

# Aberdeen International Airport

## FASI-N Airspace Change Proposal

### Stage 4 Annex B: Final Options Appraisal

Date: December 2024  
Document Version: V1.0  
Status: Public  
Document History: For submission to the CAA for the Stage 4 gateway

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## 1. Introduction

- 1.1.1 Aberdeen International Airport Limited (referred to as 'Aberdeen Airport' or 'we' throughout this document) is undertaking an Airspace Change Proposal (ACP) to provide resilience to its operation and to support the widespread introduction of new routes based on satellite navigation, known as Performance Based Navigation (PBN). The airspace change will also take the opportunity to review existing controlled airspace boundaries and classifications.
- 1.1.2 This ACP will enable Aberdeen Airport to meet the UK's Airspace Modernisation Strategy (AMS), which sets out the initiatives which the aviation industry, in particular airports, should progress to modernise the UK's airspace structure and route network. The ACP is required to follow a process set out by the Civil Aviation Authority (CAA) in a document called CAP1616.

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***Alongside this Final Options Appraisal, Aberdeen Airport has produced a Terminology Explained Document which can be found on the CAA Airspace Change Portal website. It may be beneficial to have this document open whilst reading this Final Options Appraisal.***

## 1.2 The CAP1616 airspace change process

1.2.1 Airspace change sponsors are required to follow the process in a document called 'CAP1616<sup>1</sup> Airspace Design: Guidance on the regulatory process for changing airspace design, including community engagement requirements'. This is published by the Civil Aviation Authority (CAA).

1.2.2 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.

1.2.3 The Aberdeen Airport ACP is currently in Stage 4: Update and Submit. Figure 1 shows an overview of the stages of the CAP1616 process and also provides an indicative timeline for the remaining stages. The following section provides more detail on the work undertaken to date.

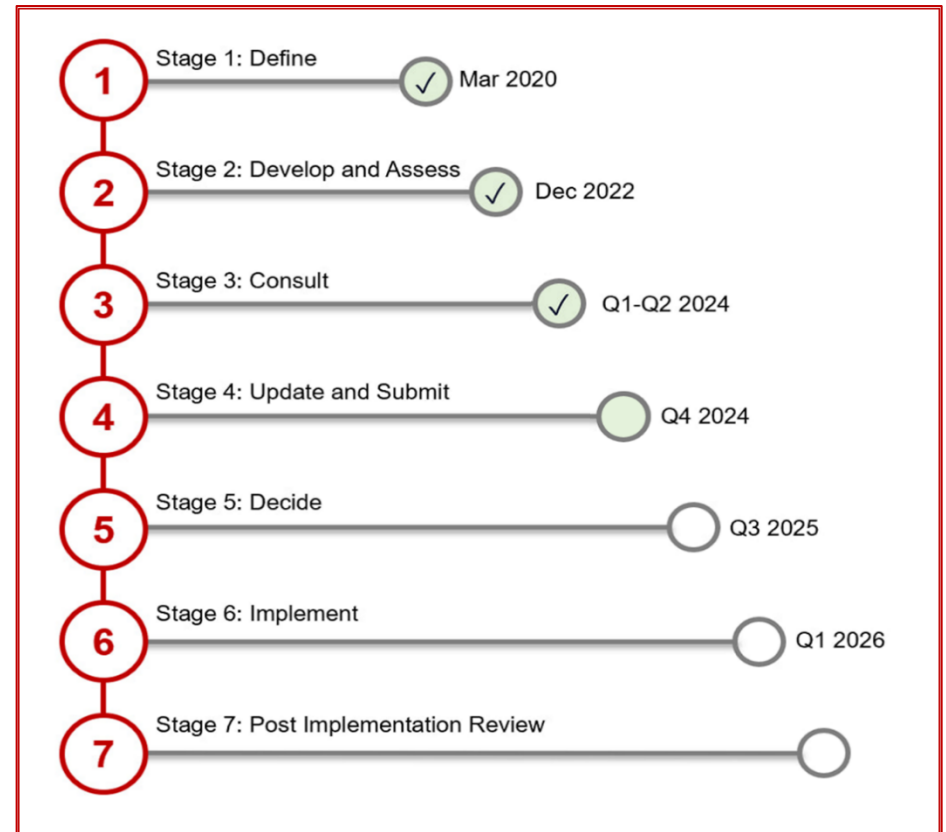


Figure 1 CAP1616 Process and an indicative timeline for this ACP

<sup>1</sup> CAP616 Edition 4. During Stage 1 to Stage 3, Aberdeen Airport was required to follow the guidance outlined in Edition 4 of CAP1616. From Stage 4 onwards, the ACP will transfer across to the guidance outlined in Edition 5.

## 1.3 Aberdeen Airport Airspace Change Proposal

1.3.1 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 we are at now, providing links to previous submission documents with further information. All documents linked below are available on Aberdeen Airport Airspace Change (FASI) page on the [CAA Airspace Change Portal](#).

Airspace Change Stage	Summary	Link to Documents
Stage 1A	<p>In November 2019, Aberdeen Airport submitted the following Statement of Need (SoN) to the CAA.</p> <p>Aberdeen Airport participated in an assessment meeting with the CAA on 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.</p>	<p><a href="#">Statement of Need on CAA's Airspace Change Portal</a></p> <p><a href="#">Assessment meeting minutes</a></p>
Stage 1B	<p>At Stage 1B Aberdeen Airport developed a set of design principles with identified stakeholders.</p> <p>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 <a href="#">here</a> in this document.</p>	<p><a href="#">Stage 1B Design Principle Submission Report</a></p>
Stage 2A	<p>Stage 2A requires change sponsors to develop and assess options for the airspace change.</p> <p>In Stage 2A, Aberdeen Airport developed a comprehensive list of options that address the Statement of Need and that align with the design principles from Stage 1. We then shared those options with our stakeholder representatives (the same ones engaged with on the Design Principles). Finally, we qualitatively assessed all options developed against the Design Principles and produced a Design Principle Evaluation (DPE). Our Comprehensive List of Options was then shortlisted before progressing to Stage 2B.</p>	<p><a href="#">Stage 2A DPE Submission Document</a></p>
Stage 2B	<p>At Stage 2B an airspace change sponsor is required to undertake an Initial Options Appraisal (IOA) of the airspace change options which proceed from Stage 2A. The IOA initially described the options under assessment and the baseline option, followed by explaining the methodology used to assess each option, and then the IOA outcome. At the end of the document we explain, based on the IOA, the options which were taken forward to Stage 3 and the preferred option.</p>	<p><a href="#">Stage 2B IOA Document</a></p>



<b>Airspace Change Stage</b>	<b>Summary</b>	<b>Link to Documents</b>
<b>Withdrawal of Aberdeen from the Airspace Change Masterplan</b>	<p>In September 2023 the Airspace Change Organising Group (ACOG) wrote to the co-sponsors (CAA and DfT) with advice on the proposed withdrawal of Aberdeen Airport from the UK Airspace Modernisation masterplan. The CAA subsequently accepted the proposal.</p> <p>Aberdeen Airport's ACP was de-coupled from the masterplan because the proposal no longer had interdependencies with the NERL ACP for the airspace above 7000ft. In addition to this, there were no interdependencies with the other Scottish cluster sponsors (Glasgow and Edinburgh Airports).</p> <p>Withdrawal from the Masterplan allows this ACP to progress on a separate, quicker, timeline than the rest of the Scottish cluster, and does not require Iteration 3 of the Masterplan to be published prior to a Stage 3 gateway. Nonetheless, the ACP does still continue to make a valuable contribution to airspace modernisation in the UK.</p>	<p><a href="#">ACOG Advice to the CAA</a></p> <p><a href="#">CAA acceptance to withdraw Aberdeen Airport from the UK Airspace Modernisation Masterplan</a></p>
<b>Resubmission of Statement of Need</b>	<p>Following acceptance of the proposal to withdraw, in October 2023 Aberdeen Airport also submitted a revised Statement of Need (SoN). Aberdeen's original SoN referred to meeting the requirements of (EU) 2018/1048 and removing reliance on PTH and ADN VORs due to NATS (En Route) plc (NERL)'s navigation aid rationalisation programme. Since submitting the SoN, the UK has withdrawn from the EU, and NERL have notified Aberdeen Airport there is no longer the intention to withdraw the ADN VOR. The reliance on PTH VOR has already been resolved.</p> <p>With these developments in mind, it was prudent to update the Statement of Need to reflect intentions going forwards.</p> <p>All Stage 2 engagement and the development of our Comprehensive List of Options was undertaken in line with this revised Statement of Need.</p>	<p><a href="#">Revised Statement of Need</a></p>
<b>Stage 3 - Consultation Preparation</b>	<p>In the consultation preparation part of Stage 3, an airspace change sponsor is required to plan for stakeholder consultation and engagement by preparing a Full Options Appraisal (FOA), Consultation Strategy, and draft Consultation documents.</p> <p>The FOA was the second-phase appraisal, following the IOA at Stage 2B, with more rigorous analysis of the impacts and benefits of the proposed airspace change options. The FOA described the options taken forward from Stage 2B and how they had been developed further and then described the options under assessment at Stage 3 compared to the baseline 'do nothing' option. The FOA also explained the methodology used to assess each option, and the FOA outcome. At the end of the document we explained, based on the outcome of the FOA, the preferred option for consultation.</p> <p>The outcomes of the FOA were then used to inform the consultation strategy and draft consultation materials. These were then submitted to the CAA as part of the stage 3 'consult/engage' gateway.</p>	<p><a href="#">Consultation Strategy</a></p> <p><a href="#">Consultation Summary Document</a></p> <p><a href="#">Main Consultation Document</a></p> <p><a href="#">Glossary &amp; Terminology Document</a></p> <p><a href="#">Frequently Asked Questions</a></p> <p><a href="#">Full Options Appraisal</a></p> <p><a href="#">FOA - Technical Appendix</a></p>
<b>Stage 3 - Collate &amp; Review Responses</b>	<p>Once an airspace change sponsor has passed the 'consult/engage' gateway which occurs in the middle of Stage 3, it launches its consultation. This is the key stage of the airspace change process for change sponsors to seek feedback that will help them understand stakeholders' views about the impacts of their airspace change proposal. This feedback will help the change sponsor make informed decisions regarding the airspace change proposal ahead of its submission</p>	<p><a href="#">Consultation Response Document</a></p>

Airspace Change Stage	Summary	Link to Documents
	<p>at the end of Stage 4.</p> <p>Once consultation has been concluded, the change sponsor must review the responses and categorise into those that present information that may impact the final airspace change proposal, and those which do not. This is documented in our Consultation Response Document although a summary of the consultation outcomes is also included in <a href="#">section 3.2 of this document</a>.</p>	
<p><b>Stage 4</b></p>	<p>Stage 4 enables the change sponsor to make any final adjustments to the airspace design ahead of submitting the final airspace change proposal to the CAA.</p> <p>Change sponsors should select a final design option and consider any updates to it in light of information received in the consultation, complete the final options appraisal (this document), assess the need for additional consultation, and submit their final airspace change proposal describing the airspace change to the CAA and stakeholders.</p> <p>To avoid confusion between referencing the previously produced Full Options Appraisal (FOA) and this Final Options Appraisal, any references to the FOA in this document will refer to the Full Options Appraisal, whereas the Final Options Appraisal will be referred to using its full title.</p>	<p><i>Final Options Appraisal – this document</i></p>

*Table 1: Aberdeen Airport ACP progress to date*

## 2. Understanding Performance Based Navigation (PBN)

2.1.1 Performance based navigation (PBN) improves the accuracy of where aircraft fly by using modern satellite navigation rather than outdated, less accurate, ground-based navigation aids (conventional navigation). This means that when aircraft fly PBN routes, they are typically more concentrated over a narrower area compared to when they are tactically controlled (vectored) by ATC.

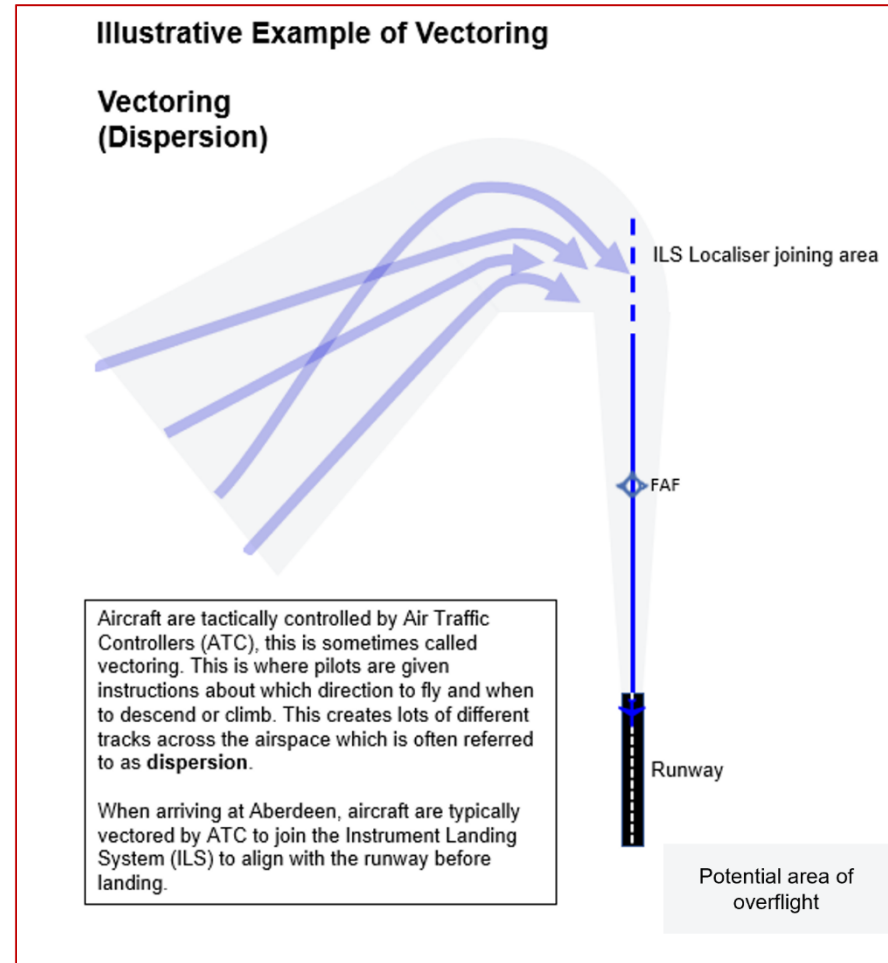
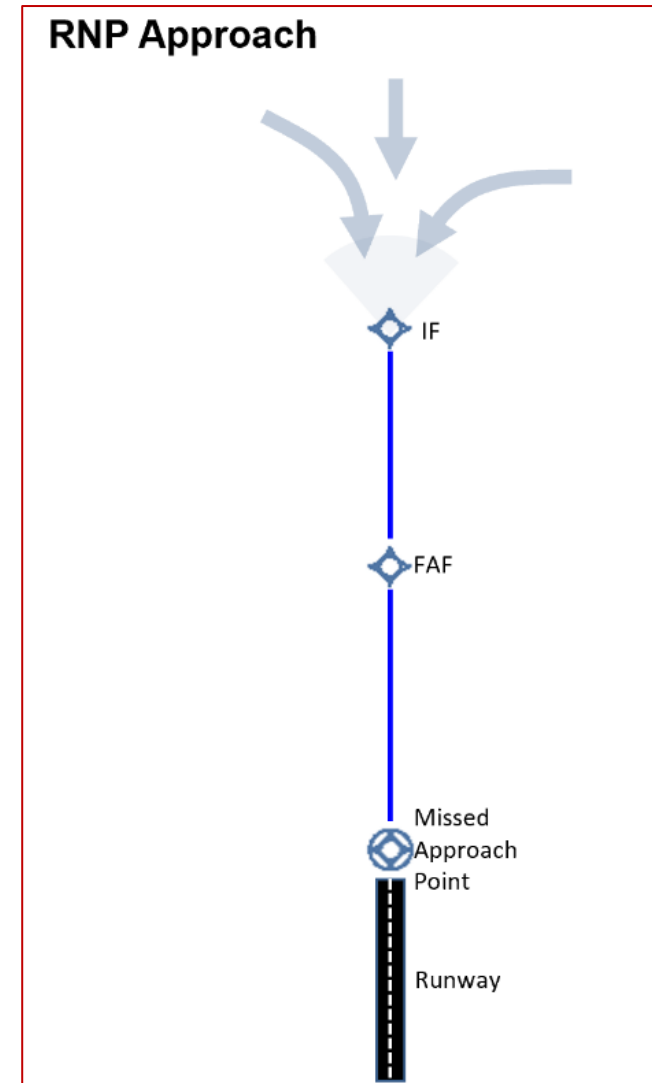


Figure 2 Illustrative Example of Vectoring

**PBN approaches**

2.1.2 Required Navigation Performance (RNP) approaches use a series of satellite-based waypoints which aircraft follow to fly the overall Instrument Approach Procedure (IAP). Aircraft join the IAP at the Intermediate Fix (IF) waypoint before flying to the Final Approach Fix (FAF) whilst descending to either land or undertake a missed approach – this part of the PBN procedure is aligned with the runway centreline (the ‘final approach’) and accurately replicates the same lateral and vertical path as the existing final approach already flown today at Aberdeen.

2.1.3 An illustrative example of an RNP approach is shown in Figure 3. The light blue semi circles show the directions from which aircraft can be vectored to join the Intermediate Fix (IF). Aircraft then follow the waypoints which are designed, where possible, to allow for continuous descent before landing.



*Figure 3 Illustrative example of RNP approach*

## **3. Overview of options development and appraisal leading to this Final Options Appraisal**

### **3.1 Development and evaluation of the Comprehensive List of Options**

- 3.1.1 The initial Comprehensive List of Options for the ACP included 10 arrivals options (3 options for runway 34 and 5 options for runway 16, and 2 baseline 'do nothing' options) and an option for reducing the volume of Controlled Airspace (CAS) alongside a CAS 'do nothing' baseline scenario. When developing these options, the aim was to meet Aberdeen Airport's Stage 1A Statement of Need and the Stage 1B Design Principles.
- 3.1.2 As part of Stage 2A, we undertook a Design Principle Evaluation (DPE) where we evaluated each option against each Design Principle. The DPE is the first opportunity within the CAP1616 process to shortlist options before progressing to the IOA. The outcome of our Stage 2A Design Principle Evaluation was that we chose to take forward all of the options on the comprehensive list, with the exception of the two baseline 'do nothing' scenarios. The baseline scenarios were discounted as they did not align with the AMS, address the Statement of Need, or provide Aberdeen Airport with any additional resilience.
- 3.1.3 Although the 2 baseline 'do nothing' scenarios (runway 16 arrivals 'do nothing', and runway 34 arrivals 'do nothing') did not progress as options, CAP1616 requires the baseline scenario to be appraised in both the Stage 2B IOA and the Stage 3 FOA, as it provides a means of testing the options against the current day operations to better understand and highlight the benefits and impacts of each new option. The baseline is also continued to be appraised as part of this Final Options Appraisal in Stage 4.

## Stage 2B Initial Options Appraisal

3.1.4 Following the DPE the options then proceeded to the Initial Options Appraisal (IOA). This is the first of three phases of appraisal within the CAP1616 process. The conclusion from the Initial Options Appraisal is shown in Table 2:

*Table 2 Stage 2 Options: Design Principle Evaluation and Initial Options Appraisal Outcomes*

### Stage 2 Options

#### Runway 16 (Continued / Discontinued)

#### Runway 34 (Continued / Discontinued)

Option name	DPE	IOA	Option name	DPE	IOA
Runway 16 Baseline 'Do nothing'	X		Runway 34 Baseline 'Do nothing'	X	
Runway 16 Arrival Option 1 – Vectors to Final Approach	✓	✓	Runway 34 Arrival Option 1 – Vectors to Final Approach	✓	✓
Runway 16 Arrival Option 2 – Inner T Bar	✓	X	Runway 34 Arrival Option 2 – T Bar	✓	✓
Runway 16 Arrival Option 3 – Outer T Bar	✓	✓	Runway 34 Arrival Option 3 – Curved Approach from the East	✓	✓
Runway 16 Arrival Option 4 – Curved Approach from the West	✓	✓			
Runway 16 Arrival Option 5 – Curved Approach from the East	✓	✓			
<b>Controlled Airspace</b>					
Existing CAS 'Do nothing'	✓	✓			
CAS Option 1 Raise portion of CTA 3 to 4500ft	✓	✓			

### 3.2 Options for the Stage 3 FOA

3.2.1 As part of the Stage 3 FOA, airspace change sponsors were required to generate analysis which reflects the overall airport’s air traffic operation (taking into account operations from all runways including arrivals and departures). As part of the Stage 3 FOA, we combined the Stage 2 options into options for appraisal at Stage 3<sup>2</sup>:

*Table 3 Stage 3 Options Configuration*

<b>Stage 3 Options Configuration</b>			
<b>Stage 2 Option name</b>		<b>Stage 2 Option name</b>	<b>Stage 3 Option</b>
Runway 16 Arrival Option 1 – Vectors to Final Approach	+	Runway 34 Arrival Option 1 – Vectors to Final Approach	<b>Vectors to Final Approach</b>
Runway 16 Arrival Option 3 – Outer T Bar	+	Runway 34 Arrival Option 2 – T Bar	<b>T-Bars</b>
Runway 16 Arrival Option 4 – Curved Approach from the West	+	Runway 34 Arrival Option 3 – Curved Approach from the East	<b>T-Bars and Curved Approaches</b>
			<b>Controlled Airspace</b>
			<b>Existing CAS ‘Do nothing’</b>
			<b>CAS Option 1 Raise portion of CTA 3 to 4500ft</b>

- Differing options on each runway end, for example to have Vectors to final approach on runway 16 and T-Bar on runway 34, were not generated because of the increased risk of confusion for ATC and pilots which leads to safety concerns.
- As noted in the IOA, runway 16 option 4 and runway 34 option 3 use a type of PBN capability called RF (Radius to Fix) however not all airlines are able to fly these curved approaches. These options were therefore combined with the T-Bars when creating the Stage 3 option to ensure a solution suitable for the majority of operations.

<sup>2</sup> Note the table does not include the runway 16 arrival option 5 (curved approach from the east) which was continued from Stage 2B. This is because safety and operability assessments ahead of the FOA identified that there were disbenefits in terms of safety and ATC workload and in order to mitigate these there would be disbenefits to noise. For further details please see [section 3.2 of the FOA document](#).

- CAS Option 1 is independent of all three PBN arrival options so for the purposes of the FOA it has been assessed separately.

3.2.2 In preparation for the Stage 3 FOA, detailed instrument flight procedure (IFP) development was undertaken on the options and this led to a number of refinements to the options design ahead of FOA. For more information please see [section 3.2 of the FOA document](#).

### **CAS option 1**

3.2.3 Detailed analytical work and discussions with ATC identified that there was an opportunity to increase the area of airspace that could potentially be released as part of this airspace change proposal compared to what was identified at Stage 2. Accordingly, the eastern boundary of CAS option 1 was moved further east. For more information please see [section 3.2 of the FOA document](#).

### **Options taken forward into Stage 3 consultation**

3.2.4 The conclusion of the Stage 3 FOA showed that the differences between the three options (Vectors to RNP; T-Bar; and Curved approaches with T-Bar) were negligible in terms of noise, fuel burn and CO<sub>2</sub>e emissions. However, the safety assessment for each option showed an increased level of complication and increased safety risk for the T-Bar and Curved Approaches with T-Bar options. As a result of this it was considered appropriate to discontinue these two options at the FOA and only progress the Vectors to RNP approach option as our preferred option for consultation.

3.2.5 The Stage 3 FOA also showed that the CAS Option 1 demonstrated benefits for General Aviation (GA) stakeholders from the release of a portion of CTA-3, with only marginal, almost indefinable, benefits and impacts to noise, fuel burn, CO<sub>2</sub>e for aircraft arriving at Aberdeen (and aircraft departing from Aberdeen not being impacted). As such, CAS Option 1 was also taken forward for consultation.

3.2.6 The Vectors to RNP approach and CAS Option 1 options were the preferred options progressed for consultation.



**Outcomes of the Stage 3 consultation**

- 3.2.7 In January 2024 we submitted our draft proposals for Consultation to the CAA and in March 2024 Aberdeen Airport was approved by the CAA to proceed to Consultation. From Monday 29 April to Sunday 21 July 2024 Aberdeen Airport consulted on the proposals to introduce Vectors to RNP approaches (to both runways) and CAS Option 1.
- 3.2.8 Following the consultation, Aberdeen Airport carefully collated, reviewed and responded to all consultation feedback on the proposals. Full details can be found within the [consultation categorisation document](#).
- 3.2.9 For the proposed PBN approaches, we did not receive any consultation feedback which may impact the design. For the CAS proposal, we received three suggestions for visual features and one piece of feedback regarding safety. The feedback is shown Table 4 below:

*Table 4 Consultation response which may impact the final proposal*

Feedback question	Feedback received which could influence the final design
<b>As a non-airspace user, do you support this proposal? [with regards to CAS Option 1]</b>	Do NOT release this airspace! The gliding and other users have hundreds of miles of open air. ATC at Aberdeen and the airlines do not. Aircraft struggle to get the height off as it is for Runway 34 and you want to make them stay higher for longer? This just shows a lack of investigation into the airspace usage. This will not stop the infringements! And it will not stop here. The constant chipping away will continue. This has the potential to cause more issues than it solves!
<b>Thinking specifically of Controlled Airspace, do you have any further comments?</b>	We need more not less! [Feedback from the same respondent as above]
<b>As an airspace user, in particular for GA (General Aviation) pilots, can you think of any visual features that could better define the boundary?</b>	Visual features could include the addition of more visual reference points (VRPs) near the boundary, or VFR checkpoints. Insch VRP at north, unsure from supplied maps about southern point.
	Invercannie Water Works might be a useful feature on the eastern edge of the airspace release area

**Development of the Final proposal**

3.2.10 Aberdeen Airport carefully considered the consultation feedback received with regards to the Controlled Airspace proposal. Table 5 provides details of the feedback received and Aberdeen Airport’s response to that feedback.

*Table 5 Consultation Response: ‘we asked, you said, we did’*

We asked	You said	We did
Feedback question	Feedback received which could influence the final design	Aberdeen Airport response
<p>As a non-airspace user, do you support this proposal? [with regards to CAS Option 1]</p>	<p>Do NOT release this airspace! The gliding and other users have hundreds of miles of open air. ATC at Aberdeen and the airlines do not. Aircraft struggle to get the height off as it is for Runway 34 and you want to make them stay higher for longer? This just shows a lack of investigation into the airspace usage.</p> <p>This will not stop the infringements! And it will not stop here. The constant chipping away will continue. This has the potential to cause more issues than it solves!</p>	<p>As part of the development of the option in Stage 2 and ahead of the consultation at Stage 3, Aberdeen Airport analysed surveillance radar data to understand what could be safely achievable within the airspace. The data showed that no departures utilise the proposed portion of airspace and on average only 1 fixed wing and 1 rotary aircraft arrival per week utilise the airspace.</p> <p>Aberdeen Airport also assessed the potential benefits and impacts of releasing the CAS with Air Traffic Control (ATC) to understand any safety concerns or operational impacts.</p> <p>Following receipt of this feedback, it was shared with ATC for review ahead of ATC responding to the consultation and also ahead of any Stage 4 safety assessment. ATC are responsible for the safe and efficient movement of aircraft within Aberdeen’s airspace and therefore they are best placed to consider whether the release of CAS could lead to any safety concerns.</p> <p>ATC carefully considered the feedback ahead of responding to the consultation however they found that releasing the section of airspace will be of great benefit to the GA</p>

We asked	You said	We did
Feedback question	Feedback received which could influence the final design	Aberdeen Airport response
Thinking specifically of Controlled Airspace, do you have any further comments?	We need more not less! [Feedback from the same respondent as above]	community, without adversely affecting the overall ATC operation. They also noted there is an expected benefit in the reduction of Controlled Airspace infringements, particularly in the vicinity of Aboyne gliding site. As such, this feedback did not influenced the final design.
As an airspace user, in particular for GA (General Aviation) pilots, can you think of any visual features that could better define the boundary?	Visual features could include the addition of more visual reference points (VRPs) near the boundary, or VFR checkpoints.	The CAA publish a <a href="#">Policy for the establishment of visual reference points (VRPs)</a> that we must follow as part of the airspace change process. This policy explains that the establishment and review of VRPs is the responsibility of the Air Traffic Service Unit (ATSU). Aberdeen Airport’s ATSU is run by NATS NSL and therefore we have shared the VRP suggestions with the NATS NSL ATC team for their consideration.  The CAA policy also states that VRPs should: <ul style="list-style-type: none"> <li>a. <i>Be visible by day and by night. It is recognised that not all VRPs may be suitable for use at night, in which case sponsors should ensure that procedures based upon reference to VRPs take this into consideration.</i></li> <li>b. <i>Be based upon prominent features such as major road networks, road junctions, masts, buildings, lakes, river confluences and reservoirs. Transitory features such as woodland, towns, villages, housing estates and disused airfields may not be suitable and should be avoided where possible.</i></li> <li>c. <i>Be consistent with Commission Regulation (EU) 923/2012 SERA.3105 ‘Minimum heights’.</i></li> </ul>

We asked	You said	We did
Feedback question	Feedback received which could influence the final design	Aberdeen Airport response
		<p>d. <i>Ensure there is no conflict with VRPs associated with adjacent aerodromes.</i></p> <p>e. <i>If referring to a disused aerodrome depicted on VFR charts, an assessment of the visibility of vestigial aerodrome features is to be undertaken in advance of selecting such features as VRPs.</i></p> <p>The first piece of feedback said ‘Visual features could include the addition of more visual reference points (VRPs) near the boundary, or VFR checkpoints’. When reviewing the changes to the CAS, the ATC team have considered potential VRP additions (and the suggestions as part of the consultation) against the requirements of the CAA policy.</p> <p>The second piece of feedback ‘<i>Insch VRP at north</i>’ refers to a VRP that is already established (see Class D airspace chart in Figure 23 for further information). The ATC team have confirmed that this VRP will remain fit for purpose as an initial routing point into the CTR from the west and northwest.</p> <p>The third piece of feedback suggested VRP ‘<i>Invercannie Water Works might be a useful feature on the eastern edge of the airspace release area</i>’. This suggestion has been carefully considered by the ATC team. Invercannie Water Works is located on the new CAS boundary line however is located c.1.5nm west of an existing VRP at Banchory. The Banchory VRP is long established over an area which is considered more prominent than the waterworks. Given this, establishment of a VPR at the waterworks has not been progressed as it would not meet requirements b. and d. of the CAA policy.</p>

We asked	You said	We did
Feedback question	Feedback received which could influence the final design	Aberdeen Airport response
		<p>ATC also carefully considered whether a VRP at Alford would be useful to identify the point at which a southbound aircraft at 4000ft can make a left turn to track southeast. However, no prominent feature could be identified other than the town itself and the CAA policy says towns should be avoided.</p>

3.2.11 Overall, the feedback received around the RNP approaches and the release of a section of CAS was broadly supportive and none of the feedback impacted the final proposal. No changes were therefore made to the RNP approaches, or the boundary of the CAS release, as a result of the consultation and the options continued as per the consultation into this Final Options Appraisal.

3.2.12 In preparation for the stage 4 submission, the RNP approach procedures underwent final instrument flight procedure (IFP) design development. This did not result in any changes to the design of the RNP procedures compared to what was presented in the Stage 3 Full Options Appraisal.

## **4. Final Options Appraisal methodology**

### **4.1 Requirements for Final Options Appraisal**

- 4.1.1 As part of the final options appraisal, it is required that sponsors consider any revised impacts due to the updated final design option and/or changes in data using the same approach as in the earlier stage (CAP1616, 3.34). For the full options appraisal, traffic forecasts were generated for the year of implementation and for the subsequent 10 years. These forecasts were used as the basis of the noise and carbon assessments.
- 4.1.2 The traffic forecasts were generated by taking actual Electronic Flight Strip Data (EFPS data) from 2022 and using Aberdeen Airport's long term business plan 5-year traffic predictions to apply growth to this data. This 5-year forecast is based on business intelligence and information including frequency of route operated, new routes, stopping routes, anticipated changes in fleet mix and speed of covid recovery. Aberdeen airport does not usually forecast out more than 5 years ahead. Given less certainty beyond 5 years, the traffic forecasts have been grown by a small forecast annual average per annum, informed by previous years.
- 4.1.3 Following the Stage 3 consultation, the assumptions underlying these forecasts have been verified with Aberdeen Airport, confirming that they remain reflective of the airport's projected operations and there is no need to update the forecasts. Consequently, and given that there are no changes to the airspace design arising from the consultation, the environmental assessment provided for the Full Options Appraisal is considered valid for the Final Options Appraisal.
- 4.1.4 The current-day scenario in the Full Options Appraisal is 2022. It is not considered proportionate or necessary to update the current-day scenario to 2023 (which would be the latest year that could be used to cover 92-day summer noise data and annual GHG data), as the current-day scenario is presented for information and context and does not factor into the Full/Final Options Appraisal which compares the situation with and without the airspace change in the implementation year (2026) and 10 years later (2035). Furthermore, the change in aircraft movements between 2022 and 2023 is extremely small and was actually a very small reduction of less than 1%. This means that 2022 data remains representative of the current-day scenario.

## 4.2 Baseline inputs

- 4.2.1 As part of this Final Options Appraisal, CAP1616 requires airspace change sponsors to set a baseline which is used for environmental evaluation of the options. CAP1616 explains that this will be a 'do nothing' scenario and will largely reflect the current-day scenario, although taking due consideration of known or anticipated factors that might affect that baseline, for example a planned housing development close to an airport, forecast growth in air traffic, or expected changes in airlines' fleet mix.
- 4.2.2 The Final Options Appraisal must then, where appropriate quantitatively, and otherwise qualitatively, appraise the difference between a pre-implementation ('do nothing') scenario and a post-implementation scenario, ensuring that the periods are comparable. The following subsections provide information which has been used to generate the baseline scenario. The full baseline appraisal is shown in the Final Options Appraisal section of this document.

### Traffic forecast

- The options within the ACP do not seek to increase movements at Aberdeen Airport; the purpose of the change is to provide resilience and meet the requirements of the Airspace Modernisation Strategy. Therefore, the traffic forecast applied 'without ACP' will remain the same 'with ACP'.
- At present the implementation date for the Aberdeen ACP is anticipated to be in Q1 2026. This Final Options Appraisal will therefore qualitatively and quantitatively describe the baseline and the anticipated factors that are expected to impact it, such as any forecast growth, fleet mix changes and planned developments based on implementation in 2026. CAP1616 also requires airspace change sponsors to forecast growth 10 years following the year of implementation.
- Aberdeen airport does not usually forecast out more than 5 years ahead. For the purposes of this Final Options Appraisal, we have taken actual Electronic Flight Strip Data (EFPS data) from 2022 and then used Aberdeen Airport's long term business plan 5-year traffic predictions to apply growth to this data. This 5 year forecast is based on business intelligence and information including frequency of route operated, new routes, stopping routes, anticipated changes in fleet mix and speed of covid recovery. Beyond 5 years, this is grown by a small forecast annual average per annum, informed by previous years, given less certainty. Aberdeen Airport has no planning/section 106 agreements which would affect our forecast. No growth has been assumed for Helicopters.
- The modal split is based on the average split over 10 years' worth of data with runway 16 being used 60% of the year, and runway 34 being used 40% of the year.
- Note that whilst Table 6 presents annual movement numbers, the noise modelling is based on movement numbers within the 92-day summer period from 16 June to 15 September inclusive.
- Table 6 below provides an overview of these forecast movement numbers:

**Table 6 Traffic Forecast**

Year	2022	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
		1	2	3	4	5	6	7	8	9	10
Per year											
Total movements	74,163	85,505	85,690	85,892	86,095	86,298	86,502	86,707	86,914	87,120	87,328
Total fixed wing arrivals	19,548	25,241	25,333	25,435	25,537	25,639	25,741	25,844	25,948	26,051	26,156
Total helicopter arrivals	17,675	17,675	17,675	17,675	17,675	17,675	17,675	17,675	17,675	17,675	17,675
Total fixed wing departures	19,396	25,045	25,138	25,238	25,339	25,440	25,542	25,644	25,747	25,850	25,953
Total helicopter departures	17,544	17,544	17,544	17,544	17,544	17,544	17,544	17,544	17,544	17,544	17,544
Average per Day											
Fixed Wing Arrivals per day (c.60%)	54	69	69	70	70	70	71	71	71	71	72
Helicopter Arrivals per day (c.40%)	48	48	48	48	48	48	48	48	48	48	48
Average per day Runway 16											
Fixed Wing Arrivals per day RWY16 (c.60%)	32	41	42	42	42	42	42	42	43	43	43
Helicopter Arrivals per day RWY16 (c.40%)	29	29	29	29	29	29	29	29	29	29	29
Average per day Runway 34											
Fixed Wing Arrivals per day RWY34 (c.60%)	21	28	28	28	28	28	28	28	28	29	29
Helicopter Arrivals per day RWY34 (c.40%)	19	19	19	19	19	19	19	19	19	19	19

- The number of helicopter movements above represent the total average number of helicopter arrivals when the main landing runway is either 16 or 34 at Aberdeen. Not all of these helicopter movements actually used runway 16 or 34. In total, around 77% of all helicopter arrivals use the main landing runway, the remaining 23% use the much smaller visual runways 14,18,23,32 and 36, as articulated in Figure 4. In Table 6, Figure 5, and Figure 6, all arrivals from the north (RWY16, RWY14, RWY18, RWY23, and H) have been grouped into the total helicopter count for RWY16 and all arrivals from the south (RWY34, RWY32 and RWY36) have been grouped into the total helicopter count for RWY34.

**Fleet mix**

4.2.3 As noted above, Aberdeen Airport has taken flight data from 2022 and grown this to reflect a 2026 forecast for the year of implementation. The fleet mix of this data has been adjusted to account for expected airline fleet changes. This includes transitions from A320-100/200 to A320 Neos, Embraer E195-E2 to B737-700 winglets, Embraer-145 to ATR72 212 A and ATR 42-500 to Jetstream 41.



**Movement information**

4.2.4 Aberdeen Airport has one main runway for fixed wing traffic and helicopter traffic is also able to arrive visually onto three other runways. Aircraft arriving onto Aberdeen’s main runway (runway 16 and runway 34) are within the scope of this ACP although all helicopter movements have been included within the noise modelling, in line with the runway modal split distribution in Figure 4. Figure 5 and Figure 6 (shown on the following pages) show the average number of movements per day across the 92-day summer period<sup>3</sup> 2035. These figures vary slightly from the figures in Table 6 which are based on the annual period.

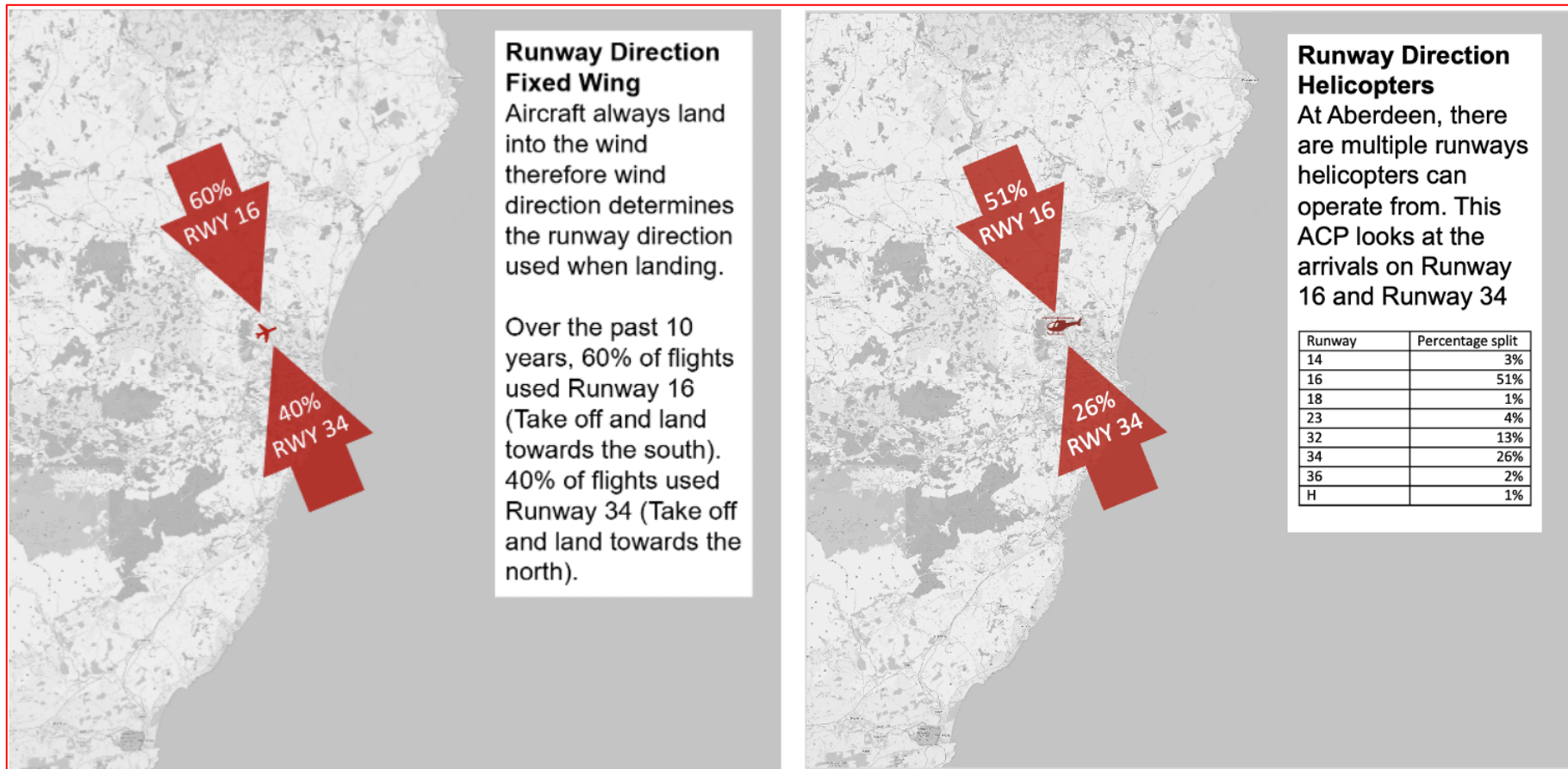


Figure 4 Modal split and Helicopter usage of Runway 16/34

<sup>3</sup> 16th June – 15th September  
 Final Options Appraisal

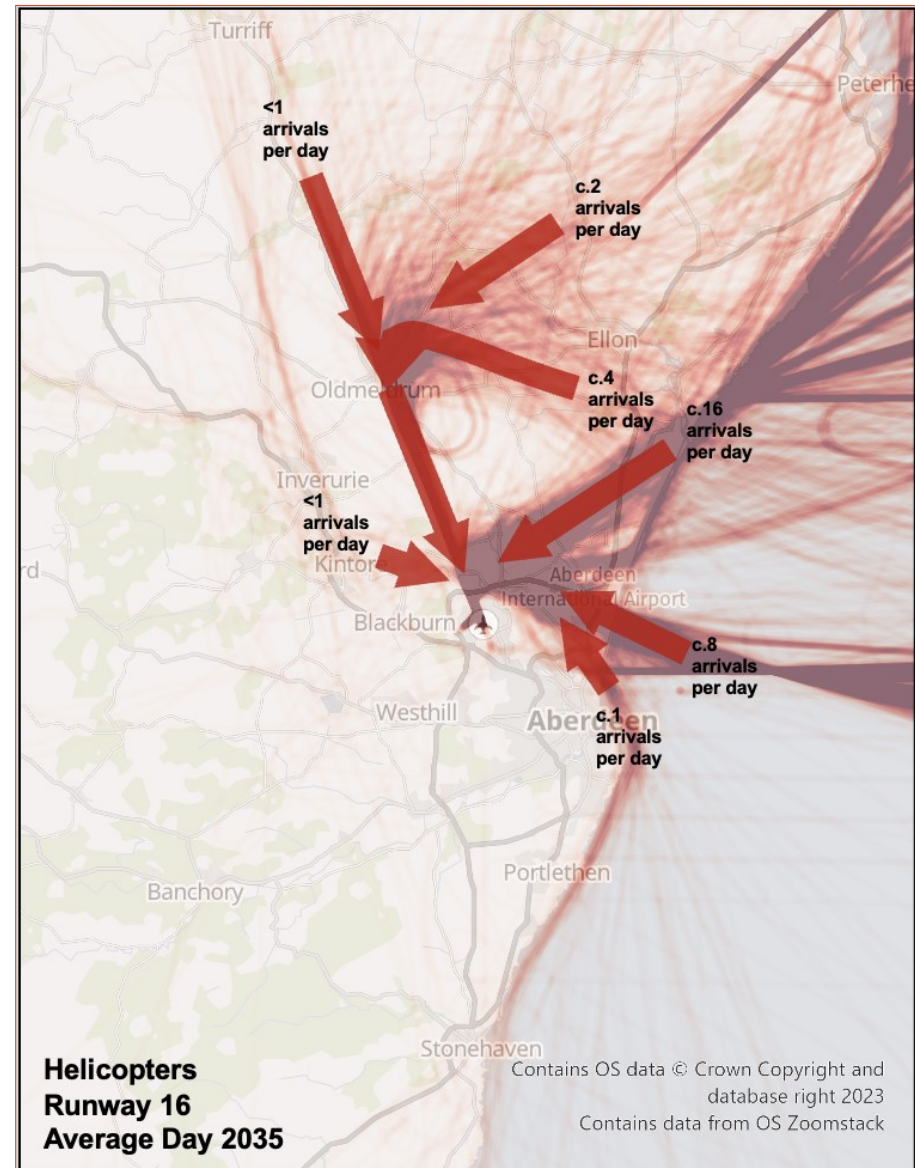
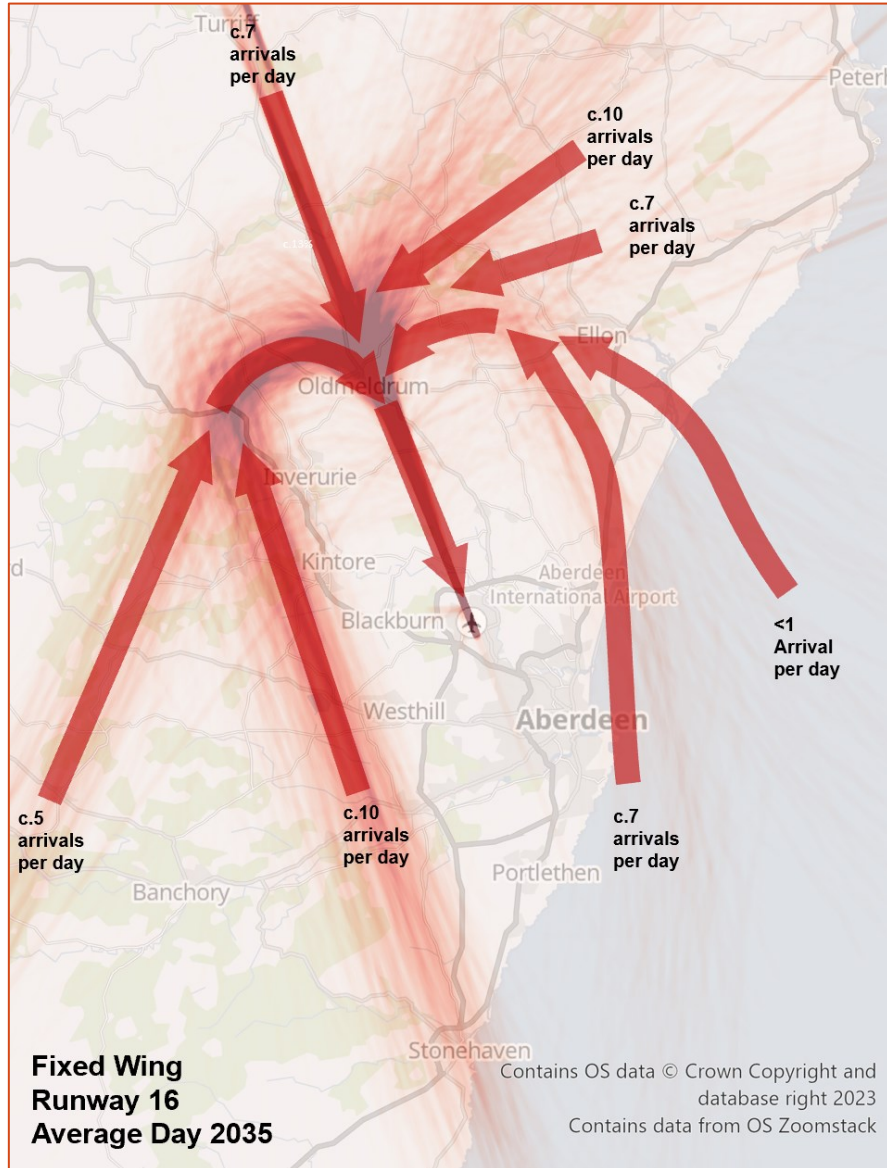


Figure 5: Average RWY 16 movements per summer day 2035. Fixed wing 46 arrivals. Helicopters 31 arrivals

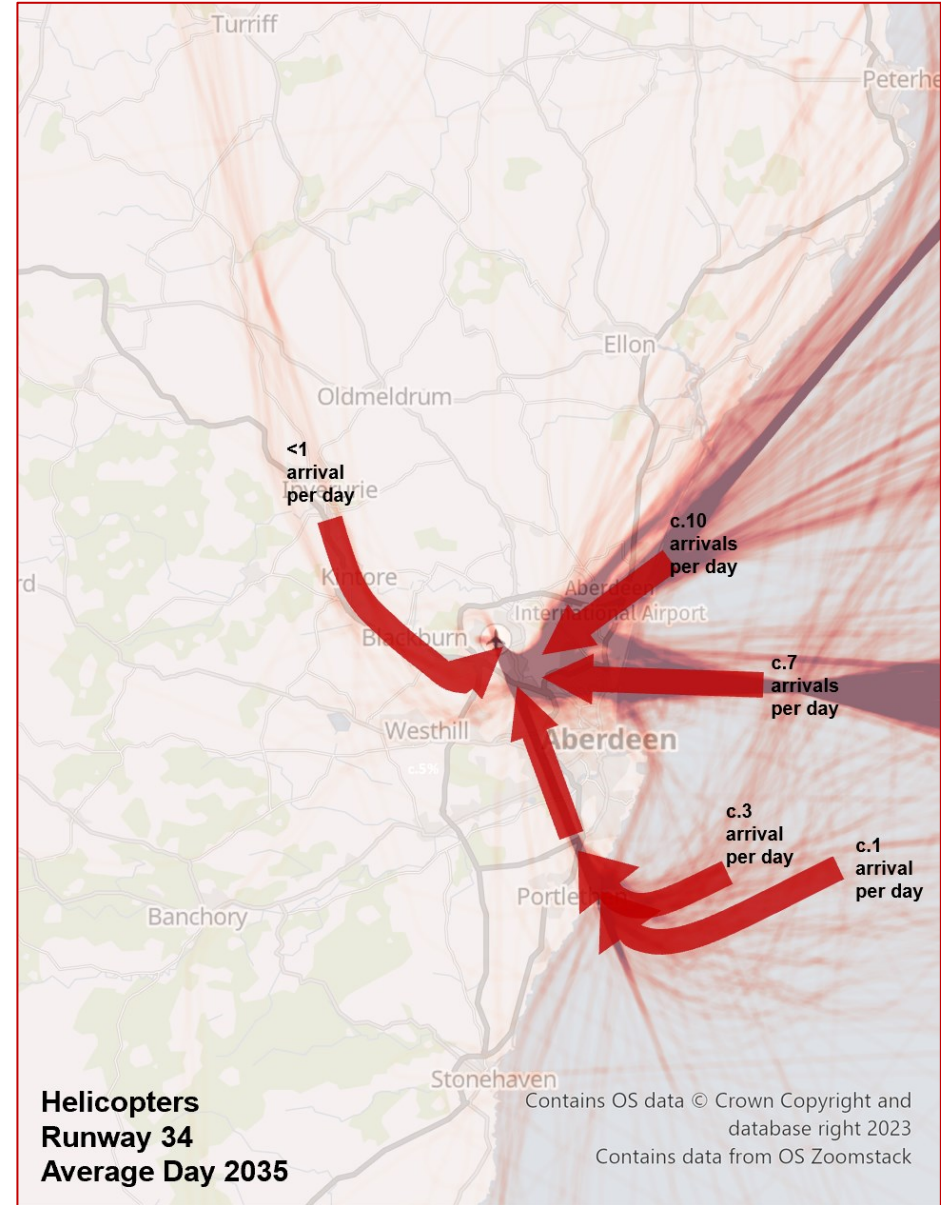
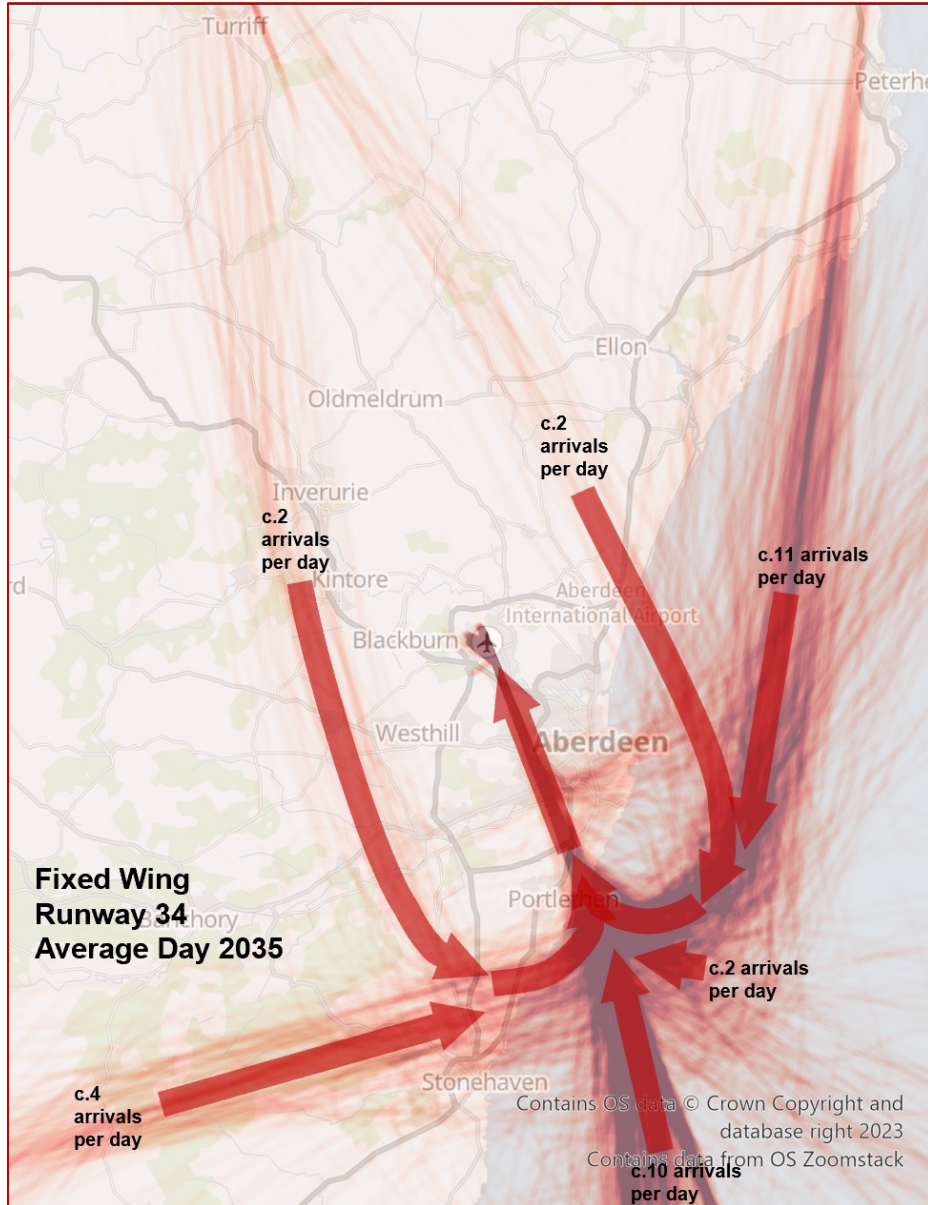


Figure 6: Average RWY 34 movements per summer day 2035. Fixed Wing 31 arrivals, Helis, 21 arrivals

Classification: Public

### **Hold usage**

- 4.2.5 Some aircraft arriving at Aberdeen have to hold. A hold is an airspace structure where aircraft circle whilst waiting to land. As part of the ILS approach procedures, there are two holds used by fixed wing aircraft (runway 16: ADN, and runway 34: DOWNI/ATF). Holds are used either when there is a lot of traffic in the airspace, and hence aircraft have to queue to land, or when aircraft are unable to land which could be due to poor visibility or the runway being temporarily unavailable.
- 4.2.6 In preparation for this Final Options Appraisal, we have looked at 2022 flight track data around hold usage which showed that c.1% of arriving fixed wing traffic used the holds. When considering the movement forecast data, this equates to less than one flight per day on average using the holds.

### **Missed approaches**

- 4.2.7 Missed approaches occur when it is judged that an approach cannot be continued to a safe landing. Aircraft may undertake a missed approach when the weather or visibility make it difficult to land, or when the aircraft is not correctly stabilised and aligned with the runway. Sometimes missed approaches also occur if the runway is temporarily blocked, or it is unsafe to land. In the event of a missed approach, aircraft fly a defined procedure.
- 4.2.8 To help estimate hold usage for the RNP approach procedures, we looked at data for the number of aircraft flying missed approaches. In 2022, c.1.7% of arriving fixed wing aircraft flew a missed approach procedure.

### **ILS outages**

- 4.2.9 The proposed PBN procedures would mainly be used in the event of an ILS outage at Aberdeen Airport and therefore in preparation for this Final Options Appraisal, we have looked at historic data around the ILS availability. In the last 5 years, there has been 1 unplanned ILS outage which lasted for 6 hours. In addition to this, the ILS is taken out of service for planned maintenance for around 5 hours per month, and up to 14 hours on a 6 monthly basis (however it is important to note that these often occur at night, or in periods when there are very few aircraft arriving/departing from Aberdeen Airport). We have factored this information in when considering how often we anticipate the PBN procedures will be operated.

### **Expected PBN usage**

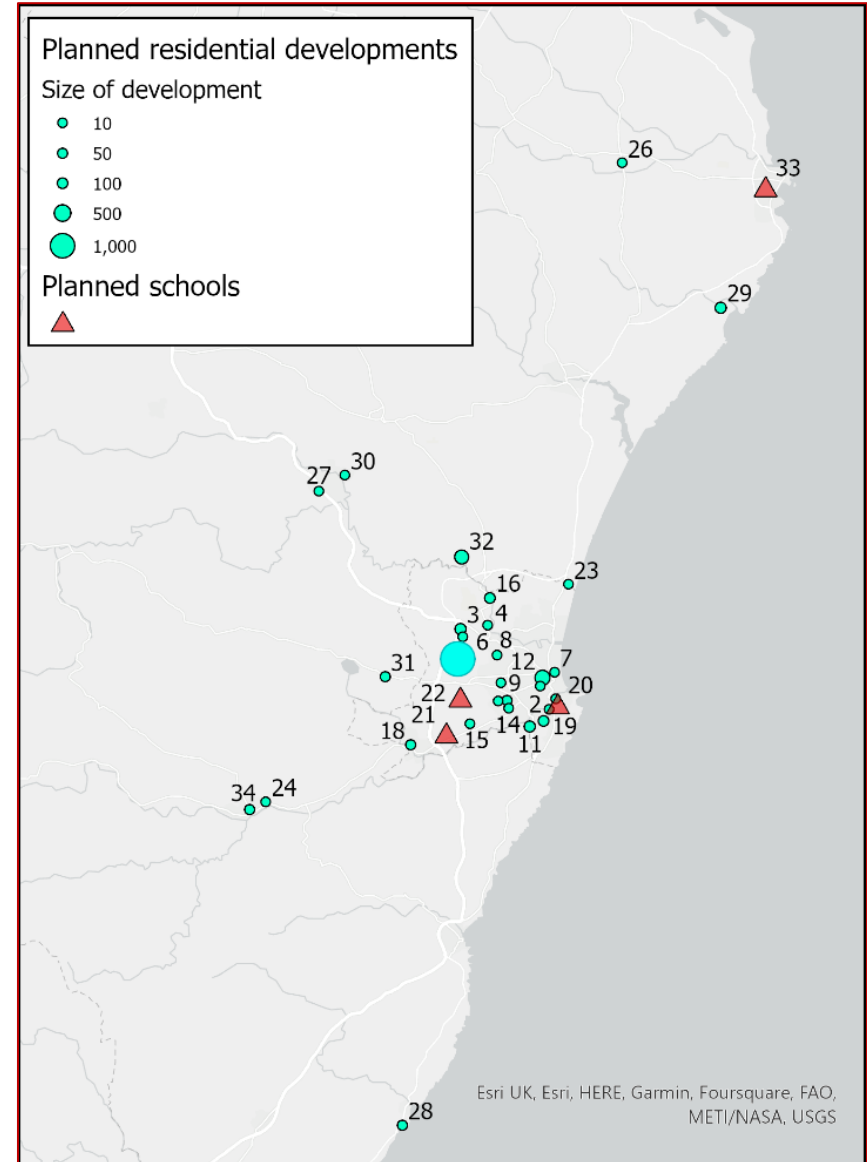
- 4.2.10 The PBN procedures proposed as part of this ACP are intended to be operated alongside the existing approaches at Aberdeen Airport and we expect the vast majority of arrivals will continue to be vectored to the ILS, as they do today. The RNP approaches are required largely for resilience purposes to cover the eventuality of loss of the ILS due to fault or maintenance however some pilots may elect to fly an RNP approach for training purposes even with a serviceable ILS.

Classification: Public

- 4.2.11 We expect c.1-5% of arrivals into Aberdeen could elect to fly the RNP approaches; however, from experience at other airports, RNP approach uptake is likely to be closer to the lower end of this assumption given the ILS will remain available. For this Final Options Appraisal, we will assess using an optimistic estimate of 5% of arrivals to fly the RNP procedures.
- 4.2.12 Feedback from helicopter operators has suggested that the PBN procedures would only be used for training purposes and therefore we have optimistically estimated c.5% of helicopter flights could use the RNP procedures.
- 4.2.13 When considering the future use of missed approaches and holds, the RNP approach procedures are not expected to result in an increase in holding or in the number of missed approaches flown. The RNP missed approach procedures replicate the existing ILS missed approach procedures and, if required, aircraft would fly a hold predicated on the existing conventional ground beacon (ADN VOR) (although the vast majority of operators will be already be flying a FMS overlay of the hold procedure).
- 4.2.14 Within the Final Options Appraisal section, we have provided operational diagrams which show the number of aircraft expected to fly the PBN procedures from the various broad arrival directions serving Aberdeen Airport.

**Planned developments**

4.2.15 As part of our preparation of the baseline, we have identified noise sensitive planned developments in the area surrounding Aberdeen Airport so that these can be incorporated as part of the appraisal of the benefits and impacts of each option. These developments have been identified through a search of the Aberdeen City Council and Aberdeenshire Council planning portals. The locations and details of the identified planned developments are shown in Figure 7 and Table 7 below.



*Figure 7: Planned Developments around Aberdeen Airport*

Table 7 Planned developments around Aberdeen Airport

ID	Ref	Local Authority	Location	Type of Development	Size of Development	Latest Status (if known)	Further information
1	<a href="#">231300/DPP</a>	Aberdeen City Council	Site Of Former Nursery Oscar Road Aberdeen AB11 8ER	Residential	20	Application Submitted	<a href="#">Project Website</a> <a href="#">Aberdeen Live Article</a>
2	<a href="#">230685/DPP</a>	Aberdeen City Council	Banks O'Dee Nursing Home Abbotswell Road Aberdeen AB12 3AB	Residential	24	Application Submitted	
3		Aberdeen City Council	Craibstone Estate Aberdeen AB21 9YA	Residential	134	Application Submitted	<a href="#">CALA Website</a>
4	<a href="#">230297/PPP</a>	Aberdeen City Council	Waterton House Stoneywood Terrace Stoneywood Aberdeen AB21 9HX	Residential Plots	16	Application Submitted (March 2023)	
5	<a href="#">230275/DPP</a>	Aberdeen City Council	Rear Of Amicable House 250/252 Union Street Aberdeen	Residential Flats	21 (9 stories)	Application Submitted (March 2023)	<a href="#">Urban Realm article</a>
6	<a href="#">230173/PPP</a>	Aberdeen City Council	Land At Greenferns Sites AB16 7RU & AB15 8TZ	Residential	1,650	Application submitted (Feb 2022)	<a href="#">Aberdeen CC article</a> <a href="#">Project website</a>
7	<a href="#">221074/DPP</a>	Aberdeen City Council	56 Park Road Aberdeen AB24 5NY	Residential	29	Application Submitted (Aug 2022)	<a href="#">Review</a>
8	<a href="#">221025/PPP</a>	Aberdeen City Council	Northfield Parish Church Byron Crescent Aberdeen AB16 7EX	Residential - Flats	16	Application Submitted (Aug 2022)	<a href="#">Aberdeen Live Article</a>
9	<a href="#">220990/PPP</a>	Aberdeen City Council	Summerhill Parish Church Stronsay Drive Aberdeen AB15 6JL	Residential – Flats	14	Application Submitted	

ID	Ref	Local Authority	Location	Type of Development	Size of Development	Latest Status (if known)	Further information
10	<a href="#">211476/DPP</a>	Aberdeen City Council	Former Bucksburn Nursing Home And Associated Land Newhills Road Aberdeen AB21 9SQ	Residential	19	Application Submitted	
11	<a href="#">231076/PAN</a>	Aberdeen City Council	Land to south and west of deeside brae Aberdeen AB12 5UE	Residential	150	Proposal of Application Notice (August 2023)	
12	<a href="#">230514/DPP</a>	Aberdeen City Council	John Street City Centre Aberdeen AB25 1LE	Residential - Purpose Built Student Accommodation (PBSA)	383	Approved (Sept 2023)	
13	<a href="#">211528/DPP</a>	Aberdeen City Council	Site Of Former Treetops Hotel 161 Springfield Road Aberdeen AB15 7SA	Residential	44 (Houses) 33 (flats)	Approved (June 2023)	
14	<a href="#">221310/DPP</a>	Aberdeen City Council	Former Braeside Primary School Braeside Place Aberdeen AB15 7TX	Residential	30	Approved (June 2023)	
15	<a href="#">220211/DPP</a>	Aberdeen City Council	Carnoc Whithom Cairnlee Road, Aberdeen	Residential	20	Approved (Nov 2023)	
16	<a href="#">221232/DPP</a>	Aberdeen City Council	Site Of Former Cordyce School Riverview Drive Dyce Aberdeen	Residential	91	Approved (Aug 2023)	
17	<a href="#">211773/DPP</a>	Aberdeen City Council	Area F3, Pinewood. Site Adjacent to Countesswells Road	Residential	17	Approved (Feb 2023)	
18	<a href="#">190314/PP</a>	Aberdeen City Council	Site OP51 Off Cornyhaugh Road Peterculter	Residential	44	Approved (Sept 2022)	
19	N/A	Aberdeen City Council	Kincorth	Residential	99	In development (July 2023)	<a href="#">News Article</a>
20	N/A	Aberdeen City Council	Tullos Cir, Aberdeen AB11 8HD	New School	-	Open	<a href="#">News Article</a>



ID	Ref	Local Authority	Location	Type of Development	Size of Development	Latest Status (if known)	Further information
21		Aberdeen City Council	Agricola St, Milltimber AB13 0BF	New School	•	Open (May 2022)	<a href="#">News Article</a>
22		Aberdeen City Council	Wisely PI, Aberdeen AB15 8NF	New School	•	Open (April 2023)	<a href="#">News Article</a>
23	<a href="#">APP/2022/2672</a>	Aberdeenshire Council	OP 1 Site Land to the East Of Blackdog Industrial Estate Blackdog Aberdeenshire	Residential	32	Approved (April 2023)	<a href="#">Project Website</a>
24	<a href="#">APP/2022/2529</a>	Aberdeenshire Council	Land To East of Woodend Barn Arts Centre Banchory AB31 5QA	Residential	14	Approved (August 2023)	
25	<a href="#">APP/2022/2408</a>	Aberdeenshire Council	Plots 80, 81, 86, 92, 93, 94, 95, 96, 97 And 87 Site At Phase 5 Crichton Meadows Stuartfield AB43 7EJ	Residential	10	Approved (December 2023)	<a href="#">Project Website</a>
26	<a href="#">APP/2022/2282</a>	Aberdeenshire Council	Phase 1E - OP1 Nether Aden Mintlaw Peterhead Aberdeenshire AB42 5BT	Residential	33	Approved (March 2023)	<a href="#">Project Website</a>
27	<a href="#">APP/2022/2169</a>	Aberdeenshire Council	Westgate South Residential Development Blackhall Road Inverurie AB51 5QF	Residential	6 (Houses) 4 (Flats)	Approved (September 2023)	<a href="#">Project Website</a>
28	<a href="#">APP/2022/2125</a>	Aberdeenshire Council	Land To East of Brae Road Gourdon DD10 0LX	Residential	49	Approved (September 2023)	<a href="#">Project Website</a>
29	<a href="#">APP/2022/2058</a>	Aberdeenshire Council	OP1 Site Nethermill Cruden Bay Aberdeenshire AB42 0AD	Residential	123	Approved (May 2023)	<a href="#">Project Website</a>

<b>ID</b>	<b>Ref</b>	<b>Local Authority</b>	<b>Location</b>	<b>Type of Development</b>	<b>Size of Development</b>	<b>Latest Status (if known)</b>	<b>Further information</b>
30	<a href="#">APP/2023/0480</a>	Aberdeenshire Council	Site At Uryside Phase 2 Osprey Heights Development Oldmeldrum Road Inverurie Aberdeenshire AB51 6BB	Residential	17	Approved (July 2023)	<a href="#">Project Website</a>
31	<a href="#">APP/2022/1062</a>	Aberdeenshire Council	Land To the North of Burnland Park and South of Straik Road Elrick Westhill AB32 6AE	Residential	50	Approved (April 2023)	<a href="#">Project Website</a>
32	<a href="#">APP/2022/1636</a>	Aberdeenshire Council	Land West of Hillbrae Way Newmachar Aberdeenshir AB21 0JN	Residential	323	Approved (August 2023)	
33	<a href="#">APP/2023/1660</a>	Aberdeenshire Council	Land At Kinmundy Sports Ground Kinmundy Road Peterhead Aberdeenshire	Leisure Facilities and School	NA	Application Submitted	<a href="#">Project Website</a>
34	<a href="#">APP/2023/0908</a>	Aberdeenshire Council	Land To Northwest of Hill of Banchory Upper Lochton Banchory Aberdeenshire AB31 5UF	Residential	78	Application Submitted	<a href="#">News Article</a>
35	<a href="#">APP/2023/0562</a>	Aberdeenshire Council	Land To the North of Cairn Close Memsie Fraserburgh AB43 7FE	Residential	35	Application Submitted	<a href="#">Project Website</a>

### 4.3 Final Options Appraisal methodology

4.3.1 At Stage 4, CAP1616 requires sponsors to carry out a final assessment of the benefits and impacts of the final proposal, tested against the 'without airspace change' baseline scenario. The purpose of this appraisal is to highlight the change to sponsors, stakeholders and the CAA, and set out the relative differences between the impacts, both positive and negative, of the final proposal.

#### Final Options Appraisal methodology

4.3.2 Our assessment criteria shown in Table 8 below have been categorised based on the example in CAP1616F, however we have added an additional category called 'Airspace Modernisation Strategy' to assess the options against the aims and objectives of the AMS. We will follow this table structure across the appraisal of the baseline and the final option. The table below also presents the Final Options Appraisal methodology that will be followed. This methodology will be used to compare the airspace change option against the baseline.

Table 8 Final Options Appraisal assessment criteria and methodology

Group	Impact
Communities	Noise impact on health and quality of life

#### Noise:

A quantitative assessment of changes to noise impacts compared with the 'do nothing' baseline. The noise assessment has been undertaken using CAP1616 primary and secondary noise metrics. CAP1616 (B54) explains: *When considering noise impacts, the CAA will weight the outcomes from 'primary' metrics over 'secondary' metrics. Primary metrics will be those that are used to quantify significant noise impacts, such as WebTAG outputs. Secondary metrics will be those that are not being used to determine significant impacts but which are still able to convey noise effects, such as N65 contours and Lmax levels. While not a noise metric, overflight contours will be a secondary metric for the purposes of decision-making.*

The following subsections describe these noise metrics.

#### Primary noise metrics: Total adverse effects on people

Adverse effects related to health and quality of life are assessed using a risk-based approach above the 51dB  $L_{Aeq,16hr}$  daytime and 45dB  $L_{Aeq,8hr}$  night-time lowest observable adverse effect level (LOAEL). The total adverse effects of noise on people is determined using the Department for Transport's suite of TAG tools, specifically the [TAG noise workbook - aviation](#). The TAG noise assessment calculates monetised values for different health outcomes from changes in  $L_{Aeq}$  noise exposure. As per CAA guidance, changes below the LOAEL (51dB  $L_{Aeq,16hr}$  daytime and 45dB  $L_{Aeq,8hr}$  night-time) have not been included in the TAG assessment.

A TAG assessment has been conducted for the option as part of this Final Options Appraisal and is presented as an overall net present value (NPV, £ in 2024 prices) along with NPVs for different health effects.

#### Primary noise metrics: $L_{Aeq}$ contours

$L_{Aeq}$  contours are the equivalent sound level of aircraft noise in dBA. This is based on the daily average movements that take place in the 16-hour period (07:00-23:00 local time) or 8-hour period (23:00-07:00) during the 92-day period 16 June to 15 September inclusive. This metric is the measure of noise exposure adopted by Government for the purposes of considering adverse effects from aircraft noise. It forms the basis of the Government's policies in relation to aircraft noise. The contours are generated based on all arrivals and departures to/from Aberdeen Airport.

$L_{Aeq}$  contours have been generated in 3dB intervals from 51dB  $L_{Aeq,16hr}$  and 45dB  $L_{Aeq,8hr}$  for the baseline and the option as part of this Final Options Appraisal. The 55dB  $L_{Aeq,8hr}$  is also reported as this represents the night-time Significant Observed Adverse Effect Level (SOAEL).

#### Secondary noise metrics: noise events above 65dB and 60 dB $L_{Amax}$ (N65 and N60)

N60 and N65 are noise metrics which respectively describe the number (N) of aircraft noise events above a noise level of 60dB  $L_{Amax}$  in the night-time period and 65dB  $L_{Amax}$  for the daytime period. These are event-based metrics, which can be used to better understand the number of noise events that occur and their location.

N65 and N60 contours ranging from 5 events have been generated for the baseline and the option as part of this Final Options Appraisal.

#### Secondary noise metrics: overflight contours

Overflight contours are generated using the CAA's 48.5 degree definition of overflight as outline in CAP1498, this means 'an aircraft in flight passing an observer at an elevation angle of 48.5° from the ground at an altitude below 7000ft'.

Overflight contours for flights below 7000ft ranging from 5 events have been generated for the baseline and the final option as part of this Final Options Appraisal. Although overflight contours are not considered a noise metric, they do enable calculation of the number of times a location may be considered to be overflown. This is an event-based metric, which can be used to better understand the number of noise events that occur and their location.

#### Colour coding of noise data results

Within this Final Options Appraisal document, the outcomes of the noise analysis have been compared against the baseline, and a comparison table provided (full data tables are available in technical Appendix A). The results have been colour coded whereby any improvements against the baseline are green, and disbenefits are red, and any results the same as the baseline are neutral (grey).

The colour coding helps identify where the final proposal performs differently from the baseline however it is very important to consider this colour coding does not account for the scale of the changes which in most cases are very small differences between the option and the baseline.

#### CAP2091 and noise modelling methodology

Noise modelling for this Final Options Appraisal has been conducted in accordance with the guidance outlined in CAP1616a and the minimum standards for noise modelling mandated in CAP2091<sup>4</sup>. Around 40% of the Aberdeen fleet are helicopters, with around 1% of helicopter arrivals using the new PBN routes. Considering this, helicopter noise has been included as part of the noise modelling.

<sup>4</sup> [CAP2091: CAA Policy on Minimum Standards for Noise Modelling](#)

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Group	Impact
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As previously agreed through engagement with the CAA, all noise modelling has been conducted to meet CAP2091 'Category C' requirements. This has subsequently been confirmed based on the population within the LOAEL contours produced for this Final Options Appraisal. Consequently, the noise models include:

- Flight profiles incorporating adjustments in altitudes, speeds, climb rates, and approach angles based on local track-keeping data for major aircraft types.
- Arrival and departure track centrelines determined from local track-keeping data.
- Dispersion around the track centrelines derived from local track-keeping data.

All noise modelling has been conducted using the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) version 3e. AEDT is identified in CAP1616a as a "recognised and validated noise model". The methodologies for noise, aircraft flight profile, and flight path computation in AEDT 3e adhere to the standards set by the European Civil Aviation Conference (ECAC) Doc 29 (4th Edition)<sup>5</sup> and the International Civil Aviation Organization (ICAO) Doc 9911 (2nd Edition)<sup>6</sup>. AEDT is also compatible with Commission Directive (EU) 2020/367 as the Directive mirrors the calculation method set out in ECAC Doc 29.

The fixed-wing Noise-Power-Distance (NPD) data utilised in AEDT 3e, which is the basis of the AEDT noise calculation method, is derived from the Aircraft Noise and Performance (ANP) Database v2.3. Additionally, AEDT incorporates data for 26 helicopter models, accompanied by a list of recommended substitutions for helicopters not covered in the database. However, these helicopters do not form part of the ANP database. Following engagement with the CAA, it has been advised that the CAA considers the CNOSSOS-EU<sup>7</sup> approach and the helicopter data contained in EU Directive 2020/367 Appendix I as best practice for the calculation of helicopter noise.

EU Directive 2020/367 specifies that, for helicopter noise calculation, the same method used for fixed-wing aircraft may be applied, with the condition that helicopters are treated as propeller aircraft, and engine-installation effects associated with jet aircraft are not included in the calculation. The helicopter data in EU Directive 2020/367 Appendix I, encompassing NPD curves, profiles, and spectral classes, has been integrated into AEDT for the assessment of helicopter noise around Aberdeen Airport. All helicopter-specific corrections, including directivity and advancing tip mach number corrections, have been disabled in the model, rendering the AEDT helicopter calculation method equivalent to the CNOSSOS-EU approach.

The aircraft types, numbers of movements, track usage, and temporal distribution of operations used in the model have been derived from the 92-day summer period of the forecasts described in Section 0. The generic helicopter data in EU Directive 2020/367 Appendix I is categorised in terms of the maximum take-off weight, which has been used to assign each helicopter type in the forecasts to one of the five generic helicopter classes.

All fixed-wing noise modelling has been produced for a 10-year average fixed-wing modal split of 60% westerly and 40% easterly. This 10-year average fixed-wing modal split has been derived from annual (365 days) modal split data from 2013 to 2022. Annual data has been used to provide a long-term average as long-term 92-day modal split data is not currently available. However, the 10-year average modal split has been checked against the last three years' 92-day summer modal splits which are readily available (2021 – 2023) and the difference between the 10-year annual average and the 3-year 92-day summer average is less than 1%. Given the very limited nature of the noise impact between airspace options, and the fact that more long-term data is available for the annual average, it is considered appropriate and proportionate to use the 10-year annual average for fixed wing noise modelling.

Due to the unavailability of historic runway use data for helicopters, the models reflect helicopter runway use during the 92-day summer 2022 period.

Terrain adjustments have been included in the noise calculations using the OS Terrain 50 product. As per the guidance in CAP1616a, these adjustments are limited to geometrical corrections for aircraft-receiver distances and elevation angles.

In accordance with CAP2091, under Category C, aircraft flight profiles are adjusted based on the standard ICAO dataset for the primary noise-dominant aircraft types, covering over 75 percent of the total noise energy produced at the airport. The identification of the main noise-dominant aircraft types has been derived from the quota count (QC) values of the airport fleet and the 92-day summer 2022 flight schedule. Notably, helicopters are the main contributor to the airport's total QC. Among fixed-wing aircraft, the top ten contributors account for 85% of the total fixed-wing QC and therefore exceed the requirement to cover over 75% of the total noise energy.

The figure below shows the cumulative percentage of total QC by aircraft type – the red box indicates the primary noise-dominant fixed-wing aircraft types identified. Flight profiles for these ten fixed-wing aircraft, along with all helicopters, have been modified to align with Category C requirements.

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<sup>5</sup> European Civil Aviation Conference (2016). ECAC Doc 29 Report on Standard Method of Computing Noise Contours Around Civil Airports.

<sup>6</sup> ICAO Doc 9911, "Recommended Method for Computing Noise Contours around Airports", Second edition, 2018.

<sup>7</sup> <https://op.europa.eu/en/publication-detail/-/publication/80bca144-bd3a-46fb-8beb-47e16ab603db>

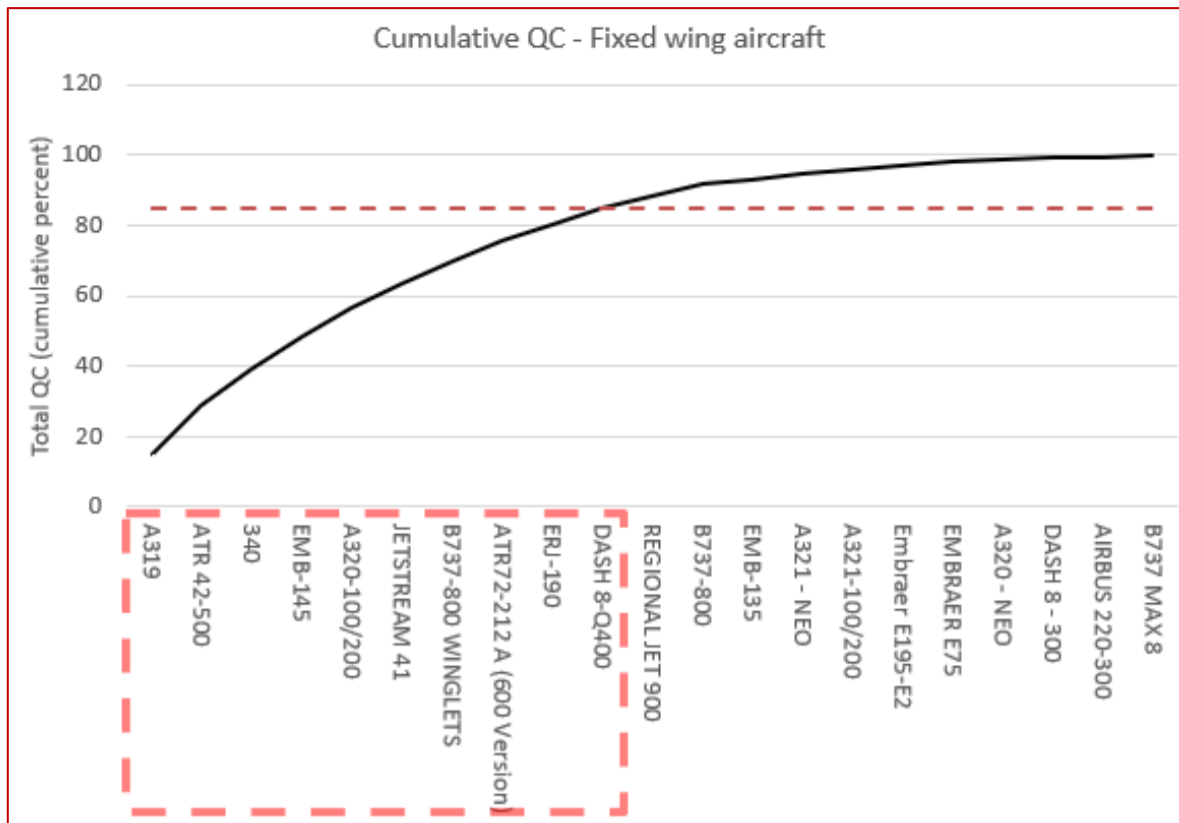


Figure 8: Primary noise-dominant aircraft types based on total QC

The flight profiles for the primary noise-dominant aircraft types have been adjusted to match the average vertical profile for each aircraft type. The average profiles have been calculated through analysis of Aberdeen Airport's track-keeping data over the 92-day summer 2022 period (16 June 2022 to 15 September 2022). Adjustments have been made to the aircraft take-off weight, flap settings, climb rates, and airspeeds, utilising the closest matching standard ICAO profile for each aircraft as a starting point. Separate profiles have been created for different aircraft stage lengths. An example of a modified profile created for a Saab 340 aircraft, compared to the calculated average profile and the standard ICAO profile, is shown in Figure 9 below. This demonstrates that the modified profile closely matches the average profile from track-keeping data and represents a substantial improvement compared to the standard ICAO profile.

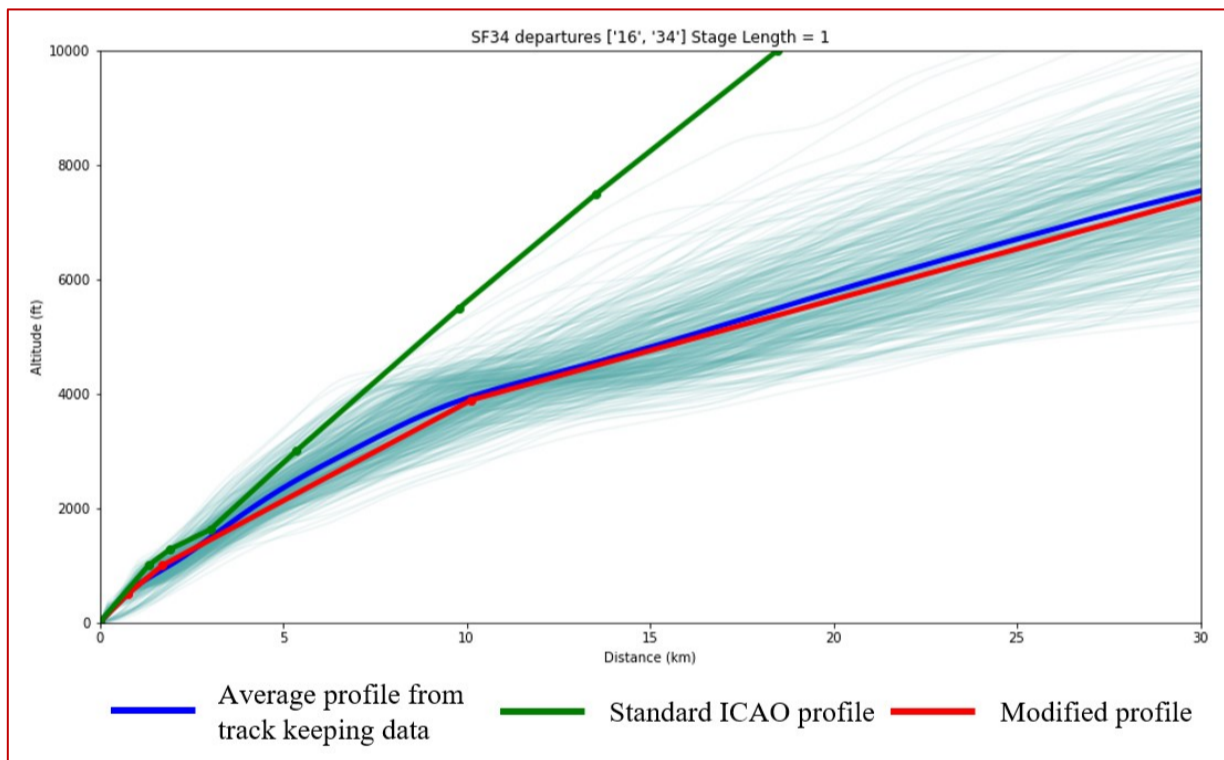


Figure 9 Modified flight profile for a Saab 340 aircraft

Departure and arrival centrelines, along with the typical lateral dispersion around the centrelines, have been calculated from Aberdeen Airport's track-keeping data during the 92-day summer 2022 period. Lateral dispersion in the noise model is represented by up to four subtracks on either side of the track centreline. The centrelines and dispersed subtracks have been programmatically calculated using BridgeNet International's Volans software via the following method.

Using the runway orientation as an initial guide, a perpendicular 'gate' is formed at a user specified offset from the end of the runway. 'Gate penetrations' by each flight track through the gate are computed and statistical computations are formed to generate a new heading, based upon the distribution of penetration offsets from the gate centre point and the prior gate centre. This process is then repeated for a user-specified number of nautical miles, generating a "back-bone" Nominal Track. Processing parameters allow the user to specify gate width, gate width growth, and outlier rejection metrics as the algorithm progresses. Once a back-bone track has been established, another pass through the flight tracks is performed to compute sub-tracks. Based on the user-specified number of desired sub-tracks, a statistical distribution of gate penetrations is computed, and each track is assigned to a sub-track. A single representative nominal sub-track is then formed using all flight tracks within a given sub-track.

Where the track data has not been sufficiently uniform to programmatically generate a track centreline (i.e. in situations where multiple tracks intersect each other), the centreline has been drawn manually based on the density of tracks. Operations have been distributed across the subtracks based on a normal distribution. The figures below show the calculated centrelines (solid lines) and dispersed subtracks (white dashed lines), overlaid against the summer 2022 track-keeping data (transparent lines).

Group

Impact

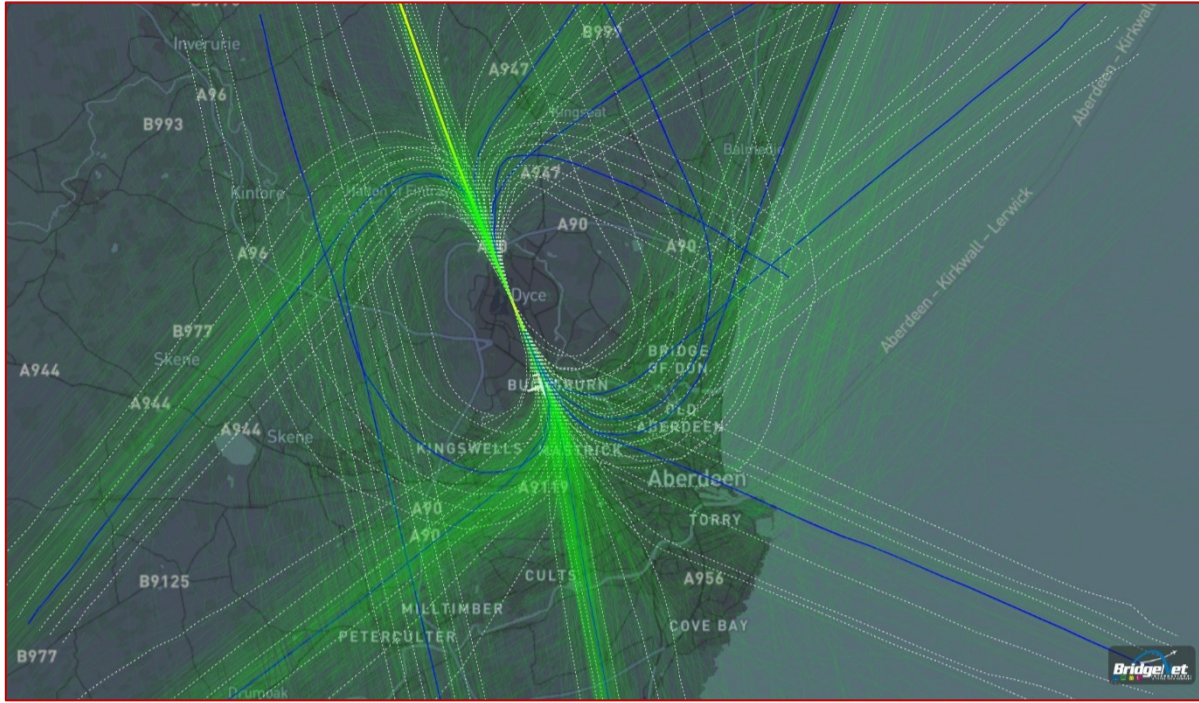


Figure 10 Fixed wing departure track centrelines

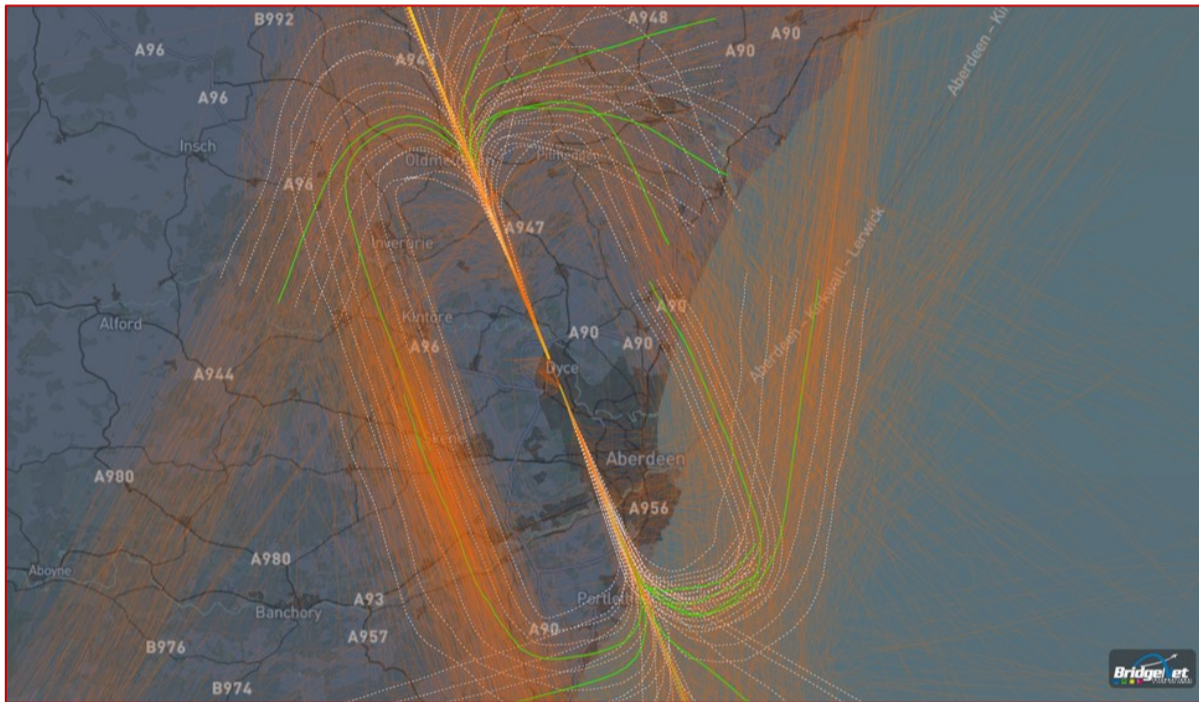


Figure 11 Fixed wing arrival track centrelines

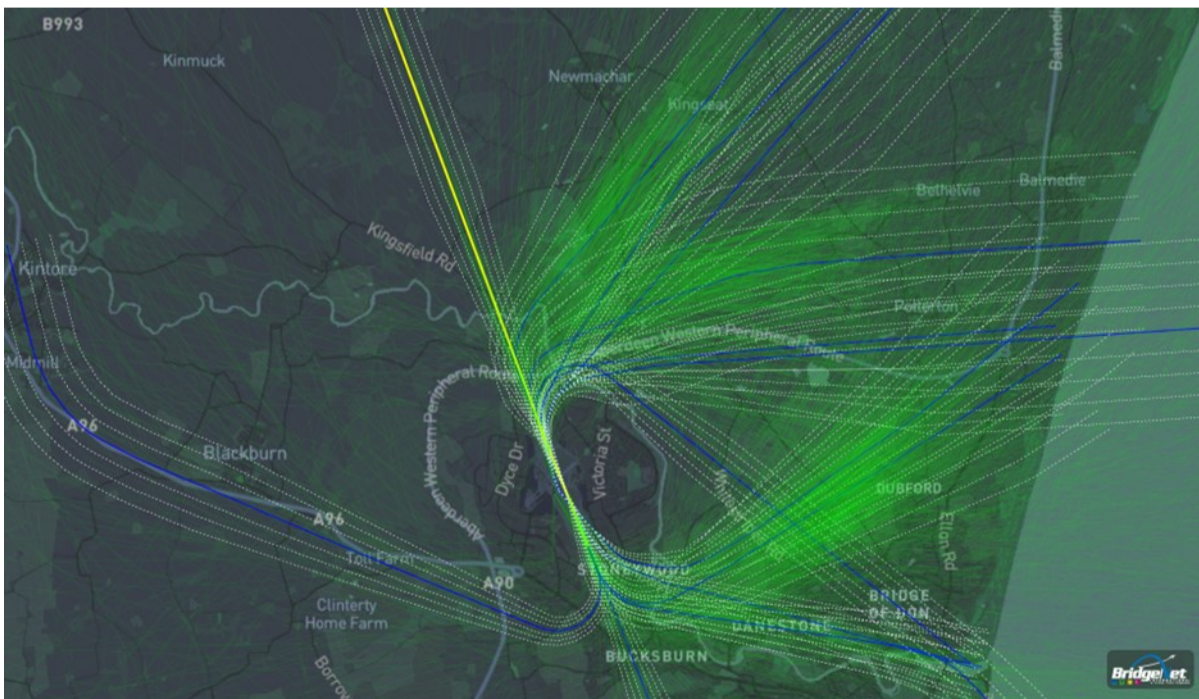


Figure 12 Helicopter departure track centrelines

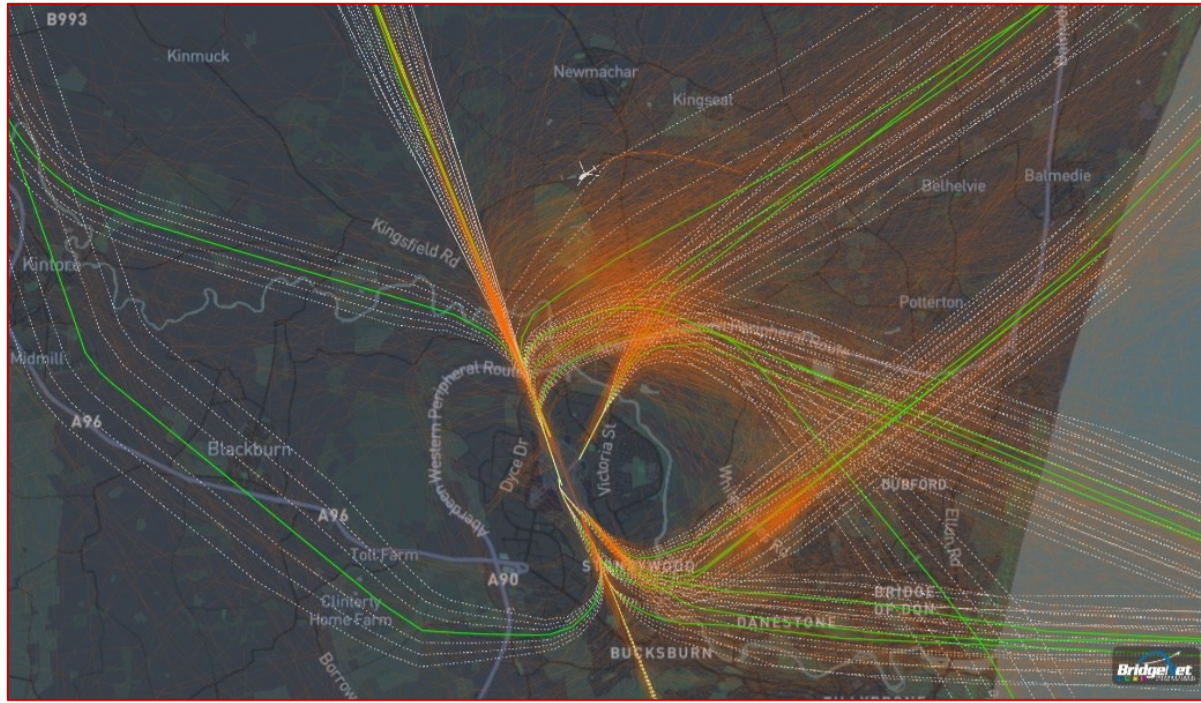


Figure 13 Helicopter arrival track centrelines

Lateral dispersion assumptions for the new PBN approaches are a conservative estimate based on professional judgement, informed by track data for two airports with RNAV1 SIDS. Whilst this is not necessarily a direct correlation to PBN approaches and there is an absence of RF data, it has been used to help inform expected dispersion. This corresponds to a maximum dispersion of +/- 0.5 nm for fly-by turns, +/- 0.3 nm for RF curves, and +/- 0.1 nm on straight segments including final approach.

Considering the above adjustments, it is considered that the modelling undertaken meets the requirements of CAP2091 Category C and the guidance set out in CAP1616a.

Meteorological data for the modelling has been sourced from historic METAR data for Aberdeen Airport (accessed via the Iowa Environmental Mesonet). Meteorological conditions (temperature, relative humidity, pressure, sea level pressure, and wind speed) have been included in the noise calculations as a 10-year average over the 92-day summer period.

L<sub>Aeq</sub> contours have been calculated over a 100m x 100m regularly spaced grid of receivers at a height of 1.2m from local ground level, as per the guidance on the use of AEDT contained in CAP1616a. Due to the wider spatial extent of the N65 and N60 contours, these have been calculated over a 200m x 200m regularly spaced grid of receivers at a height of 1.2m from local ground level.

**CAP1498 overflights**

Overflights have been calculated for all aircraft operations below 7000ft. The same CAP2091 Category C standards used for the noise modelling described in the previous section have been applied in the calculation of overflights including modified flight profiles for the primary noise-dominant aircraft types, lateral dispersion, and terrain adjustments. As recommended in CAP1616a, a threshold angle of 48.5° has been used in the calculation of overflights. Overflight contours have been calculated over a 200m x 200m regularly spaced grid of receivers at a height of 1.2m from local ground level.

**Additional noise metrics**

CAP1616 outlines several "additional optional noise metrics" for explaining and portraying noise impacts to affected communities. The metrics include 100% mode L<sub>Aeq</sub> contours and difference contours. As all changes occur outside the LOAEL contour, these additional metrics have not been incorporated into the assessment as they do not offer additional insights into noise impacts. Considering that there are no material differences between the options in terms of noise impacts, this is considered proportionate to the likely noise effects of the change under consideration [CAP1616 B4].

**Population and noise sensitive building counts**

Population counts within the calculated noise contours have been generated from the latest 2023 population data supplied by CACI Ltd. This data has been supplemented with the planned residential developments described in Section 0. A population per dwelling of 2.19 (calculated from the CACI dataset) has been applied to each of the planned developments to estimate the number of individuals in each development.

Counts of non-residential noise sensitive buildings within the calculated noise contours have been generated from the latest 2023 PointX data. The PointX classification codes included in the assessment are shown in the table below and cover schools, hospitals, care homes, and places of worship. This data has been supplemented with the planned non-residential developments described in Section 3.1.5.

PointX classification code	Description	Noise sensitive building type
05310375	First, primary and infant schools	School
05310376	Further education establishments	
05310377	Independent and preparatory schools	
05310379	Broad age range and secondary state schools	
05310380	Special schools and colleges	
05310381	Higher education establishments	
05310382	Unspecified and other schools	
05310801	Pupil Referral Units	
05280780	Accident and Emergency hospitals	Hospital
05280371	Hospitals	Care home
05280373	Nursing and residential care homes	
06340459	Places of worship	Places of worship

Table 9 Noise sensitive building types considered in the assessment

**Group Impact**

**TAG assessment**

The May 2024<sup>8</sup> version of the [TAG noise workbook - aviation](#) has been used to calculate monetised noise impacts.  $L_{Aeq,16hr}$  and  $L_{Aeq,8hr}$  has been calculated at individual population receptors at a height of 1.2m from local ground level directly for the baseline and for each airspace change option. The number of individuals experiencing an increase or decrease in  $L_{Aeq}$  with airspace change and without airspace change for year 1 and year 10 have been input into the workbook in 1dB bands. As per CAA guidance, changes below the lowest observed adverse effect level (LOAEL) (51dB  $L_{Aeq,16hr}$  daytime and 45dB  $L_{Aeq,8hr}$  night-time) have not been input into the workbook. This assessment method in the workbook has been set to 'individual' and appraisal period has been set to 10-year. Monetised values have been output in 2010 prices for consistency with the example presented in CAP1616a.

**Communities Tranquillity**

CAP1616 states that "explicit consideration of any changes to routes and/or traffic patterns that may affect either an Area of Outstanding Natural Beauty (AONB)<sup>9</sup> or a National Park, with specific regard to impacts upon tranquillity". In the context of this ACP, there are no National Parks or National Scenic Areas (NSAs) within the scope of the proposed changes. The closest national park, the Cairngorms, is overflown at altitudes above 7000ft. This has been verified using the [Scottish Government's catalogue of spatial data](#).

CAP1616 further states that impacts on "any locally identified 'tranquil' areas that are identified through community engagement and are subsequently reflected within an airspace change proposal's design principles" must be considered. [Aberdeen Planning Guidance 2023: Noise](#) identifies several Candidate Quiet Areas (CQA) and the [Scottish Government's catalogue of spatial data](#) provides information on the locations of country parks, regional parks, gardens and designated landscapes. The potential impacts on these areas have been evaluated by calculating the total number of unique areas within the  $L_{Aeq}$ ,  $N_x$ , and overflights below 7000ft contours, as well as the total area (in km<sup>2</sup>) intersected by these contours.

**Communities Biodiversity**

**Habitats Regulations Assessment (HRA) screening**

An early screening assessment has been undertaken to determine whether a Habitats Regulations Assessment (HRA) is required as part of the Aberdeen Airport airspace change proposal.

CAP2527<sup>10</sup> provides a Habitats Regulations screening assessment of European Sites potentially affected by the Airspace Change Masterplan<sup>11</sup>. The report establishes a precautionary Zone of Influence (ZoI)<sup>12</sup> with a radius of 18km from each airport boundary in the Masterplan. This radius is based on the potential impacts listed below and the conservative assumption that all aircraft, whether departing or arriving, will be at altitudes greater than 3,000ft at distances greater than 18km from the airfield. A justification for the ZoI for each of the impacts is provided in CAP2527.

- Increases in the atmospheric concentration and deposition of nitrogen (18km ZoI);
- Aircraft collision with wildlife (birds and bats) (13km ZoI); and,
- Presence of aircraft / aircraft noise (18km ZoI).

The table below details the six European Sites within the CAP2527 precautionary ZoI for Aberdeen Airport.

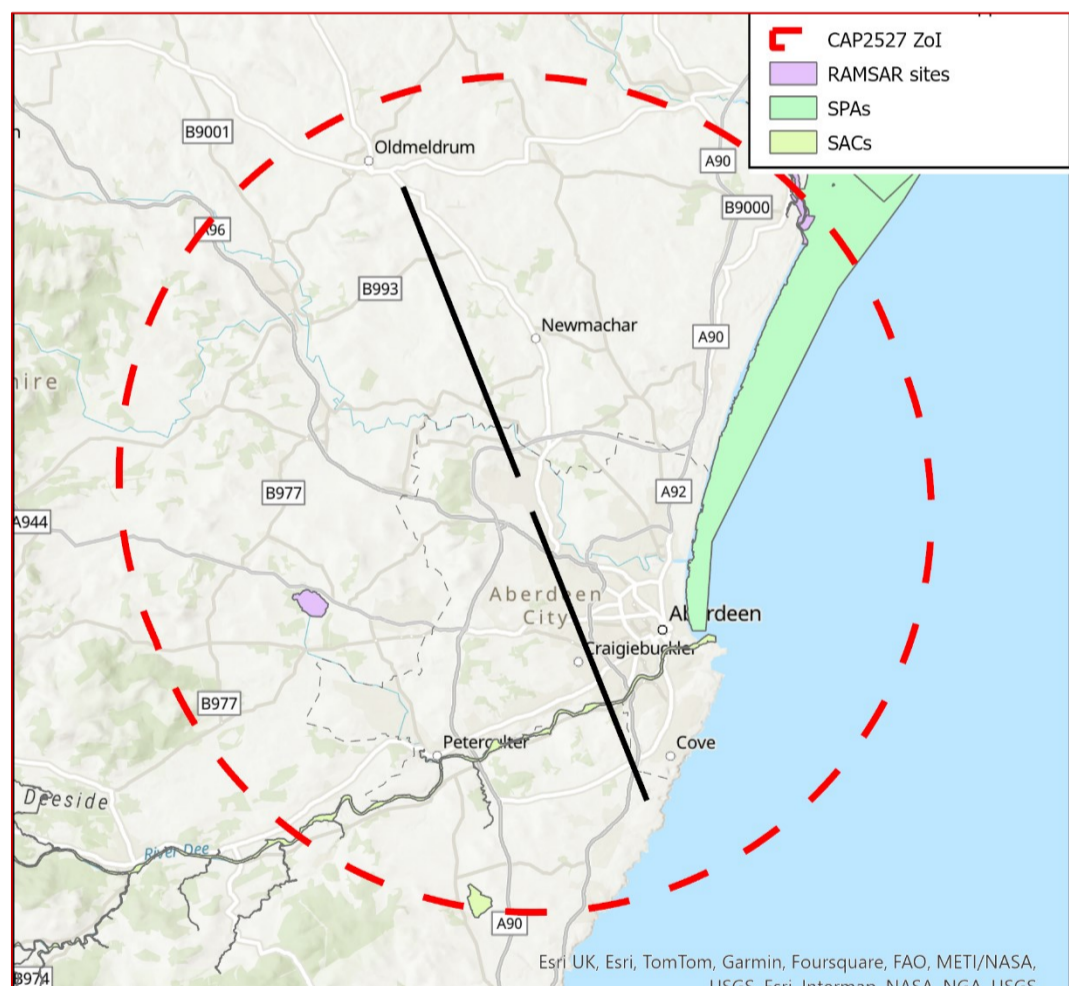
*Table 10 European Sites within the Aberdeen Airport ZoI*

European site	Distance from airport
Loch of Skene Ramsar	9.4km
Loch of Skene SPA	9.4km
Red Moss of Netherley SAC	16.8km
River Dee SAC	8.5km
Sands of Forvie SAC	16.4km
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	7.2km

The figure to the right shows the European Sites within the CAP2527 ZoI (dashed red line) and the proposed airspace change options (solid black lines). Of the six European Sites, only the River Dee SAC is overflown by the airspace change options within the ZoI and below 3000ft.

The airspace design options overflying the River Dee SAC are all on final approach. This means that, compared to the baseline situation, the option under consideration in this Final Options Appraisal:

- will not increase the number of aircraft movements overflying any European Site below 3000ft;
- will not change the altitude of aircraft overflying any European Site below 3000ft; and,
- will not change the lateral dispersion of aircraft overflying any European Site below 3000ft.



*Figure 14 European Sites within the Aberdeen Airport ZoI*

Considering that the options result in no change to air traffic movements overflying any European Site below 3000ft compared to the baseline situation, a Habitats Regulations Assessment can be screened out.

<sup>8</sup> This was the latest version of the TAG workbook available at the time of undertaking the Final Options Appraisal

<sup>9</sup> National Scenic Areas (NSA) in Scotland

<sup>10</sup> CAA (2023) CAP2527 Airspace Change Masterplan: Habitats Regulations Screening Report

<sup>11</sup> At the time of publication, Aberdeen airport was part of the Airspace Change Masterplan. Aberdeen's ACP has subsequently been de-coupled from the masterplan because the proposal no longer has interdependencies with the NERL ACP for the airspace above 7000ft

<sup>12</sup> The Chartered Institute of Ecology and Environmental Management (CIEEM) defines a ZoI as "the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities".



**Group Impact**

**Communities Air quality**

CAP 1616a Airspace Change: Environmental requirements technical annex (para 1.96 and 1.97) states: “Due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet are unlikely to have a significant impact on local air quality. Therefore, the impact of airspace design on local air quality is generally negligible compared to changes in the volume of air traffic, and local transport infrastructures feeding the airport. However, airspace change sponsors must include consideration of whether local air quality could be impacted when assessing airspace change proposals.

Change sponsors must produce information on local air quality impacts only where there is the possibility of pollutants breaching legal limits following the implementation of an airspace change (or worsening an existing breach of legal limits). The CAA deems that this is only likely to become a possibility where:

- there is likely to a change in aviation emissions (by volume or location) below 1,000 feet, and
- the location of the emissions is within or adjacent to an identified AQMA.”

For arrivals, aircraft are at or below 1000ft when they are aligned with the final approach track and therefore there are no lateral changes to aviation emissions for any of the options. As the ACP does not seek to increase capacity for Aberdeen, there will be no change to the volume of Aviation Emissions.

For the purposes of the Final Options Appraisal a qualitative statement has been made around air quality.

**Wider Society Greenhouse gas impact**

Fuel burn for fixed wing aircraft has been calculated using the Aviation Environmental Design Tool (AEDT) version 3e. For fixed wing aircraft, AEDT calculates the fuel consumed over each flight path segment using the Base of Aircraft Data (BADA) version 3.15 model and the Senzig-Fleming-Iovinelli (SFI) method<sup>13</sup>. However, unlike fixed wing aircraft, helicopters lack internationally accepted fuel burn calculation methods. Aberdeen Airport has provided fuel usage data for an S92 helicopter across various phases of departure and approach procedures. This data includes fuel burn for take-off, initial climb (up to 450m), climb-out (450-1000m), approach, holding, and landing procedures, along with the duration the helicopter operates in each phase. In total, the fuel burn data covers a duration of 350 seconds for departure operations and 540 seconds for arrival operations. Based on radar data from the 92-day summer 2022 period, these durations encompass approximately the first 22.3km of departure operations (see Figure 15) and the final 31.4km of arrival operations (see Figure 16). Assessing helicopter fuel burn using data from a single helicopter type and the operational modes covered is considered a proportionate approach for this ACP. This is because beyond this distance, the differences between existing and future tracks are minimal, there's no anticipated change in the number of helicopter operations between assessment years, and the total number of helicopters expected to fly the new routes is small (approximately 1% of helicopter arrivals will use the new routes, resulting in a change in overall helicopter track miles flown of around 0.1%).

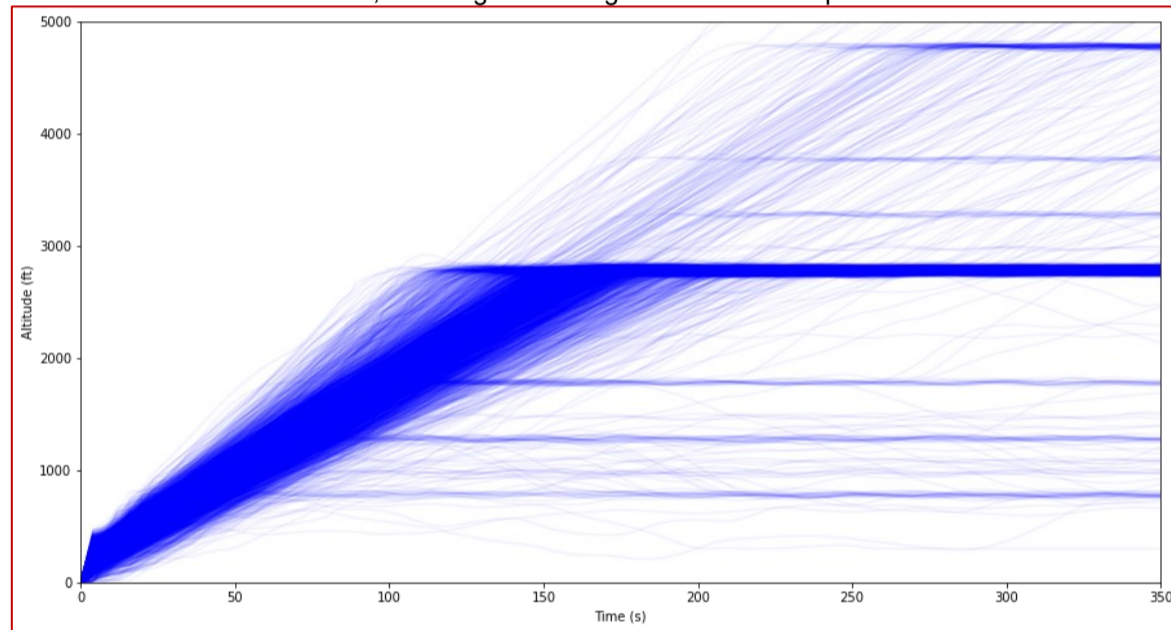


Figure 15 Altitude profile of helicopter departures as a function of time over the 92-day summer 2022 period.

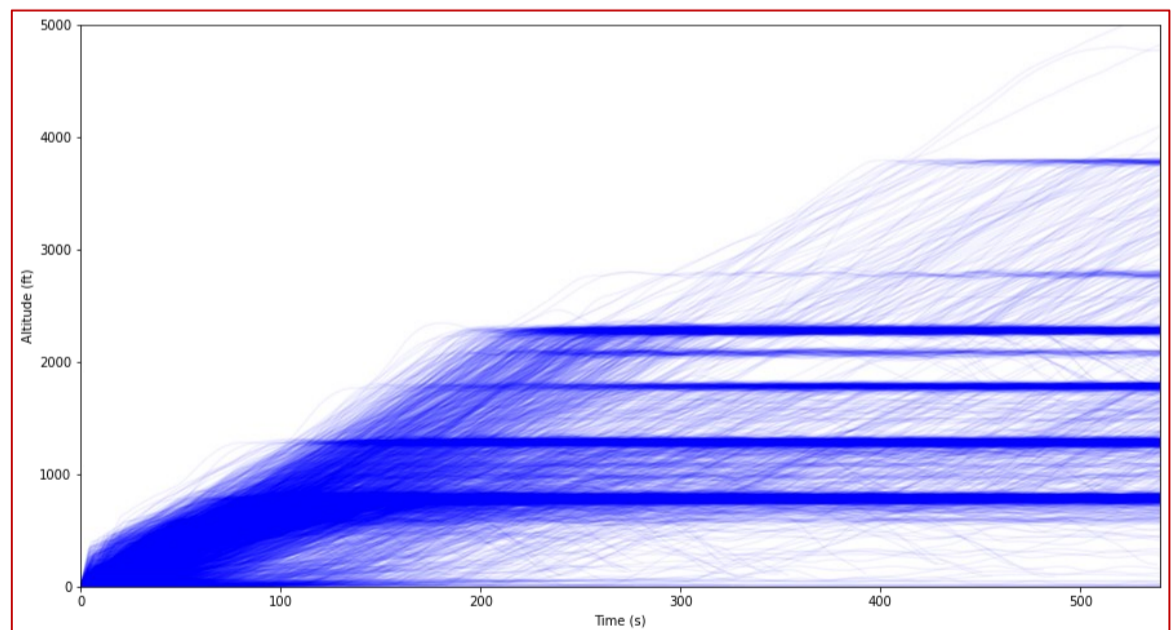


Figure 16 Altitude profile of helicopter arrivals as a function of time over the 92-day summer 2022 period.

Model inputs, including aircraft types, the numbers of movements, and track usage were derived from the forecasts detailed in Section 0. Aircraft flight profiles have been sourced from the ANP v2.3 database. Aircraft types in the fuel burn modelling have been categorised into Aircraft Modelling Categories (MCATs), grouping similar types based on short/long haul, narrow/wide body, and the number and type of engines. The ADMS-Airport (air quality modelling software) user guide<sup>14</sup> serves as the reference for these categories (pg98-99 and Table 6.35).

<sup>13</sup> FAA (2022). Aviation Environmental Design Tool (AEDT) Version 3e Technical Manual.

<sup>14</sup> Cambridge Environmental Research Consultants Ltd (2020). ADMS-Airport User Guide.

Group	Impact		
Category	Description	Representative aircraft	Notes
A1	Medium / short range jet aircraft	E145 (Embraer ERJ-145)	Representative of all Embraer medium/short range aircraft
A2		A319 (Airbus A319)	Representative of all Airbus medium/short range aircraft
A3		B738 (Boeing 737-800)	Representative of all Boeing medium/short range aircraft
A4		CRJ9 (Bombardier CRJ900)	Representative of all other medium/short range aircraft
B	Business jet aircraft	C56X (Cessna 560X Citation Excel)	Representative of all other business jet aircraft
E1	Piston engine aircraft	C172 (Cessna 172 Skyhawk)	Representative of all Cessna and Piper piston engine aircraft
E3		P68 (Partenavia P68)	Representative of all other piston engine aircraft
F1	Turboprop engine aircraft	AT76 (ATR-72-600)	Representative of all ATR turboprop engine aircraft
F2		SF34 (Saab 340)	Representative of all Saab turboprop engine aircraft
F3		JS41 (BAe Jetstream 41)	Representative of all BAe and Bombardier turboprop engine aircraft
F5		BE20 (Hawker Beechcraft King Air 200)	Representative of all other turboprop engine aircraft

Departure and arrival centrelines for the baseline situation have been calculated from Aberdeen Airport's track-keeping data using BridgeNet International's Volans software (see the noise modelling methodology for further details). To ensure a like for like comparison between the different airspace change option and the 'do nothing' scenarios, the existing and proposed track centrelines used in the greenhouse gas assessment have been extended to common endpoints in the network.

The mass of carbon dioxide equivalent in tonnes (tCO<sub>2e</sub>) emitted for the with airspace and without airspace change scenario has been calculated by multiplying the mass (in tonnes) of kerosene burned during flight by a factor of 3.18 (tonnes of CO<sub>2e</sub> / tonne of fuel), as set out in CAP1616a<sup>15</sup> (para 1.86). Throughout the report the term greenhouse gas emissions or GHG refers to carbon dioxide equivalent (CO<sub>2e</sub>) emissions.

Since 2012, greenhouse gas emissions from domestic flights and flights departing and arriving at UK airports from the European Economic Area (EEA) and Gibraltar have been included in either the EU Emissions Trading System (ETS) or the UK ETS, following the exit of the UK from the European Union (EU) in 2021<sup>16</sup>. Therefore, greenhouse gas emissions have been categorised into 'traded', including those traded under the UK ETS, and the remainder categorised as 'non-traded', and includes those emissions associated with international flights that are not traded under the UK ETS.

In alignment with the Department for Energy Security and Net Zero (DESNZ) guidance on greenhouse gas emissions valuation<sup>17</sup>, the change in emissions (from 'do nothing' to do-something) for each option has been valued using the TAG Greenhouse Gasses Workbook<sup>18</sup>. The TAG workbook<sup>18</sup> is an excel tool developed by the Department for Transport to calculate the monetised impacts of CO<sub>2e</sub> assessments, among other environmental assessments, in appraisal schemes and utilises the carbon appraisal values derived from the TAG data book<sup>19</sup>. For the purposes of this assessment, the annual mass of CO<sub>2e</sub> estimated to be released to the atmosphere has been linearly interpolated between the values derived for the opening year of 2026 and interim year of 2035.

Additionally, from 2024, all greenhouse gas emissions from international flights above 85% of the 2019 baseline will incur offsetting obligations under Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)<sup>16</sup>. Therefore, as previously agreed with the CAA, an additional TAG assessment has been undertaken for completeness that takes CORSIA traded emissions into account.

It should be noted that airport's 2019 international flight emissions were not calculated using a detailed 'bottom-up' approach combining AGS reported flight numbers, aircraft fleet mix and destination information. Instead, a high-level estimate was made based on the fact that 2019 total aircraft movements at Aberdeen (91,284 ATMs<sup>20</sup>) were 23% higher than those in 2022 (74,083 ATMs). Hence the same ratio (23%) was applied to the airport's 2022 international aviation emissions (463 tCO<sub>2e</sub>) to estimate 2019 total international emissions (570 tCO<sub>2e</sub>). The calculation assumes that the mix between domestic, EEA and international flights remains the same between 2022 to 2019. This method was deemed reasonable because international flights at Aberdeen represent approximately only 1% of all ATMs. The TAG methodology, otherwise, follows the method described in the previous paragraph. In this case, since non-traded emissions for the do-nothing scenario and do-something scenario options are capped at 85% of 2019 international emissions, with the remainder of the international emissions considered traded under CORSIA, the overall assessment score (£) is always zero since there is no change in non-traded emissions.

#### Wider society Capacity/resilience

The introduction of PBN arrivals at Aberdeen was prompted by the requirement to meet the Airspace Modernisation Strategy however they also provide resilience in the event of an ILS outage. Historic information suggests unplanned ILS outages are very rare (one unplanned event lasting 6 hours in the last 5 years), and planned maintenance is coordinated around quiet times of day to minimise impacts. The assessment will therefore qualitatively describe any benefits or impacts to resilience compared with the 'do nothing' baseline as it would not be proportionate to attempt to quantify the resilience benefit for such a small average outage per year. The final option does not seek to increase capacity at the airport; the purpose of the change is to provide resilience and meet the requirements of the Airspace Modernisation Strategy.

#### General Aviation Access

Within the PBN arrival option assessment, a qualitative assessment of changes to GA access to controlled airspace compared with the 'do nothing' baseline has been undertaken. This assessment considers whether the final option has the potential to require more/less CAS, and/or affect existing helicopter routes.

CAS option 1 has been assessed independently in [section 5.3 and 5.4](#) of this document. This assessment includes the quantitative volume of CAS to be released compared to the baseline, alongside a qualitative assessment of the potential positive benefits and negative impacts of the option.

#### General Aviation/commercial airlines Economic impact from increased effective capacity

<sup>15</sup> CAA (2020) CAP 1616a Airspace Change: Environmental requirements technical annex. Available at: <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8128>

<sup>16</sup> Department for Transport (2023) TAG Unit A5.2: Aviation Appraisal. Available at: <https://assets.publishing.service.gov.uk/media/655b76b2d03a8d000d07fcde/tag-unit-A5-2-aviation-appraisal.pdf>

<sup>17</sup> Department for Energy Security and Net Zero (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

<sup>18</sup> Department for Transport (2024) TAG: environmental impacts worksheets. Available at: <https://www.gov.uk/government/publications/tag-environmental-impacts-worksheets> (this was the latest version of the TAG workbook available at the time of undertaking the Final Options Appraisal)

<sup>19</sup> Department for Transport (2024) TAG data book. Available at: <https://www.gov.uk/government/publications/tag-data-book>

<sup>20</sup> UK CAA (2023) UK airport data 2019. Available at: <https://www.caa.co.uk/data-and-analysis/uk-aviation-market/airports/uk-airport-data/>

Group	Impact
<p>It is not intended that this Airspace Change will facilitate any future growth for the airport or offer any increased capacity; the purpose of the change is to provide resilience and meet the requirements of the Airspace Modernisation Strategy. With this in mind, a qualitative statement will be made around the options' economic impact from capacity.</p>	
<b>General Aviation/commercial airlines</b>	Fuel burn
<p>Total fuel burn has been calculated using AEDT 3e using the same methodology as the greenhouse gas assessment. Fuel burn has been monetised based on a price of £636.60 per tonne. This value had been calculated from the IATA jet fuel price<sup>21</sup> of \$824.35 per tonne and a currency conversion rate of 1USD = GBP0.79 from Reuters<sup>22</sup> (both as of 01/01/2024).</p>	
<b>Commercial airlines</b>	Training costs
<p>A qualitative assessment of changes to commercial airline training costs compared with the 'do nothing' baseline. RNP approach procedures are in regular use across the UK and globally and are part of 'business as usual' for air transport pilots. There is therefore not anticipated to be any significant training costs for airlines and therefore a qualitative assessment has been undertaken.</p>	
<b>Commercial airlines</b>	Other costs
<p>A qualitative assessment of changes to other relevant commercial airline costs compared with the 'do nothing' baseline. No other costs have been identified as a result of the options, and hence a qualitative statement has been made.</p>	
<b>Airport/ANSP</b>	Infrastructure costs
<p>A quantitative assessment of changes to ANSP infrastructure costs compared with the 'do nothing' baseline.</p>	
<b>Airport/ANSP</b>	Operational costs
<p>A quantitative assessment of changes to ANSP operational costs compared with the 'do nothing' baseline.</p>	
<b>Airport/ANSP</b>	Deployment costs
<p>A quantitative assessment of ANSP deployment costs compared with the 'do nothing' baseline.</p>	
<b>All</b>	Safety
<p><b>Procedure operability:</b> A qualitative safety assessment will be undertaken which compares against the baseline. In preparation for this Stage 4 submission, Aberdeen Airport have instructed their Air Navigation Service provider, National Air Traffic (NATS) Services Limited (known as NATS NSL) to undertake detailed safety assessments.</p> <p>The following safety assessment work has been undertaken; these works support the proposed ATC procedures associated with the change:</p> <ul style="list-style-type: none"> <li>• Initial Preliminary Hazard Identification at Stage 3a of options, including Preferred option.</li> <li>• ATC Procedures Safety Analysis</li> </ul> <p>A summary of this safety assessment will be included within this Final Options Appraisal.</p> <p><b>Procedure design:</b> This assesses the option against PANS OPS criteria. This is the regulation used when designing procedures within the UK.</p> <p><b>Specification of approaches:</b> This part of the assessment looks at whether the specification of the approach (for example an RNP approach compared to a VOR/DME approach) offers any enhanced safety compared to the types of approaches promulgated at Aberdeen today.</p>	
<b>All</b>	Performance against the vision and parameters/strategic objectives of the AMS <span style="float: right;">Qualitative</span>
<p>A qualitative assessment of how the final option performs against the AMS vision and objectives. This assessment is informed by the other Final Option Appraisal assessment categories and aims to summarise these rather than replicate the full information already shown.</p> <p>The vision of the Airspace Modernisation Strategy is to 'Deliver quicker, quieter and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace'. The strategy sets out four objectives to achieve the vision:</p> <p><b>Safety:</b> Maintaining and, where possible, improving the UK's high levels of aviation safety has priority over all other 'ends' to be achieved by airspace modernisation.</p> <p><b>Integration of diverse users:</b> Airspace modernisation should wherever possible satisfy the requirements of operators and owners of all classes of aircraft, including the accommodation of existing users (such as commercial, General Aviation, military, taking into account interests of national security) and new or rapidly developing users (such as remotely piloted aircraft systems, advanced air mobility, spacecraft, high-altitude platform systems).</p> <p><b>Simplification, reducing complexity and improving efficiency:</b> Consistent with the safe operation of aircraft, airspace modernisation should wherever possible secure the most efficient use of airspace and the expeditious flow of traffic, accommodating new demand and improving system resilience to the benefit of airspace users, thus improving choice and value for money for consumers.</p> <p><b>Environmental sustainability:</b> Environmental sustainability will be an overarching principle applied through all airspace modernisation activities. Modernisation should deliver the Government's key environmental objectives with respect to air navigation as set out in the Government's Air Navigation Guidance and, in doing so, will take account of the interests of all stakeholders affected by the use of airspace.</p>	

<sup>21</sup> <https://www.iata.org/en/publications/economics/fuel-monitor/>

<sup>22</sup> <https://www.reuters.com/markets/currencies/>

## 5. Final Options Appraisal

### 5.1 Baseline 'Without airspace change'

#### Baseline 'without airspace change' description

5.1.1 This section describes the baseline 'without airspace change' (do nothing) scenario which will be used to compare against the final options performance.

5.1.2 The figures below show the swathes of arrivals to Aberdeen's easterly runway (16) and westerly runway (34). There are no published centreline flows other than on final approach and therefore all arrivals are vectored by ATC onto a closing heading to establish on the ILS localiser. Typically, aircraft are joining final approach between 8 and 12nm from touchdown although there are variances to this. Some helicopter traffic<sup>23</sup> flies the ILS approaches and joins within the same swathe as fixed wing traffic, albeit at lower altitude, with the remaining helicopter traffic taking a more direct visual approach when weather conditions allow. Alongside the ILS procedures, Aberdeen Airport also promulgates VOR/DME approaches for runway 16 and runway 34, and an NDB/DME approach for runway 34.

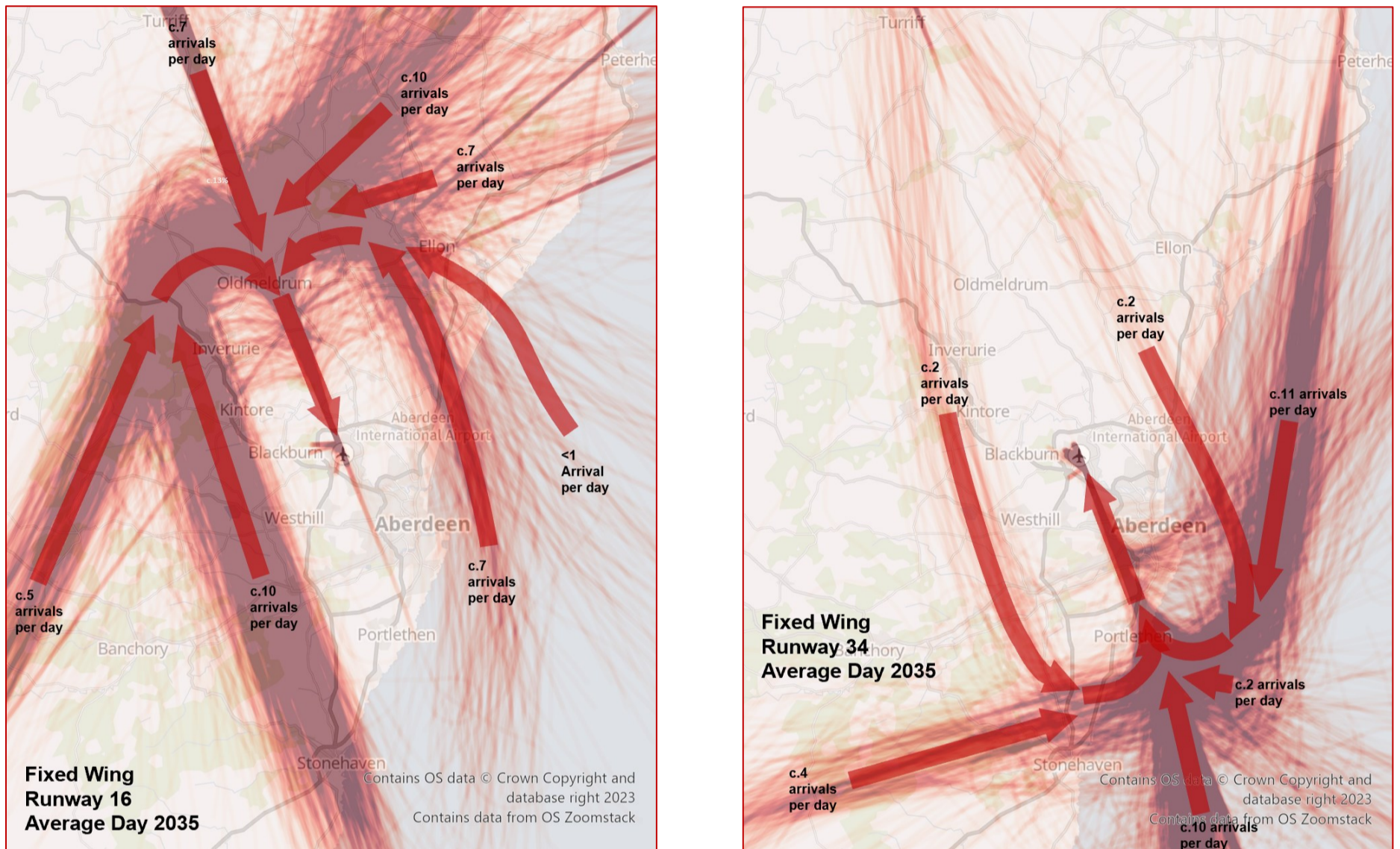


Figure 17 Baseline 'do nothing' for fixed wing arrivals, summer 2035. Note: No departure tracks are shown as they are not within scope of the ACP

<sup>23</sup> Note helicopter use of the ILS is very weather dependent; in clear visibility helicopters are likely to arrive under VFR and take a more direct route to the airfield whereas in poor visibility almost all helicopters would use the ILS.

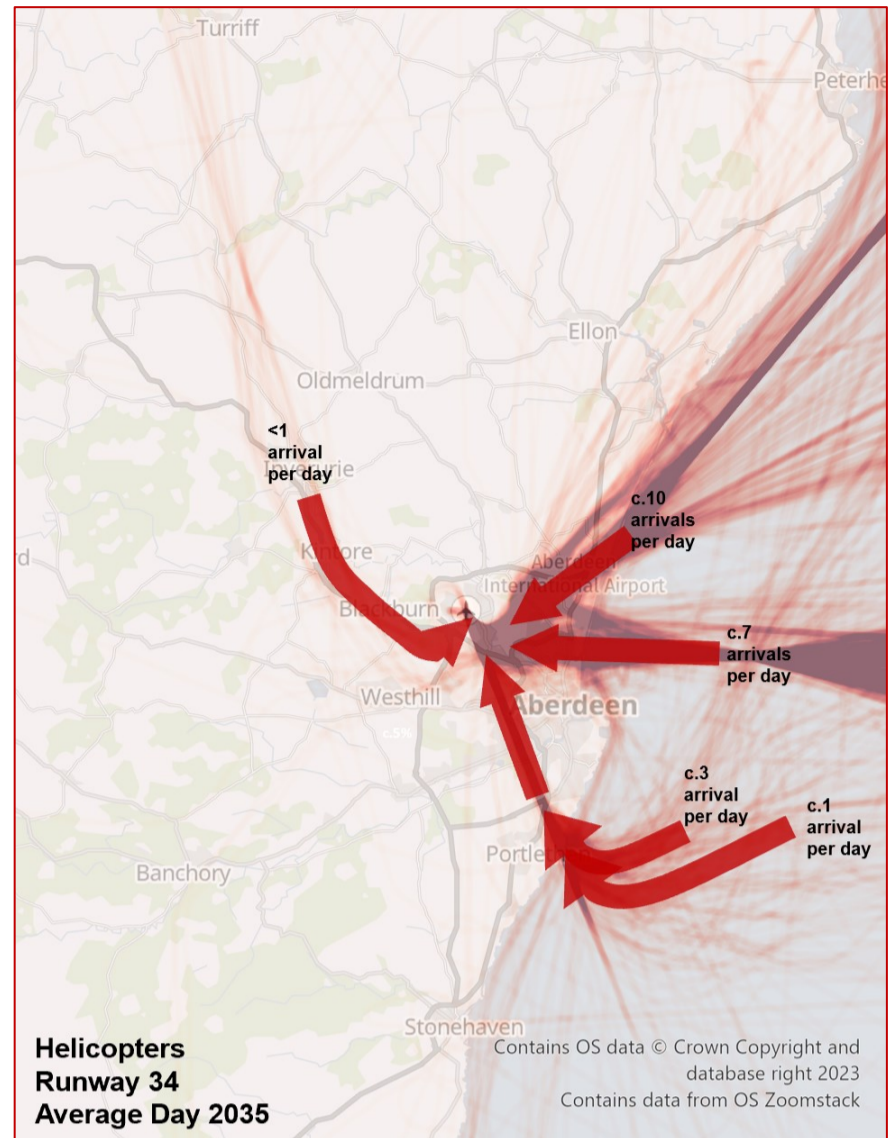
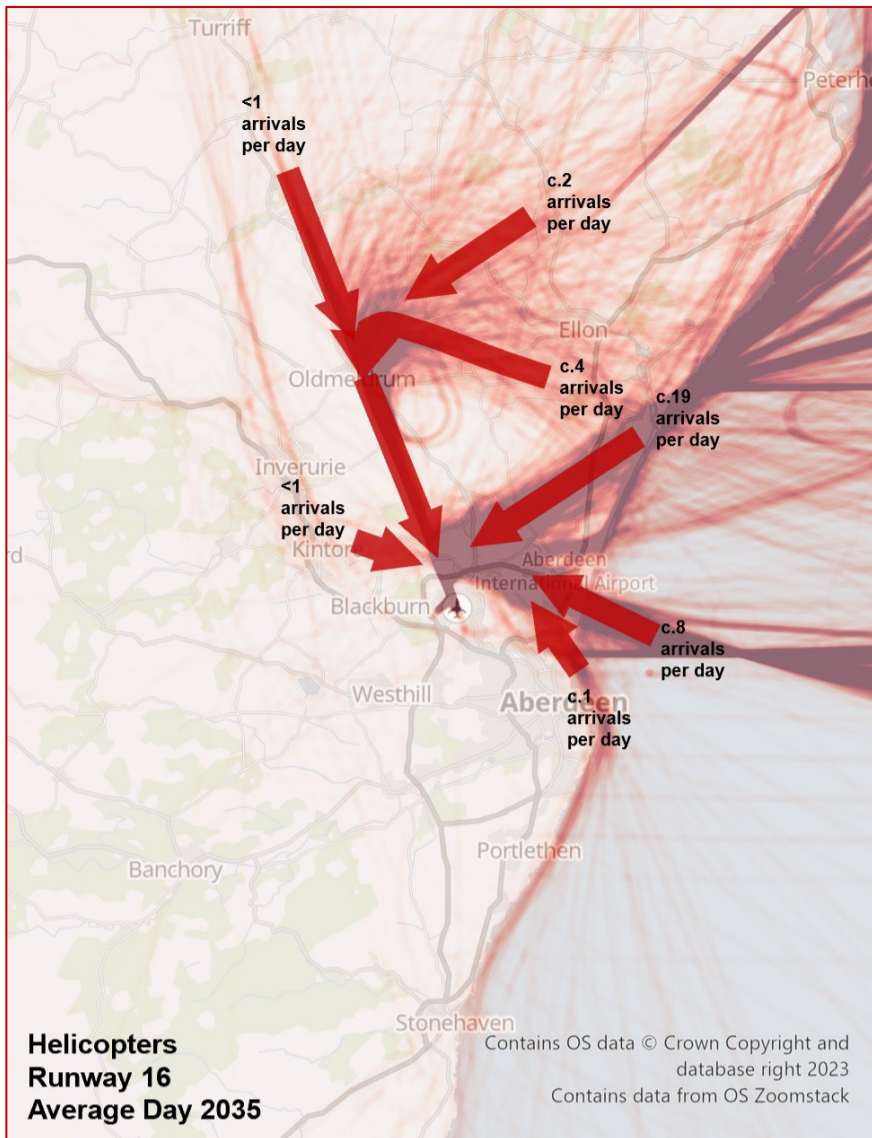


Figure 18 Baseline 'Do nothing' for Helicopter arrivals, summer 2035. Note: No departure tracks are shown as they are not within scope of the ACP

5.1.3 The ILS procedures have two associated holds; ADN and DOWNI/ATF which are predicated on the ADN VOR and ATF NDB. On average, c.1% of arriving fixed wing traffic are expected to use the holds; however, hold use is dependent on weather and traffic conditions.

5.1.4 The images below show the published ILS procedures at Aberdeen. For full details, please see section EGPD Section 2.24 of the eAIP:

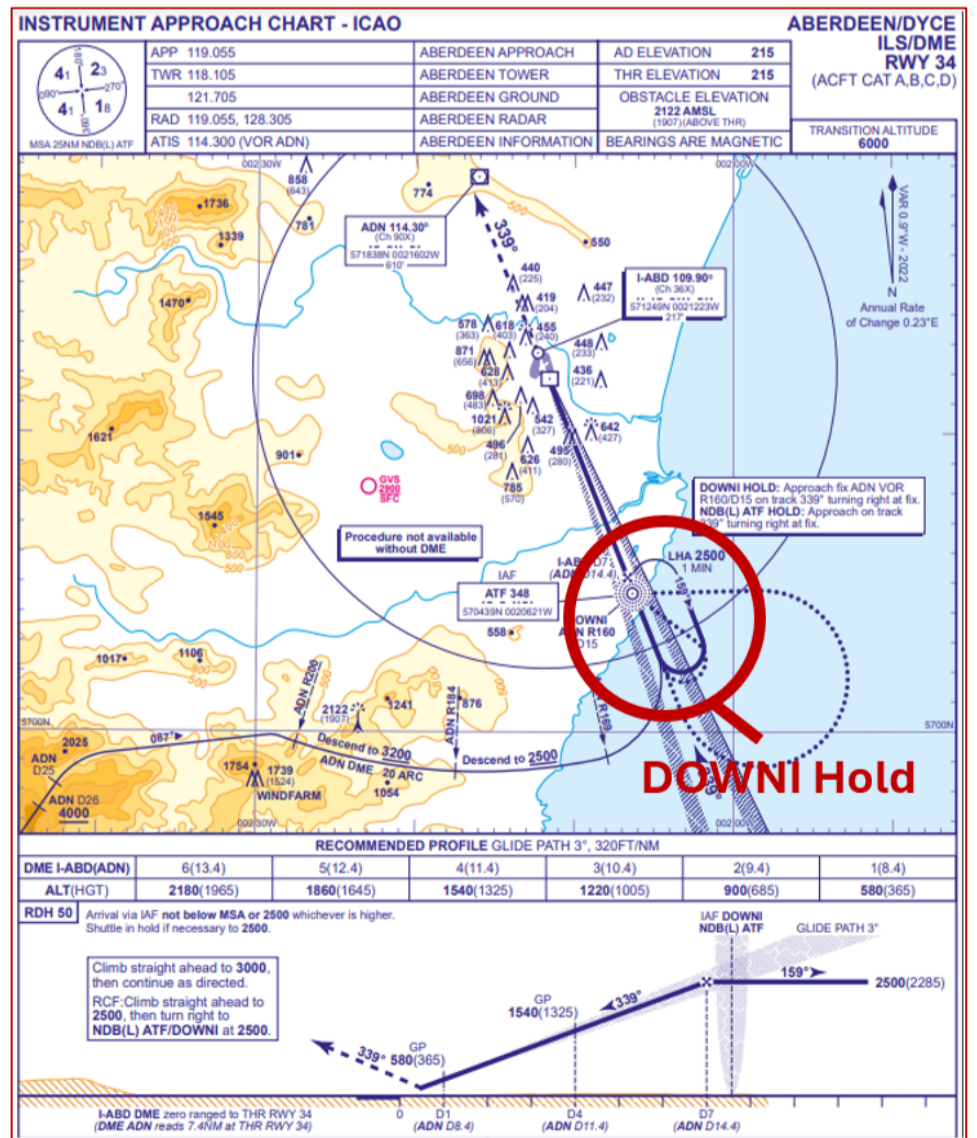
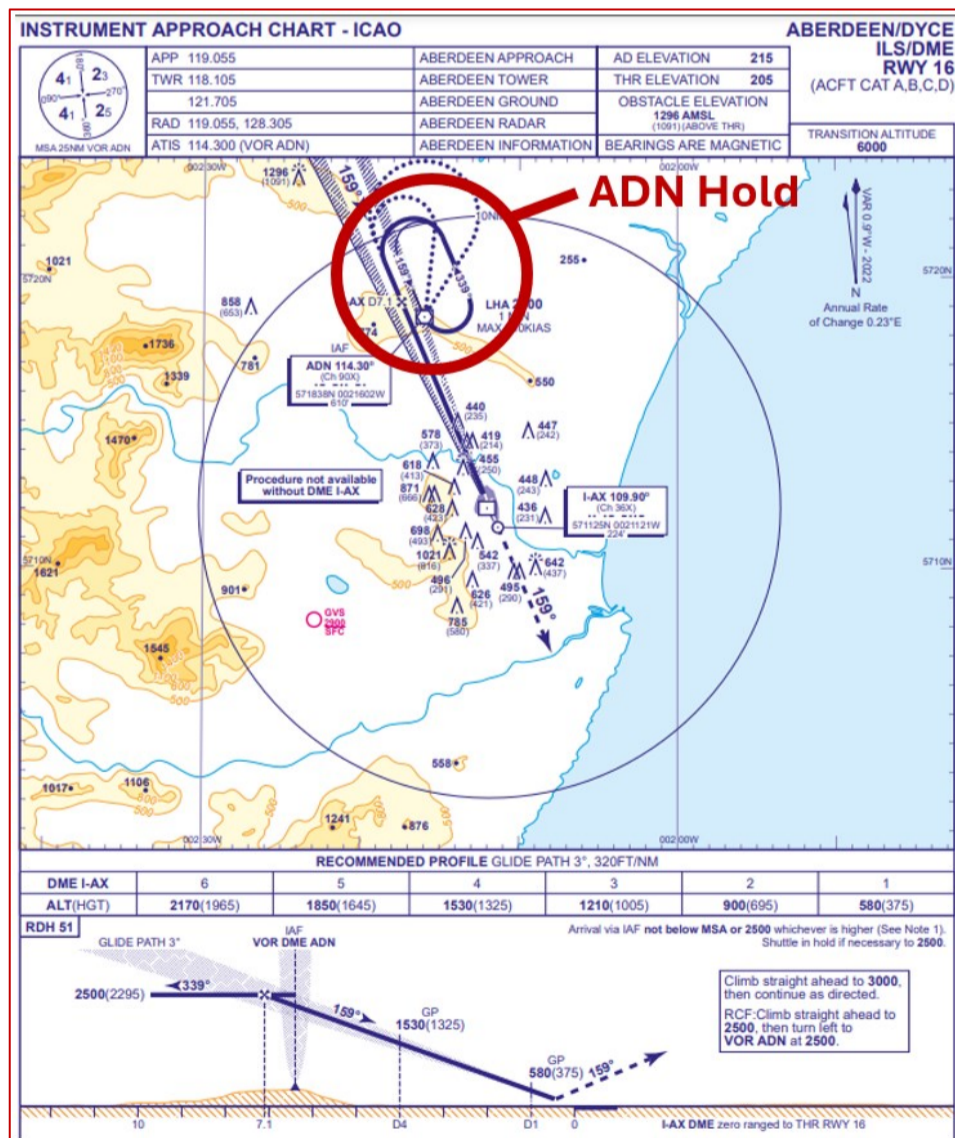


Figure 19 runway 16 and runway 34 ILS approach charts. Source: EGPD Section 2.24 of the eAIP

**Final Options Appraisal: Without Airspace Change**

Group	Impact
Communities	Noise impact on health and quality of life

**TAG outcomes**

Information about the changes in  $L_{Aeq}$  contours compared to the baseline  $L_{Aeq}$  contours will be used to generate TAG outcomes for the final option. There is no TAG outcome for the baseline given this is the 'do nothing' scenario.

**$L_{Aeq}$  contours**

The following tables show  $L_{Aeq}$  noise contour data for the 'without airspace change' pre-implementation scenario for the year of implementation and 10 years following implementation. For each contour band, the area of the contour is presented along with the population and number of potentially noise sensitive buildings within each band. The contour figures can be found in Technical Appendix A. **Within Technical Appendix A we have also presented the contour data for the current airspace (2022) as required by CAP1616.**

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2026	Without airspace change	$L_{Aeq, 16hr}$	51	56.40	33800	12	0	80	6	12
			54	19.10	10600	1	0	18	1	5
			57	8.10	4200	0	0	11	0	2
			60	4.00	1000	0	0	4	0	1
			63	2.10	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2035	Without airspace change	$L_{Aeq, 16hr}$	51	56.90	34400	12	0	80	6	12
			54	19.30	11000	1	0	18	1	5
			57	8.20	4200	0	0	11	0	2
			60	4.00	1100	0	0	4	0	1
			63	2.10	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	No. of care homes	No. of places of worship	No. of listed buildings	No. of places of worship	No. of schools
2026	Without airspace change	$L_{Aeq, 8hr}$	45	28.00	26600	7	0	30	5	10
			48	14.70	12300	2	0	18	1	6
			51	8.00	5400	0	0	9	0	3
			54	4.10	1300	0	0	4	0	1
			55	3.30	700	0	0	0	0	0
			57	2.10	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2035	Without airspace change	$L_{Aeq, 8hr}$	45	28.60	27300	7	0	30	5	11
			48	15.00	12800	2	0	18	1	6
			51	8.20	5500	1	0	9	0	3
			54	4.20	1400	0	0	5	0	1
			55	3.40	900	0	0	0	0	0
			57	2.20	100	0	0	0	0	0

**N60 N65 contours**

The following tables show N65 and N60 noise contour data for the 'without airspace change' pre-implementation scenario for the year of implementation and 10 years following implementation. For each contour band, the area within the contour is presented along with the population and number of potentially noise sensitive buildings within each band. The contour figures can be found in Technical Appendix A.

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2026	Without airspace change	N65	5	565.70	111000	26	0	306	32	41
			10	222.40	86900	20	0	152	22	28
			20	60.80	52400	14	0	84	16	15
			50	15.20	11500	0	0	18	1	5
			100	4.60	1100	0	0	4	0	0

**Group Impact**

Year	Scenario	Metric	Contour	Area (km2)	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2035	Without airspace change	N65	5	567.10	112300	26	0	308	32	41
			10	223.10	88000	22	0	155	22	29
			20	61.50	52800	14	0	84	16	15
			50	15.60	12100	1	0	18	1	5
			100	5.00	1500	0	0	5	0	0

Year	Scenario	Metric	Contour	Area (km2)	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2026	Without airspace change	N60	5	33.20	34000	5	0	38	7	11
			10	14.20	13200	1	0	19	1	4
			20	2.20	300	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km2)	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2035	Without airspace change	N60	5	34.00	35000	6	0	39	7	11
			10	14.90	13700	1	0	20	1	4
			20	2.70	300	0	0	0	0	0

**Overflight contours**

The following table shows overflight contour data for the 'without airspace change' pre-implementation scenario for the year of implementation and 10 years following implementation. For each contour band, the area within the contour is presented along with the population and number of potentially noise sensitive buildings within each band. The contour figures can be found in Technical Appendix A.

Year	Scenario	Metric	Contour	Area (km2)	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2026	Without airspace change	N65	5	565.70	111000	26	0	306	32	41
			10	222.40	86900	20	0	152	22	28
			20	60.80	52400	14	0	84	16	15
			50	15.20	11500	0	0	18	1	5
			100	4.60	1100	0	0	4	0	0

Year	Scenario	Contour	Scenario	Area (km2)	Total population	No. of care homes	No. of hospitals	No. of listed buildings	No. of places of worship	No. of schools
2035	Without airspace change	N65	5	567.10	112300	26	0	308	32	41
			10	223.10	88000	22	0	155	22	29
			20	61.50	52800	14	0	84	16	15
			50	15.60	12100	1	0	18	1	5
			100	5.00	1500	0	0	5	0	0

**Noise:**

Currently there are no published arrival routes at Aberdeen other than on final approach. Aircraft arriving onto runway 16 and runway 34 are vectored by Aberdeen ATC to join the ILS localiser. Typically, aircraft join the final approach, where they are aligned with the runway centreline, at around 8-12nm (15-22km). The vectoring by ATC creates broad dispersion across the airspace between 7000ft and joining the final approach at around 3500ft-2500ft.

**Runway 16**

This broad area of dispersion between 7000ft and around 3500-2500ft overflies the areas of Kintore, Kemnay, Inverurie, Rothienorman, Methlick, Ellon and Pitmedden. Aircraft arriving from the north overfly Turriff and Tulloch and the eastern parts of Oldmeldrum. The areas of Oldmeldrum and Tarves are located under the base leg turns. Aircraft then join the final approach where the swathe then narrows as aircraft fly the extended runway centreline before landing. There are no dense areas of population under the final approach, although there are the lower populated areas of Whiterashes, Stralock and Middleton.

**Runway 34**

This broad area of dispersion between 7000ft and around 3500-2500ft largely overflies the sea however arrivals from the west overfly the areas of Newtonhill and the northern parts of Stonehaven. From the north, there is so little traffic that it does not show on the average heat map however the track data shows, close to 7000ft, the areas of Peterculter, Drumoak and Milltimber are overflown. Portlethen and Cove Bay are overflown as part of the base leg turns. Aircraft then join the final approach where the swathe narrows as aircraft fly the extended runway centreline before landing. This overflies Findon, the eastern part of Cults and the western areas of Aberdeen such as the Bridge of Dee, Rubislaw, and Bucksburn.

**Group Impact**

**Wider society Tranquillity**

The following tables show the area and number of locations/spaces that are relevant to the consideration of tranquillity and sit within the LAeq, N65, N60 and overflight contours.

Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
				2026	Without airspace change	LAeq, 16hr	51	1	0.00	1	0.10	0	0.00
54	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
57	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
60	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
63	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00

Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
				2035	Without airspace change	LAeq, 16hr	51	1	0.00	1	0.10	0	0.00
54	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
57	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
60	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
63	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00

Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
				2026	Without airspace change	LAeq, 8hr	45	0	0.00	0	0.00	0	0.00
48	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
51	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
54	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
55	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
57	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00

Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
				2035	Without airspace change	LAeq, 8hr	45	0	0.00	0	0.00	0	0.00
48	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
51	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
54	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00
55	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00

Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
				2026		N60	5	0	0.00	0	0.00	0	0.00
10	0	0.00	0				0.00	0	0.00	0	0.00	0	0.00



Group		Impact											
	Without airspace change		20	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
2035	Without airspace change	N60	5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			10	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			20	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
2026	Without airspace change	N65	5	1	0.70	3	0.70	1	0.20	0	0.00	0	0.00
			10	1	0.60	3	0.50	1	0.00	0	0.00	0	0.00
			20	1	0.00	2	0.10	1	0.00	0	0.00	0	0.00
			50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			100	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
2035	Without airspace change	N65	5	1	0.70	3	0.70	1	0.20	0	0.00	0	0.00
			10	1	0.60	3	0.50	1	0.00	0	0.00	0	0.00
			20	1	0.00	2	0.10	1	0.00	0	0.00	0	0.00
			50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			100	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
2026	Without airspace change	Overflights (24hr)	5	1	0.70	3	0.70	7	8.90	0	0.00	0	0.00
			10	1	0.70	2	0.50	1	0.70	0	0.00	0	0.00
			20	1	0.30	2	0.20	0	0.00	0	0.00	0	0.00
			50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Year	Scenario	Metric	Contour	Country parks		Candidate Quiet Area (CQA)		Gardens & Designated Landscapes		National Parks		National Scenic Area (NSA)	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
2035	Without airspace change	Overflights (24hr)	5	1	0.70	3	0.80	7	9.80	0	0.00	0	0.00
			10	1	0.70	2	0.50	1	0.80	0	0.00	0	0.00
			20	1	0.40	2	0.20	0	0.00	0	0.00	0	0.00
			50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Group	Impact
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<b>Wider society</b>	Biodiversity
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Aircraft aligned with the extended runway centreline on final approach overfly the River Dee SAC. A Habitats Screening Assessment (HRA) has been undertaken to understand potential impacts to biodiversity and more information about this can be found in the Final Options Appraisal Methodology section.

<b>Communities</b>	Air quality
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Aircraft arriving at Aberdeen fly a standard 3-degree angle of approach and descend through 1000ft typically between 5 - 7km before the landing threshold. This is in the last stages of the final approach when aircraft are aligned with the runway centreline.

On runway 34 parts of Aberdeen City Centre are within an [Air Quality Management Area](#) located approximately 2.4km from the landing threshold.

<b>Wider society</b>	Greenhouse gas impact	Qualitative
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**TAG outcomes**  
Information about the changes in carbon emissions will be used to generate TAG outcomes for the final option. There is no TAG outcome for the baseline given this is the 'without airspace change' scenario.

**Fuel burn data**

Scenario	Year	Fuel use (t)	Fuel cost (£)
Without airspace change	2026	18,221	11,866,099
Without airspace change	2035	18,694	12,174,230

**Greenhouse Gas (GHG) emissions data**

Scenario	Year	Total emissions (tCO <sub>2</sub> e)	GHG International GHG emissions (tCO <sub>2</sub> e)	Traded (Domestic) GHG emissions (tCO <sub>2</sub> e)	Traded (EEA) GHG emissions (tCO <sub>2</sub> e)	UKETS GHG emissions (tCO <sub>2</sub> e)	Traded GHG emissions (tCO <sub>2</sub> e)	GHG emissions per flight (tCO <sub>2</sub> e)
Without airspace change	2026	57,942	485	46,349	11,017	57,366		0.68
Without airspace change	2035	59,447	594	47,437	11,416	58,852		0.68

The table above is based on the vast majority of IFR arrivals at Aberdeen flying an ILS approach as they do in the baseline today; however, the proposed PBN arrival options are predominately for resilience and so will most likely be used in the event of an ILS outage. With this in mind, alongside the data above, Aberdeen has generated some data around fuel burn and carbon emissions of a VOR/DME approach, which would be flown in the event of an ILS outage.

Owing to the frequency of ILS outages, it is not possible to meaningfully incorporate an outage scenario into the carbon emission data above, which is required to be based on an annual forecast by CAP1616. Therefore we have generated data for a single day of arrivals summarised by runway end which can be compared against each option.

Option	Year	RWY16		RWY34		Total	
		Fuel (t)	Carbon (tCO <sub>2</sub> e)	Fuel (t)	Carbon (tCO <sub>2</sub> e)	Fuel (t)	Carbon (tCO <sub>2</sub> e)
VOR (Without airspace change)	2026	8.0	25.4	5.1	16.1	13.1	41.5
VOR (Without airspace change)	2035	8.3	26.3	5.3	16.7	13.5	43.0

<b>Wider society</b>	Capacity/resilience
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Aberdeen Airport currently promulgates ILS/DME, LOC/DME and VOR/DME approaches for runway 16, and ILS/DME, LOC/DME, VOR/DME and NDB/DME approaches for runway 34. These approaches are dependent on conventional ground based navigation equipment. The most common approach, the ILS/DME is dependent on the ADN VOR as well as the ILS. During period of ILS u/s, aircraft typically fly a VOR/DME approach.

<b>General Aviation</b>	Access
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This baseline scenario would not offer any change from the existing Controlled Airspace (CAS) arrangements in place today. The final option has been compared against this existing scenario. ([See existing CAS 'without ACP' section for further details](#)).

<b>General Aviation/commercial airlines</b>	Economic impact from increased effective capacity
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It is not intended that this Airspace Change will facilitate any future growth for the airport or offer any increased capacity; the purpose of the change is to provide resilience and meet the requirements of the Airspace Modernisation Strategy.

<b>General Aviation/commercial airlines</b>	Fuel burn
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Please see Greenhouse Gas assessment above.

<b>Group</b>	<b>Impact</b>
<b>Commercial airlines</b>	Training costs
As this option is already in operation, there are no training costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between our final option and this baseline.	
<b>Commercial airlines</b>	Other costs
As this option is already in operation, there are no other costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between our final option and this baseline.	
<b>Airport/ANSP</b>	Infrastructure costs
As this option is already in operation, there are no infrastructure costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between our final option and this baseline.	
<b>Airport/ANSP</b>	Operational costs
As this option is already in operation, there are no operational costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between our final option and this baseline.	
<b>Airport/ANSP</b>	Deployment costs
As this option is already in operation, there are no deployment costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between our final option and this baseline.	
<b>All</b>	Safety
The baseline is already in safe operation and there are no safety concerns raised at this time.	
<b>All</b>	Performance against the vision and parameters/strategic objectives of the AMS
Whilst vectoring of arrivals is a perfectly reasonable option in a future operating environment, doing nothing with arrivals will not align with the AMS as it would not offer Aberdeen any modern PBN procedures. The following qualitative assessment looks at the four objectives of the Airspace Modernisation Strategy:	
<b>Safety:</b> The 'without airspace change' option will maintain but not improve aviation safety.	
<b>Integration of diverse users:</b> The 'without airspace change' option would not enable any reductions in the volume or classification of CAS.	
<b>Simplification, reducing complexity and improving efficiency:</b> The 'without airspace change' option does not offer any opportunities to reduce complexity or improve efficiency.	
<b>Environmental sustainability:</b> The 'without airspace change' option does not offer any opportunities to improve noise and/or greenhouse gas emissions.	

## 5.2 Final Option: Vectors to final approach

### Option description

5.2.1 This option would continue to see those arrivals wishing to fly an RNP approach 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 approach arrivals would be vectored to join final approach in the same location, at the Initial Fix (IF), usually with a closing heading of no greater than 45°. The IF has been positioned so those arrivals would join final approach at around 10.5nm, keeping the vectored arrival swathes consistent with the baseline. The vast majority of aircraft (95%+) would continue to arrive as they do today.

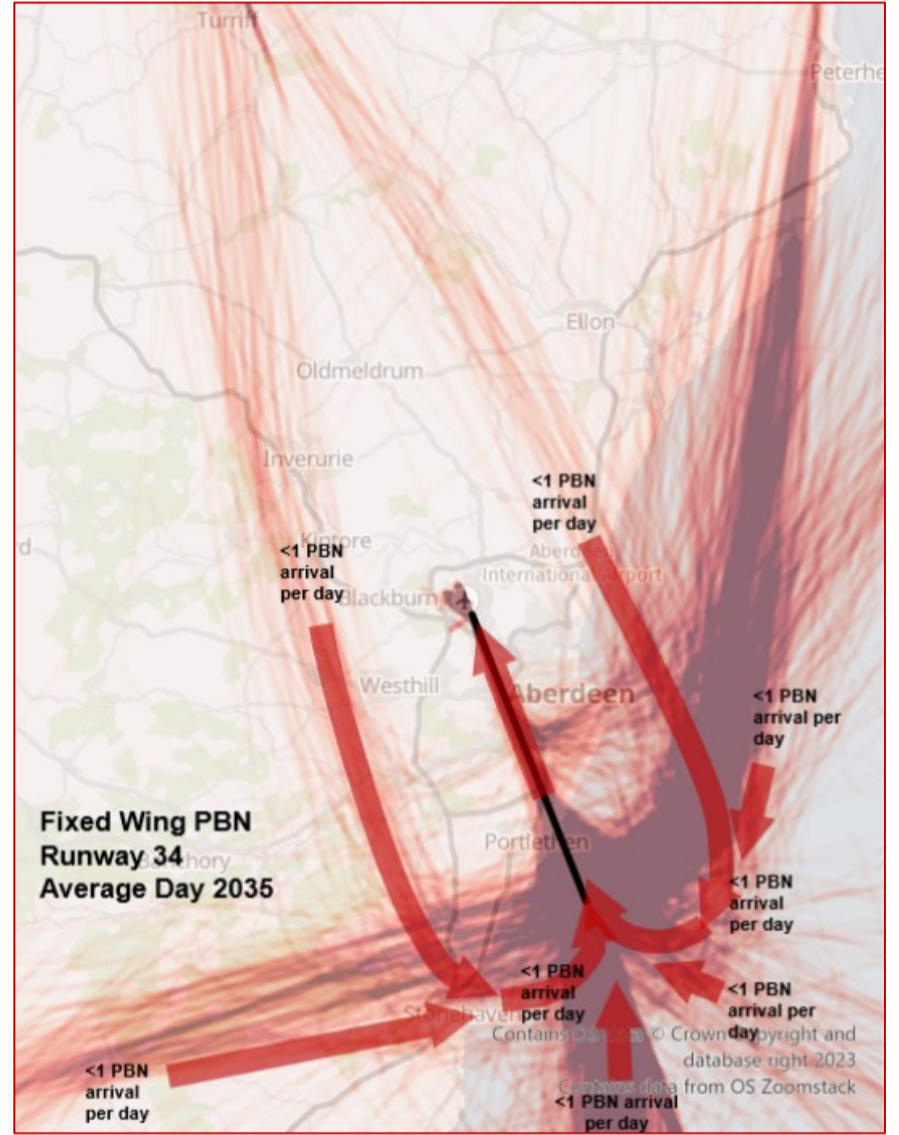
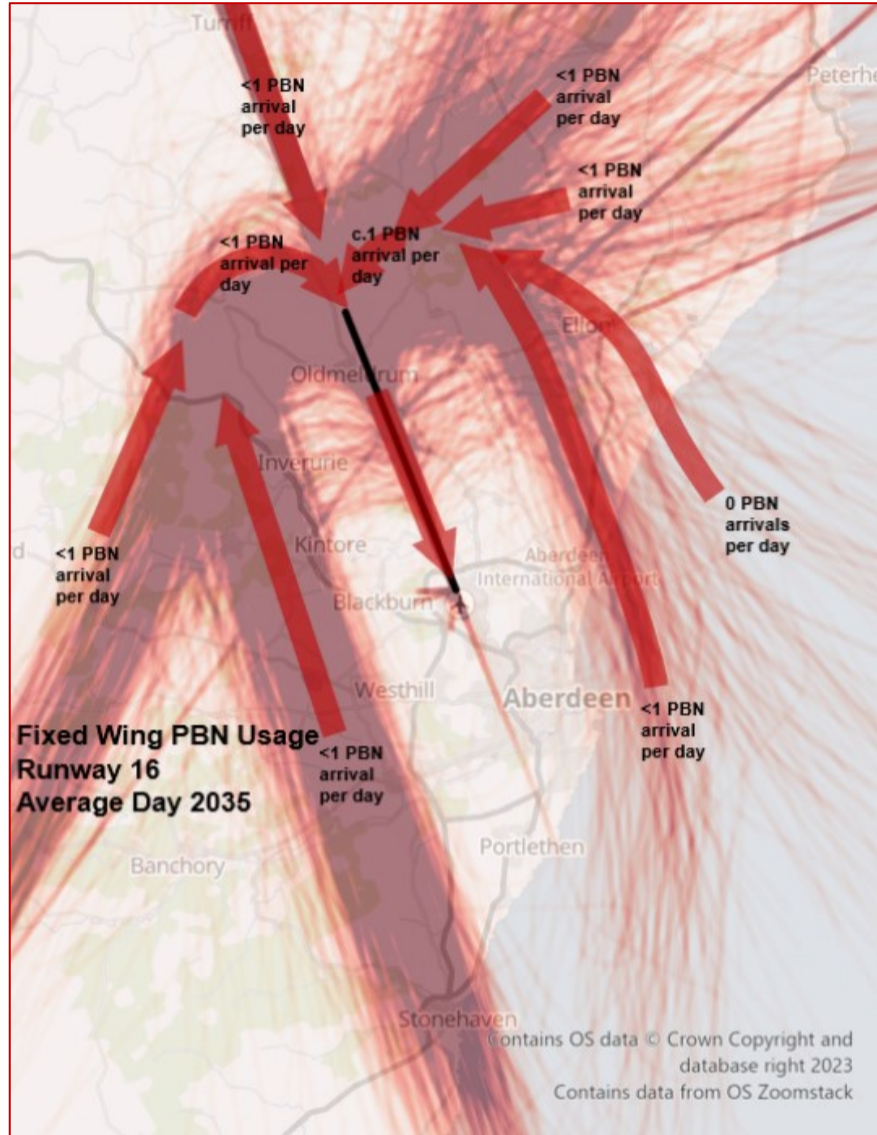


Figure 20 Expected fixed wing usage of vectors to RNP approach option based on optimistic 5% estimate. Note: The majority of arrivals (95%+) would continue to arrive as they do within the baseline.

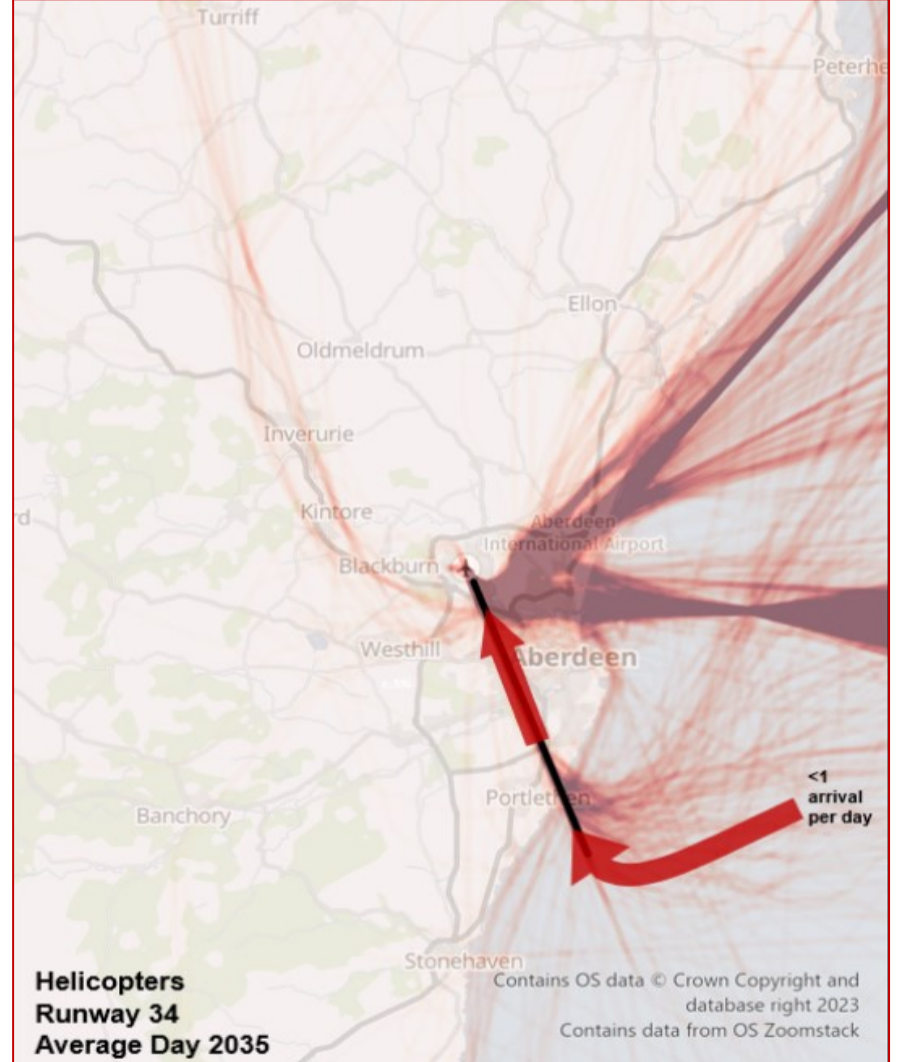
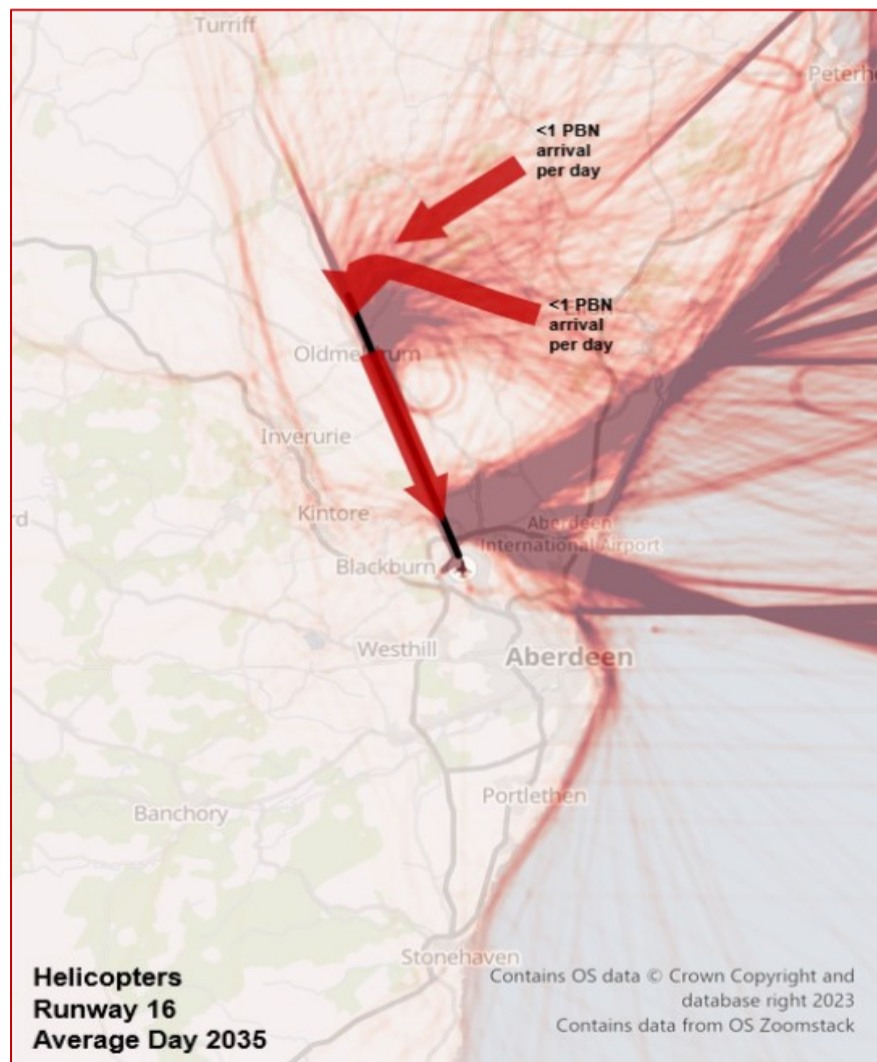


Figure 21 Expected helicopter usage of vectors to RNP approach option based on optimistic 5% estimate. Note: The majority of arrivals (95%+) would continue to arrive as they do within the baseline.

within the baseline.

5.2.2 The following figure shows a draft indicative chart for the vectors to final approach procedures with the associated missed approach procedures. Sections of the chart have been redacted as the CAA does not permit draft charts to be published as part of an ACP.

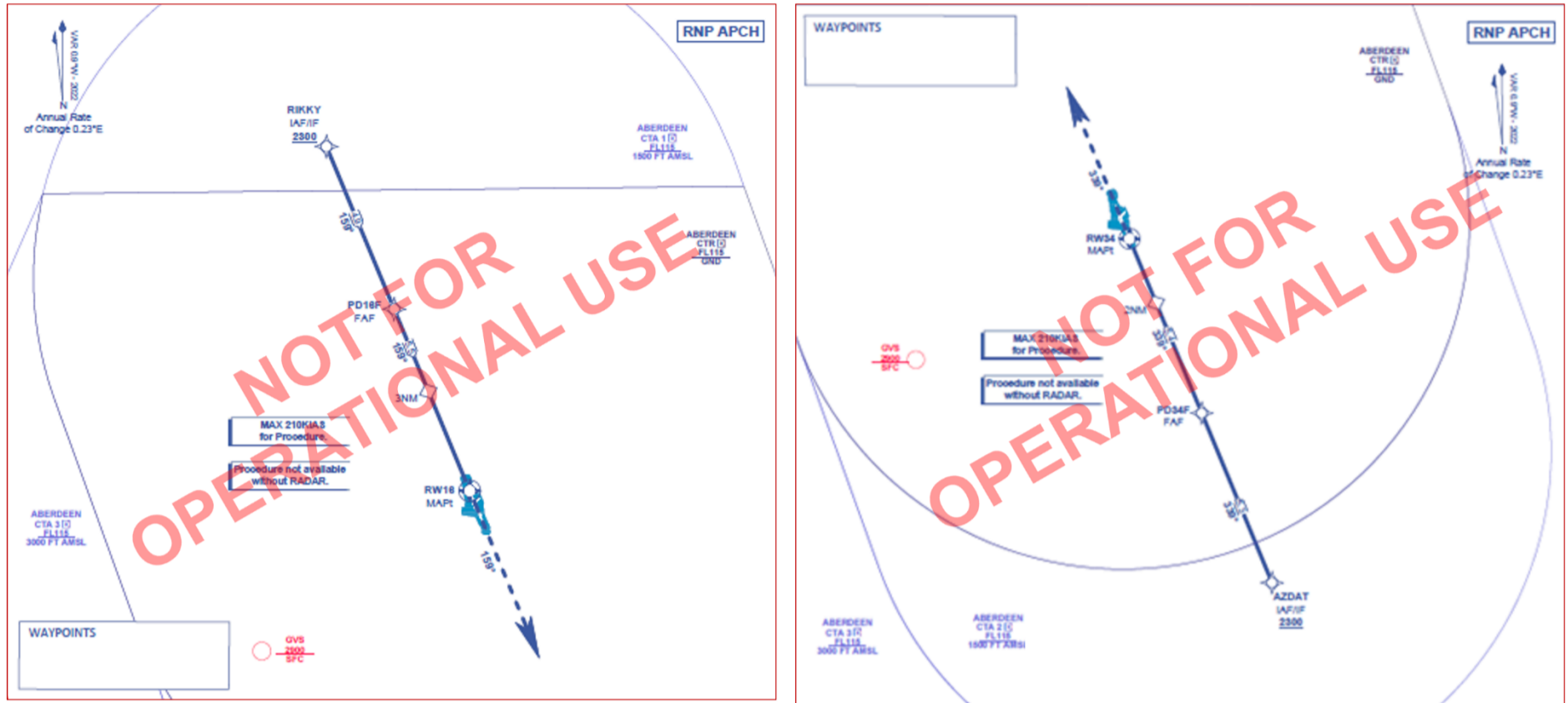


Figure 22 Vectors to Final Approach: Draft Indicative Chart Information, with Missed Approach

**Final Options Appraisal: With Airspace Change**

Group	Impact
Communities	Noise impact on health and quality of life

For the purposes of the noise assessment data, Option A = Vectors to RNP approach (our proposed final option)

**TAG outcomes**

TAG has been used to assess total noise impacts over a 10-year appraisal period. The monetised net present value (NPV) of noise changes of this option is -£6,963 (2024 prices).

In the Full Options Appraisal, the NPV was reported in 2010 prices rather than 2024 prices. Additionally, there have been updates to the GDP per capita and GDP deflator forecasts used in the workbook since the Full Options Appraisal was conducted. These changes have resulted in approximately a doubling of the NPV for the option compared to the valuation presented in the Full Options Appraisal. However, the changes to the output price year and the GDP per capita and GDP deflator forecasts would apply equally to all options presented in the Full Options Appraisal. Therefore, these changes do not alter the overall conclusions of the Full Options Appraisal.

It is important to highlight that this result is influenced by a limited number of receptors transitioning between 1dB bands in the TAG evaluation due to noise variations of less than 0.1dB. These changes are negligible beyond the accuracy of any noise model. Therefore the TAG outcome for this option is not considered to be material to the assessment.

It is also important to note that the TAG methodology is based on analysis in 1dB bands whereas the LAeq contour data is presented in 3dB bands as required by CAP1616. This means that the numbers in the TAG tables and the number in the LAeq contour tables cannot be directly compared. For example there may be individuals that experience a small noise change that moves them from 1dB band to another, but they remain within the same, wider, 3dB band. This does not affect the way the assessment is undertaken, it is simply a difference in the way the data is summarised.

Scenario	NPV Total	NPV Sleep	NPV Amenity	NPV AMI	NPV Stroke	NPV Dementia	Individuals experiencing increased daytime noise in forecast year	Individuals experiencing reduced daytime noise in forecast year	Individuals experiencing increased nighttime noise in forecast year	Individuals experiencing reduced nighttime noise in forecast year
Option A	-£6,963	-£9,389	£1,924	£0	£201	£301	47	27	0	19

**LAeq contours**

The following table shows the difference between the option LAeq performance and the baseline for year of implementation and 10 years following implementation.

**Group Impact**

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2026	Opt A Comparison	L <sub>Aeq</sub> , 16hr	51	0.10	0	0	0	0	0	0
			54	0.00	0	0	0	0	0	0
			57	0.00	0	0	0	0	0	0
			60	0.00	0	0	0	0	0	0
			63	0.00	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2035	Opt A Comparison	L <sub>Aeq</sub> , 16hr	51	0.00	0	0	0	0	0	0
			54	0.00	-100	0	0	0	0	0
			57	0.00	0	0	0	0	0	0
			60	0.00	0	0	0	0	0	0
			63	0.00	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2026	Opt A Comparison	L <sub>Aeq</sub> , 8hr	45	0.00	0	0	0	0	0	0
			48	0.00	0	0	0	0	0	0
			51	0.00	0	0	0	0	0	0
			54	0.00	0	0	0	0	0	0
			55	0.00	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2035	Opt A Comparison	L <sub>Aeq</sub> , 8hr	45	0.00	0	0	0	0	0	0
			48	0.00	0	0	0	0	0	0
			51	0.00	0	0	0	0	0	0
			54	0.00	0	0	0	0	0	0
			55	0.00	0	0	0	0	0	0

**N60 N65 contours**

The following table shows the difference between the option N65/N60 performance and the baseline for year of implementation and 10 years following implementation:

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2026	Opt A Comparison	N65	5	-0.50	0	0	0	0	0	0
			10	-0.10	100	0	0	1	0	0
			20	0.00	0	0	0	0	0	0
			50	0.00	0	0	0	0	0	0
			100	0.00	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2035	Opt A Comparison	N65	5	-0.60	0	0	0	1	0	0
			10	-0.10	0	0	0	1	0	0
			20	0.00	100	0	0	0	0	0
			50	0.00	0	0	0	0	0	0
			100	0.00	0	0	0	0	0	0

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2026	Opt A Comparison	N60	5	0.00	0	0	0	0	0	0
			10	0.00	0	0	0	0	0	0
			20	0.00	0	0	0	0	0	0

Group			Impact							
Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2035	Opt A Comparison	N60	5	0.00	0	0	0	0	0	0
			10	0.00	0	0	0	0	0	
			20	0.00	0	0	0	0	0	

**Overflight contours**

The following table shows the difference between the option overflight performance and the baseline, for year of implementation and 10 years following implementation:

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2026	Opt A Comparison	Overflights (24hr)	5	-8.10	-900	0	0	-2	0	1
			10	0.00	-200	0	0	0	0	
			20	0.40	0	0	0	0	0	
			50	0.00	0	0	0	0	0	

Year	Scenario	Metric	Contour	Area (km <sup>2</sup> )	Total population	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2035	Opt A Comparison	Overflights (24hr)	5	-8.60	-1300	0	0	-3	-1	1
			10	-0.60	0	0	0	0	0	
			20	0.50	0	0	0	0	0	
			50	0.10	0	0	0	0	0	

**Noise summary**

When operating the PBN approach, aircraft will be vectored towards a fixed waypoint (IF) rather than the ILS localiser (where there is a broader area of dispersion around joining the final approach). Aircraft will be able to join the waypoint up to 45° either side of the extended centreline. 95%+ of traffic would continue to fly as they do in the baseline (as they do today). This option is not expected to impact flight paths from aircraft departing from Aberdeen.

For aircraft flying the vectors to RNP approach option, joining at a fixed waypoint may lead to a very small redistribution of noise however analysis has shown the average tracks of arriving aircraft align very closely with the position of the IF and, also given the small number of aircraft expected to fly the PBN arrival procedure, any change is anticipated to be so small it would not be material.

This is reflected in the primary noise data which shows no changes in the LAeq contour data between the option and the baseline, with the exception of two very marginal differences in the LAeq,16hr outcomes. This marginal difference is due to the small increase in concentration around the IF for RWY16 arrivals and is negligible in terms of the potential for adverse noise effects.

Similarly, although the TAG analysis shows that there is a cost associated with this option, it is important to highlight that this result is influenced by a limited number of receptors transitioning between 1dB bands in the TAG evaluation due to noise variations of less than 0.1dB. These changes are negligible beyond the accuracy of any noise model. Therefore, the TAG outcome for this option is not considered to be material to the assessment.

The secondary N60 metric shows no changes in contour data and the N65 metrics suggests very marginal differences which are not anticipated to be material.

Finally the overflight data, which is generated between 0-7000ft, shows marginal differences in the lower frequency 5 and 10 per day contours which result in improvements to the number of people overflown compared to the baseline. It is important to note however that these improvements are based on an optimistic 5% of arriving aircraft flying the PBN procedures.

Overall, it is concluded that this option is not expected to result in any significant or material positive benefits or negative impacts to noise.

**Wider society** **Tranquillity**

There are no changes in the number or area of locations/spaces that are relevant to the consideration of tranquillity within the LAeq, N65 and N60 contours (please see technical appendix A for full data tables). The Government’s *Planning Practice Guidance – noise*<sup>24</sup> notes that at noise exposure below the LOAEL “Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.” It is therefore considered that as there are no material differences in noise levels within the LAeq contours that there are no material impacts to tranquillity.

Overflight data shows very small changes to the area of already overflown designated gardens and landscapes within the 5 flights per day contour. However no new areas are overflown and the scale of the change to the area already overflown is not considered to be a material impact.

Year	Scenario	Metric	Contour	Country parks		CQA		Gardens & Designated Landscapes		National Parks		NSA	
				Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )	Total	Area (km <sup>2</sup> )
				2026	Opt A Comparison	Overflights_24hr	5	0	0.00	0	0.00	0	0.90
			10	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

<sup>24</sup> <https://www.gov.uk/guidance/noise--2> (Whilst PPG-N is not Scottish Government guidance, it provides useful information on how to apply the concept of LOAELs which are part of UK airspace policy and hence apply to Scotland)

Group			Impact										
			20	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Year	Scenario	Metric	Contour	Country parks		CQA		Gardens & Designated Landscapes		National Parks		NSA	
				Total	Area (km2)	Total	Area (km2)	Total	Area (km2)	Total	Area (km2)	Total	Area (km2)
				2035	Opt A Comparison	Overflights_24hr	5	0	0.00	0	0.00	0	1.20
			10	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			20	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
			50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

**Wider society** Biodiversity

This option overflies the River Dee SAC on final approach. The option will not increase the number of aircraft movements, will not change the altitude of aircraft, and will not change the lateral dispersion of aircraft overflying any the European Site below 3000ft. Considering this, the option is not likely to result in significant biodiversity effects on any European Site.

**Communities** Air quality

Impacts to air quality are considered for changes below 1000ft. This option does not change lateral flight paths below 1000ft and therefore there is no anticipated change or impact to air quality as a result of this option.

**Wider society** Greenhouse gas impact

No change to the profiles of inbound or outbound aircraft is expected as a result of this option. This option is not expected to impact aircraft departing from Aberdeen.

**TAG outcomes**

TAG has been used to assess the greenhouse gas impact over a 10-year appraisal period. The change in carbon dioxide emissions over the appraisal period is 185.3t, of which 183.5t is traded. The monetised net present value (NPV) of carbon dioxide equivalent emissions of this option is -£39,233 (2024 prices). At the time of the Full Options Appraisal, the current version of the TAG workbook included only non-traded flights in the total NPV. The May 2024 version of the TAG workbook used for this Final Options Appraisal includes both traded and non-traded flights in the total NPV. Additionally, the NPV in the Full Options Appraisal was reported in 2010 prices rather than 2024 prices and there have been updates to the GDP per capita and GDP deflator forecasts used in the workbook. As the majority of flights operating at ABZ are traded, this change in the workbook methodology has resulted in a significant increase in the total NPV compared to the valuation reported in the Full Options Appraisal.

However, the inclusion of traded flights in the total NPV, the changes to the output price year, and the GDP per capita and GDP deflator forecasts would apply equally to all options assessed in the Full Options Appraisal. As the number of traded and non-traded flights is the same between the options assessed in the Full Options Appraisal, the updates to the TAG workbook do not alter the overall conclusions of the Full Options Appraisal.

**Fuel burn data**

The following tables show annual Fuel Burn, and the associated cost:

Scenario	Year	Fuel use (t) (Annual)	Fuel cost (£) (Annual)
Do nothing	2026	18,221	11,866,099
Vectors to final approach	2026	18,227	11,869,827
Difference:		+6	+3,728

Scenario	Year	Fuel use (t) (Annual)	Fuel cost (£) (Annual)
Do nothing	2035	18,694	12,174,230
Vectors to final approach	2035	18,700	12,178,094
Difference:		+6	+3,864

**Greenhouse gas emissions data**

Scenario	Year	Total emissions (tCO <sub>2</sub> e)	GHG International emissions (tCO <sub>2</sub> e)	GHG Traded (Domestic) emissions (tCO <sub>2</sub> e)	GHG Traded (EEA) emissions (tCO <sub>2</sub> e)	UKETS GHG emissions (tCO <sub>2</sub> e)	Traded GHG emissions (tCO <sub>2</sub> e)	GHG emissions per flight (tCO <sub>2</sub> e)
Do nothing	2026	57,942	576	46,349	11,017	57,366	0.68	
Vectors to final approach	2026	57,961	576	46,363	11,021	57,384	0.68	
Difference:		+19	0	+14	+4	+18	0	



Group		Impact										
Scenario	Year	Total emissions (tCO <sub>2</sub> e)	GHG International emissions (tCO <sub>2</sub> e)	GHG Traded (Domestic) GHG emissions (tCO <sub>2</sub> e)	Traded (EEA) GHG emissions (tCO <sub>2</sub> e)	UKETS GHG emissions (tCO <sub>2</sub> e)	Traded GHG emissions (tCO <sub>2</sub> e)	GHG emissions per flight (tCO <sub>2</sub> e)				
Do nothing	2035	59,447	594	47,437	11,416	58,852	0.68					
Vectors to final approach	2035	59,466	595	47,451	11,420	58,871	0.68					
<i>Difference:</i>		+19	+1	+14	+4	+19	0					

The tables above are based on the vast majority of IFR arrivals at Aberdeen flying an ILS approach as they do in the baseline today and it assumes an optimistic 5% of arrivals will fly the PBN approach option. However, the proposed PBN arrival options are predominately for resilience and so will most likely be used in the event of an ILS outage. With this in mind, Aberdeen has generated some data around fuel burn and carbon emissions of a VOR/DME approach, which would be flown in the event of an ILS outage.

Owing to the frequency of ILS outages, it is not possible to meaningfully incorporate an outage scenario into the carbon emission data above, which is required to be based on an annual forecast by CAP1616. Therefore, we have generated data for a single day of arrivals summarised by runway end which has been compared against the option.

Option	Year	RWY16			RWY34			Total		
		Fuel (Day)	(t)	Carbon (tCO <sub>2</sub> e)	Fuel (Day)	(t)	Carbon (tCO <sub>2</sub> e)	Fuel (Day)	(t)	Carbon (tCO <sub>2</sub> e)
VOR/DME approach	2026	8.0		25.4	5.1		16.1	13.1		41.5
Vectors to final approach	2026	7.8		24.7	4.7		15.1	12.5		39.8
VOR/DME approach	2035	8.3		26.3	5.3		16.7	13.5		43.0
Vectors to final approach	2035	8.1		25.6	4.9		15.6	13.0		41.2

**Summary**

When considering 5% of aircraft flying the vectors to final approach option, the fuel burn and carbon emissions data shows a small negative impact (less than 0.1% increase in total emissions between the do something and baseline scenarios, of which the majority are traded) to annualised fuel use and carbon emissions as required by CAP1616 however, as noted in this Final Options Appraisal, 5% usage is considered an optimistic estimate and therefore any negative impacts are likely to be smaller than stated in the data above. Considering this, the impact of this option on fuel burn and greenhouse gas emissions is not considered to be material to the assessment.

The RNP procedures are most likely to be flown in a resilience scenario when the ILS is unavailable and in this case, the option offers fuel burn and carbon emission improvements compared to the VOR/DME approach which is used today.

**Wider society** Capacity/resilience Qualitative

The introduction of PBN satellite-based approaches at Aberdeen would improve resilience in the event of ground-based navigation aid outage which may reduce delays and diversions.

Although this ACP does not seek to increase capacity at Aberdeen, in the event of an ILS outage, the implementation of vectors to an RNP approach would enable a workload reduction for Aberdeen ATC which means ATC may have greater capacity to handle traffic compared to current day where aircraft would fly a VOR/DME or NDB approach.

**General Aviation** Access

This option is not expected to directly impact General Aviation; the procedures would be contained within existing CAS, and aircraft would continue to be vectored onto final approach as they are within the baseline. If CAS Option 1 is progressed this option would be compatible with it, resulting in a reduction in CAS volume.

The option is not expected to impact the helicopter routes to and from Aberdeen Airport.

**General Aviation/commercial airlines** Economic impact from increased effective capacity

This option is not expected to alter the airspace capacity at Aberdeen; the purpose is to provide resilience and meet the requirements of the Airspace Modernisation Strategy. The availability of PBN procedures provides resilience to the loss of the ILS which could reduce the number of diversions owing to improved minima over the remaining conventional approach procedures. This is expected to enable a reduction in operational costs for airlines however given the historic data around ILS outages, it would not be proportionate to try to quantify this.

**General Aviation/commercial airlines** Fuel burn

Please see greenhouse gas assessment above.

**Commercial airlines** Training costs

Procedures are introduced worldwide as part of an AIRAC cycle. As part of this cycle, airlines update their procedures accordingly and undertake training if required. This arrival option is not anticipated to require any additional training costs for airlines.

**Commercial airlines** Other costs

No other airline costs are foreseen.

**Airport/ANSP** Infrastructure costs

Group	Impact	
<p>The initial deployment phase of the ACP may require some minor ATC system engineering amendments which are anticipated to cost £70,000.</p>		
<b>Airport/ANSP</b>	Operational costs	
<p>The availability of PBN procedures provides resilience to the loss of the ILS which could reduce the number of diversions owing to improved minima over the remaining conventional approach procedures. This may offer increased operating revenue to Aberdeen in the event of an ILS outage during poor weather however given the historic data around ILS outages, it would not be proportionate to try to quantify this.</p> <p>The vectors to final approach procedures will require ongoing procedure design review as part of the mandatory 5 year review cycle. This is anticipated to cost £8,000 every 5 years.</p>		
<b>Airport/ANSP</b>	Deployment costs	
<p>This option is expected to require a small amount of training cost for Air Traffic Controllers at Aberdeen ATC which is estimated to cost £15,000.</p>		
<b>All</b>	Safety	
<p>The detailed ATC safety assessments undertaken as part of the APSA identified three hazards which have been mitigated to acceptable safety levels. Overall, Implementation of RNP Approach procedures can be expected to enhance safety in the event of ILS unserviceability where ATC and operators would otherwise be reliant on VOR/DME or NBD approaches which are non-precision approaches (NPA). In the event of ILS outage, the implementation of RNP approaches would enable a workload reduction for ATC and operators compared to the current day where aircraft would fly a VOR/DME or NBD approach. PBN approaches are also widely claimed to enhance safety over non precision approaches (NPAs) by reducing the risk of Controlled Flight Into Terrain (CFIT).</p> <p>The procedures have been designed by UK Approved Procedure Design Organisation and validated in accordance with CAA Policy.</p>		
<b>All</b>	Performance against the vision and parameters/strategic objectives of the AMS	Qualitative
<p>The following qualitative assessment looks at the four objectives of the Airspace Modernisation Strategy:</p> <p><b>Safety:</b> The implementation of RNP approaches is expected to enhance safety in the event of ILS unserviceability. RNP approaches also offer improved safety compared to NPA's.</p> <p><b>Integration of diverse users:</b> This option offers operators arriving at Aberdeen greater resilience in the event of an ILS outage. With regards to other airspace users, the option is wholly contained within existing CAS and would be compatible with the proposed reduction in CAS outlined in CAS Option 1.</p> <p><b>Simplification, reducing complexity and improving efficiency:</b> This option offers resilience in the event of ground based navigation aid outages. It does not seek to increase capacity at Aberdeen Airport; the purpose of the change is to provide resilience and offer PBN procedures which meet the AMS. The option would be operated very similarly to how aircraft arrive today and therefore there are not any opportunities for simplification, reducing complexity, or decreasing ATC workload through day to day operations although there are some workload benefits in the event of ILS u/s.</p> <p><b>Environmental sustainability:</b> This option would have no material change in terms of noise, carbon emissions and air quality when compared against the 'without airspace change' scenario.</p>		

### 5.3 Without ACP CAS assessment methodology

#### Option description

5.3.1 The Controlled Airspace (CAS) structure will remain as it is today. Please see section AD 2 EGPD (AD 2.EGPD-4-1) of the [eAIP](#) for the Class D Airspace chart.

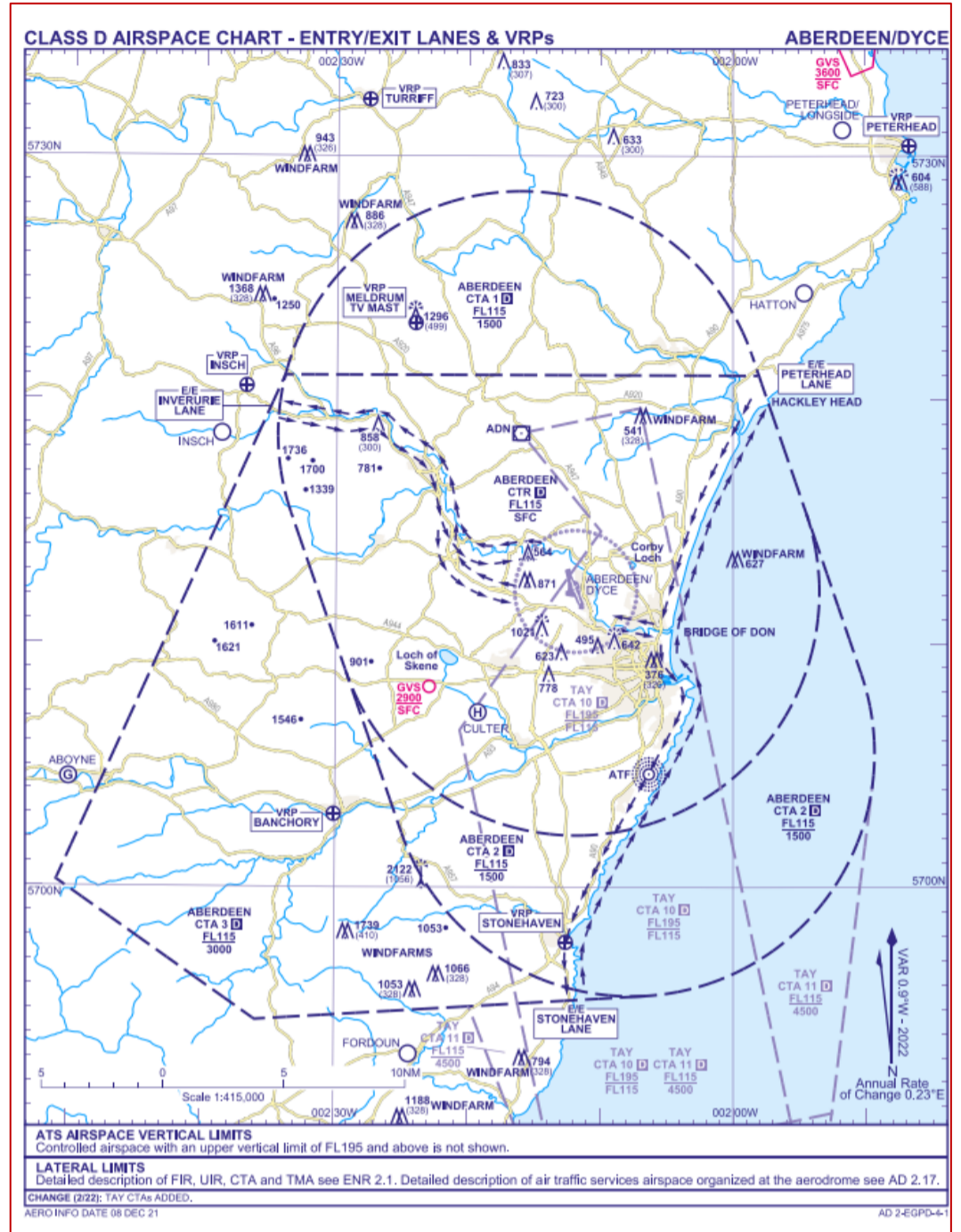


Figure 23 Aberdeen's Existing Class D Airspace Chart

#### Final Options Appraisal: Without Airspace Change (CAS)

5.3.2 The following table presents the existing 'do nothing' pre-implementation baseline for the CAS scenario. It also outlines the methodology used to assess CAS Option 1 against the baseline.

Group	Impact
<b>Communities</b>	Noise impact on health and quality of life
	This option is the 'without airspace change' for the existing CAS structure. Aircraft departing and arriving at Aberdeen will continue to fly as they do today (see <a href="#">Baseline Inputs</a> and <a href="#">Baseline 'without airspace change' section</a> for further details). CAS Option 1 will be compared against this baseline to understand if altering the CAS will result in any changes to tracks over the ground to and from Aberdeen Airport, and subsequently noise below 7000ft.
<b>Communities</b>	Air quality
	This option is the 'do nothing' for the existing CAS structure. Aircraft departing and arriving at Aberdeen will continue to fly as they do today. Impacts to air quality are considered for changes below 1000ft. CAS Option 1 will be compared against this baseline to understand if altering the CAS will result in any changes to tracks below 1000ft.
<b>Wider society</b>	Tranquillity
	This option is the 'do nothing' for the existing CAS structure. Aircraft departing and arriving at Aberdeen will continue to fly as they do today (see <a href="#">Baseline Inputs</a> and <a href="#">Baseline 'without airspace change' section</a> for further details). CAS Option 1 will be compared against this baseline to understand if altering the CAS will result in any changes to tracks over the ground to and from Aberdeen Airport, and subsequently tranquillity below 7000ft.
<b>Wider society</b>	Biodiversity
	This option is the 'do nothing' for the existing CAS structure. Aircraft departing and arriving at Aberdeen will continue to fly as they do today (see <a href="#">Baseline Inputs</a> and <a href="#">Baseline 'without airspace change' section</a> for further details). CAS Option 1 will be compared against this baseline to understand if altering the CAS will result in any changes to tracks over the ground to and from Aberdeen Airport, and subsequently biodiversity below 3000ft.
<b>Wider society</b>	Greenhouse gas impact
	This option is the 'do nothing' for the existing CAS structure. Aircraft departing and arriving at Aberdeen will continue to fly as they do today (see <a href="#">Baseline Inputs</a> and <a href="#">Baseline 'without airspace change' section</a> for further details). CAS Option 1 will be compared against this baseline to understand if altering the CAS will result in any changes to track length, and subsequently to fuel burn and CO <sub>2</sub> e emissions.
<b>Wider society</b>	Capacity/resilience

Group	Impact
	<p>The existing CAS does not constrain capacity or resilience. CAS Option 1 will be compared against this baseline to understand if altering CAS will result in any changes to capacity/resilience for Aberdeen Airport.</p>
<p><b>General Aviation</b></p>	<p>Access</p>
	<p>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:</p> <ul style="list-style-type: none"> <li>Whiterashes: close to the ADN and the final approach track for runway 16.</li> <li>Peterculter: helicopter training site.</li> <li>Aberdeen Royal Infirmary (ARI): located underneath the final approach track for runway 34.</li> <li>Trump Golf Course: a helicopter landing site near Balmedie on the coast to the east of the airfield.</li> </ul>
	<p>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 and 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. The dense activity around Deeside Gliding Club generates traffic that navigates around or underneath CTA3. Figure 24 shows a gliding activity heatmap generated by Airspace4All which helps to illustrate density of glider operations around the Aberdeen CTR/CTAs.</p>
	<p>Airspace4All also published a piece of work on VFR Significant Areas (VSA) which highlighted two areas, 'Aberdeen Coastal Corridor' and the 'Inverness – Aberdeen Coastal Corridor' which have been identified as being particularly important to VFR operations, i.e. General Aviation (GA). 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. For more information, please see our Stage 2A document on the <a href="#">CAA Airspace Change Portal</a>.</p>
<p><b>General Aviation/commercial airlines</b></p>	<p>Economic impact from increased effective capacity</p>
	<p>Doing nothing will not enable any increased effective capacity; later in this Final Options Appraisal we will estimate the difference between CAS Option 1 and this baseline.</p>
<p><b>General Aviation/commercial airlines</b></p>	<p>Fuel burn</p>
	<p>This option is the 'do nothing' for the existing CAS structure. Aircraft departing and arriving at Aberdeen will continue to fly as they do today (see <a href="#">Baseline Inputs</a> and <a href="#">Baseline 'without airspace change' section</a> for further details). Option 1 will be compared against this baseline to understand if altering the CAS will result in any changes to track length, and subsequently to fuel burn.</p>
<p><b>Commercial airlines</b></p>	<p>Training costs</p>
	<p>As this option is already in operation, there are no training costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between CAS Option 1 and this baseline.</p>
<p><b>Commercial airlines</b></p>	<p>Other costs</p>
	<p>As this option is already in operation, there are no other costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between CAS Option 1 and this baseline.</p>
<p><b>Airport/ANSP</b></p>	<p>Infrastructure costs</p>
	<p>As this option is already in operation, there are no infrastructure costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between CAS Option 1 and this baseline.</p>
<p><b>Airport/ANSP</b></p>	<p>Operational costs</p>
	<p>As this option is already in operation, there are no operational costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between CAS Option 1 and this baseline.</p>
<p><b>Airport/ANSP</b></p>	<p>Deployment costs</p>
	<p>As this option is already in operation, there are no deployment costs anticipated as there will be no change; later in this Final Options Appraisal we will estimate the difference between CAS Option 1 and this baseline.</p>
<p><b>All</b></p>	<p>Safety</p>
	<p>The baseline is already in safe operation and there are no safety concerns raised at this time. A qualitative safety assessment will be undertaken which compares against the baseline. In preparation for this Stage 4 submission, Aberdeen Airport have instructed their Air Navigation Service provider, NATS NSL to undertake detailed safety assessments.</p>
	<p>The following safety assessment work has been undertaken; these works support the proposed ATC procedures associated with the change:</p>
	<ul style="list-style-type: none"> <li>Initial Preliminary Hazard Identification at Stage 3a of options, including Preferred option.</li> <li>ATC Procedures Safety Analysis</li> </ul>
	<p>A summary of this safety assessment will be included within this Final Options Appraisal.</p>
	<p>In addition to this, a qualitative safety assessment has been provided around any safety benefits and/or impacts to aviation users, such as General Aviation, outside of Aberdeen Airport.</p>

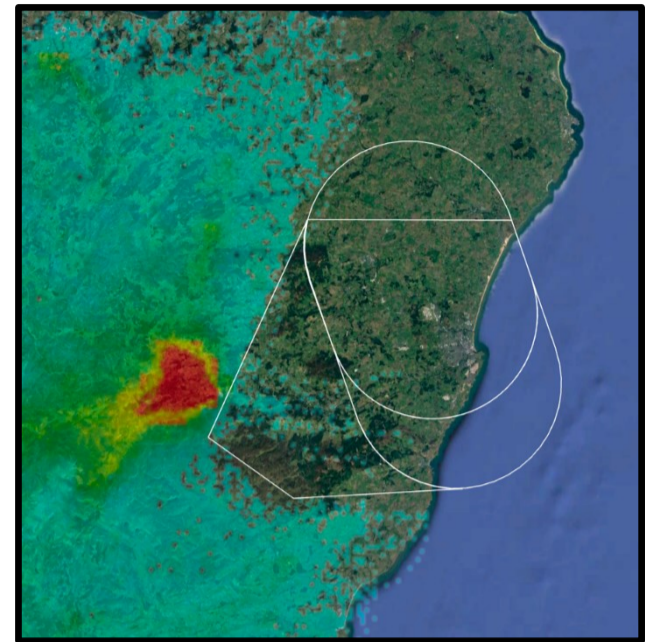


Figure 24 Gliding Activity Heatmap (Source: Airspace4All)

Group	Impact
All	Performance against the vision and parameters/strategic objectives of the AMS

The following qualitative assessment looks at the four objectives of the Airspace Modernisation Strategy:

**Safety:** The 'do nothing' option will maintain but not improve aviation safety.

**Integration of diverse users:** The 'do nothing' would not enable any reductions in the volume or classification of CAS.

**Simplification, reducing complexity and improving efficiency:** The 'do nothing' option does not offer any opportunities to reduce complexity or improve efficiency.

**Environmental sustainability:** The 'do nothing' option does not offer any changes to noise and/or greenhouse gas emissions. Later in this FOA we will qualitatively assess the positive benefits and negative impacts of CAS Option 1 against this assessment. The conclusions about how CAS Option 1 performs against the AMS will be informed by the assessments within the Final Options Appraisal.

**5.4 With Airspace Change: CAS Option 1: raise portion of CTA 3 to 4500ft**

**Option description**

- 5.4.1 CAS Option 1 proposes to raise the base of a SW portion of CTA 3, shown in red outline on the chart opposite, from 3000ft to 4500ft.
- 5.4.2 Analysis of surveillance data followed by conversations with Aberdeen ATC identified a section of CTA 3 which was underutilised.
- 5.4.3 The figure opposite illustrates the section of CTA 3 that will be considered for declassification from Class D to Class G airspace between 3000ft and 4500ft. The remaining section from 4500ft to FL115 will be called CTA-4.
- 5.4.4 The data showed that there were not any fixed wing or rotary wing departures from Aberdeen which used the airspace proposed to be released. For arrivals, there was on average 1 fixed wing and 1 rotary wing aircraft a week within the airspace (around 0.2% of Aberdeen’s arrivals).



Figure 25: Aberdeen CTA map with proposed change

**Final Options Appraisal: With Airspace Change (CAS)**

Group	Impact
<b>Communities</b>	Noise impact on health and quality of life
<p>The section of airspace proposed to be raised to 4500ft has been identified by ATC as being under-used and then confirmed using radar data. Analysis of this data showed that the profiles of aircraft departing from Aberdeen are currently above this volume. For arrivals, very occasionally there is an aircraft within this volume however this is so infrequent (less than 2 aircraft a week on average) that it would not impact quantified noise metrics which look at an average day. Furthermore this very small number of aircraft would be higher in future, and therefore would present a very small noise benefit.</p> <p>Overall, we conclude that raising this portion of CTA 3 would have no material impact on the noise from aircraft arriving and departing from Aberdeen; there would be no material changes to tracks over the ground, aircraft profiles, and subsequently noise from Aberdeen Airport’s operation, are expected as a result of implementing this option.</p>	
<b>Communities</b>	Air quality
<p>CAS Option 1 is not expected to materially alter tracks over the ground for aircraft arriving and departing from Aberdeen below 1000ft and therefore this option is not expected to have any impacts on air quality from Aberdeen Airport’s operation.</p>	
<b>Wider society</b>	Tranquillity
<p>The noise analysis has demonstrated that there will be no material changes to tracks over the ground as a result of releasing a portion of CAS and therefore there are no material changes expected to tranquillity.</p>	
<b>Wider society</b>	Biodiversity
<p>There will be no change to tracks over the ground below 3000ft and therefore no impacts to biodiversity are anticipated.</p>	
<b>Wider society</b>	Greenhouse gas impact
<p>CAS Option 1 is not expected to alter tracks over the ground for aircraft arriving and departing from Aberdeen and therefore this option is not expected to have any impacts to greenhouse gas impact from Aberdeen Airport’s operation. However, it may enable more fuel efficient routings by GA, catering for flight up to 4400ft, instead of 2900ft.</p>	
<b>Wider society</b>	Capacity/resilience
<p>CAS Option 1 is not expected to change the capacity or resilience within the airspace compared to the ‘do nothing’ baseline.</p>	
<b>General Aviation</b>	Access
<p>CAS Option 1 would result in the release of 27.8nm<sup>3</sup> of class D controlled airspace within Aberdeen’s CTA 3. The increase of the base of this part of CTA3 would enable improved soaring profiles for flights to/from Deeside Gliding Club at Aboyne. In addition to this, it would enable GA transiting the airspace to remain outside of controlled airspace at a higher altitude than today.</p>	

<b>Group</b>	<b>Impact</b>
<b>General Aviation/commercial airlines</b>	Economic impact from increased effective capacity
CAS Option 1 does not offer any increased capacity for Aberdeen Airport compared to the 'without airspace change' baseline.	
<b>General Aviation/commercial airlines</b>	Fuel Burn
CAS Option 1 is not expected to materially alter tracks over the ground for aircraft arriving and departing from Aberdeen and therefore this option is not expected to have any impacts to fuel burn from Aberdeen Airport's operation.	
<b>Commercial airlines</b>	Training costs
This option is not expected to result in any additional training costs for airlines; aircraft will continue to operate as they within the baseline. Updated charts reflecting the changes to the CAS will be introduced as part of an AIRAC cycle.	
<b>Commercial airlines</b>	Other costs
No other airline costs are foreseen.	
<b>Airport/ANSP</b>	Infrastructure costs
No infrastructure costs are foreseen.	
<b>Airport/ANSP</b>	Operational costs
No operational costs are foreseen.	
<b>Airport/ANSP</b>	Deployment costs
This option is expected to require a small amount of effort for NATS at Aberdeen ATC to update documentation, ATC procedures and ATC systems to reflect the new CAS structure; however this cost would be incorporated as part of the wider changes should PBN approaches be introduced.	
There will also be some airport IFP cost to update some procedures to reflect the increased base of CAS (see safety assessment below).	
<b>All</b>	Safety
The detailed ATC safety assessments undertaken as part of the APSA identified three hazards which have been mitigated to acceptable safety levels. The release of this volume of CAS is expected to improve safety for General Aviation users operating outside of CAS. This is because the release could be expected to decrease congestion in the surrounding class G airspace.	
<b>All</b>	Performance against the vision and parameters/strategic objectives of the AMS
<b>Safety:</b> Expected to maintain safety of operations to/from Aberdeen Airport and improve safety for General Aviation operating outside of CAS.	
<b>Integration of diverse users:</b> Would enable the release of CAS which reduces Aberdeen's CAS volume and results in an area of airspace being reclassified.	
<b>Simplification, reducing complexity and improving efficiency:</b> No change to capacity, efficiency or resilience at Aberdeen Airport is anticipated.	
<b>Environmental sustainability:</b> Is not expected to positively benefit or negatively impact aircraft arriving or departing from Aberdeen. The release of the section of CAS may offer some fuel savings for general aviation using the airspace.	

## 6. Final Options Appraisal conclusion

6.1.1 The following sections provide an overview of the outcome of the Final Options Appraisal.

### 6.2 Cost Benefit Analysis

6.2.1 As outlined in [CAP1616f](#) (section 3.43 onwards), as part of the Final Options Appraisal the Airspace Change Sponsor needs to value all relevant costs and benefits associated with the final design option(s) and produce a Cost Benefit Analysis (CBA) which outputs a Net Present Value (NPV) for the final option. The costs / benefits of the final design option must be compared to the respective baseline costs / benefits in order to produce the net costs / benefits. All values must be expressed in 'real' rather than 'nominal' terms and reported for a particular 'base year' (i.e. removing the effects of inflation). As well as taking account of inflation, Airspace Change Sponsors need to be aware of people's time preference and discount the values appropriately. For the purposes of the airspace change process it is appropriate to use a Social Time Preference Rate (STPR), as per the guidance set out in Chapter 5 of the UK Government's Green Book and TAG A1.1.

6.2.2 Table 11 shows the NPV of all relevant costs associated with the RNP approaches. The following assumptions have been applied:

- All values are reported in real terms with a base year of 2024.
- For discounting purposes, the Standard STPR of 3.5% has been applied to all cost categories, apart from the Noise category where the Health STPR rate of 1.5% has been applied.
- For Noise and GHG, values are taken directly from the WebTAG workbooks before any discounting is applied.
- For Fuel, the jet fuel price is based on the week ending 5 Jan 2024 and the GBP to USD conversion rate from 1 Jan 2024.

6.2.3 When reviewing these costs, please note that they have been generated based on an optimistic 5% of aircraft flying the PBN procedures and we expect this number to be lower.

6.2.4 Although the cost benefit analysis shows that there are noise costs associated with the final option, it is important to highlight that this result is influenced by a limited number of receptors transitioning between 1dB bands in the TAG evaluation due to noise variations of less than 0.1dB. These changes are negligible beyond the accuracy of any noise model. Therefore the noise costs are not considered to be material to the assessment.



Table 11 Option A - Net Present Value

RNP approaches - Net Present Value		1	2	3	4	5	6	7	8	9	10	Total	
		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035		
STANDARD STPR	Real Values (2024)	Airport Infrastructure Costs	-£68,045	£0	£0	£0	£0	£0	£0	£0	£0	£0	-£68,045
		Airport Operational Costs	£0	£0	£0	£0	-£7,158	£0	£0	£0	£0	-£6,389	-£13,547
		Airport Deployment Costs	-£14,581	£0	£0	£0	£0	£0	£0	£0	£0	£0	-£14,581
		GHG Emissions (Traded & Non-Traded)	-£4,537	-£4,523	-£4,621	-£4,942	-£5,111	-£5,083	-£5,057	-£5,032	-£5,098	-£5,008	-£49,012
		Fuel	-£3,741	-£3,629	-£3,520	-£3,414	-£3,312	-£3,213	-£3,117	-£3,023	-£2,932	-£2,844	-£32,745
		<b>Sum</b>	<b>-£90,904</b>	<b>-£8,152</b>	<b>-£8,141</b>	<b>-£8,356</b>	<b>-£15,581</b>	<b>-£8,296</b>	<b>-£8,174</b>	<b>-£8,055</b>	<b>-£8,030</b>	<b>-£14,241</b>	<b>-£177,931</b>
	STANDARD STPR Discount Factor	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68		
Net Present Value	-£84,860	-£7,353	-£7,095	-£7,035	-£12,675	-£6,521	-£6,207	-£5,910	-£5,693	-£9,754	-£153,103		
HEALTH STPR	Real Values (2024)	Noise	-£1,272	-£1,156	-£1,041	-£925	-£810	-£694	-£579	-£463	-£348	-£232	-£7,522
		<b>Sum</b>	<b>-£1,272</b>	<b>-£1,156</b>	<b>-£1,041</b>	<b>-£925</b>	<b>-£810</b>	<b>-£694</b>	<b>-£579</b>	<b>-£463</b>	<b>-£348</b>	<b>-£232</b>	<b>-£7,522</b>
	HEALTH STPR Discount Factor	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85		
	Net Present Value	-£1,235	-£1,106	-£981	-£859	-£741	-£626	-£514	-£405	-£300	-£197	-£6,963	
<b>FINAL OPTION A NPV</b>		<b>-£86,095</b>	<b>-£8,459</b>	<b>-£8,075</b>	<b>-£7,894</b>	<b>-£13,416</b>	<b>-£7,147</b>	<b>-£6,721</b>	<b>-£6,315</b>	<b>-£5,992</b>	<b>-£9,952</b>	<b>-£160,067</b>	

## **6.3 Conclusion and next steps**

- 6.3.1 The Final Options Appraisal has demonstrated that the proposal to introduce RNP approaches, for training and resilience to Aberdeen Airport, and the release of a section of CAS, would meet the aims of the ACP and ensure Aberdeen Airport aligns with the airspace modernisation strategy whilst not resulting in any material impacts.
- 6.3.2 As such Aberdeen Airport plans to proceed with the proposal to:
- Introduce modern satellite-based arrival procedures (RNP approaches) which would be used by a very small percentage of arrivals for resilience and training purposes; and
  - Release a section of the Controlled Airspace (CAS Option 1), which is not routinely used by the aircraft arriving or departing from Aberdeen Airport, for the benefit of other airspace users.
- 6.3.3 This Final options appraisal document forms part of the Stage 4 submission for this Airspace Change Proposal. As part of the next steps of the process, Aberdeen Airport will prepare a formal submission for the CAA using the standard CAP1616 submission template. We will then submit this to the CAA and all documents will be published on the CAA's Airspace Change Portal.
- 6.3.4 Following the Stage 4 submission, Aberdeen Airport will move into Stage 5 of the CAP1616 process; Decide. Stage 5 is where the CAA assess the Airspace Change Proposal and all the documentation and evidence accompanying it, holding a Public Evidence Session when it is proportionate to do so before making its decision.
- 6.3.5 We expect a decision on this airspace change proposal from the CAA in Q3 2025.

**Revision statement**

- 6.3.6 CAP1616 requires sponsors to be clear with stakeholders the extent to which the proposed airspace change once implemented is reversible if it does not meet the objectives it is designed to achieve as part of the post implementation review at Stage 7.
  
- 6.3.7 As this ACP looks to introduce PBN approaches for resilience alongside the existing conventional procedures, it is possible for this change to be reversed if required and the new PBN procedures withdrawn from operation.