraft refused permission to transit the airspace in question, and the reasons why. Change Sponsors should note that such records would enable ATS Managers to plan staffing requirements necessary to effectively manage the airspace under their control;	
I	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure.	See paras 4.41 and 3.4.2

Table 21 – Airspace Requirements (A13)

Item	CAA CAP725, Appendix A paragraph A14 Off Route Airspace Requirements.	Description in this Proposal
A		There are no proposed changes to off route airspace structures.

Table 22 – Airspace Requirements (A14)