Aberdeen International Airport (AIAL)

FASI-N Airspace Change Proposal

Step 2A
Design Principle Evaluation

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Glossary

Acronym	Term	Description
AIAL	Aberdeen International Airport Ltd	Aberdeen Airport – the sponsor of this ACP
ACOG	Airspace Change Organising Group	Established in 2019 at the request of the Department for Transport and Civil Aviation Authority to coordinate the delivery of key elements of the UK's Airspace Modernisation Strategy.
ACP	Airspace Change Proposal	To carry out any permanent change to the published airspace, the Civil Aviation Authority (CAA) requires the change sponsor to carry out an airspace change proposal in accordance with CAP1616.
ADS-B	Automatic Dependent Surveillance Broadcast	A means by which aircraft can automatically transmit and/or receive data such as identification, position, and additional data, as appropriate in a broadcast mode via a data link.
AIP	Aeronautical Information Publication	A publication which contains details of regulations, procedures and other information pertinent to the operation of aircraft in the particular country to which it relates.
AMS	Airspace Modernisation Strategy	UK Government has tasked the aviation industry to modernise airspace in the whole of the UK. The long-term strategy of the CAA and the UK Government is called the Airspace Modernisation Strategy (AMS). Its CAA document reference number is CAP1711.
AMSL	Above Mean Sea Level	
ANSP	Air Navigation Service Provider	An organisation that provides the service of managing the aircraft in flight or on the manoeuvering area of an airport and which is the legitimate holder of that responsibility.
ATC	Air traffic control	The ground-based personnel and equipment concerned with controlling and monitoring air traffic within a particular area.
ATZ	Aerodrome Traffic Zone	An airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.
CAA	Civil Aviation Authority	The UK Regulator for aviation matters
CAP1616	Civil Aviation Publication 1616	The airspace change process regulated by the CAA
	Capacity	A term used to describe how many aircraft can be accommodated within an airspace area without compromising safety or generating excessive delay

CAS	Controlled Airspace	Generic term for the airspace in which an air traffic control service is provided as standard; note that there are different sub classifications of airspace that define the particular air traffic services available in defined classes of controlled airspace.
-	Centreline	The nominal track for a published route
-	Concentration	Refers to a density of aircraft flight paths over a given location, this generally refers to high density where tracks are not spread out; this is the opposite of dispersal
CCO	Continuous Climb Operations	An aircraft operating technique facilitated by the airspace and procedure design and assisted by appropriate ATC procedures, allowing the execution of a flight profile optimised to the performance of aircraft, leading to significant economy of fuel and environmental benefits in terms of noise and emissions reduction
CDO	Continuous Descent Operations	An aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight to the extent permitted by the safe operation of the aircraft and compliance with published procedures and ATC instructions
-	Conventional navigation	The historic navigation standard where aircraft fly with reference to ground-based radio navigation aids
-	Conventional route	Routes defined to the conventional navigation standard, i.e. using ground based radio navigation beacons to determine their position.
CTA	Control Area	Controlled airspace extending upwards from a specified limit above the earth. Control Areas are situated above the Aerodrome Traffic Zone (ATZ) and afford protection over a larger area to a specified upper limit.
CTR	Control Zone	Controlled airspace extending upwards from the surface of the earth to a specified upper limit. Aerodrome Control Zones afford protection to aircraft within the immediate vicinity of aerodromes
db	Decibels	A unit used to measure the intensity of a sound (or the power level) of an electrical signal by comparing it with a given level on a logarithmic scale.
DER	Declared End of Runway	

-	Dispersal	Refers to the density of aircraft flight paths over a given location, this generally refers to lower density – tracks that are spread out; this is opposite of Concentration
DPE	Design Principle Evaluation	A evaluation of each option against each design principle which forms part of Stage 2A of the CAP1616 process
-	Easterlies	When a runway is operating such that aircraft are taking off and landing in an easterly direction
-	Final Approach	The final part of an arrival flight path that is directly lined up with the runway
FL	Flight Level	The Altitude above sea-level in 100 feet units measured according to a standard atmosphere. A flight level is an indication of pressure, not of altitude. Only above the transition level (which depends on the local QNH but is typically 4000 feet above sea level) are flight levels used to indicate altitude; below the transition level feet are used.
FLARM	Flight Alarm	FLARM (an acronym based on 'flight alarm') is the proprietary name for an electronic device which is in use as a means of alerting pilots of small aircraft, particularly gliders, to potential collisions with other aircraft which **are similarly equipped.**
-	Flight-path	The track flown by aircraft when following a route, or when being directed by air traffic control
ft	Feet	The standard measure for vertical distances used in air traffic control
FASI	Future Airspace Implementation Strategy	Under the Government’s Airspace Modernisation Strategy (AMS, ref 15) airports in the UK are required to update their airspace and routes in a coordinated way.
GA	General Aviation	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights, balloons, and private corporate jet flights.
IFP	Instrument Flight Procedures	A published procedure used by aircraft flying in accordance with the instrument flight rules, which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.

ILS	Instrument Landing System	An ILS operates as a ground-based instrument approach system that provides precision lateral and vertical guidance to an aircraft approaching and landing on a runway, using a combination of radio signals to enable a safe landing even during poor weather.
IOA	Initial Options Appraisal	A qualitative appraisal of an option against a baseline ‘do nothing’ scenario, as required at Step 2B of CAP1616
L_{Aeq}		The most common international measure of noise, meaning, ‘equivalent continuous sound level’. This is a measurement of sound energy over a period of time.
$L_{Aeq\ 16h}$		The A-weighted Leq measured over the 16 busiest daytime hours (0700-2300) is the normal time-period used to develop the Airport Noise Contours for day-time operations.
$L_{Aeq\ 8h}$		The A-weighted Leq measured over the 8 night-time hours (2300-0700) is the normal time-period used to develop the Airport Noise Contours for night-time operations.
-	Lower Airspace	Airspace in the general vicinity of the airport containing arrival and departure routes below 7,000ft. Airports have the primary accountability for the design of this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency
NAP	Noise Abatement Procedures	Noise abatement procedures are designed to minimise exposure of residential areas to aircraft noise, while ensuring safety of flight operations
NATS (ATC)		NATS ATC - the air navigation service provider at Aberdeen Airport under commercial contract for the aerodrome control provision.
NATS NERL		NATS NERL - The UK’s licenced air traffic service provider for the en route airspace (upper network) that connects airports with each other, and with the airspace of neighbouring states.
nm	Nautical Mile	Aviation measures distances in nautical miles. One nautical mile (nm) is 1,852 metres. One road mile (‘statute mile’) is 1,609 metres, making a nautical mile about 15% longer than a statute mile.
-	Network Airspace / Upper network	En route airspace above 7,000ft in which NATS has accountability for safe and efficient air traffic services for aircraft travelling between the UK airports and the airspace of neighbouring states.

NTK	Noise Track Keeping	A system that monitors and records radar data to monitor aircraft operations and report statistics focused around noise.
PANS OPS	Procedures for Air Navigation Services Aircraft Operations	PANS-OPS is contained in an ICAO Document 8168 which sets out the design criteria and rules for instrument flight procedures which include approach and departure procedures.
PBN	Performance Based Navigation	Referred to as PBN; a generic term for modern standards for aircraft navigation capabilities including satellite navigation (as opposed to 'conventional' navigation standards)
RMA	Radar Manoeuvring Area	An ATC operational area articulated as a volume of airspace by the ANSP. It facilitates the close-in radar vectoring by ATC that is required to take the aircraft safely from a holding stack and established onto final approach.
RNAV / RNAV 1	aRea NaVigation	This is a generic term for a particular specification of Performance Based Navigation. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline of the route 95% or more of the time. In practice the accuracy is much greater than this.
RNP-RF	Required Navigation Performance – Radius to fix	An advanced navigation specification under the PBN umbrella. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline 95% or more of the time, with additional self-monitoring criteria. In practice the accuracy is much greater than this. The RF means Radius to Fix, where airspace designers can set extremely specific curved paths to a greater accuracy than RNAV1.
RNP-AR	Required Navigation Performance – Authorisation required	An advanced navigation specification under the PBN umbrella. 'Authorisation required' refers to aircraft and operators complying with specific airworthiness and operational requirements. RNP-AR allow airspace designers to set extremely specific curved paths to a greater accuracy than RNAV1, these can be designed before and after the Final Approach Fix.
-	Separation	Aircraft under Air Traffic Control are kept apart by standard separation distances, as agreed by international safety standards. Participating aircraft are kept apart by at least 3nm or 5nm lateral separation (depending on the air traffic control operation), or 1,000ft vertical separation.
SID	Standard Instrument Departure	Usually abbreviated to SID; this is a route for departures to follow straight after take-off.

	Tactical Intervention	Air traffic control methods that involve controllers directing aircraft for specific reasons at that particular moment (see Vector)
TMA / ScTMA	Terminal Manoeuvring Area (Terminal Airspace) / Scottish Terminal Manoeuvring Area	An aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of traffic. The airspace surrounding Glasgow & Edinburgh airports is described as the Scottish TMA (ScTMA). This is the airspace that contains all the arrival and departure routes for Glasgow & Edinburgh from the surface to 6000ft.
TMZ	Transponder Mandatory Zone	Airspace of defined dimensions where the carriage and operation of transponder equipment is mandatory.
VFR	Visual Flight Rules	Visual Flight Rules (VFR) are the rules that govern the operation of aircraft in Visual Meteorological Conditions (VMC) (conditions in which flight solely by visual reference is possible)
VMC	Visual Meteorological Conditions	Visual meteorological conditions (VMC) are the meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima
VSA	VFR Significant Area	A volume of airspace which has been identified as being particularly important to VFR operations. A VSA might take the form of a route, a zone, or an area chosen for its particular importance to GA users. These areas do not have any official status but are intended to highlight the importance of a particular area so that future airspace development plans can take account of the GA activity.
-	Vector / vectoring	An air traffic control method that involves directing aircraft off the established route structure or off their own navigation – ATC instruct the pilot to fly on a compass heading and at a specific altitude. In a busy tactical environment, these can change quickly. This is done for safety and for efficiency.
-	Westerly operation	When a runway is operating such that aircraft are taking off and landing in a westerly direction

Introduction

Following the publication of the strategic rationale for airspace modernisation[1], the Government directed the Civil Aviation Authority (CAA) to “prepare and maintain a coordinated strategy and plan for the use of UK airspace up to 2040, including its modernisation”. As a result, in 2018 the CAA published the Airspace Modernisation Strategy (AMS)[2], which replaced the earlier 2011 Future Airspace Strategy. The AMS sets out the initiatives required to modernise the existing Airspace System by upgrading the airspace design, technology, and operations. The CAA recently consulted on a draft, refreshed AMS and is considering the responses prior to publishing an updated version of the strategy.

One of the most important initiatives required to achieve the AMS objective is known as FASI (Future Airspace Strategy Implementation). 21 airports in the UK comprise FASI and Aberdeen Airport is one of them. This FASI initiative is considered the UK’s Airspace Change National Infrastructure Programme (the Programme). The Programme encompasses the requirement to fundamentally redesign the National Airspace System at lower altitudes and in the terminal airspace that serves commercial air transport across the busiest regions of the UK, making the most of the capabilities of modern aircraft and satellite-based navigation technology. These airspace design projects are sponsored by the 21 airports (for the local arrival and departure routes below 7000ft) and by NERL (for the airspace structures and route network above 7000ft).

Today’s national route network is designed with reference to a grid of ground navigation beacons distributed across the UK. Some of these beacons are outdated and reaching their end of life. Meanwhile, 99% of the current commercial air transport fleet operates almost exclusively using avionics that rely on satellite navigation. Aircraft are able to follow routes designed to satellite navigation standards (known as Performance-based Navigation or PBN) with greater precision than conventional ground navigation. The widespread deployment of routes designed to satellite navigation standards is a cornerstone of airspace modernisation. The opportunity to design a new network of PBN routes with far greater accuracy and flexibility offers the potential to address many of the issues set out in the Government’s strategic rationale. Significant improvements in airspace capacity and efficiency can be achieved by positioning routes so that they are safely separated and optimised by design.

Whilst more precise routes can be used to avoid noise sensitive areas, they may also concentrate the impacts of overflight. For this reason, the use of multiple route options that can distribute the impacts more equitably, or be configured to offer predictable relief from noise, must be considered in consultation with local stakeholders when routes are being developed for deployment at lower altitudes.

The number, complexity and overlapping scope of the individual Airspace Change Proposals (ACPs) needed to deliver the Programme requires a strategic coordination mechanism in the form of a single joined up implementation plan or Masterplan.

[1] Upgrading UK Airspace Strategic Rationale
[2] UK Airspace Modernisation Strategy, CAA CAP1711, 2018

Given the large number of organisations involved (21 airports and NATS EnRoute Limited (NERL)), the CAA and Department for Transport (DfT) also required NERL to set up an impartial body, The Airspace Change Organising Group[3] (ACOG) to develop a Masterplan, coordinate the Programme and lead the necessary engagement with external stakeholders. In this context, ACOG was established in 2019 as a unit within NERL, separate and impartial from the organisation's other functions.

Masterplan Iteration 2[4] was accepted by the CAA on 27th January 2022. The purpose of Iteration 2 is to provide a system-wide view of the scope of the constituent ACPs and identify the potential interdependencies between the proposals. Collectively, the ACPs that are included in the Masterplan are referred to as the 'constituent airspace change proposals'. Each individual ACP is developed following the same detailed process steps laid out in the CAA's guidance for changing the airspace design – known as CAP1616[5]. The CAA evaluates the progress of every ACP through each stage of the process, via a series of (seven) regulatory gateways and make decisions on whether to approve further development and ultimately the implementation of the proposed changes. A summary of the CAP1616 process is available in the next section.

Iteration 2 places Aberdeen International Airport Ltd (AIAL) in the 'STMA regional cluster' alongside Edinburgh and Glasgow Airports and the NATS Scottish TMA.

AIAL began their ACP to modernise their airspace in November 2019 and passed through Stage 1 of CAP1616 in March 2020. Shortly after this, the project and much of the wider Programme was paused due to COVID-19 pandemic whilst the aviation industry focussed on managing the pandemic and its recovery from it. The Programme was remobilised in March 2021 following the provision of DfT grant funding, allowing AIAL to recommence their ACP in May 2021.

This document forms part of the AIAL Stage 2 submission to the CAA. It sets out how Aberdeen International Airport has developed its Comprehensive List of Options for the ACP and how it tested those options and their development with their stakeholders. It then explains the methodology used to evaluate the options against the Design Principles as well as containing a summary of that evaluation.

All airspace design options in this document are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation with all our stakeholders.

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[3] ACOG Website
[4] Link to Iteration 2
[5] CAA CAP 1616, edition 4, March 2021

The CAP1616 Airspace Change Process

In December 2017 the Civil Aviation Authority (CAA) published CAP1616[6] Airspace Design: Guidance on the regulatory process for changing airspace design, including community engagement requirements. The guidance sets out the process for the airspace change process, which a change sponsor of any permanent change to the published airspace design must follow. The airspace change process is split into 7 Stages;

Figure 1: CAP1616 Process

[6] CAP1616

Where Aberdeen Airport is in their Airspace Change Proposal

This Airspace Change Proposal is required to follow the CAP1616 process detailed in the section above. Table 1 below summarises the CAP1616 stages already undertaken for this ACP and the stage where we are at now, providing links to previous submission documents with further information.

Airspace Change Stage	Summary	Link to Documents (Also available on the ACP portal)
Stage 1A	In November 2019, AIAL submitted their following statement of need (SoN) to the CAA	Statement of Need on CAA's Airspace Change Portal
	AIAL participated in an assessment meeting with the CAA on the 19 November 2019 as part of Step 1A of the CAP1616 process. The purpose of the assessment meeting is for the change sponsor to present and discuss their SoN and to enable the CAA to consider whether the proposal falls within the scope of the formal airspace change process.	Assessment meeting minutes
Stage 1B	At Stage 1B AIAL developed a set of design principles with identified Stakeholders. The aim of the design principles is to provide high-level criteria that the proposed airspace design options should meet. They also provide a means of analysing the impact of different design options and a framework for choosing between or prioritising options. The final design principles outlined within the Stage 1B submission, are also shown here in this document.	Stage 1B Design Principle Submission Report
Stage 2A	Stage 2A requires change sponsors to develop and assess options for the airspace change. In Stage 2A, the change sponsor develops a comprehensive list of options that address the Statement of Need and that align with the design principles from Stage 1. We then share those options with our Stakeholder representatives (the same ones engaged with on the Design Principles). Feedback from the engagement may then be used to refine and/or generate further options where feasible at this stage or later in the process. Finally, we qualitatively assess all options developed against the Design Principles and produce a Design Principle Evaluation. This is where we are now. The following sections of this document outline how we have developed airspace change options, engaged with Stakeholders, and then assessed the options against the design principles developed at Stage 1B.	This Document

Table 1: AIAL ACP to date

Aberdeen's Design Principles for this ACP

The design principles were set following engagement with representative stakeholder groups as part of CAP1616 Stage 1. The final design principles are shown in Table 2 below:

#	Design Principle
1	The airspace design and its operation must be as safe or safer than today for all airspace users that are affected by the airspace change.
2	Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it.
3	Design options should minimise the change to tracks over the ground of aircraft arriving and departing from Aberdeen.
4	Design options should investigate the feasibility of steeper approaches for PBN arrivals to reduce the noise footprint of Aberdeen Airport's operation.
5	Arrival route options should enable aircraft to descend continuously and should not inhibit departures from climbing continuously. If both cannot be achieved, there should be preference to the most environmentally beneficial option.
6	Options should not increase and should aim to reduce the emissions footprint of aircraft operating at Aberdeen by reviewing existing controlled airspace boundaries and usage of flight paths in the NERL network.
7	Design the appropriate volume of controlled airspace (CAS) to safely support commercial air transport and release controlled airspace which is not required.
8	Controlled airspace options should ensure there is safe and efficient access for other types of operations, and should explore measures, including classification and flexible use of airspace, where possible and appropriate, to improve access and decrease airspace segregation.
9	Options shall not reduce and where possible enhance the air traffic movement capacity of Aberdeen Airport.
10	Ensure the Aberdeen operation is resilient to the withdrawal or failure of navigation aids and systems.

Table 2: AIAL Design Principles

The principles are numbered for ease of reference. Design principle DP1, regarding the safety of all affected airspace users takes top priority, over all other principles. Subject to this overriding principle of maintaining a high standard of safety, the second highest priority principle for our ACP that cannot be discounted is that it accords with the published AMS (CAP 1711), any current or future plans associated with it and all other relevant policies and regulatory standards. DP3 - DP10 all share equal priority.

For more information about our Design Principles, please see our Stage 1B documents on the CAA's Airspace Change Portal.

UK Airspace Change Masterplan Iteration 2

The number, complexity and overlapping scope of the individual airspace ACPs needed to deliver the Programme requires a strategic coordination mechanism in the form of a single joined up implementation plan or Masterplan. In their capacity as co-sponsors of the AMS, the Department for Transport and CAA commissioned NERL to create the Masterplan.

Airspace modernisation is a long and complex process. Larger ACPs with many interdependencies can take several years longer to develop than smaller ones with fewer interactions. As a consequence, ACOG proposed (and the co-sponsors accepted) that the final Masterplan is developed through a series of iterations. The iterative approach recognises that different information and levels of detail will be available at different times. ACOG may have an insufficient level of detail about some ACPs to make firm conclusions and need to make assumptions that are refined in later iterations. It also means that the Masterplan remains flexible and responsive to accommodate the evolving context for airspace modernisation, such as changes arising from the AMS review, new policy directions or unanticipated events.

ACOG envisages a minimum of four iterations of the Masterplan. The iterations broadly align with the regulatory gateways of the CAP 1616 process. Each iteration must be accepted separately into the AMS, except Iteration 1, which was a high-level plan that has already been assessed and published[7].

The purpose of Iteration 2 is to provide a system-wide view of the scope of the constituent ACPs and identify the potential interdependencies between the proposals. The assessment of the interdependencies between the constituent ACPs remains at a high level in Iteration 2 because most of the sponsors were yet to produce a comprehensive list of airspace design options at the time of its creation.

The Masterplan becomes, together with the CAP 1616 process, the legal basis against which individual airspace change decisions are made by the CAA. Therefore, the CAA's decisions on airspace change proposals will need to ensure that there is no misalignment with the Masterplan. The CAA must apply its airspace change decisions in accordance with the Masterplan and therefore in the best interests of the overall Airspace System and not just in the interests of the individual ACP sponsor.

The timeline and sequencing of the Masterplan ACPs are complex issues. It is not considered feasible for all the constituent ACPs in the Programme to be developed and deployed at the same time. The Masterplan takes a modular approach to deployment and requires coordination and strong programme management discipline to mitigate the risks of design conflicts, technical misalignments, and a lack of transparency for external stakeholders. To help with this, the Masterplan has placed each of the ACPs into a regional cluster and Iteration 2 places AIAL in the 'STMA regional cluster' alongside Edinburgh and Glasgow Airports and the NATS Scottish TMA.

[7] Airspace Masterplan Iteration One (Southern UK): co-sponsor assessment, CAA CAP 1884, February 2021.

The deployment timescales for each individual ACP within a cluster are determined by the size, complexity and interdependencies of the proposal and a series of important programme planning assumptions regarding the activities that controllers and operators must conduct to prepare for changes to the airspace structure and route network.

Aberdeen’s Potential Interdependencies Identified within Iteration 2

The Masterplan identifies the interdependencies between the constituent ACPs based on an analysis of the broad sections of airspace where a flight path could ‘conceivably be positioned’ below 7000ft within the scope of each proposal. Based on this broad assessment and owing to the relatively limited scope of the AIAL ACP the Masterplan identifies that Aberdeen does not have any dependencies below 7000ft with flight paths to and/or from Edinburgh or Glasgow airport. This is as we would expect, as explained in the next section of this document. However, Iteration 2 envisaged that there could be dependencies with NERL in the airspace above 7000ft and for this reason, Iteration 2 advises that that the STMA cluster, including AIAL could be deployed in a single implementation, currently targeting Winter 2025.

Aberdeen's Existing Airspace Arrangements (Baseline)

Runway and Local Geography

Aberdeen International Airport is located in the Dyce suburb of Aberdeen, Scotland, approximately 5 nautical miles (9.3km; 5.8mi) North West of Aberdeen city centre. The airport is owned and operated by AGS Airports which also operates Glasgow and Southampton airports.

AIAL has one Instrument runway (16/34) which is used for fixed and rotary wing aircraft. With prevailing winds in the UK from the South-west, in 2022, Runway 34 was in operation 42% of the time and Runway 16 was in operation 58% of the time.

There are also 3 much smaller runways 05H/23H, 14H/32H and 36H which are all visual runways and only available for helicopter movements. Additionally, the main runway 16/34 can be safely divided into 3 and used at the same time for helicopters to arrive and depart. Operations across all runways are divided between fixed wing aircraft, which make up approximately 60% of movements, and rotary wing which make up approximately 40%.

There are multiple areas of dense population within the local vicinity of the airport as illustrated in Figure 2.

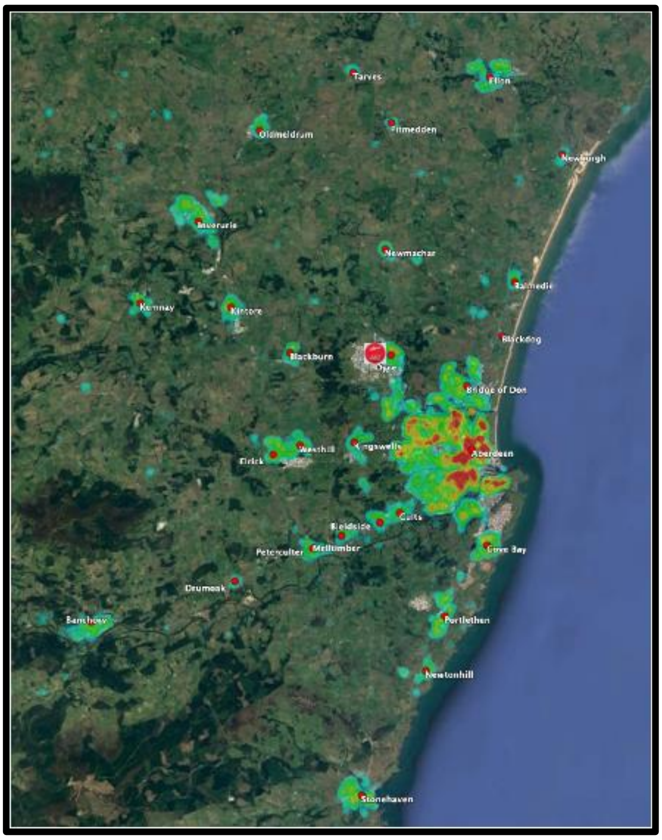

Figure 2: Local population centres

Controlled Airspace (CAS) Arrangements

Aberdeen controllers are responsible for over 100,000 square nautical miles of varying classes of airspace. Approach radar controllers typically control out to a range of 55 nautical miles and work alongside a team who control the offshore traffic in the North Sea airspace. Within the radar room, NATS also provide the air traffic control radar services to Sumburgh Airport on Shetland. The Air Traffic Management (ATM) environment around Aberdeen is complex and when combined with the volume and type of traffic, this creates a demanding Air Traffic Control environment.

Aberdeen CTR is Class D airspace from the surface to Flight Level (FL)115. CTA 1,2 and 3 are also Class D and shown in Figure 3.

ATS AIRSPACE VERTICAL LIMTS Controlled airspace with an upper vertical limit of FL195 and above is not shown.

ABERDEEN			ABERDEEN			
CTR	D	FL115 / SFC	CTA-2	D	FL115 / 1500	
CTA-1	D	FL115 / 1500	CTA-3	D	FL115 / 3000	

LATERAL LIMITS

Detailed description of FIR, UIR, CTA and TMA see ENR 2.1. Detailed description of air traffic services airspace organized at the aerodrome see AD 2.17.

Figure 3 CAS boundaries

P18, when active, is a Class D[8] airway which routes south of Aberdeen towards Newcastle; this airway is only currently available typically in evening periods and at weekends. Approval to use P18 is determined by the aircraft's destination. The following destinations are permitted to use P18 southbound: EGNT, EGNV, EGNJ, EGSH, EGNM, EGNX, EGCC, EGBB, EGBE, EGGP, EGNH, EGHI, EGHH. These can be dictated by cruising level and other destinations may also be permitted. In addition to P18, the airspace surrounding the CTA/CTR has two pieces of Class E + TMZ airspace from 4500ft to FL195 which controllers report works well with the traffic within these areas.

Fixed Wing Operations

Fixed wing aircraft are currently vectored soon after departing from Aberdeen; there are no Standard Instrument Departures (SID) from the airport, however all jet aircraft and aircraft over 5700kg MTOW[9] are required to follow Preferred Departure Routes (PDRs)[10] when departing unless otherwise instructed by ATC or if there is a safety reason.

There are no planning restrictions, KPIs or requirements for departures to adhere to the PDRs. These routes are only used as a means of aircraft departing the airport. Aircraft are routinely vectored off the PDRs to manage traffic levels within the airspace, particularly when integrating helicopters and fixed wing operations. This provides ATC with the flexibility to vector aircraft to suit the operational needs according to the traffic situation at the time, which is of paramount importance to enable ATC to integrate the much slower moving, non-scheduled rotary aircraft movements. This routine vectoring results in a wide dispersal of departure tracks, and full flexibility for controllers to depart both fixed wing and rotary aircraft within quick succession.

Table 3 Aberdeen Airport's Preferred Departure Routes (PDRs)

Runway	ATC Clearance	Procedures
16	Via PTH VOR	Climb straight ahead. At ADN DME 8.5 nm or 800 ft aal whichever is the later, turn right to LAVTI (570818N 0022417W). At LAVTI turn left to GLESK and then to PTH VOR.
16	Via ADN VOR Northbound	Climb straight ahead. At ADN DME 8 nm or 600 ft aal, whichever is the later, turn left to ADN VOR. At ADN VOR turn on course.
34	Via PTH VOR	Climb straight ahead to 1000 ft aal. After reaching 1000 ft aal turn left to follow P600 centreline to GLESK and PTH VOR.
34	Via ADN VOR Northbound	Climb straight ahead to ADN VOR. At ADN VOR turn on course.

[8] Class A from south of Newcastle
[9] Maximum Take Off Weight
[10] Note: Currently in the AIP the PDRs are described as Noise Preferred Routes (NPRs); this is incorrect as NPRs can only be prescribed by the Department for Transport (DfT) and Aberdeen does not have these. The AIP is currently being updated and therefore throughout this document and future documents we will refer to these as PDRs (which as sometime also known as Standard Departure Routes (SDRs).

Reviewing the PDRs against the published airspace also demonstrates that compliance with the PDRs can be challenging. For example, it is known that if airway P18 is available aircraft are typically advised to climb straight ahead until passing 800' before turning on track BALID; this differs significantly from the PDR outlined in the table above for Runway 16 via PTH VOR.

There are no Standard Arrival Routes (STARs) with Prestwick Area Control Centre (ACC) positioning traffic towards the ADN VOR before Aberdeen Approach vector fixed wing aircraft to join Aberdeen's final approach. Instrument approach procedures are available using conventional navigation aids (navaids) for both runway 16 and 34 as outlined in Table 4.

Table 4 Aberdeen Airport Existing Instrument Approaches

Runway	Instrument Approach
16	ILS/DME
	LOC/DME
	VOR/DME
34	ILS/DME
	LOC/DME
	VOR/DME
	NDB(L)/DME

The ILS/DME procedures are the most frequently used Instrument Approach procedure at Aberdeen. The LOC/VOR/NDB/DME procedures are used mainly for training purposes and in the event of ILS failure or outage for maintenance.

Aberdeen currently publish three holds, with the main holding pattern based on the VOR ADN. ATC may also request aircraft to hold at DOWNI and LATF, both of which utilise ground-based navigational aids. ATC report that the ADN position (above the airport) 'works well', and this is particularly in the case of non-radar procedures. There are also some Scottish TMA en-route holds available, however it is important to note that en-route controllers have no information about helicopter traffic.

The main holding pattern will be based on the VOR ADN but ATC may request aircraft to hold at DOWNI, L ATF. Details of all these patterns are as follows:

Holding Point	Details
VOR ADN	Holding axis 161° MAG, turning left at the facility. Lowest holding altitude 2500 ft.
DOWNI (570439N 0020621W)	Holding axis aligned on ADN VOR RDL 161° (Inbound track 341° MAG) between 15 DME ADN (DOWNI) and 20 DME ADN, turning right at the fix. Lowest holding altitude 2500 ft.
L ATF	Holding axis 341° MAG, turning right at the facility. Lowest holding altitude 2500 ft

Table 5: Aberdeen Airport Holds as published in AIP

Rotary Operations

Rotary wing traffic make up approximately 40% of movements into and out of Aberdeen Airport. This proportion of helicopter traffic presents unique ATM integration challenges as the majority of rotary movements are non-scheduled and have to be tactically integrated with the scheduled fixed wing traffic. The nature of rotary movements being far slower than fixed wing, also presents additional challenges for ATC and therefore the flexibility for ATC to vector whenever required is of paramount importance for maintaining an efficient operation.

There are numerous combinations of runway configurations that can be used to optimise the operation; for example, if the main runway 16/34 is sectorised into three, with Runways 23 and 32 being the sectorised points, ATC can land and take off rotary aircraft at the same time.

The procedures for runway sectorisation and helicopter runway arrivals and departures are detailed within the Manual Air Traffic Services Part 2 procedures, alongside Memorandums of Understanding with the helicopter operators. Defined within the AIP is a helicopter route structure which contain standard operating practices, agreed with locally based helicopter operators as well as a system of Helicopter Main Routes Indicators out to the North Sea Off Shore Safety Area (OSA). These are shown in Figure 4.

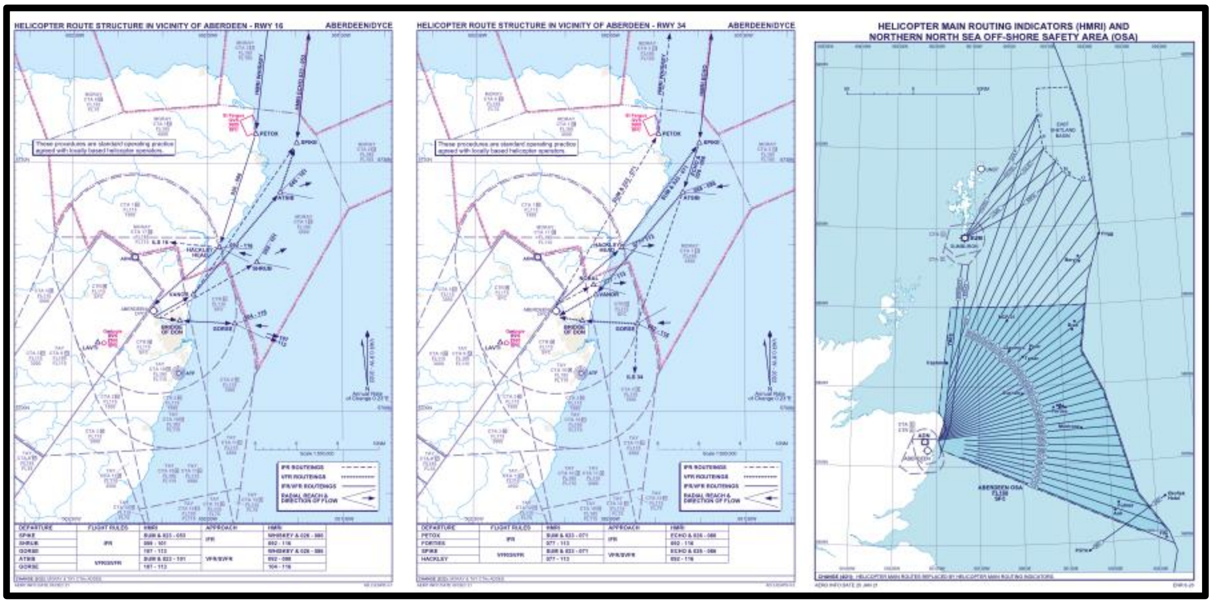

Figure 4 Aberdeen Helicopter Routes

The flexibility in infrastructure, and the ATCO's ability to manage the available runways to optimise arrivals and departures, is vitally important in ensuring the most efficient operation possible at Aberdeen. Alongside the flexibility of the runway availability, ATCO's have full flexibility with airspace, in order to integrate the fixed and rotary wing traffic and maintain an efficient operation.

Integration of Fixed Wing and Rotary Operations into Aberdeen's Airspace.

The current ATM environment at Aberdeen allows for a highly flexible and adaptable airspace environment; ATC can vector all aircraft to efficiently manage the airspace which is particularly beneficial for the integration of fixed and rotary wing traffic.

The images below give an indication of the fixed and rotary routes at Aberdeen, but it is important to note that ATC routinely vector aircraft outside of these routes in order to accommodate traffic. We show images of this vectoring later in the document.

Figure 5: PDRs, HMRs and ILS approach: Runway 34

Figure 6: PDRs, HMRs and ILS approach: Runway 16

Existing Traffic Patterns

Arrivals

There are no defined flight paths routinely used by ATC for arriving traffic until aircraft are established on the final approach. Fixed wing arrivals into AIAL are vectored onto final approach with the majority of arrivals routing inbound from the South via P18 or P600.

The majority of helicopter arrivals land on the non-instrument runways but when Instrument Flight Rules (IFR) conditions exist, they will be vectored to the Instrument Landing System (ILS) to land on the main runway.

To achieve an optimised delivery of aircraft onto the runway, approach controllers are given an area of airspace or Radar Manoeuvring Area (RMA), to keep aircraft under their control within.

The RMA is an Air Traffic Control (ATC) operational area articulated as a volume of airspace by the Air Navigation Service Provider (ANSP). It facilitates the close-in radar vectoring by ATC that is required to take the aircraft safely from a holding stack and established onto final approach. It provides approach controllers with the airspace necessary to perform their primary function of sequencing the aircraft into the required landing order with the distance between each aircraft which is required by the airport at any particular time.

Aberdeen has Noise Abatement Requirements published in the UK Aeronautical Information Publication (AIP) which detail how far from the runway threshold ATC can position aircraft onto final approach:

> *IFR aircraft shall not join final approach to either runway at a height of less than 1500 FT Aberdeen QFE unless they are propeller driven aircraft whose MTWA does not exceed 5700 KG when the minimum height shall be 1000 FT Aberdeen QFE.*
>
> *In addition to paragraph 2.21(c), aircraft conducting an instrument approach shall not descend below 1800 FT Aberdeen QFE before intercepting the ILS or nominal glidepath nor thereafter fly below it. Aircraft landing without ILS assistance shall follow a descent path consistent with a 3° glidepath (or the approach procedure recommended profile if different).*

Figure 7 and Figure 8 below show typical arrival swathes into AIAL:

Figure 7: Runway 16 Arrivals Heat Map (Fixed wing and helicopters)

Figure 8: Runway 34 Arrivals Heat Map (Fixed wing and helicopters)

Departures

As already explained, other than the PDRs there are no defined Instrument Flight Procedures for aircraft departing Aberdeen with vectoring of aircraft soon after departure a routine feature. Figure 9 and Figure 10 below show typical departure swathes from AIAL:

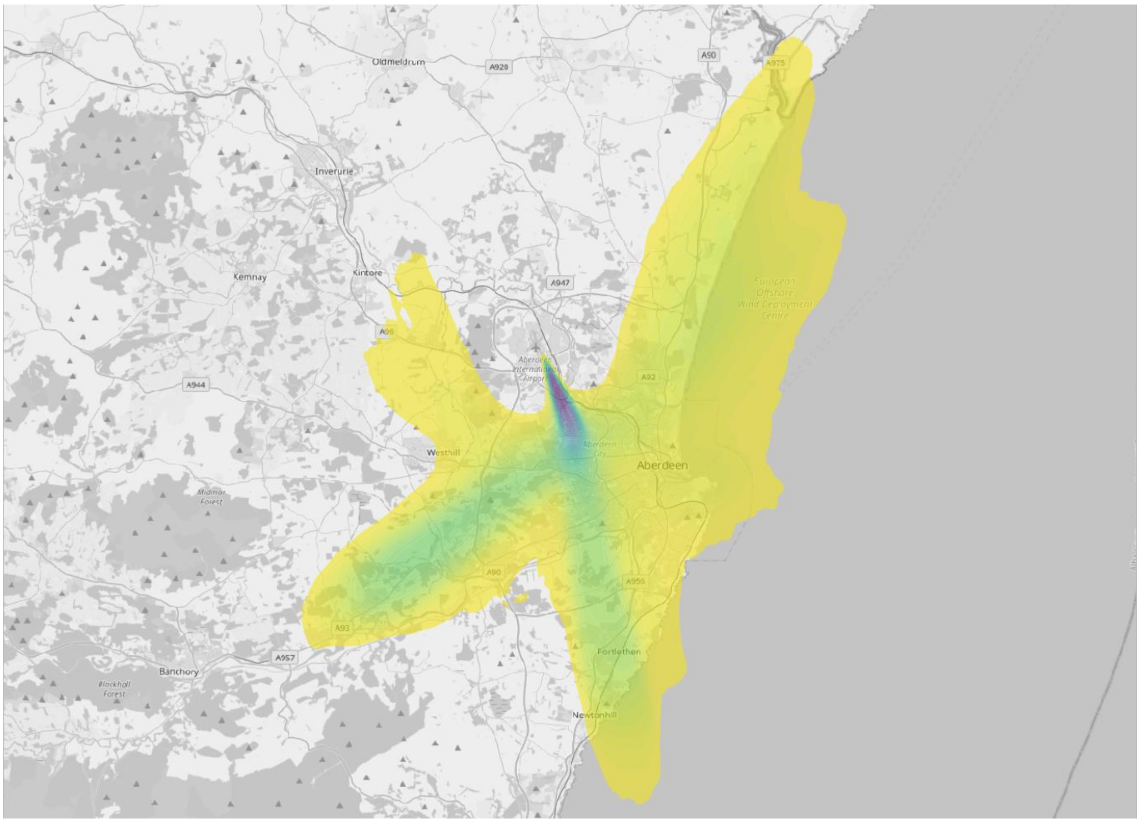

Figure 9 Runway 16 Fixed wing departure density plots (Summer 2022)

Figure 10 Runway 34 Fixed wing departure density plots (Summer 2022)

All Arrivals and Departures

Figure 11 shows all arrival and departures from Aberdeen Airport including helicopter movements from 0-7000ft.

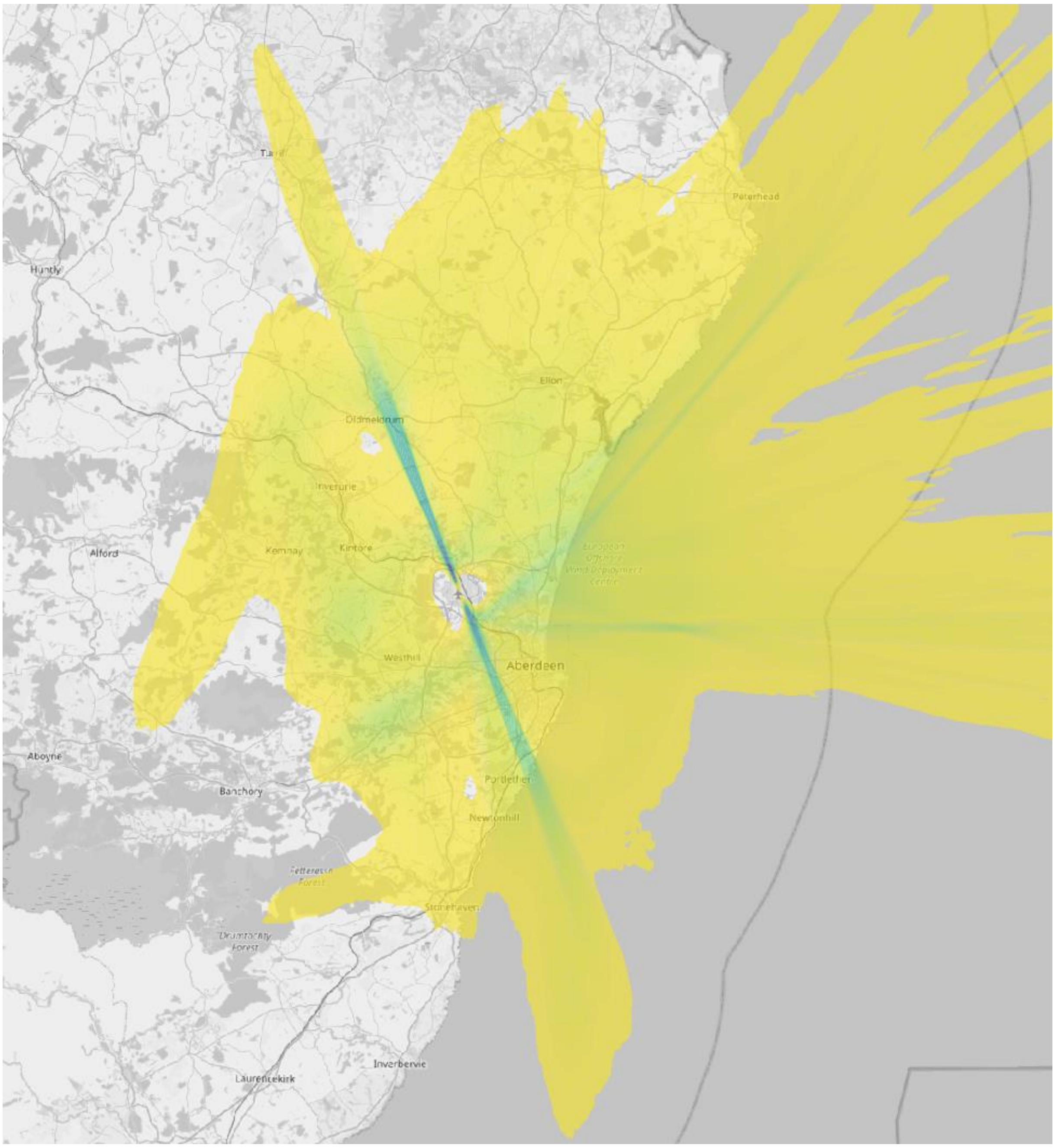

Figure 11 All Aberdeen Movements: Helicopter and Fixed Wing All Runways

Movements

Current declared capacity across the airport is 36 movements per hour, however by sectorising the main runway and utilising the various runways available, 47 movements per hour has been achieved. Air Traffic Control (ATC) report that movements above 36/hr work well during VFR conditions, however, during IFR only, it becomes far more challenging due to the complexity of the operation and the need for both fixed and rotary wing aircraft to use only the instrument runway.

In low visibility, the airport can typically operate 26 – 28 movements per hour, with flow rates only applicable to fixed wing aircraft. In Low Visibility Procedures (LVPs), hourly slots are sometimes divided between fixed wing and rotary aircraft, with helicopters being held in tactical offshore holding patterns that are determined on the day.

The broad direction of fixed wing and helicopter arrivals are shown in Figure 12 and Figure 13 below:

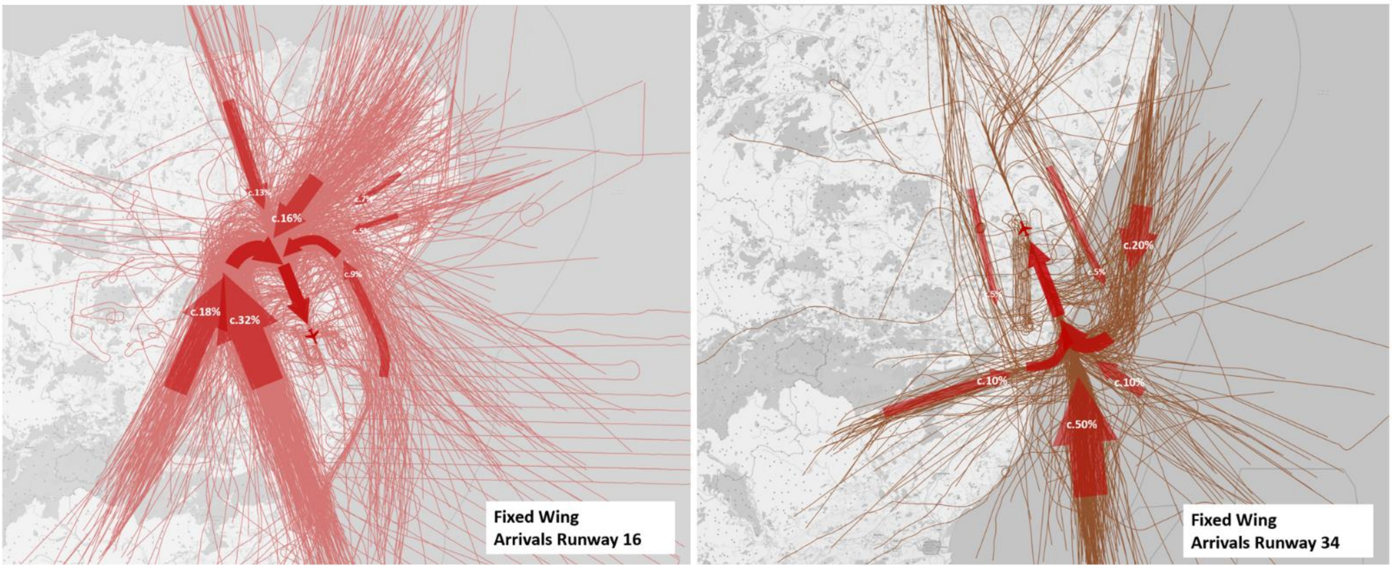

Figure 12 Broad directions and % of fixed wing arrivals

Figure 13 Broad directions and % of Helicopter arrivals

AIAL's Existing Noise Environment

Measuring sound and describing its impacts or effects is an inherently complex process. Some individuals find noise more disruptive than others. Any attempt to define and measure sound, particularly as a single number, therefore has limitations, and cannot fully capture the spectrum of personal experiences of noise. However, seeking to quantify sound is essential to managing the noise challenge. There is not a single metric that meets all needs for assessing, quantifying, or communicating noise effects and there is a need to use a number of different metrics. For example, some metrics are better correlated with health effects, whilst other metrics can be more useful for communicating and understanding impacts, or for use in performance management monitoring.

The L_{Aeq} (equivalent continuous sound level) metric

The most common international measure of noise is the L_{Aeq}, meaning 'equivalent continuous sound level'. This is a measurement of the total sound energy over a period of time. It is easiest to think of this as an average, but important to note that all the sound energy in the time period is captured by this metric. In the UK, daytime aircraft noise is typically measured by calculating the equivalent continuous sound level in decibels (dB) over 16 hours (07:00 to 23:00) to give a single daily figure ($L_{Aeq,16hr}$).

Night-time aircraft noise is most typically measured over an 8-hour night period (23:00 to 07:00) to give a single night time figure ($L_{Aeq,8hr}$).

The average noise exposure is commonly calculated for the 92-day summer period from June 16th to September 15th. The summer day period is used because people are more likely to have their windows open or be outdoors, and because aviation activity is generally at its most intense during the summer periods. Separate assessment for day and night recognises that daytime and night-time noise can lead to quite different effects (principally daytime annoyance and night-time sleep disturbance) and thus it is better to define and measure daytime and night-time noise separately.

AIAL L_{Aeq} Contours 2016

AIAL does not have any planning conditions which requires them to generate and publish noise contours on an annual basis. Generating noise contours is extremely detailed work and at this stage in the project it is not proportionate to generate such contours for a baseline (and then for every potential system combination of new design options) which would likely need to be re-done for Stages 3 and 4[11]. However, AIAL did generate $L_{Aeq\ 16h}$ area (Day) and $L_{Aeq\ 8h}$ area (night) for their *Noise Action Plan 2018-2023* which we will use here to help inform the baseline at Stage 2. These will be updated to inform the assessment of the shortlisted options against the baseline in Stage 3[12] but the existing 2016 contours are considered a suitable benchmark against which to help qualitatively appraise options in Stage 2.

The *size* of these contours are determined largely by four main factors:

- The type of aircraft using the airport

[11] CAP1616 Para 146
[12] Noise modelling will be performed to CAP2091 Category C in Stage 3 onwards

- The number of aircraft using the airport
- The frequency of use of each flight path
- The height of aircraft on those flight paths

The *shape* of these contours are directly influenced by the position of the flight paths, especially at c.3,000-4,000ft and below. Figure 14 and Figure 15 show AIAL's noise contours as they were in 2016.

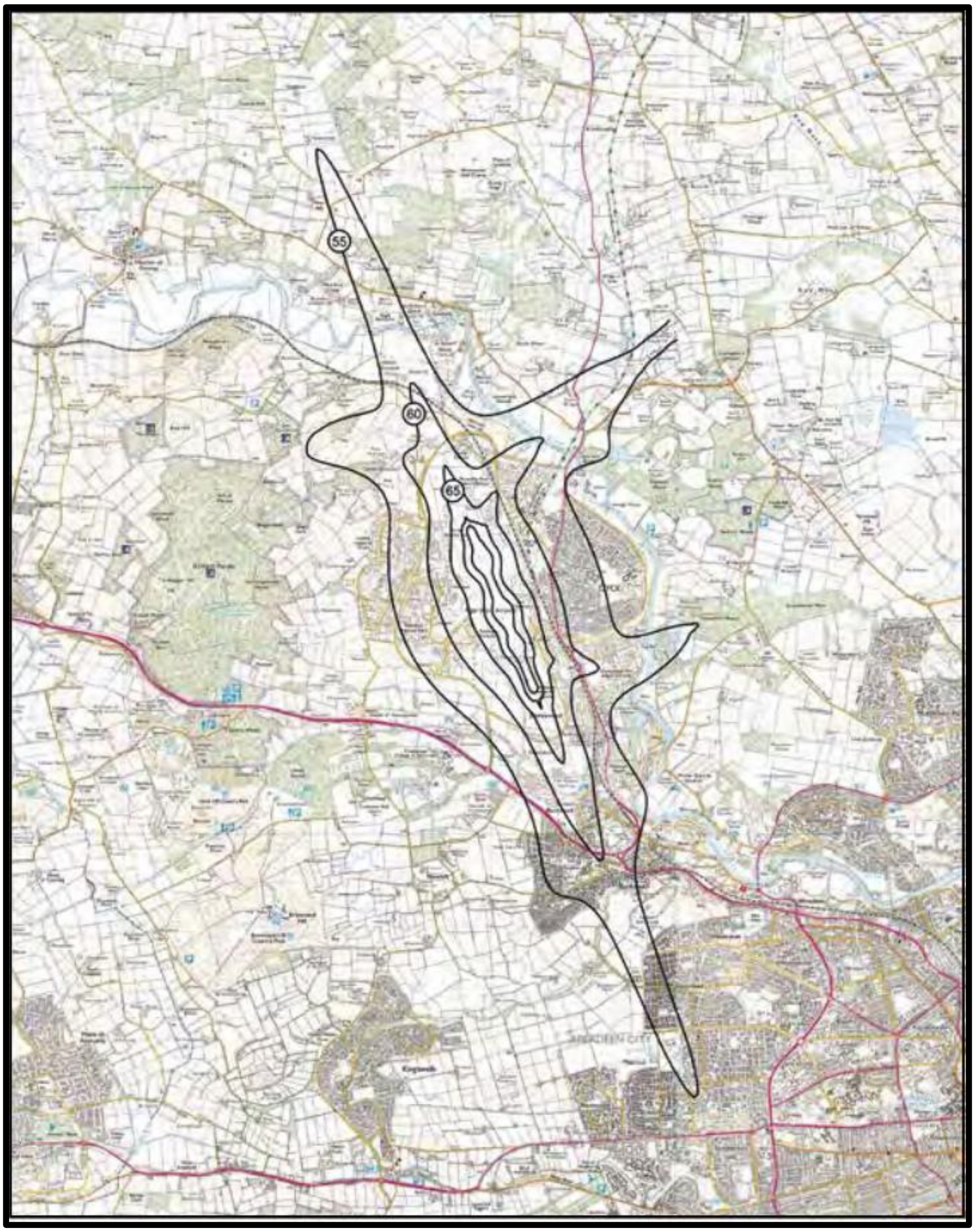

Figure 14 2016 LAeq, 16hr 55-75dB(A) Fixed-wing 52%S/48%N, Helicopters 64%S/36%N

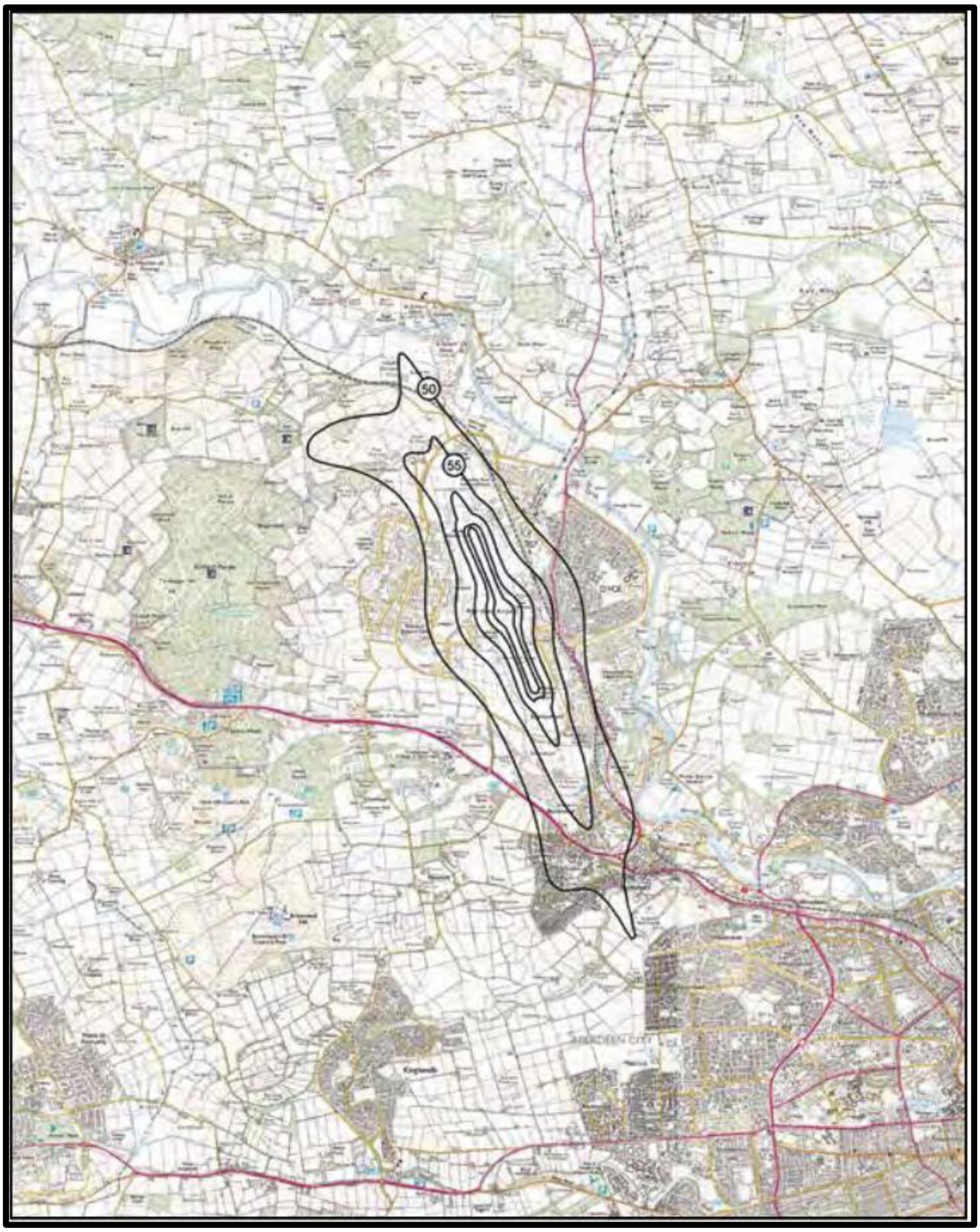

Figure 15 2016 LAeq, 8hr 55-75dB(A) Fixed-wing 49%S/51%N, Helicopters 73%S/27%N

Contour Population Counts

CAA use population density within certain contours to help inform their decision making. The population numbers are used to help determine the scale of any adverse effects from aircraft noise. AIAL's dwelling and population counts are given for the 2016 $L_{Aeq\ 16hr}$ and $L_{Aeq\ 8hr}$ contours in Table 6 and Table 7 below. Population data and household estimates are given to the nearest 100 and are based on 2011 census data updated for 2016, supplied by CACI Information Solutions.

2016 annual day L_{Aeq},16hr contours – estimated areas, populations and households

L_{Aeq},16hr, dB(A)	Area (km^2)	Population	Households
> 55	> 13.0*	> 10,000*	> 4,450*
> 60	4.2	1,250	650
> 65	1.5	50	< 50
> 70	0.6	0	0
> 75	0.3	0	0

*NB: the 55 dB(A) contour does not close so a definitive figure cannot be given.

Table 6: 2016 annual summer day $L_{Aeq,\ 16h}$ area, residential building and population counts

2016 L_{night} contours – estimated areas, populations and households

L_{night}, dB(A)	Area (km^2)	Population	Households
> 50	7.1	4,700	2,200
> 55	2.6	500	250
> 60	1.0	< 50	< 50
> 65	0.4	0	0
> 70	0.2	0	0

Table 7: 2016 annual summer night $L_{Aeq,\ 8h}$ area, residential building and population counts

Continuous Climb/Continuous Descent Performance

There are a number of factors that can influence Continuous Descent (CDA) and Continuous Climb (CCO) performance to/from an airport. These can be operational restrictions, interactions with other traffic flows to/from the same airport or another airport and also Controlled Airspace restrictions.

AIAL's performance for continuous descent performance is measured between 6,000ft and 1,800ft. Between June 2020 and May 2022, c.65% of arrivals performed a Continuous Descent on approach to Aberdeen. However, this data includes helicopters which cruise below 6,000ft. When excluding helicopters, CDA performance is in the region of 80-85%.

AIAL's performance for continuous climb performance is measured between the runway and FL100. Between June 2020 and May 2022, c.96% of departures climbed continuously on departure to at least FL100. This data excludes helicopters which cruise well below FL100.

General Aviation

There are several routine General Aviation activities and trends taking place in the vicinity of AIAL.

Gliders: There is known to be a high amount of gliding traffic on the edges of controlled airspace at Aberdeen; Deeside Gliding club lays to the west of the aerodrome is a base for extensive wave soaring both locally and throughout the Scottish Highlands. Highland Gliding club and Insch airfield lies to the north west. ATC report that glider pilots are typically very experienced and have a good awareness of the airspace structure. Figure 16 shows a Gliding activity heatmap generated by Airspace4All which helps to illustrate density of Glider operations around the Aberdeen CTR/CTAs. The dense activity around Deeside Gliding Club generates traffic that navigates around or underneath CTA3.

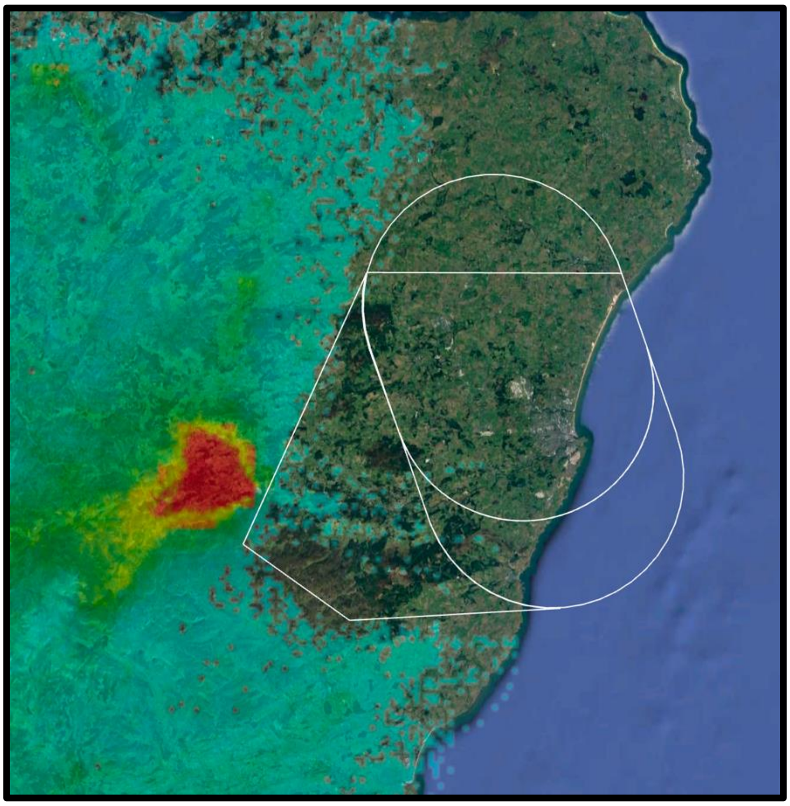

Figure 16 Gliding activity heatmap (Airspace4All Gliding Significant Areas)

General Aviation: There are various GA airfields that are located close to controlled airspace, or under the base of controlled airspace.

There are also a small number of GA airfields within the control zone:

- Whiterashes: close to the ADN and the final approach track for Runway 16.
- Peterculter: helicopter training site.
- Aberdeen Royal Infirmary (ARI): located underneath the final approach track for Runway 34.
- Trump Golf Course: a helicopter landing site near Balmedie on the coast to the east of the airfield.

In addition to this, there are a low number of GA operations to/from Aberdeen Airport each year.

Other Airspace Users: There are a number of movements to/from Aberdeen each year operated by the Air Ambulance (fixed wing) and also search and rescue.

In 2017, Airspace4All published a piece of work on VFR Significant Areas (VSA). The term VFR Significant Area denotes a volume of airspace which has been identified as being particularly important to VFR operations i.e. General Aviation (GA). A VSA might take the form of a route, a zone or an area chosen for its particular importance to its GA users. These areas do not have any official status but are intended to highlight the importance of a particular area so that any future airspace development plans can take due account of the GA activity.

Of relevance to Aberdeen is the ‘Aberdeen Coastal Corridor’ and the ‘Inverness – Aberdeen Coastal Corridor’ which are illustrated in Figure 17 and Figure 18. Figure 17 The Aberdeen Coastal Corridor identified by Airspace4All

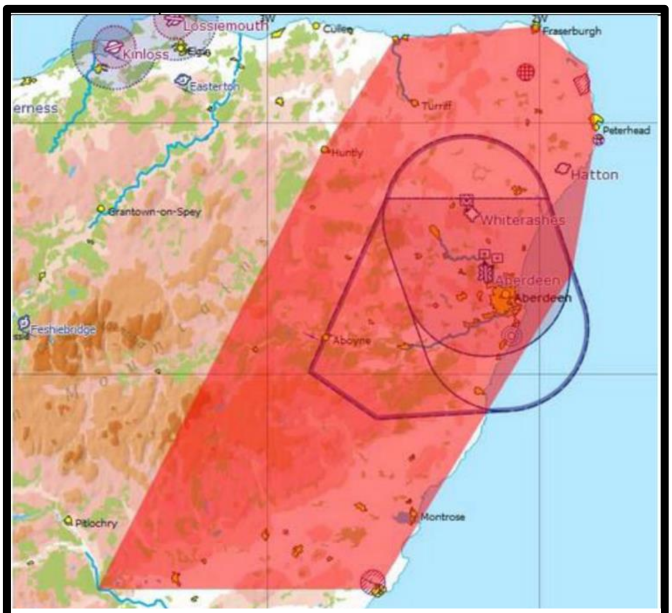

Figure 17 The Aberdeen Coastal Corridor identified by Airspace4All

The Aberdeen Coastal Corridor is an East coast transit route avoiding the Grampians and is an important recreational area for unpowered aircraft to FL195 and above. The area is approximately 30nm wide by 75nm long. It contains one airfield with an ATZ, one Danger area, two HIRTAs, three gliding fields, one balloon launching site and several grass strips and helipads.

Airspace 4all claim that *“Extension of Class D south or west of Aberdeen would prejudice the north-south passage owing to high ground and high frequency of cloud.”*

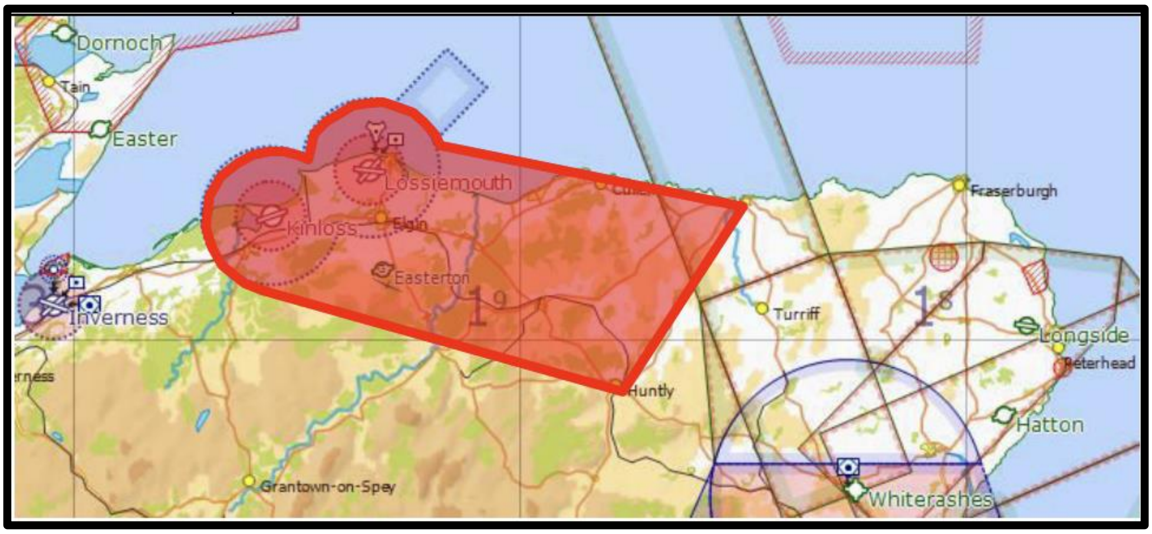

Figure 18 The Inverness-Aberdeen Coastal Corridor identified by Airspace4All

The Inverness-Aberdeen Coastal Corridor is 33nm long and 13nm wide links the Inverness Hub and Aberdeen Coastal Corridor for VFR transit during times of low cloud base over high terrain to the south.

CAA Airspace Classification Review Consultation

In December 2019 the CAA launched a consultation to ask respondents to identify volumes of controlled airspace, where the classification could be amended to better reflect the needs of all airspace users on an equitable basis.

The key points raised by GA stakeholders to CAA with regards to controlled airspace in the vicinity of Aberdeen were:

- Base levels and dimensions of airspace cause issues for gliders, particularly CTA 3 or P600 to the West of Aberdeen.
- Replies most referenced operations during daylight hours, where the airspace classification could be amended if CAS cannot be released.
- Other feedback mentioned increasing the classification to the North (Currently class E) to better protect aircraft there and there was a suggestion to make P18 full time, allowing traffic to route that way thus easing P600 traffic allowing for its classification or size to be reduced.

Navigation Aid Rationalisation

NATS EnRoute Limited (NERL) are currently undertaking a rationalisation programme for ground-based VOR infrastructure. As part of this, the PERTH VOR currently utilised by Aberdeen (PTH), will be withdrawn. The current timeline anticipates PTH to be withdrawn sometime after 31st December 2022. PTH is only referenced as part of Aberdeen's Preferred Departure Routes for departures and there is a separate process underway to remove the references.

ACP Scope

Although the above sections outline the existing operations for arrivals and departures for both fixed wing and rotary traffic, this ACP is limited in scope.

Aberdeen Airport has a highly complex Air Traffic Management (ATM) operation which requires integration of a high number of rotary wing aircraft alongside fixed wing. As a result, the ATC operation requires a highly flexible and adaptable environment and at present, this is achieved through tactical vectoring to optimise capacity and enable departures in quick succession. Aberdeen ATC have advised that they do not have any existing or envisaged Air Traffic Controller workload or safety issues as a result of this dependency on vectoring.

Typically, when considering PBN, most aerodromes look to introduce systemised PBN Standard Instrument Departures (SIDs) and Standard Arrivals Routes (STARs) however in the case of Aberdeen, this systemised fixed route structure would not be able to replicate the existing operational flexibility. This would likely have an impact to capacity at peak times and potentially a negative impact on the communities and stakeholders that neighbour Aberdeen Airport. SIDs and STARs are therefore not within scope of this ACP. Changes to the helicopter routes structures are also not within scope.

Therefore, in line with our Statement of Need, to increase AIAL's resilience in the event of ground-based navigation aid failure, this ACP will seek to introduce RNP Approach procedures to Instrument Runways 34/16. Their respective Missed Approaches will end at the extant ADN hold, however that hold will be based on PBN to add further resilience to the operation. The ACP will also review existing Controlled Airspace boundaries, seeking to reduce the volume of Class D airspace where possible.

These RNP Approaches will not replace the ILS approaches but will compliment them. Even after implementation of RNP Approaches we expect the vast majority of arrivals will continue to be vectored to the ILS, as they do today. The RNP Approaches are required largely for resilience purposes to cover the eventuality of loss of the ILS due to fault or maintenance however some pilots may elect to fly an RNP Approach even with a serviceable ILS.

For our stakeholder engagement we explained that we could expect c. 1-5% of fixed wing arrivals into Aberdeen could elect to fly these approaches however from experience at other airports, RNP Approach uptake is likely to be closer to the lower end of this assumption. At 5%, this would equate to c.3 RNP fixed wing arrivals per day on average. Note that helicopters may also elect to fly RNP Approaches so a similar assumption could be c.1-5% of Helicopter arrivals that currently use the ILS. At 5% this would equate to c.2 RNP rotary arrivals per day on average. We will use these figures for our Design Principle Evaluation and Initial Options Appraisals.

You will note later in this document we have an option which offers a shorter approach than today. If this was to be implemented, we may see a higher frequency of arrivals opting for this approach than the 1-5% given above. This was highlighted to stakeholders during our engagement on the Comprehensive List of Options (see Appendix F).

Options Development and Stakeholder Engagement

This section describes the stakeholder engagement conducted by Aberdeen Airport for Step 2A of the ACP process and aims to:

- Provide evidence that engagement with stakeholders has created a good understanding of the options development process, including the need for the options to be aligned with the Design Principles in a fair and consistent manner.
- Demonstrate how the stakeholder engagement conducted by Aberdeen Airport and the feedback received has helped to influence the options development process.

Following the announcement in March of 2021 from The DfT and CAA of short-term financial support for the next phase of the FASI programme, Aberdeen Airport restarted its ACP in May 2021. In September 2021, we contacted our stakeholders to inform them that the ACP was restarting and that stakeholder engagement for Stage 2 would begin in the following months.

Stakeholder qualification

During Stage 1, Aberdeen Airport undertook a stakeholder mapping exercise to identify stakeholders that are affected by current airport operations and those that could be affected by any changes associated with the ACP.

Given the breadth of stakeholders potentially affected by any future ACP, the following approach to stakeholder selection in Stage 1 was adopted:

- Involving representatives of communities currently affected by the flightpaths
- Involving representatives of communities that could be affected by future flight paths
- Proactively engaging the representatives of any relevant seldom heard/hard to reach groups, including equalities groups
- Targeting interested parties and/or those with a willingness to engage through future phases as per CAP1616 guidance
- Qualifying participants to ensure we have the right representative

All stakeholders that were identified during Stage 1 as affected by current operations or as potentially affected by future changes, were carried forward into our Stage 2 stakeholder database.

As the ACP process was paused because of COVID-19, some stakeholders from Stage 1 changed for a variety of reasons (retirement, redundancy, leaving post etc.). As such, before inviting stakeholders to participate in an engagement process for Stage 2, Aberdeen Airport carried out another qualification exercise to confirm and/or update stakeholder data inherited from Stage 1, which included:

- A desktop update of the stakeholder database where new contact information was available publicly or through the airport (e.g. operational airlines, newly elected MPs/MSPs).
- Issued two emails to all Stage 1 stakeholders asking them to confirm that they remain the relevant contact or, alternatively, confirm a replacement contact.
- Endeavoured to establish a replacement contact within an organisation if required (e.g. where stakeholders asked to be removed from our database or if previous contacts were generating failed delivery notices, and there was no other organisational contact in our database).
- Mapped qualified stakeholders against our stakeholder categories (as outlined in Appendix C of CAP1616 for Stage 1B engagement and the CAA's engagement plan template), to ensure all stakeholder categories had active contacts that could participate in engagement.

Regardless of whether Stage 1 stakeholders had confirmed if they were the appropriate contact, all Stage 1 stakeholders were retained in our Stage 2 database and received correspondence throughout the Stage 2 process. Evidence of this exercise and engagement is available in Appendices A and C.

The only stakeholders that were removed from engagement and from our database were those that requested to be removed or those contacts that were consistently generating failed delivery notices. In the latter case, we endeavoured to establish an alternative contact for the organisation.

Moreover, while it is not anticipated by the CAA that key impacted audiences will be identified at Stage 2A, it became apparent during the options development process that the geographical area that could potentially be affected by future changes was larger than previously anticipated. No new local authority areas were affected, but six new community councils were invited to participated in Stage 2 engagement as a result of this evaluation. These are highlighted in Appendix A.

In line with CAP1616, Aberdeen Airport intends to bring stakeholders on the ACP journey. Using the methods and approach to stakeholder identification and qualification outlined above, Aberdeen was able to ensure that every effort was made to involve as many Stage 1 stakeholders as possible in Stage 2, and re-engage them ahead of future stages.

Overview of our approach to engagement

Methodology

Our approach to engaging stakeholders is based on the Inform, Listen and Adapt model:

- *Inform* stakeholders of the background, drivers, issues, and opportunities associated with the ACP and the factors that influence options development as outlined in the Design Principles.
- *Listen* to the feedback from stakeholders about the options development process and if it has been guided by the Design Principles.
- *Adapt* the Comprehensive List of Design Options if stakeholder feedback indicates that this is necessary.

CAP1616 makes it clear that the CAA is not seeking detailed discussion on the plusses and minuses of individual design options at Step 2A. Rather, it is looking for sponsors to test their hypotheses with stakeholders, with a view to ensuring the design principles have been met as far as possible.

As such, it was important that we delivered an engagement process that mitigated against the potential for detailed commentary on individual options, and instead promoted reflection on the approach to options development. To achieve this, we held ‘briefing sessions’ offering appropriate time for feedback and Q&A, as opposed to a workshop style session.

Maximising participation

We hosted four briefing sessions in total during March and April 2022. One of these sessions was specific to airline and general aviation stakeholders, and the other three were open to all stakeholders. One of the all-stakeholder briefing sessions was held in-person, while the other three sessions were hosted online.

We decided to hold a separate airline and general aviation briefing session, to provide a forum for these stakeholder groups to raise questions that are of particular interest/relevance to their community.

Stakeholders could sign up to attend a briefing session through Aberdeen Airport’s dedicated ACP website, or by emailing or phoning the ACP engagement team. We aimed to maximise participation in the briefing sessions using the following measures:

- Issued an initial invite via email to all stakeholders four weeks in advance of the first session.
- Issued a reminder to register via email to all stakeholders three weeks in advance of the first session.
- Followed up by telephone contact with qualified stakeholders for whom we had contact phone numbers.
- Mapped registrants against our stakeholder categories, and continued follow up contact with organisations of any stakeholder categories that were under-represented.

All stakeholders listed as Stage 2 stakeholders in Appendix A were invited to the engagement sessions. The attendees at each briefing session are outlined in Table 8 - Table 11.

Table 8 Attendees at briefing session 1 (22 March 2022)

Airtask Group Ltd	GATCO
British Gliding Association	NATS Aberdeen
Deeside Gliding Club	Udny Community Council

Table 9 Attendees at briefing session 2 (24 March 2022)

Alexander Airflight Training	KLM
Association of Remotely Piloted Aircraft Systems	Loganair
Babcock	Ministry of Defence (MOD)
Bridge of Don Community Council	NATS Aberdeen
Bristow Helicopters	NHV Helicopters
British Helicopter Association	RAF Lossiemouth
Cabro Aviation	Signature Flight Support
CHC-Scotia	

Table 10 Attendees at briefing session 3 (31 March 2022)

Aberdeen City Council	NATS Aberdeen
Aberdeenshire Council	Nestrans
Bristow Helicopters	North Kincardine Community Council
Cabro Aviation	Offshore Energies UK
Eastern Airways	West Atlantic
easyJet	Edinburgh Airport
Environmental Protection Scotland	Ministry of Defence

Table 11 Attendees at Airline/GA briefing session (12 April 2022)

Alexander Air	Offshore Energies UK
British Helicopter Association	Offshore Helicopter Services UK
easyJet	

Engagement with MPs and MSPs

We took the decision to engage with MPs and MSPs on a separate one-to-one basis, as we did in Stage 1. This was to account for the fact that these stakeholders represent multiple communities, possibly with conflicting interests. In total, Aberdeen Airport representatives met with one local parliamentarian:

- Kirsty Blackman MP (SNP, Aberdeen North)

Stage 2A briefing sessions and stakeholder feedback

Overview of briefing sessions

During the briefing sessions, stakeholders were given a presentation on the background to Aberdeen Airport's ACP to date and the approach to options development. They were also presented the options themselves, as well as information on possible changes to the Controlled Airspace Volume. At the time of the briefing sessions, seven options were under consideration and stakeholders had an opportunity to ask questions on all of them. They were also informed about the next steps in the process, including how to provide feedback on whether our initial Comprehensive List of Design Options is aligned with the Design Principles.

Participants had opportunities to ask questions throughout the presentation, as well as at the end of the presentation. During the online briefing sessions, questions could either be typed in a Q&A box or asked verbally. All responses to questions were provided verbally to ensure a full answer, and stakeholders were encouraged to follow up over email or telephone if they required more information.

The presentation slides can be found in Appendix F. Table 12 outlines the questions asked during the briefing sessions and Aberdeen's responses to those questions.

Table 12 Questions asked and answers provided during Step 2A briefing sessions

Question	Answer
The AMS is under review; which version are you talking about?	The official AMS at this time is as documented in CAP1711 – Dec 2018.
Will the conventional approaches be withdrawn?	The ILS/DME and LOC/DME approaches will remain in use and it is expected they will remain the preferred approach even after implementation of the RNP APCHs. AIAL have not yet determined whether the VOR/DME and NDB/DME procedures will also remain.
Will these enhancements that you're trying to make increase or decrease the minima?	We would expect the RNP APCHs to provide better (lower) minima than LOC/DME, VOR/DME and NDB/DME but would expect ILS/DME to still provide better minima than RNP APCH.
You seem to be only considering a straight-in approach not a curved final approach segment rolling out at 500ft. Would you be looking to utilise RNP-AR approaches?	Approaches such as RNP-AR 'rolling out at 500ft' are a useful tool for some scenarios such as to enable access to aerodromes where other approaches are not viable, or to position flight paths over water etc. In the case of Aberdeen they would result in very low overflight of new communities and would therefore only be considered if there was an overriding need which there isn't at this time.

Are Point In Space (PiNS) helicopter being considered?	No. Point in Space procedures are considered to benefit IFR helicopter operations to landing sites and heliports where no other form of IFR procedure exist. Aberdeen Airport has multiple IFR options suitable for both fixed and rotary operations, therefore the development for PinS would have limited benefit to the operation at this time.
Will there be limited use of RNP due to continuing with membership of the European Galileo and EGNOS programmes following the UK's decision to leave the European Union?	Lack of EGNOS means that the LPV line of minima is not available however LNAV and LNAV/VNAV procedures are still available without EGNOS.
Is this primarily going to be an RNP to the final approach fix, then the continuation of an ILS approach, as opposed to an RNAV to LNAV minima?	No these are full RNP Approach procedures with LNAV and LNAV/VNAV minima that will not use the ILS.
The options don't provide a suitable curved approach for traffic from the east to RWY 16 – helicopters generally arrive from the northeast.	As the helicopters normally arrive from the NE, positioning onto a curved approach to RWY 16 was not thought to be helpful as we would expect the T Bar to be used in this instance. However, we will develop another option for Curved Approaches from the East to RWY 16 for formal consideration.
Would you consider making the ACP a TMZ to enable the drone industry	No, this ACP is to introduce RNP APCH procedures and do reduce Aberdeen's reliance on conventional navigation, as set out in our Statement of Need.
LHR has trialed, and now have permanent, slightly steeper 3.2˚ RNAV approaches. Has this been considered?	We are seeking feedback from industry on whether 3.2˚ approaches are viable into Aberdeen and then AIAL will consider the relative benefit of such an approach angle, given the relatively low frequency of use expected.
Do you take account of planning permissions and new developments?	Yes, CAP1616 requires sponsors to have regard for local plans/Local Development Frameworks and to try and take account of future building developments
Will the PBN system be capable of tracking large commercial RPAS aircraft currently used in the north sea for methane detection?	No, these PBN approaches are a navigation system, not a surveillance system.
Will the changes impact Remote Controlled aircraft including drones around the field?	We do not expect these approaches to affect Aberdeen Aeromodellers Flying Club in Banchory Devenick although this will need to

	be confirmed prior to implementation. The new approaches will also need to be considered when the airport considers requested for Drone operations.
If you're approaching from the north onto Runway 16, could you be cleared to go directly to the final approach fix rather than one of the T-bars?	In this scenario, if traffic conditions allow, ATC would direct you to the Initial Fix which will be aligned with Final Approach, ahead of the final approach fix rather than to a T-Bar.
We use safeguarding maps to determine when we consult with airport on new developments and all kinds of planning applications, will this airspace change process change the criteria that we might use for consulting the airport and if so will it be more onerous or less onerous?	We would not expect these approaches to change the method used by Local Authorities but they could have an impact on the Coloured Square safeguarding maps. If this is the case, those maps would be updated and re-issued to local authorities.

Whilst most of these questions sought clarification, the sessions did result in an additional option being developed.

Generating further feedback

Aberdeen Airport wanted to ensure that all stakeholders had an opportunity to provide feedback on its options development process, regardless of whether or not they had attended one of the briefing sessions. We achieved this by making all the relevant information (presentation slides, Design Principles and the Comprehensive List of Design Options) and a recording of one of the briefing sessions available to view on Aberdeen's dedicated ACP website. This enabled stakeholders to submit informed feedback, even if they did not attend a live briefing session.

All stakeholders in our database received an email after the briefing sessions asking them to submit feedback via an online feedback form, regardless of whether or not they had attended a briefing session. We also offered to post hardcopies of the feedback form or email Microsoft Word versions if required. No such requests were received.

To ensure that we heard from as many stakeholders as possible, we used the following methods to maximise the response rate:

- Issued an email to all stakeholders explaining how they can provide feedback (including stakeholders that did not attend a briefing session).
- Issued a reminder email to all stakeholders asking them to provide feedback (including stakeholders that did not attend a briefing session).
- Provision of briefing session materials and recording of the briefing session on a dedicated Aberdeen ACP website.
- A dedicated Aberdeen ACP email address and freephone information line to encourage and coordinate correspondence.

- Bilateral engagement between the sponsor and individual stakeholders where this was requested.
- Extended the feedback window from four weeks to five weeks to encourage additional stakeholders to provide feedback (an additional reminder email was issued).

In total, 17 organisations provided feedback on Aberdeen Airport's approach to options development. The feedback form and all the responses from stakeholders are provided in Appendix D.

The following sections summarise the feedback received and provide responses to that feedback.

After the feedback period closed, we issued correspondence to all stakeholders (including those who did not attend the briefing sessions) to outline the next steps in the ACP process.

Stakeholder engagement log

Table 13 sets out the chronology of the engagement activities conducted to develop our design principles. A full engagement log that records all forms of engagement with our stakeholders during the course of the engagement is provided in Appendix B, with copies of all of the correspondence in Appendix C.

Table 13 Chronology of engagement activities

Engagement activity	Date
ACP restart	May 2021
Email issued to all Stage 1 stakeholders advising of restart to Aberdeen's ACP	30th September 2021
Email issued to all Stage 1 stakeholders asking them to confirm or nominate a point of contact for their organisation	21st January 2022
Email issued to all Stage 1 stakeholders reminding them to confirm or nominate a point of contact for their organisation	3rd February 2022
Invite to Stage 2 briefing sessions issued to all stakeholders	14th February 2022
Reminder to register for Stage 2 briefings sessions issued to all stakeholders	1st March 2022
Invite to meet issued to MSP/MPs	1st March 2022
Invite to Stage 2 briefing sessions sent to new community councils	11th March 2022
Pre-reading materials sent to all stakeholders registered to attend Stage 2 briefing sessions	16th March 2022
Briefing session #1 (in-person)	22nd March 2022

Follow up email sent to stakeholders who attended briefing session #1	23rd March 2022
Briefing session #2 (online)	24th March 2022
Follow up email sent to stakeholders who attended briefing session #2	25th March 2022
Invite to Airline/General Aviation briefing sessions issued to Airline and General Aviation stakeholders.	28th March 2022
Briefing session #3 (online)	31st March 2022
Follow up email sent to stakeholders who attended briefing session #3	1st April 2022
Reminder to register for Airline/General Aviation briefing session issued to Airline/General Aviation stakeholders	5th April 2022
Airline/General Aviation briefing session (online)	12th April 2022
Follow up email sent to stakeholders who attended Airline/General Aviation briefing session	12th April 2022
Email issued to all stakeholders (including those who did not attend the briefing sessions) providing briefing session materials and inviting feedback	14th April 2022
Email issued to all stakeholders reminding them to submit feedback	28th April 2022
Email issued to all stakeholders reminding them to submit feedback	9th May 2022
Initial feedback deadline	13th May 2022
Email issued to all stakeholders to inform them of extended feedback deadline	16th May 2022
Second feedback deadline	23rd May 2022
Email issued to all stakeholders informing them of next steps	30th May 2022

In total, 17 organisations provided written feedback on AIAL's approach to options development. All the responses from stakeholders are provided in Appendix D.

The following sections summarise the feedback received and provides responses to that feedback.

Community, Tourism and Local Government Stakeholder Feedback

Aberdeen Airport received written responses from 2 community stakeholders. Full copies of all the feedback received is at Appendix D.

Table 14 Summary of Stage 2A Community feedback

Stakeholder	Summary of Feedback	Aberdeen Response
Aberdeenshire Council	The online presentation of the engagement process was useful as was the ability to re-watch the presentation. Presentations were clear and there was plenty of opportunity to ask questions.	N/A
Bridge of Don Community Council	No further comments.	N/A

Industry Stakeholder Feedback

Aberdeen Airport received written feedback from 12 industry stakeholders. Full copies of all the feedback received is at Appendix D.

Table 15 Summary of Stage 2A Industry feedback

Stakeholder	Summary of Feedback	Aberdeen Response
British Gliding Association	Welcomes the proposal to increase the base of part of CTA3 that is adjacent to Deeside Gliding Club at Aboyne to 4500ft but higher would be better. Please could the ACP process look at the actual requirement for the base of this airspace bearing in mind modern aircraft performance and the desire to avoid level sectors in both arrivals and departures, and taking into account the shift in traffic away from P600 and on to P18 (Tay CTA), so that the airspace is the minimum required to satisfy the design requirements and ATC needs.	We analysed a sample of Radar, PlaneFiunder and 360Radar data to understand usage of the airspace and the outcome was there are existing profiles into and out of Aberdeen at 5000ft+. However in Stage 3 we will use a larger data set to re-analyse the usage of CTA3 to see if any enhancements on 4500ft (vertically or laterally) can be made. Note that since the presentation we gave to stakeholders which highlighted NERL's ACP to increase the usage of P18, NERL have since withdrawn that ACP. We therefore do not expect a reduction in the use of P600.

Stakeholder	Summary of Feedback	Aberdeen Response
British Helicopter Association	No comment	N/A
MoD (DAATM)/RAF Lossiemouth	No issues with the options. The ACP team liaised directly with RAF Lossiemouth as well as DAATM, which was nice to see.	N/A
West Atlantic UK	A 3.2 Approach would be achievable but is not the preferred option.	Noted
Offshore Helicopter Services Ltd	A curved approach to RW16 from the East duplicating the proposed one from the West would be worth considering.	We will create this additional option for consideration.
Alexander Air Ltd	A 3.2 Approach is feasible. Can the base of CTA1 be raised to 2000ft. T Bars/Curved Approaches are preferable.	Comment on TBAR/Curved approaches noted. Reference raising of the base of CTA1 to 2000ft, we investigated this in detail but is considered not viable due to: • The RWY 16 LOC/DME and VOR/DME procedures require descent to 2300ft within CTA1 meaning they would not be contained at least 500ft above the base of CAS. • Helicopters are vectored in CTA 1 at 2300ft (West side) or 2000ft (East side). A base raise to 2000ft means the minimum vectored level would be 2500ft. The heli's normally cruise at 2000ft so when being vectored for an IFR approach fixed wing arrivals can be descended on top to 3000ft. With a higher base, heli's would need to climb to 2500ft with Fixed wings descending to 3500ft resulting in a longer final and increased chance of level off (loss of CDA). Heli's often report icing when climbed above 2000ft.

Stakeholder	Summary of Feedback	Aberdeen Response
Air Task	A 3.2 Approach is achievable. Would welcome the release to some existing controlled airspace.	Noted
Deeside Gliding Club	Welcomes the proposal to increase the base of part of CTA3 that is adjacent to Deeside Gliding Club at Aboyne to 4500ft but higher/a larger area would be better.	As per BGA response.
easyJet	No real concerns with a 3.2˚ approach but it is better practice to keep the approaches aligned with the PAPI's.	Noted.
Eastern Airways	A 3.2 Approach is achievable.	
GATCO	The designs and changes should be made as simple as possible for air traffic control who will be the ones implementing these procedures and changes and having to work around them. They should aim to reduce controller workload not increase it by increasing complexity or adding extra traffic into or around the airspace. There are far more civil movements than GA or gliding in the area. The civil movements should always take priority due to much larger numbers of passengers if something went wrong. We should always act with caution and restraint when reducing the airspace civilian aircraft operate in.	Noted however we will be looking to release CAS back to Class G where it is obviously underutilised, especially in areas where GA would benefit so long as it is safe to do so.

Stakeholder	Summary of Feedback	Aberdeen Response
Association of Remotely Piloted Aircraft	Supports steeper approaches. DP9 – “Options shall not reduce and where possible enhance the air traffic movement capacity of Aberdeen Airport”. Without a means to enable drone operations - how is that increasing the ATC movement capacity and/or offering options. EASA’s Vertiport Design Principles should be considered before defining an ACP.	Integrating drone operations into Aberdeen Airport or building Vertiports is not within scope of this ACP. The scope is set out in the Statement of Need.

Interdependent ACP sponsor feedback

Aberdeen Airport received written feedback from NATS, Edinburgh Airport and Glasgow Airport. Full copies of all the feedback received is at Appendix D.

Table 16 Summary of Stage 2A NERL, GLA and EDI feedback

Stakeholder	Summary of Feedback	Aberdeen Response
Edinburgh Airport	The presentation was excellent and understandable. The design principles seem straightforward and you have covered them all.	N/A
NERL	No Impact to PC operations anticipated but please note at this stage this response does not necessarily constitute NATS support of the airport ACP	Noted.
Glasgow Airport	In response to the Aberdeen Airport Stage 2A engagement to date, I can confirm that there appears to be no interdependencies or impact on Glasgow Airport below 7000ft.	Noted

In addition to the engagement above, we have also taken part in a number of technical working groups and bilateral workshops with ACOG, NERL and NATS Aberdeen ATC. A list of these technical meetings is at Appendices B and C. Technical working groups and Programme co-ordination meetings allow sponsors within the STMA regional cluster to discuss timelines, risks, deployment strategies, Masterplan integration as well as CAP1616 interpretations and different methodologies to meet CAP1616 requirements. The bilateral workshops were focussed on sharing their ACP design options (where available) to understand the level of interactions and dependencies that exist. In the case of Aberdeen, so far adjacent designs have not driven a change to designs being considered.

Response to Stakeholder Feedback

Our options development process, specifically its alignment with the Design Principles, was thoroughly tested through engagement with and feedback from a wide range of stakeholders that are potentially affected by the airspace change. The briefing sessions that we organised brought together a mix of representatives from different backgrounds and with different interests. All the sessions were attended by airport staff, technical specialists, and third-party facilitators to ensure that our engagement was effective.

We would like to thank all stakeholders that gave their time to consider the issues and opportunities associated with the airspace change and share their views on the options development process. We feel that the engagement has allowed us to thoroughly test our approach to options development to ensure it is aligned with the Design Principles.

We understand that there will never be unanimous agreement on all the airspace design options. As can be seen above, one piece of feedback was received that directly influenced the Comprehensive List of Options. This is to include an additional curved approach to Runway 16 from the East. We also investigated the suggestion to raise CTA1 to 2000ft with ATC, however this was not viable for the reasons articulate in Table 15 above.

Aberdeen's Comprehensive List of Options is set out in the next section. The route centrelines and/or CAS boundaries used for the illustration of the options will inform the DPE and IOA. However, they could move as options are refined throughout the ACP. Adjustments are likely to be very minor, given the nature of the RNP Approaches but there could be changes to T-BAR/Curved approach positions on the basis of integration with the wider airspace network below and above 7,000ft, reacting to ongoing stakeholder engagement, increasing environmental and operational performance and in accordance with more detailed IFP design and validation in Stages 3 and 4.

AIAL’s Airspace Design Options at Stage 2A

This section sets out AIAL’s Comprehensive List of Options at Stage 2A of the Airspace Change Process. Each option has a description of what it is trying to achieve and, for the purposes of enabling stakeholder engagement so far and allowing for analysis in the Initial Options Appraisal, provisional route centrelines. However, those route centrelines or CAS boundaries could move as options are refined throughout the project. Refinement will be on the basis of integration with the wider airspace network below and above 7,000ft, reacting to stakeholder engagement, increasing environmental and operational performance and in accordance with more detailed IFP design and validation in Stages 3 and 4. This refinement could potentially include merging some elements of different options into a final design solution if that is considered to provide greater benefit to Aberdeen Airport, their stakeholders and/or the wider FASI programme.

As described in the Stakeholder engagement section, Aberdeen has a series of different options broken down into the following categories:

- Runway 16 Arrival Options
- Runway 34 Arrival Options
- Options for CAS release

RWY 16 Do Nothing

This option represents the do-nothing scenario for AIAL's ACP. More detail on the baseline is described in the section above.

Figure 19 below shows the swathes (yellow) of a week of fixed wing arrivals to Aberdeen's Easterly runway (16). There are no published centrelines flown other than on final approach and therefore all arrivals are vectored by ATC onto a closing heading to establish on the Localiser. Typically, aircraft are joining final approach between 8 and 12nm from touchdown although there are variances to this.

No departure tracks are shown in this image as they are not within scope of the ACP. Aberdeen's existing Class D airspace structures are shown in black.

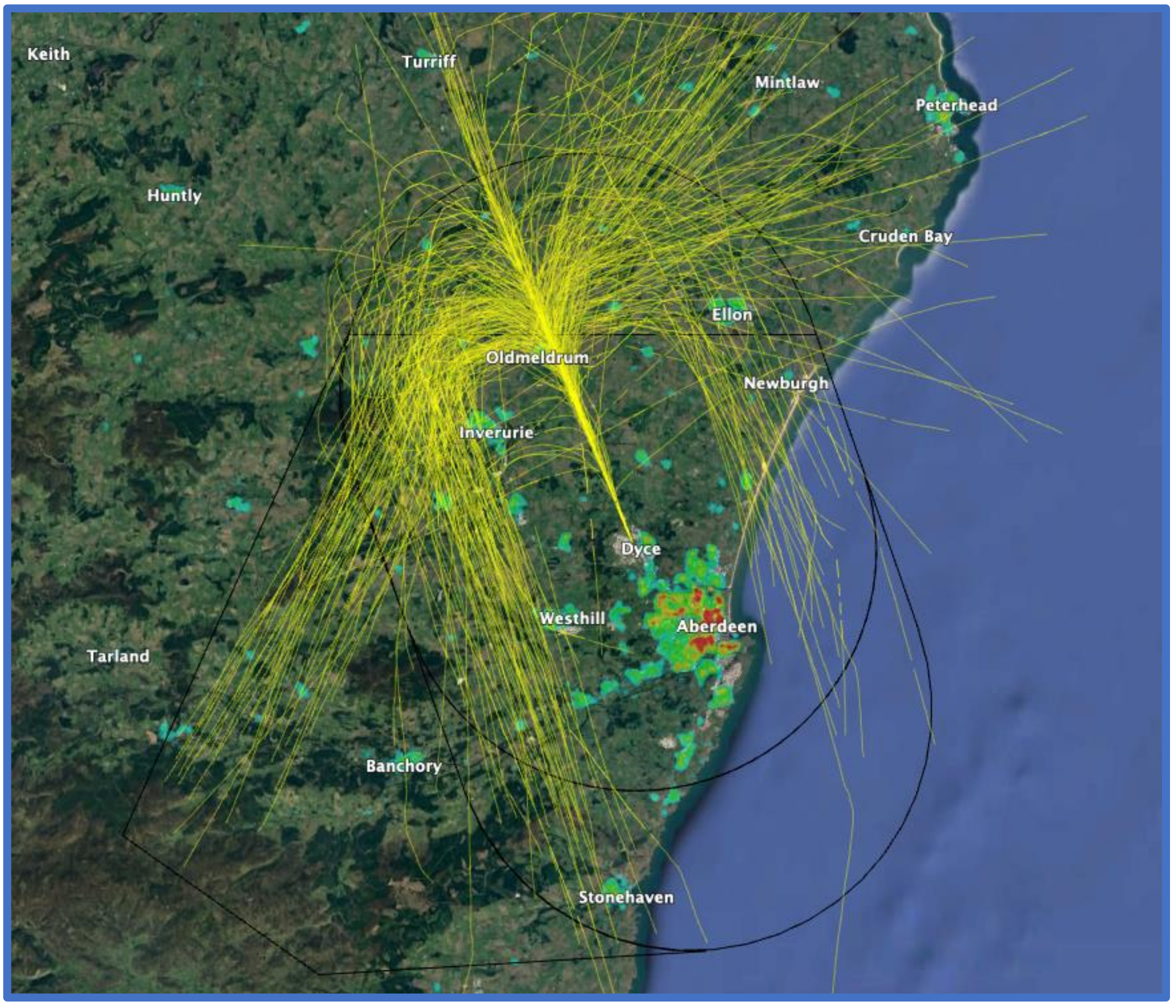

Figure 19 Existing arrival swathes (yellow) against Class D CAS boundaries (black) to Aberdeen's Easterly runway

Runway 16 Arrival Option 1 – Vectors to Final Approach

This option would continue to see those arrivals wishing to fly an RNP APCH vectored to final approach as they are today. The only difference would be whereas with the ILS, the arrivals have flexibility in where they join final approach from 8nm and beyond, RNP APCH arrivals would be vectored to join final approach in the same location, at the Initial Fix (IF). The IF in the illustration in Figure 20 has been positioned so those arrivals would join final approach at approximately 8nm.

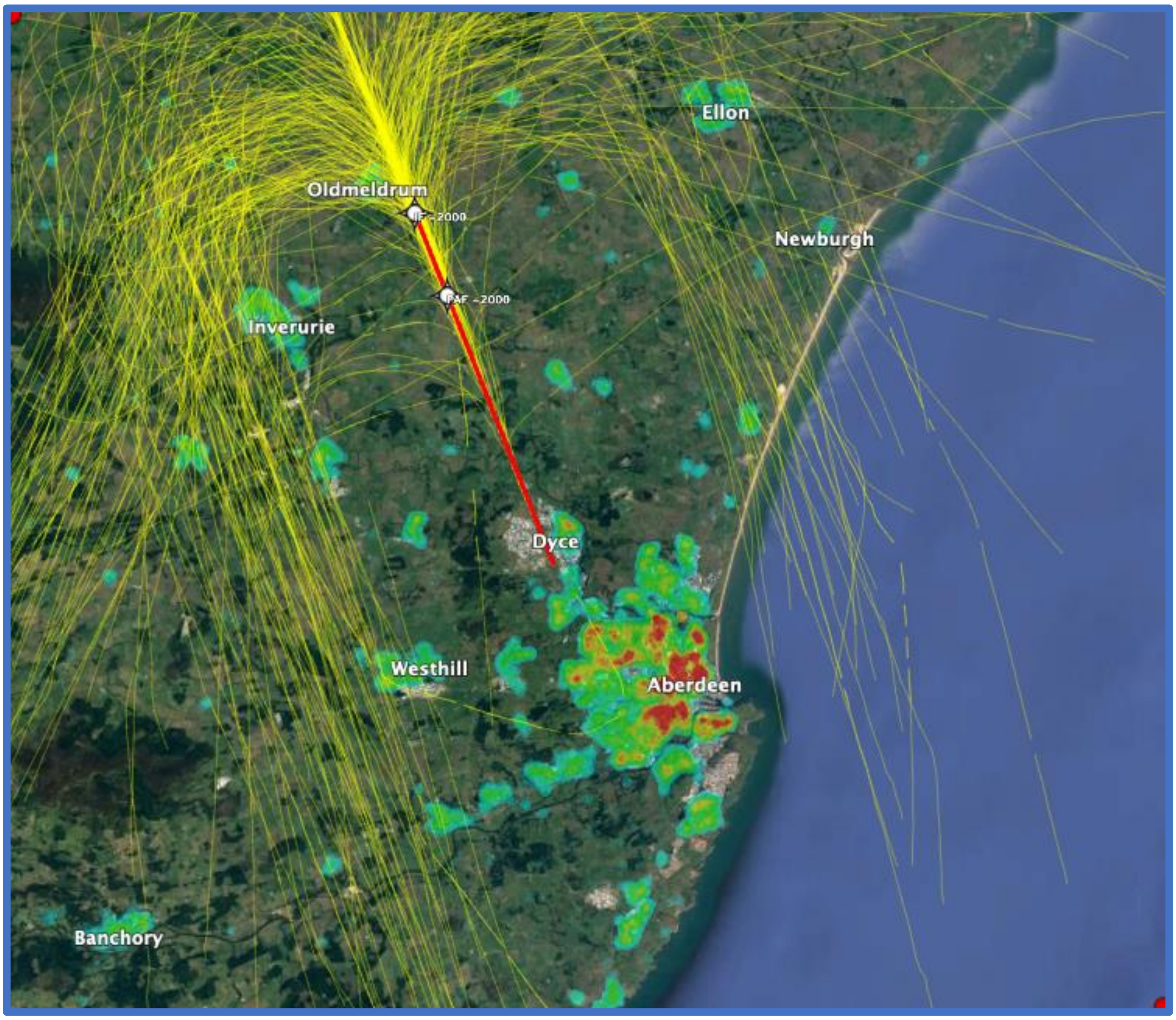

Figure 20 Option 1 Vectors (yellow) to Final Approach (red).

Runway 16 Arrival Option 2 – Inner T Bar

This option would see those arrivals wishing to fly an RNP APCH vectored towards an Initial Approach Fix (IAF) positioned on base-leg from either side of final approach. The IAFs in the illustration in Figure 21 have been positioned to minimise track miles flown but still aim to be within the most frequently overflown part of the existing arrival swathe, consistent with an 8-9nm final. As a result, the tracks between the IAFs and Final Approach (the ‘T-Bars’) overfly the communities of Oldmeldrum and Tarves.

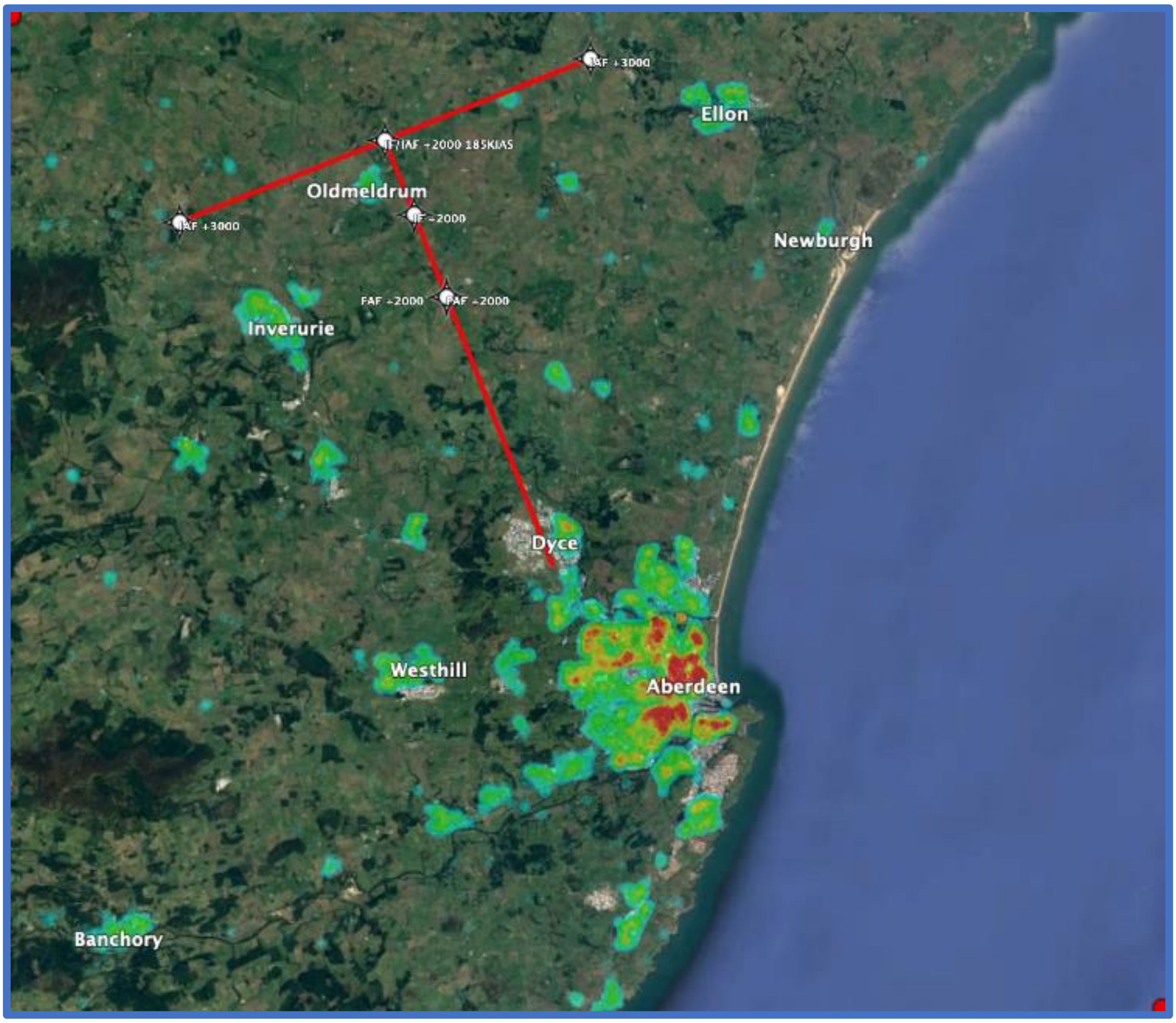

Figure 21 Option 2 Vectors to closer T BAR (red).

Runway 16 Arrival Option 3 – Outer T Bar

This option would see those arrivals wishing to fly an RNP APCH vectored towards an Initial Approach Fix (IAF) positioned on base-leg from either side of final approach. The IAFs in the illustration in Figure 22 have been positioned to reduce overflight of the communities of Oldmeldrum and Tarves although still within the existing arrival swathe, consistent with a 9-10nm final.

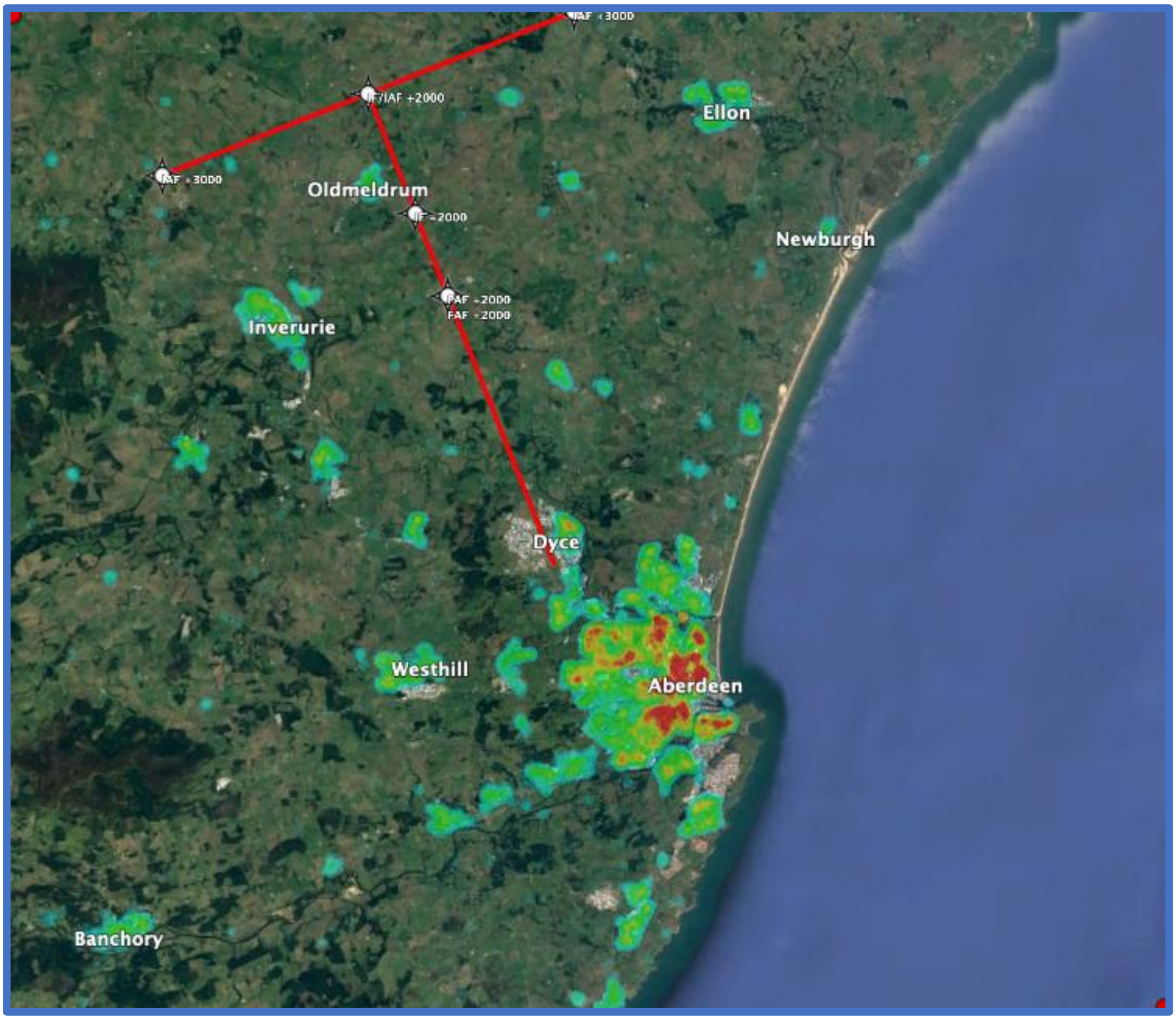

Figure 22 Option 3 Vectors to outer T BAR (red).

Runway 16 Arrival Option 4 – Curved Approach from the West

This option would see those arrivals wishing to fly an RNP APCH that were also equipped with 'Radius to Fix' (RF) functionality vectored towards an Initial Fix (IF) positioned downwind to the West of final approach. The RF allows aircraft to fly in an arc of fixed radius around a point, direct to the Final Approach Fix (FAF), enabling shorter track miles and CO_2 reduction. The tracks in the illustration in Figure 23 have been positioned to try and route between Kemnay, Kintore, Inverurie and Oldmeldrum. Note however that those communities could still be overflown according to the CAA definition of overflight, but the concentration enabled by RF would mean aircraft would very accurately fly around the arc onto final approach. Those communities are currently overflown by arrivals, but the curved path is not within the main arrival swathe on base leg and therefore communities could be expected to experience a change in frequency overflight.

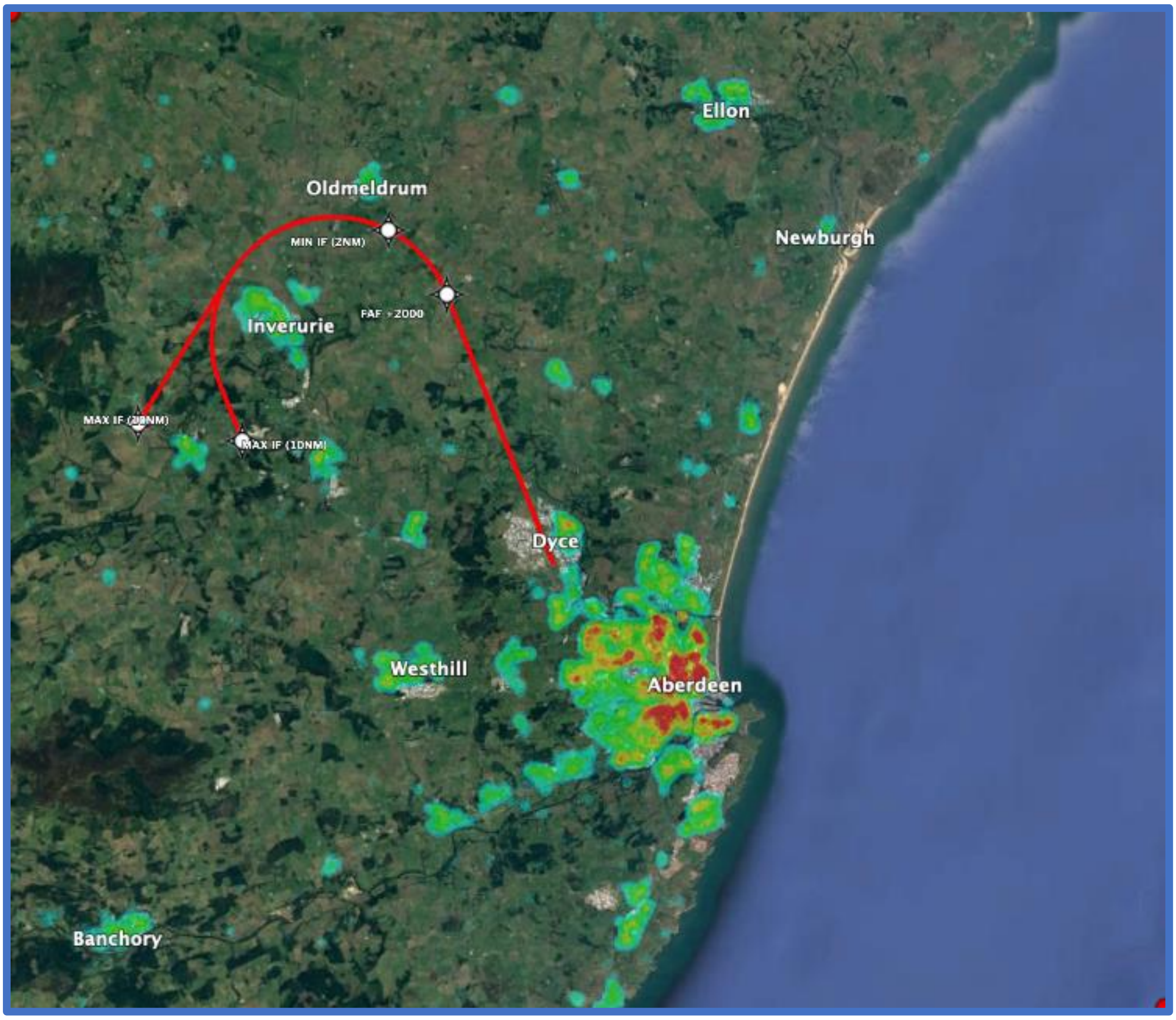

Figure 23 Option 4 Vectors to a curved, shorter arrival from the West (red).

Runway 16 Arrival Option 5 – Curved Approach from the East

This option was suggested by Stakeholders during our engagement. It would see those arrivals wishing to fly an RNP APCH that were also equipped with 'Radius to Fix' (RF) functionality vectored towards an Initial Approach Fix (IAF) positioned downwind to the East of final approach. The RF allows aircraft to fly in an arc of fixed radius around a point, direct to the Final Approach Fix (FAF), enabling shorter track miles and CO_2 reduction. The tracks in the illustration in Figure 24 have been positioned to try and route between Ellon, Pitmedden and Tarves. Note however that those communities could still be overflown according to the CAA definition of overflight, but the concentration enabled by RF would mean aircraft would very accurately fly around the arc onto final approach. Those communities are currently overflown by arrivals, but the curved path is not within the main arrival swathe on base leg and therefore communities could be expected to experience a change in frequency overflight.

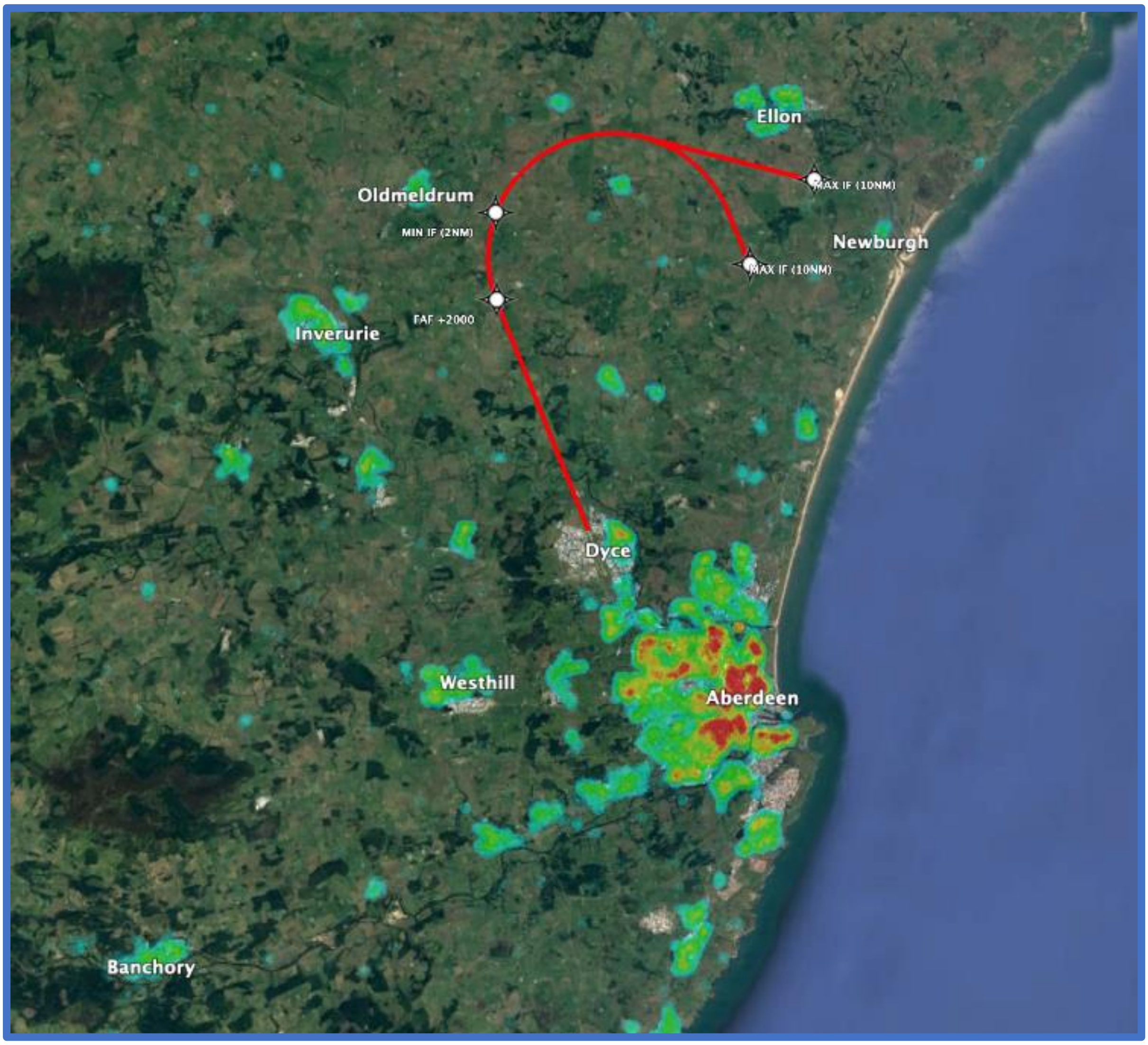

Figure 24 Option 5 Vectors to a curved, shorter arrival from the East (red).

RWY 34 Do Nothing

This option represents the do-nothing scenario for AIAL's ACP. More detail on the baseline is described in the section above.

Figure 25 below shows the swathes (yellow) of a week of fixed wing arrivals to Aberdeen's Westerly runway (34). There are no published centrelines flown other than on final approach and therefore all arrivals are vectored by ATC onto a closing heading to establish on the Localiser. Typically, aircraft are joining final approach between c.8nm and 12nm from touchdown although there are variances to this.

No departure tracks are shown in this image as they are not within scope of the ACP. Aberdeen's existing Class D airspace structures are shown in black.

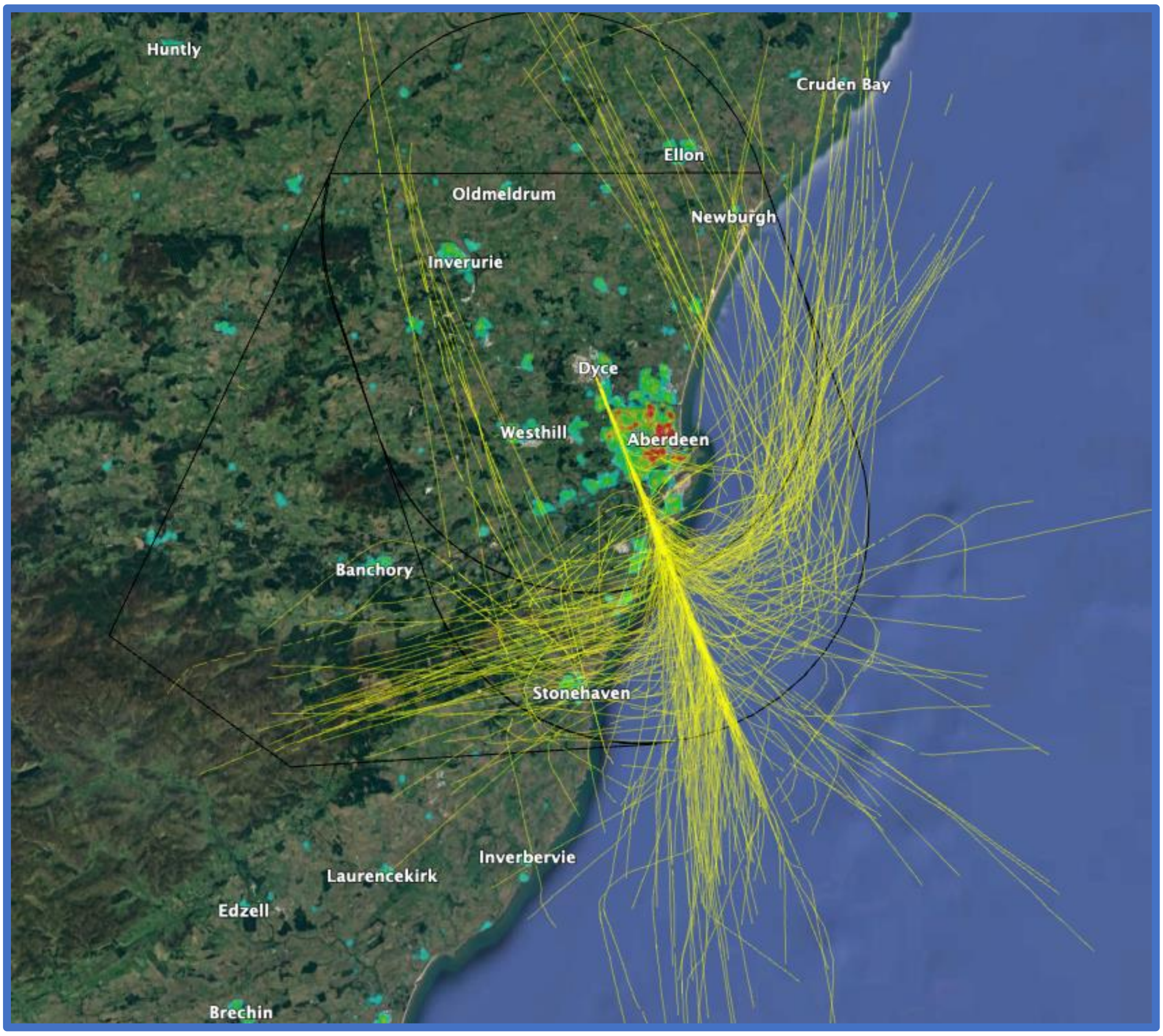

Figure 25 Existing arrival swathes (yellow) against Class D CAS boundaries (black) to Aberdeen''s Westerly runway

Runway 34 Arrival Option 1 – Vectors to Final Approach

This option would continue to see those arrivals wishing to fly an RNP APCH vectored to final approach as they are today. The only difference would be whereas with the ILS, the arrivals have flexibility in where they join final approach from c.8nm and beyond, RNP APCH arrivals would be vectored to join final approach in the same location, at the Initial Fix (IF). The IF in the illustration in Figure 26 has been positioned so those arrivals would join final approach at approximately 8nm, keeping the vectored arrival swathes consistent with the baseline.

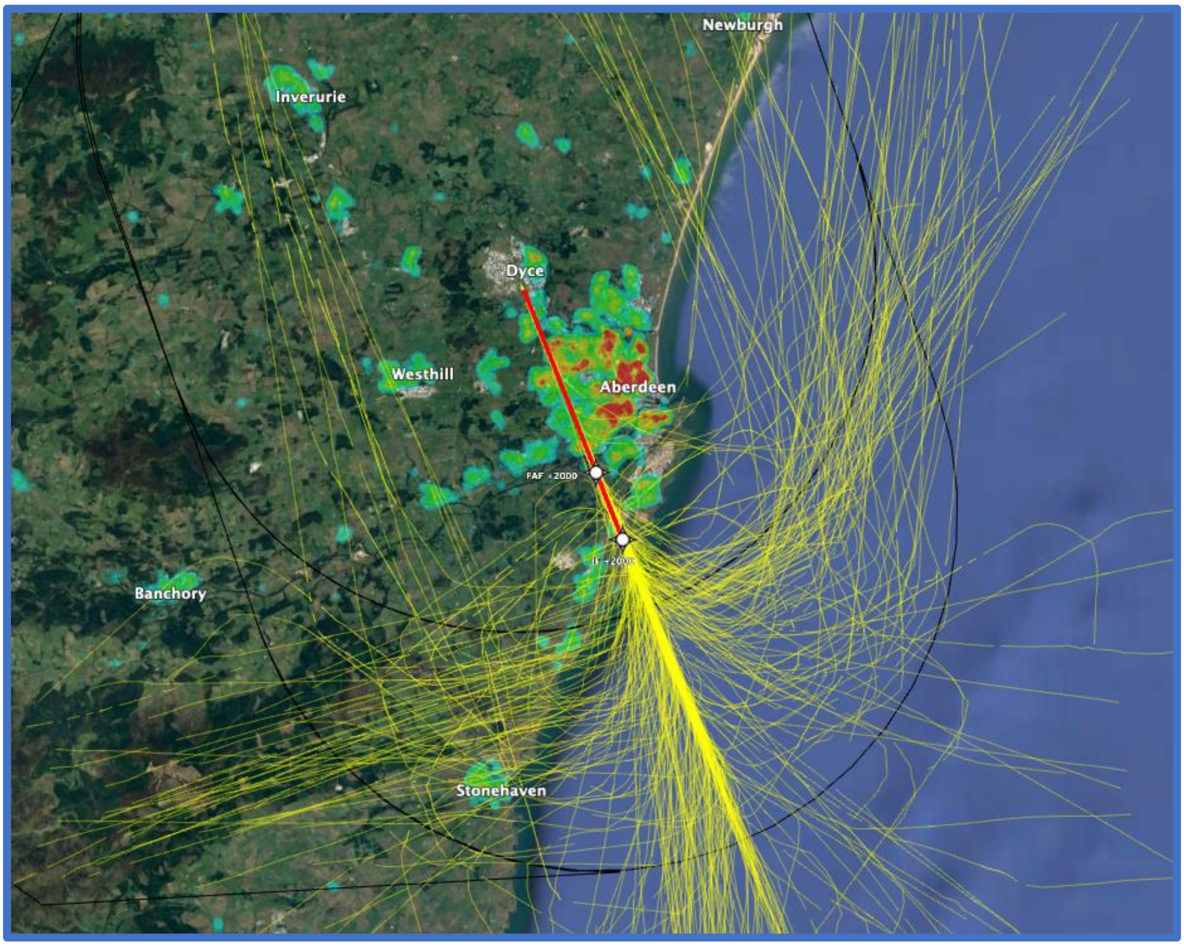

Figure 26 Option 1 Vectors (yellow) to Final Approach (red).

Runway 34 Arrival Option 2 – T Bar

This option would see those arrivals wishing to fly an RNP APCH vectored towards an Initial Approach Fix (IAF) positioned on base-leg from either side of final approach. The IAFs in the illustration in Figure 27 have been positioned to minimise track miles flown but still within the most frequently overflown part of the existing arrival swathe, consistent with an 8-9nm final. The T-Bars are predominantly over water, but Muchalls and Newtonhill would be expected to be overflown to a similar extent as in the baseline.

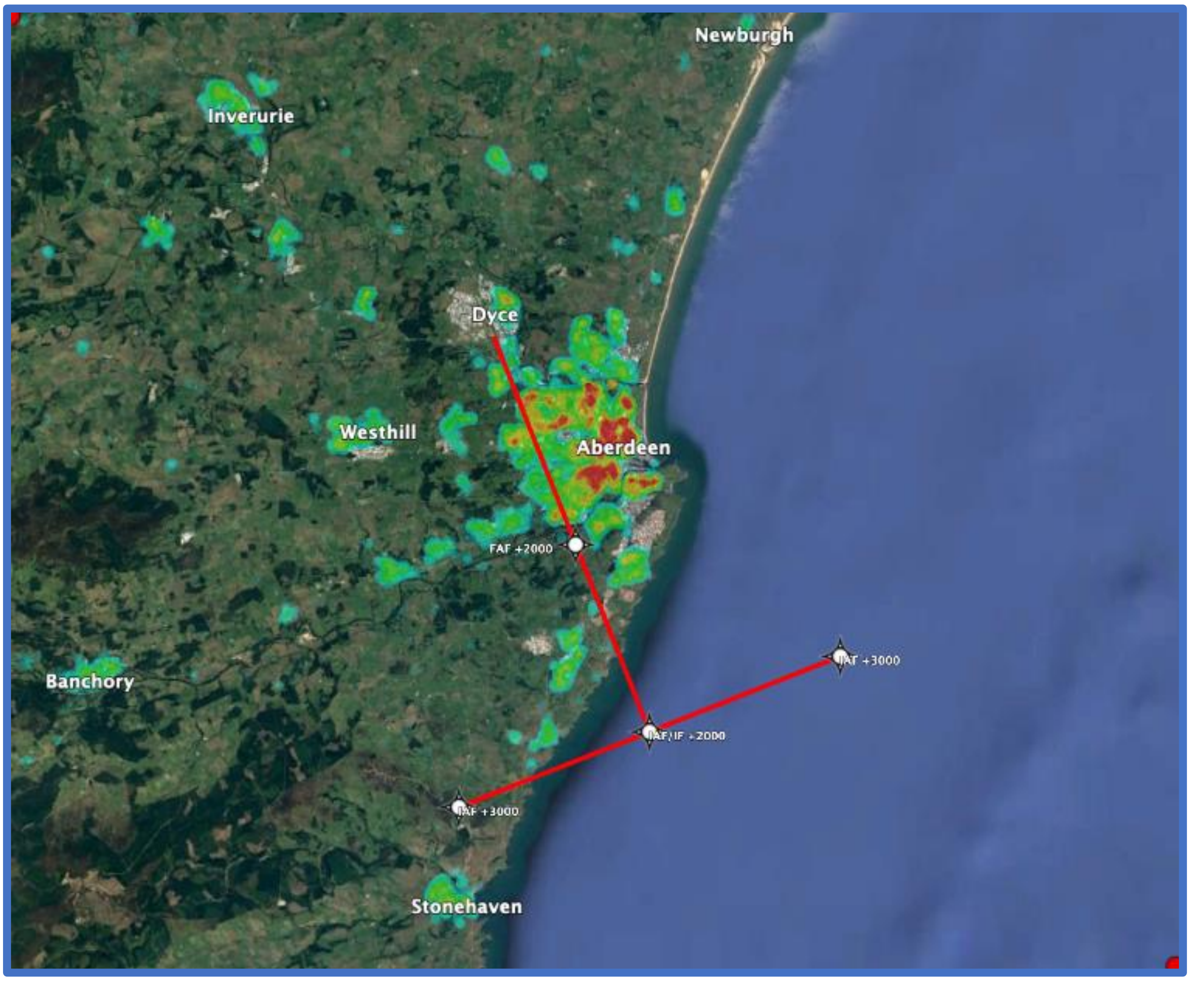

Figure 27 Option 2 Vectors to T BAR

Runway 34 Arrival Option 3 – Curved Approach from the East

This option would see those arrivals wishing to fly an RNP APCH that were also equipped with 'Radius to Fix' (RF) functionality vectored towards an Initial Approach Fix (IAF) positioned downwind to the East of final approach. The RF allows aircraft to fly in an arc of fixed radius around a point, direct to the Final Approach Fix (FAF), enabling shorter track miles and CO_2 reduction. The tracks in the illustration in Figure 28 have been positioned to be largely over water and then around Cove Bay. Note however that Cove Bay could still be overflown according to the CAA definition of overflight, but the concentration enabled by RF would mean aircraft would very accurately fly around the arc onto final approach. Those communities are currently overflown by arrivals, but the curved path is not within the main arrival swathe on base leg and therefore communities could be expected to experience a change in frequency of overflight.

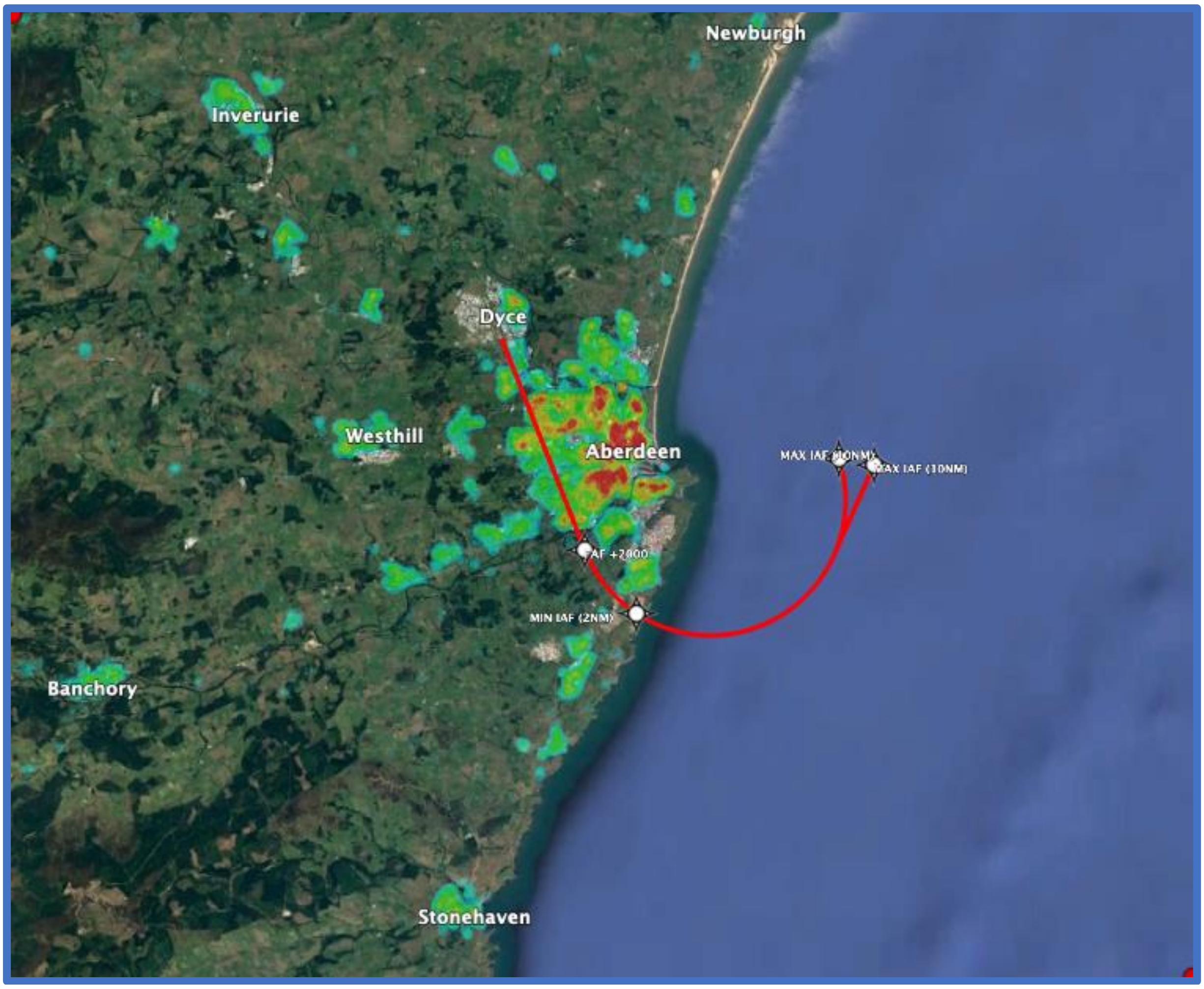

Figure 28 Option 5 Vectors to a curved, shorter arrival from the East (red).

A curved approach to RWY 34 from the West was considered but not generated owing to the extremely small number of flights arriving from the North West that this track would facilitate.

Controlled Airspace Release Option 1 – CTA 3

Analysis of surveillance data followed by conversations with Aberdeen ATC identified a section of CTA 3 which was underutilised. It is initially considered that the base of a SW portion of CTA 3 could be raised to 4,500ft without any negative impact on the operation.

Figure 29 below illustrates the section of CTA 3 that will be considered for a declassification from Class D to Class G.

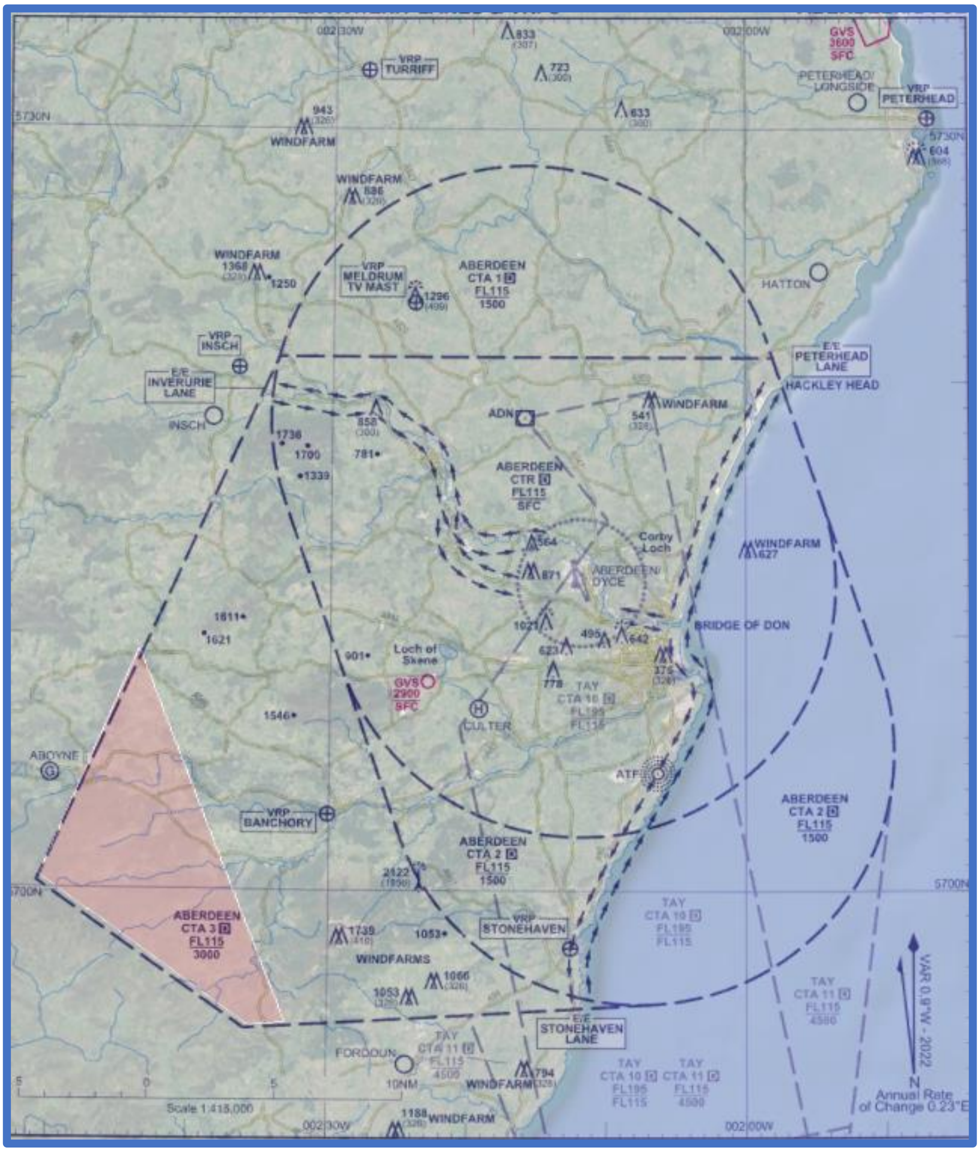

Figure 29 CAS option 1 – CTA 3

Other Procedures

Missed Approaches

These procedures are part of an Instrument Approach Procedure and enable aircraft to safely reposition for another approach under certain circumstances if they are unable to land from their first approach. This is a safe and routine part of operations for all pilots and controllers. There are many reasons for a pilot, or a controller, to initiate a missed approach. On average, there are around 35 Missed Approaches per month at Aberdeen, meaning that any environmental considerations are negligible.

Our new RNP Approaches will need Missed Approach procedures. We will look to replicate what happens today for the ILS Missed Approaches although there might be some subtle differences owing to the different design criteria.

After the Full Options Appraisal concludes and AIAL’s preferred options are chosen, we can then consider the Missed Approaches to support the safe operation of the design and include the considerations in the consultation material in Stage 3.

Slightly Steeper Approaches

Our 4th Design Principle is that design options should investigate the feasibility of steeper approaches for PBN arrivals to reduce the noise footprint of Aberdeen Airport’s operation.

Feedback from industry was that 3.2˚ approaches were viable although easyJet advised it is best practice to have the approach angle aligned with the Precision Approach Path Indicators (PAPIs) (which would remain at 3.0˚ for the ILS) and West Atlantic UK advised it was not preferred.

Steeper approaches can provide small noise benefits however the change in noise levels are so small they are not likely to be noticeable. Considering the relatively low percentage of arrivals expected to fly the RNP APCH, the noise benefits of a slightly steeper approach are expected to be negligible. These will be considered in the Initial Options Appraisal (IOA).

Alignment with the Masterplan

As set out in CAA's Assess and Accept Criteria, Sponsors will be unable to progress through the Stage 3 Gateway of the CAP 1616 process until the system-wide airspace design of the proposed options, and the cumulative impacts of those options, are represented in an accepted Iteration 3 of the masterplan. To generate Iteration 3, ACOG will require "granular data from ACP sponsors' 'full' options appraisals" and furthermore, Iteration 3 will not be accepted by the CAA until ACOG has published a draft of it and conducted a public engagement exercise on some of its content. Aberdeen will not be able to progress through Stage 3B without NATS, Glasgow and Edinburgh Airports if there are dependencies between the 3 sponsors. At this stage, there are no identified dependencies between the 4 ACPs. NATS ScTMA and Glasgow are all currently in Stage 3A with Edinburgh in Stage 2.

Masterplan Iteration 2 suggests an STMA cluster implementation date of Q4 2025.

Design Principle Evaluation

The Design Principle Evaluation involves taking all of the options developed and qualitatively evaluating them against the Design Principles to understand how they respond. This helps to determine which options best meet the design principles and therefore proceed to the next stage of the airspace change process.

As part of the Airspace Change Process at Stage 1B, AIAL developed a set of design principles with identified stakeholders. The aim of the design principles is to provide high-level criteria that the proposed airspace design options should meet. They also provide a means of analysing the impact of different design options and a framework for choosing between or prioritising options.

Design Principle Evaluation Methodology

At the DP Evaluation Stage, CAP1616 requires airspace change sponsors to qualitatively evaluate options against the design principles, and categorises each evaluation as either ‘met’, ‘partially met’ or ‘not met’.

In order to evaluate each option in a fair and transparent way, we have followed the methodologies set out in Table 17 DPE Methodology when evaluating against each design principle.

Table 17 DPE Methodology

#	Design Principle		Methodology Overview Approach to evaluation	Met	Partially Met	Not Met
1	The airspace design and its operation must be as safe or safer than today for all airspace users that are affected by the airspace change		Qualitative assessment will be undertaken by SME. The assessment will state any potential safety concerns and indicate if additional safety case mitigation may be required ahead of ACP submission.	The airspace design is expected to be as safe or safer than today with no safety concerns at this time	The airspace design is anticipated to be safe however additional work is required to generate an acceptable safety case	Acceptable safety assurances are not likely to be met and therefore option discounted
2	Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it.	Maintain and enhance high aviation safety standards	There are 5 known outcomes, or ends, that are expected from airspace modernisation as detailed in CAP1711 and Aberdeen's Design Principles already encompass 4 out of 5 of these objectives. (See AMS section below)	Evaluated in DP1		
		Secure the efficient use of airspace and enable integration		Evaluated in DP7 and DP8		
		Avoid flight delays by better managing the airspace network		Evaluated in DP9 and DP10		
		Improve environmental performance by reducing emissions and by better managing noise		Evaluated in DP3, DP4, DP5, DP6, DP9 and DP10		
		Facilitate defence and security objectives	An SME assessment of whether the option is expected to better facilitate, not affect or impede defence and security objectives. All options have been assessed as having no affect at this stage, based on the MoD feedback received in Stage 2	Option expected to better facilitate defence and security objectives	Option not expected to affect defence and security objectives	Option expected to impede defence and security objectives
3	Design options should minimise the change to tracks over the ground of aircraft arriving and departing from Aberdeen.		A visual comparison of 2 weeks of fixed wing radar tracks against the nominal centrelines of the IFPs proposed for each option.	Option is expected to result in no changes or very minimal changes to tracks over the ground compared to the baseline	Option could result in changes to tracks over the ground but over areas currently routinely overflown by Aberdeen traffic	Option is expected to change tracks over the ground and would result in overflight of areas not currently routinely overflown by Aberdeen traffic
4	Design options should investigate the feasibility of steeper approaches for PBN arrivals to reduce the noise footprint of Aberdeen Airport's operation.		Qualitative SME assessment of whether the option is expected to enable or restrict a VPA of greater than 3.0˚	Slightly Steeper Approaches are considered feasible with the option	Not applicable	Slightly Steeper Approaches are not considered feasible with the option

#	Design Principle	Methodology Overview Approach to evaluation	Met	Partially Met	Not Met
5	Arrival route options should enable aircraft to descend continuously and should not inhibit departures from climbing continuously. If both cannot be achieved, there should be preference to the most environmentally beneficial option.	Qualitative SME assessment of whether the option would enable continuous descent and whether it is expected to inhibit departures from climbing continuously.	Option is designed to enable continuous descent and is not expected to inhibit departures from climbing continuously.	Not applicable	Option is not expected to enable continuous descent
6	Options should not increase and should aim to reduce the emissions footprint of aircraft operating at Aberdeen by reviewing existing controlled airspace boundaries and usage of flight paths in the NERL network.	Qualitative SME assessment of whether the option is expected to reduce, maintain or increase track miles flown compared to a typical arrival track from each direction. This is done by comparing the track miles for a typical arrival from GLESK, SMOKI, RATPU, and PETOX (arrival waypoints within the NERL network) and comparing it to the track miles that would be flown for the same arrivals from each direction in the new option. Track mileage gives an indication of likely increases/decreases to fuel burn, and this subsequently provides an indication of emissions footprint.	Option is expected to enable shorter track miles for Aberdeen traffic compared to the baseline	Option is not expected to change track miles for Aberdeen traffic compared to the baseline	Option is expected to increase track miles for Aberdeen traffic compared to the baseline
7	Design the appropriate volume of controlled airspace (CAS) to safely support commercial air transport and release controlled airspace which is not required	Assessment of whether the option would require any more CAS compared to today and/or whether it would enable a reduction in CAS	Option is expected to enable a reduction in CAS compared to the baseline	Option is expected to be contained within existing CAS but does not enable a reduction in CAS	Option is expected to require more CAS compared to the baseline
8	Controlled airspace options should ensure there is safe and efficient access for other types of operations, and should explore measures, including classification and flexible use of airspace, where possible and appropriate, to improve access and decrease airspace segregation.	Qualitative assessment of whether the option is expected to lead to a lowering of airspace classification or facilitate and FUA style arrangement.	Option could enable a change in classification of airspace to a lower classification	Option is not expected to lead to a change in airspace classification	Option could enable a change in Classification of airspace to a higher classification
9	Options shall not reduce and where possible enhance the air traffic movement capacity of Aberdeen Airport.	Qualitative SME assessment of whether the option is expected to reduce, maintain or enhance capacity at Aberdeen	Option is expected to enhance ATM capacity of Aberdeen Airport	Option is not expected to affect the ATM capacity of Aberdeen Airport	Option is expected to reduce ATM capacity of Aberdeen Airport
10	Ensure the Aberdeen operation is resilient to the withdrawal or failure of navigation aids and systems.	Qualitative SME assessment of whether the option is expected to provide additional resilience to the withdrawal of Navaids or systems	Option provides additional resilience.	Not applicable	Option does not provide additional resilience

Airspace Modernisation Strategy

The CAA has requested evidence that the Design Principle Evaluation includes an assessment of how the different Design Options respond to the relevant AMS Design Principle: "Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it."

There are 5 known outcomes, or ends, that are expected from the Airspace Modernisation Strategy (AMS) as detailed in CAP1711 and Aberdeen's Design Principles already encompass 4 out of 5 of these objectives. Table 18 sets out which parts of our Design Principle Evaluation assesses against the 5 AMS known outcomes.

AMS known outcome	Aberdeen's design principle which assesses this outcome
Maintain and enhance high aviation safety standards	(DP1) The airspace design and its operation must be as safe or safer than today for all airspace users that are affected by the airspace change.
Secure the efficient use of airspace and enable integration	(DP7) Design the appropriate volume of controlled airspace (CAS) to safely support commercial air transport and release controlled airspace which is not required. (DP8) Controlled airspace options should ensure there is safe and efficient access for other types of operations, and should explore measures, including classification and flexible use of airspace, where possible and appropriate, to improve access and decrease airspace segregation.
Avoid flight delays by better managing the airspace network	(DP9) Options shall not reduce and where possible enhance the air traffic movement capacity of Aberdeen Airport. (DP10)Ensure the Aberdeen operation is resilient to the withdrawal or failure of navigation aids and systems.
Improve environmental performance by reducing emissions and by better managing noise	(DP3) Design options should minimise the change to tracks over the ground of aircraft arriving and departing from Aberdeen. (DP4) Design options should investigate the feasibility of steeper approaches for PBN arrivals to reduce the noise footprint of Aberdeen Airport's operation. (DP5) Arrival route options should enable aircraft to descend continuously and should not inhibit departures from climbing continuously. If both cannot be achieved, there should be preference to the most environmentally beneficial option. (DP6) Options should not increase and should aim to reduce the emissions footprint of aircraft operating at Aberdeen by reviewing existing controlled airspace boundaries and usage of flight paths in the NERL network. (DP9) Options shall not reduce and where possible enhance the air traffic movement capacity of Aberdeen Airport. (DP10) Ensure the Aberdeen operation is resilient to the withdrawal or failure of navigation aids and systems.
Facilitate defence and security objectives	We don't have a specific design principle to meet this objective. However, none of our options are assessed as affecting defence and security objectives and our stakeholder list ensures that this aspect is considered by the relevant parties.

Table 18: AMS known outcomes mapped against Aberdeen's Design Principles

Determining the overall outcome of the AMS DP

We have broken the AMS design principle down into components to reflect the known outcomes, or ends, that are expected from the Airspace Modernisation Strategy (AMS) however as part of the DPE, we are required to show an overall outcome for the AMS Design Principle. The following methodology has been applied in order to fairly and transparently evaluate each option:

Overall Met (AMS Design Principle)	Overall Partially Met (AMS Design Principle)	Overall Not Met (AMS Design Principle)
All component DPs are 'Met'	All component DPs are 'Partially Met' or a mixture of 'Met and 'Not met'	All component DPs are 'Not met'.

Special case (Not Met): Using the methodology outlined above, in the context of the AMS the baseline scenarios would be considered as partially met however a 'do nothing' scenario would not result in any Airspace Modernisation for Aberdeen and therefore would fundamentally not meet the AMS. The baseline options therefore are categorised as 'not met' for the AMS design principle.

Summary of the Design Principle Evaluation

The table 20 below summarises the outcome of the Design Principle Evaluation. The full detail of the Design Principle Evaluation is available in Annex A.

Option Name	The airspace design and its operation must be as safe or safer than today for all airspace users that are affected by the airspace change	Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it.	Design options should minimise the change to tracks over the ground of aircraft arriving and departing from Aberdeen.	Design options should investigate the feasibility of steeper approaches for PBN arrivals to reduce the noise footprint of Aberdeen Airport's operation.	Arrival route options should enable aircraft to descend continuously and should not inhibit departures from climbing continuously. If both cannot be achieved, there should be preference to the most environmentally beneficial option.	Options should not increase and should aim to reduce the emissions footprint of aircraft operating at Aberdeen by reviewing existing controlled airspace boundaries and usage of flight paths in the NERL network.	Design the appropriate volume of controlled airspace (CAS) to safely support commercial air transport and release controlled airspace which is not required	Controlled airspace options should ensure there is safe and efficient access for other types of operations, and should explore measures, including classification and flexible use of airspace, where possible and appropriate, to improve access and decrease airspace segregation.	Options shall not reduce and where possible enhance the air traffic movement capacity of Aberdeen Airport.	Ensure the Aberdeen operation is resilient to the withdrawal or failure of navigation aids and systems.	Result
RWY 16 Do Nothing											Option Discontinued
RWY 16 Option 1 Vectors to final approach											Option carried forward to IOA
RWY 16 Option 2 Inner T Bar											Option carried forward to IOA
RWY 16 Option 3 Outer T Bar											Option carried forward to IOA
RWY 16 Option 4 Curved Approach from West											Option carried forward to IOA
RWY 16 Option 5 Curved Approach from East											Option carried forward to IOA
RWY 34 Do Nothing											Option Discontinued
RWY 34 Option 1 Vectors to final approach											Option carried forward to IOA
RWY 34 Option 2 T Bar											Option carried forward to IOA
RWY 34 Curved Approach from East											Option carried forward to IOA
Existing CAS Do Nothing											Option carried forward to IOA
CAS Option 1 Raise portion of CTA 3 to 4500ft											Option carried forward to IOA

Table 19: DPE Summary

Design Principle Evaluation Conclusion

Discontinuing Methodology and DPE outcome

The Design Principle Evaluation itself is considered the main methodology for discontinuing options; at this early stage it provides a broad overview of an options' overall performance against all of the Design Principles and allows us to identify any options that overall perform comparatively poorly.
Although the DPE can be used to shortlist options, it is often more appropriate to gather further information from the Initial Options Appraisal (IOA) at Step 2B before choosing to discontinue an option. There are however some exceptions to this when an option has not met certain Design Principles.

With the exception of the DP1 (Safety) which is the top priority and DP2 (AMS) which comes second to safety, Aberdeen Airport's Design Principles are not prioritised or weighted. When reviewing the outcomes of the DPE, we therefore first looked to these two prioritised design principles when discontinuing options.

All of the approach options met DP1 (Safety) and therefore none will be discontinued on this basis. CAS Option 1 partially met the safety design principle, as it requires further some investigation, however it is expected to be safe and therefore we have not discontinued this option on the basis of safety at this stage. With regards to DP2, the two baseline 'do nothing' options did not meet this design principle as they would not offer the opportunity for the airspace to be modernised. These options also do not address the statement of need, offer any opportunity for improvement or provide any additional resilience for Aberdeen. These have therefore been discontinued however they will remain present throughout the ACP for baseline comparative purposed only.

All of the remaining options partially meet the AMS design principle. This is because there are many competing factors within the parameters of the AMS, and there is inevitably a balance to be achieved between these. We therefore decided to not discontinue any further options on the sole basis of the AMS, until we understood more detail about their benefits and impacts at the Initial Options Appraisal (IOA).

We finally looked to the remainder of the Design Principles to understand if there are any options that overall performed comparatively poorly against the remaining 8 Design Principles. We found a mix of performance across the options and design principles and given the design principles themselves are not prioritised, we have chosen to take forward all the remaining options to the Initial Options Appraisal. This will enable us to gather more detailed information about the options to understand their benefits and impacts before shortlisting any further.

Next steps

The next stage of the ACP process involves undertaking an Initial Options Appraisal (IOA) of the remaining options, to understand in further detail the benefits and impacts. This step of the process could result in a shorter list of preferred options to take into Stage 3. The Initial Options Appraisal will be published on the CAA's Airspace Change Portal.