Full Options Appraisal Document

ACP-2019-32
Version 1.1

Edinburgh Airport

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Version	1.1
Date	22/10/25
Description of changes made	Figure 21 on page 40 has been amended

What's your view?

All sections and annexes have been published as separate documents in order to manage file size.

Introduction

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1. Introduction

1.1 Airspace Modernisation

In 2017 the Department of Transport (DfT) notified aviation stakeholders that as demand for aviation is forecast to continue growing, delays and environmental impacts are expected to increase if the UK's airspace is not upgraded to introduce additional capacity.

In response, the Civil Aviation Authority (CAA) was tasked to develop the UK Airspace Modernisation Strategy (AMS) which was first published in December 2018.

The overall programme of changes required to implement the AMS is considered one of the most significant airspace and Air Traffic Management (ATM) developments ever undertaken. Some of the most important changes described in the AMS concern the widespread adoption of satellite-based navigation technology, known as Performance Based Navigation (PBN).

1.2 Airspace Change Organising Group (ACOG) and the Masterplan

The Airspace Change Organising Group (ACOG) was formed in 2019 under the direction of the UK Government DfT and the CAA, who co-sponsor and regulate airspace modernisation. ACOG is tasked with developing the UK Airspace Change Masterplan (the Masterplan), with oversight from an impartial Steering Committee of senior representatives drawn from across the aviation sector. More information is available on ACOG's website, www.acog.aero.

The UK's airspace is being upgraded as part of the UK government's airspace modernisation programme. This includes redesigning the arrival and departure routes that serve many of the UK's airports. Airspace modernisation will be delivered, in part, through a series of linked Airspace Change Proposals (ACPs). Eighteen of the UK's airports are sponsoring ACPs to upgrade the arrival and departure routes that serve their operations in the lower airspace (below 7,000ft). NATS, the UK's licensed Air Navigation Service Provider for en route operations, is currently sponsoring seven ACPs to upgrade the route network that sits above 7,000ft, in busy portions of airspace where there are lots of climbing and descending flights, referred to as Terminal Control Areas (TMAs).

1.3 The Masterplan

Airspace modernisation is a complex programme, with many organisations working together on a single co-ordinated implementation plan out to 2040 – the Masterplan. The changes that make up the Masterplan will upgrade the UK's airspace and deliver the objectives of the government's AMS.

The Masterplan is organised into four regional clusters (shown in Figure 1 opposite) so that simpler airspace changes can deploy sooner, realising benefits earlier. The timelines for making airspace changes are generally shorter within simpler clusters where there are fewer airports, and less complex interdependencies between the airport ACPs.

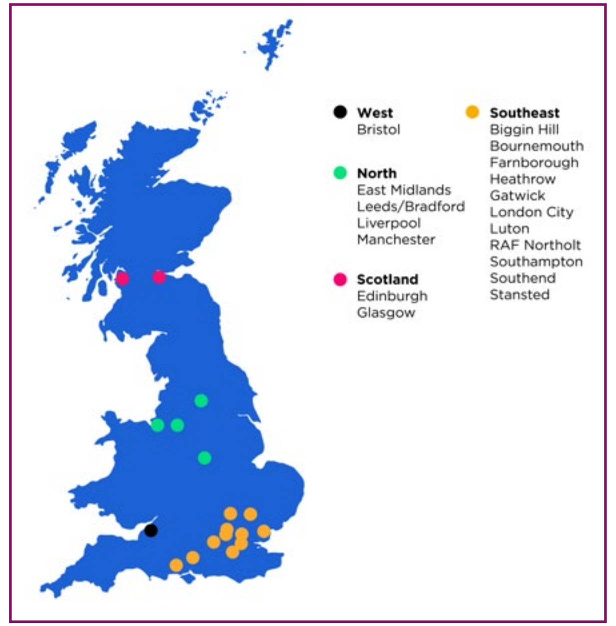


Figure 1: Four clusters of the Airspace Change Masterplan and airport sponsored ACPs.

1.4 Scottish Airspace Modernisation

Edinburgh Airport's ACP forms part of a wider Scottish Airspace Modernisation proposal. This is formed between Edinburgh Airport, Glasgow Airport and NATS EN-route Plc. (NERL). Within the Masterplan, it is referred to as the Scottish Terminal Control Area (ScTMA) Cluster.

Edinburgh Airport and Glasgow Airport are responsible for the modernisation of their respective airport's departure and arrival routes below 7,000ft and the airport's controlled airspace (CAS). NERL is responsible for connecting these routes into the network airspace, and the wider route network above 7,000ft.

The three ACPs are being progressed independently, however, there are design interdependencies between the proposals i.e. a change to Edinburgh Airport's design may result in a knock-on change for NERL and/or Glasgow Airport.

Consequently, Edinburgh Airport, Glasgow Airport and NERL, co-ordinated by ACOG, have worked closely together to develop the Scottish Airspace Modernisation proposal.

This Full Options Appraisal (FOA) document firstly describes the evolution of Edinburgh Airport's options from the concepts and swathes presented in our Stage 2 Initial Options Appraisal (IOA) into a set of detailed options.

After establishing the detailed options, this document then focuses on the FOA of those options and concludes with our selection of the preferred option for consultation.

The design process has involved looking at how best to design routes with respect to local data, such as population maps, and also how to ensure a safe and efficient system for the whole ScTMA. As we progress through this document, we describe all the work that has influenced the design being taken to consultation, including links to the relevant ACOG documentation which shows how the Edinburgh Airport proposal fits within the wider system design.

1.5 Performance Based Navigation (PBN)

Today's national airspace route network is designed with reference to a grid of ground-based navigation beacons distributed across the UK. Some of these beacons are outdated and reaching their end of life. Meanwhile, over 99% of current commercial air transport fleets operate almost exclusively using avionics that utilise satellite navigation. Aircraft follow routes designed to satellite navigation standards (known as Performance Based Navigation or PBN) with greater precision than previous conventional ground navigation.

The widespread deployment of routes designed to satellite navigation standards is a cornerstone of airspace modernisation. The opportunity to design a new network of PBN routes with far greater accuracy and flexibility offers the potential to address issues set out in the government's strategic rationale. Significant improvements in airspace capacity and efficiency can be achieved by positioning routes so that they are safely separated and optimised by design. Figure 2 opposite illustrates how PBN routes are different to the conventional routes in today's airspace (note that PBN routes are also referred to as RNAV routes[1]).

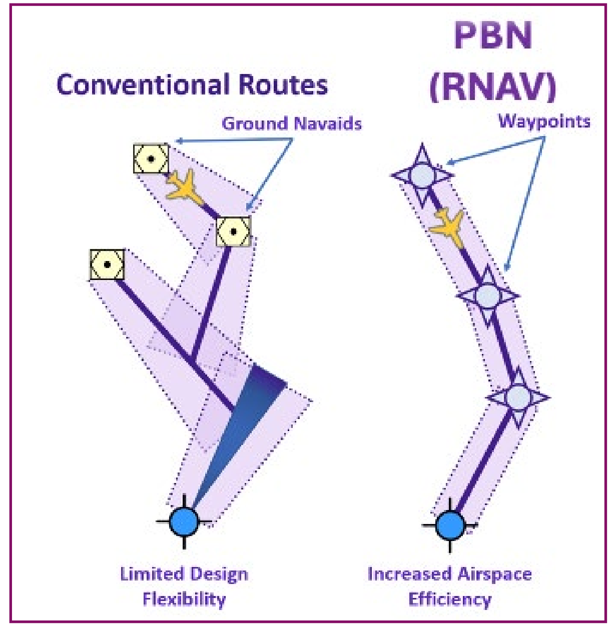


Figure 2: Types of Performance Based Navigation considered as part of the Edinburgh Airport option design.

[1] The RNAV is itself an abbreviation of the term area navigation.

1.6 CAP1616

Since January 2018, any changes to airspace are required to follow the CAA's CAP1616 regulatory guidance. CAP1616 outlines a 7-stage process for changing airspace design, including community engagement requirements as shown in Figure 3 opposite.

A key principle of the airspace change process is ensuring transparency throughout. Those potentially affected by an airspace change proposal should feel confident that their voice has a formal place in the airspace change process.

The CAA monitors the progress of airspace change proposals against the requirements of the airspace change process at key defined points, called gateways. At each gateway, the CAA will assess whether the relevant airspace change process requirements have been met. The gateways determine whether the airspace change process has been followed up to that point, and whether to approve progression to the next stage.

In early 2023, the CAA conducted a public consultation on proposed changes to CAP1616. Edition 5 was published at the end of October 2023. In November 2023, the CAA wrote to Edinburgh Airport to inform them that Stage 3 of CAP1616 should be carried out in accordance with the most recently published Edition 5.

As such, this Full Options Appraisal and all our Stage 3 documentation will be based on the guidance provided in **Edition 5 of CAP1616** and **CAP1616f, Guidance on Airspace Change Process for Permanent Airspace Change Proposals**. Stages 1 and 2 of the Edinburgh ACP were written in accordance with CAP1616 Edition 4, which is available **here**.

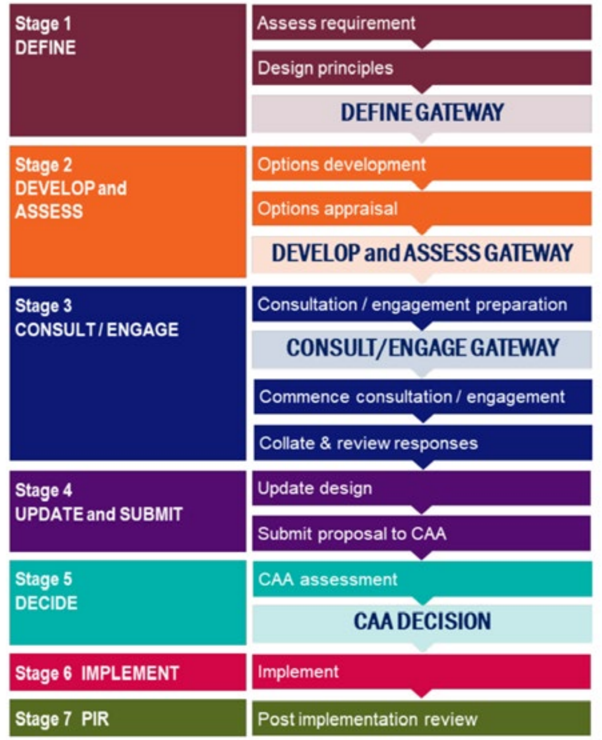


Figure 3: CAP1616 (Edition 5) 7-Stages.

1.7 Edinburgh Airport's Airspace Change Proposal

Edinburgh Airport Limited (referred to as 'Edinburgh Airport', 'we', or 'our' throughout this document) began the ACP to modernise our airspace in April 2019. In 2020, the project and much of the wider Programme was paused due to the COVID-19 pandemic whilst the aviation industry focused upon managing their response to the pandemic and subsequent recovery. The Programme was remobilised in April 2021, following the provision of DfT grant funding, allowing Edinburgh Airport to recommence our ACP in 2021.

This ACP is required to follow the CAP1616 process detailed in the section above. Table 1 on page 6 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.

Table 1: ACP progress to date

Airspace Change Stage	Summary	Link to Documents[2]
Stage 1: Assess Requirement	In 2019, Edinburgh Airport submitted their statement of need (SoN) to the CAA.	Statement of Need on CAA's Airspace Change Portal
	Edinburgh Airport participated in an assessment meeting with the CAA as part of Step 1A of the CAP1616 process. The purpose of the assessment meeting was for the change sponsor to present and discuss their SoN and to enable the CAA to consider whether the proposal falls within the scope of the formal airspace change process.	Assessment meeting minutes
Stage 1: Design Principles	At Stage 1B Edinburgh developed a set of design principles with identified Stakeholders. The aim of the design principles was to provide high-level criteria that the proposed airspace design options should meet. They also provided a means of analysing the impact of different design options and a framework for choosing between or prioritising options. The final design principles are presented within the Stage 1B submission.	Stage 1B Design Principle Submission Report
Stage 2: Options Development	Stage 2A requires change sponsors to develop and assess options for the airspace change. In Stage 2A, we developed our comprehensive list of options that address the SoN 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). Feedback from the engagement was then used to refine and/or generate further options. Finally, we qualitatively assessed the options we had developed against the design principles and produced a Design Principle Evaluation (DPE). Our Stage 2A document provides details of this process and the resultant DPE.	Step 2A DPE Submission Document
Stage 2: Options Appraisal	At Stage 2B an Airspace Change Sponsor is required to undertake an Initial Options Appraisal (IOA) of the airspace change options which proceed from Step 2A. Our Stage 2B document described the baseline of today's airspace, the options under assessment, and explanation of the methodology used to assess each option, and finally the IOA outcome.	Step 2B IOA Document
Stage 3: Consultation/ Engagement Preparation	At Stage 3, an airspace change sponsor is required to plan for stakeholder consultation and engagement by preparing a Consultation Strategy, Consultation Document, and a Full Options Appraisal (FOA). The FOA is the second phase of appraisal, following the IOA at Stage 2B, with more rigorous analysis of the impacts and benefits of the proposed airspace change options. Sponsors may also rationalise and refine their design options before completing the full options appraisal. This document records the FOA. The contents of the FOA are described below.	This document

[2] This column provides a link to the main and latest version of the documents. In each case there may have been previous submissions also submitted, and/or appendices and/or other supporting information also published alongside. The full document set is available on the **CAA airspace change portal for this ACP**.

1.8 This Full Options Appraisal (FOA) document

This Full Options Appraisal (FOA) document forms part of Edinburgh Airport's Stage 3 submission to the CAA. The FOA is part of a suite of materials that are presented within the Stage 3 public consultation. It is a more technical document which:

- Describes the evolution of the options from the concepts and swathes of Stage 2 into the detailed design options that are required for FOA (Section 2).
- Describes the methodology used to assess each option based on assessment categories required by CAP1616 (Section 3).
- Explains the baseline 'do nothing' pre-implementation scenario and compares each option against the baseline scenario to identify the positive benefits and negative impacts of each option (Section 4).
- Draws conclusions based on these assessments around the preferred option to take forward to Consultation (Section 5).

As part of our consultation materials, we have created a glossary and terminology explanation document which may be beneficial to refer to when reading this document. This is found in Annex A.

When developing an FOA, airspace change sponsors are required to ensure the FOA meets certain requirements, as listed in CAP1616. These are outlined in Table 2 on page 8 alongside details about where to find the information within this document.

Note that all airspace design options in this document are subject to change throughout the next stages of the airspace change process as options are matured in detail and refined in accordance with safety requirements and as an outcome of the Stage 3 public consultation.

Table 2: CAP1616 Full Options Appraisal requirements and where to find them in this document

CAP1616 Full Options Appraisal Requirement	Where to find in this document
Each shortlisted design option fully developed, including a comparison of its impacts against the baseline scenarios	A description of how the design options have been developed can be found in Section 2. Comparison of each option's positive benefits and negative impacts against the 'without airspace change' pre-implementation baseline can be found in Section 4.
All evidence gaps identified at Stage 2 fully assessed	The methodology for the FOA is presented in Section 3; this includes details of the evidence gaps from Stage 2 and how these have been addressed in the FOA.
All reasonable costs and benefits quantified	The methodology for the FOA is presented in Section 3; this explains our approach to quantitatively and qualitatively appraising the options, including justification for the approach if not quantified. The FOA results are presented in Section 4; this describes these costs and benefits for each option against the 'without airspace change' pre-implementation baseline.
All other costs and benefits described qualitatively	
Reasons why costs and benefits have not been quantified	
Detail on the preferred design option, setting out reasons for the preference (where relevant)	The FOA conclusions can be found in Section 5, including the rationale for which option we are taking to consultation as our preferred option.
A more detailed assessment of the impacts on safety, if completed by the change sponsor	Details of the methodology for assessing safety can be found in Section 3 and the safety appraisal undertaken for each option is presented in Section 4 as part of the FOA.
A quantified and monetised environmental assessment of the design options, including direct and consequential impacts	The FOA results are presented in Section 4; this includes full details of the assessments of environmental impacts and Net Present Value (NPV) and Cost Benefit Analysis (CBA) tables.

1.9 Scottish Airspace Modernisation system wide design

The options included within this FOA form part of a wider design which aims to modernise Scottish Airspace. There are three interdependent Airspace Change Proposals (ACPs) that form the ScTMA Cluster being co-ordinated by the Airspace Change Organising Group (ACOG) (referred to as Scottish Airspace Modernisation in the consultation material). This proposal is Edinburgh's part in the redesign of the wider area referred to as the ScTMA Cluster. This cluster also includes a proposal from Glasgow Airport for their routes below 7,000ft and also one for NATS En-route Ltd (NERL) for the network connecting routes above and beyond the airports.

The ACPs in the ScTMA Cluster must adhere to CAP1616 and the UK Airspace Change Masterplan Iteration 3 – ScTMA (referred to as 'the Masterplan').

The Masterplan outlines how the options in each cluster ACP relate to one another (their interdependencies), including any design conflicts and the potential solutions. The Masterplan includes a Cumulative Analysis Framework (CAF) that considers the cumulative and collective impacts of the cluster ACPs when viewed as an integrated system. Cumulative impacts occur when specific options from different ACPs overlap in the same airspace below 7,000ft. In contrast, collective impacts represent the combined positive and negative effects of all the cluster ACPs combined.

The CAF guides ACP sponsors in identifying the interdependencies between their proposals and provides a suite of metrics to evaluate the potential solutions to design conflicts, highlighting where there may be trade-offs, for example between mitigating noise and reducing greenhouse gas emissions. The CAF ensures that the cumulative and collective impacts of the cluster ACPs have been considered by the sponsors when developing their individual proposals.

The CAF has three parts that are aligned to the three phases of options appraisal that the individual ACPs are required to conduct in the CAP1616 process. These parts are explained below and summarised in Table 3.

The CAF Part 1 (CAF1) provides a basis for the ACP sponsors to collaborate on the identification of interdependencies and resolution of any design conflicts, before producing the CAP1616 Full Options Appraisals. The outputs of the CAF1 review for the ScTMA Cluster ACPs are reported in the UK Airspace Change Masterplan Iteration 3 – ScTMA. The CAF1 outputs are also summarised in ACOG's document titled 'Description of the proposed system-wide design for the Scottish (ScTMA) Cluster of the Airspace Change Masterplan'.

The CAF Part 2 (CAF2) provides more information on how the options presented by the ACP sponsors for consultation work together as a system. The CAF2 is produced by combining information from each sponsors' Full Options Appraisal. The result is a suite of tables and diagrams to match those presented in the Full Options Appraisals for each ACP, showing the cumulative and collective impacts for the cluster as a whole, rather than the impacts for each proposal in isolation.

Cumulative data helps stakeholders identify where and how they may be affected by more than one ACP at or below 7,000ft, e.g. a person is overflown by 10 aircraft a day from one ACP and 20 from another ACP – giving a cumulative overflight impact from both ACPs of 30 overflights per day for that person (note that within Scottish Airspace Modernisation cluster, there are no cumulative overflight impacts between Edinburgh and Glasgow Airports).

Collective data describes the overall performance of all the ACPs when considered as a single cluster.

The outputs of the CAF2 review are expected to be of value to stakeholders who are interested in the impacts of the three Scottish cluster ACPs when viewed as a system. The CAF2 report has been produced by ACOG using information from Edinburgh, Glasgow and NERL's Full Options Appraisals and can be found in this proposal in Annex B. The CAF2 outputs have also been summarised in ACOG's document titled 'Description of the proposed system-wide design for the Scottish (ScTMA) Cluster of the Airspace Change Masterplan'.

The CAF Part 3 (CAF3) will be produced after the consultation, once the preferred designs have been finalised by the ACP sponsors, incorporating stakeholder feedback. The CAF3 will use information from the Stage 4 Final Options Appraisals produced for the Edinburgh, Glasgow and NERL ACPs.

Table 3: CAF Stages as summarised in ScTMA Masterplan Iteration 3

CAF Phase	Key characteristics and use	Link to CAP1616 and Masterplan
CAF1: Review of Route Interdependencies, Design Conflicts and Trade-Offs	• Provides an assessment of design conflicts and trade-offs between route options in interdependent ACPs. • Provides a basis for sponsors to resolve design conflicts considering collective performance (including cumulative impacts). • Trade-off information may be drawn from Initial Options Appraisals. • Qualitative, with additional quantitative assessment added where necessary.	• Prior to sponsors starting CAP1616 Full Options Appraisal. • Outputs will be presented in the Stage 3 Consult Gateway submissions and Masterplan Iteration 3. • CAF1 information in Masterplan Iteration 3 demonstrates how cumulative impact, collective impact and trade-offs have been accounted for in the design pre-consultation.
CAF2: Full CAF	• Identifies cumulative impact of consultation options. • Generation of information to describe collective cluster-wide performance and trade-offs for consultation options. • Comparison between cluster-wide consultation option(s) and the cluster-wide baseline. • Information drawn from Full Options Appraisals.	• After each sponsor in the cluster has completed Full Options Appraisal. • Outputs are presented in the Stage 3 Consult Gateway submissions and Masterplan Iteration 4.
CAF3: Final CAF	• Identifies cumulative impacts of final designs. • Generation of information to describe collective performance and trade-offs in the final cluster-wide design. • Comparison between final cluster-wide design and the cluster-wide baseline. • Information drawn from Final Options Appraisals.	• After each sponsor in the cluster has completed Final Options Appraisal. • Outputs will be presented in Masterplan Iteration 4. • Comparison of CAF3 and CAF2 output in Masterplan Iteration 4 will demonstrate how cumulative impact, collective impact and trade-offs have been affected by the design updates in Stage 4.

Evolution of the Options Prior to FOA

02

2. Evolution of the Options Prior to FOA

As part of CAP1616 Stage 2, Edinburgh Airport developed options based on the Stage 1 Design Principles and the Statement of Need (SoN). Following stakeholder engagement, these options went through to the Design Principle Evaluation (DPE) and Initial Options Appraisal (IOA) resulting in a shortlist of conceptual/swathe options to be taken forward to Stage 3, which is where we are now.

The options in the Stage 2 IOA do not have the detail or assurance necessary to undertake a quantitative FOA. For this we need a design which reflects the overall airport's air traffic operation, taking into account operations to/from all runways including arrivals and departures. This means that FOA needs options which include designs for the full airport system, which is a combination of all the individual routes for runway 24 and runway 06, for both arrivals and departures.

The start of Stage 3 is where the detailed design is developed and refined to produce full airport system options suitable for FOA[1]. CAP1616 does not define a process for refining and rationalising options prior to FOA and therefore Edinburgh Airport developed a four-step process. The following section describes the work undertaken within these steps:

- Section 2.1 covers **Step1: Designing individual routes** (including alternative designs where appropriate), refining the Stage 2 swathes and conceptual drawings into detailed designs for each individual route.
- Section 2.2 covers **Step 2: Combining the individual routes for each runway into full airport system scenarios.** These were potential designs for the full airport system, but at this stage there were still too many to feed into the more detailed FOA.
- Section 2.3 covers **Step 3: Pre-FOA review** where we collected additional data on each full airport system scenario to inform our down selection.
- Section 2.4 covers **Step 4: Down selection of full airport system options for FOA**, where we present the rationale for the selection of options for the FOA.

Note that the images within the sections below depict nominal PBN centrelines for both arrivals and departure routes where we expect most flights to fly. This section articulates the design evolution of these route centrelines and therefore unless specifically noted, any potential spread of flights around the lines as a result of track keeping accuracy and/or vectoring for safety reasons, is not depicted in the images.

Unless otherwise stated all route usage figures relate to a percentage of overall traffic using the route in 2036, considering arrivals and departures for both runways. The percentage difference between 2027 and 2036 usage rates is minimal – see Section 3.1.2.

2.1 Step 1: Designing individual routes

2.1.1 Method for designing individual routes

The starting point for our Stage 3 design process was to establish individual routes starting from the swathes and conceptual designs presented in our Stage 2 IOA.

Our airport operation either operates in a westerly mode referred to as runway 24, or an easterly mode referred to as runway 06 (see Annex A for background information on runway directions).

For each runway there needs to be a set of routes for arriving and departing traffic, coming from, and going to, all parts of the globe.

In this step of the design process, we developed designs for every individual arrival and departure route.

The design of the individual routes was led by our team of design experts referring to the following considerations:

- Technical Instrument Flight Procedures (IFP) development and operational viability assessment.
- Local data represented by population, today's flight paths, 'GoldSET' maps and other airspace user requirements.
- Route length.
- Application of concentration, respite and relief.
- Integration with the network airspace and neighbouring airports.

[1] 4.13 of CAP1616f explains 'The change sponsor may undertake further work as part of the design process to rationalise and refine their design options before completing the full options appraisal. This further work may be especially necessary for complex airspace change proposals, or where there are a significant number of design options remaining after the initial options appraisal. As a result of this work, the change sponsor may decide not to progress some of the design options that were initially shortlisted at the end of Stage 2 on to the full options appraisal. The change sponsor must provide a robust rationale supported with appropriate evidence, justifying why certain design options were not progressed to the full options appraisal. This rationale plus the supporting evidence must be clearly explained in any consultation/engagement materials and in the final airspace change proposal submitted to the CAA.'

The method and considerations for each of these tasks are described below and their application is described later in the remainder of Section 2.1.2 and 2.1.3. Note that the considerations are listed sequentially but in practice they often ran in parallel, with each contributing to the ongoing design as relevant data and analysis became available[2].

2.1.1.1 Considerations for technical IFP development and separation assurance

Certain technical criteria have to be met when designing new routes.

These included[3]:

- Separation criteria – these govern how far apart routes must be positioned in order for the aircraft on them to be considered safe.
- IFP design criteria – these are rules which designers must follow to ensure that aircraft are able to fly the routes (for example they govern how tight turns can be, or how close turns follow each other).

In terms of the IFP design it was necessary to establish pragmatic division of design responsibility between our design of low-level routes and NERL who design the network above. The division of responsibility is nominally at 7,000ft which is the level where the government determines low level effects of noise and overflight are given priority over other environmental impacts.

However, aircraft climb and descend at different rates. This is due to a number of different factors primarily involving the aircraft type, the weight of the aircraft, weather conditions, the number and type of engines and operating procedures. Descent rates are more standard, particularly on final approach from c.3,000-4,000ft but climb rates vary significantly. As a result, there is therefore no single lateral point on a flight path where all aircraft reach 7,000ft and IFP design responsibility shifts between the airport and NERL.

Furthermore, the IFP procedures themselves pass through 7,000ft. It is not safe or practical to design part of a procedure up to 7,000ft and separately design the other half from 7,000ft – the IFP procedures must be designed as a continuous whole.

The scope for our design therefore continues beyond 7,000ft to/from a point in the system where it is pragmatic for the IFP design responsibilities to transfer between us and NERL. These points are

- For arrivals, the scope of our IFP design responsibilities was chosen to take place at the holding stacks. This means that NERL have developed the procedures for flight paths flown to the holding stack entry and for the holding patterns themselves, which NERL are proposing to raise to c.10,000ft above mean sea level (amsl) or higher. We developed the IFPs for the routes from the holding stack exit down to the final approach (these arrival routes between the hold and the final approach are known as the PBN approach transitions – see Section 2.1.2). For the sections of the route above 7,000ft we have worked closely with NERL to ensure that they provide a safe and efficient link between our designs below 7,000ft and their design for the holding stack.
- For departures, we designed the IFPs for the departure routes (Standard Instrument Departures (SIDs)) which feed flights into the wider ATS (Air Traffic Service) route network. The exact point at which a SID ends and an ATS route starts is variable. It is a NATS NERL requirement that the SIDs from each runway need to connect to an ATS route in the same location from either runway end; they therefore cannot necessarily end at 7,000ft.

The design process for route segments in our ACP above 7,000ft has been collaborative with NERL with the focus being on safety, efficiency and improved access of other airspace users.

2.1.1.2 Consideration of local data represented by population, 'GoldSET' maps and other airspace user requirements

The focus of our design process, and therefore its description in the remainder of Section 2, was primarily on the detailed design below 7,000ft where local factors come more into play.

Our design team referred to local data when designing individual routes in Step 1 of our 4-step process for evolving options prior to FOA (see Section 2 introduction for an overview of these design steps).

[2] Annex C shows how these considerations map to our design principles from the previous Stage of CAP1616 process. Annex C should be referred to after reading this section (2.1).

[3] Further detail of the technical design considerations is provided in Annex K.

At this early stage, no noise or overflight contour modelling was undertaken so local considerations were fed into the design team in the form of the following local considerations:

- Population density maps.
- Today's flight paths.
- GoldSET multicriteria data.
- Feedback from Stage 2 including other airspace user requirements.

These are described below.

Population density maps – minimising the impact of aviation noise is the government's environmental priority below 7,000ft[4]. Consideration of population density maps gave our design experts a guide to areas to avoid in order to minimise the number of people likely to be overflown. Minimising populations beneath or in the vicinity of routes below 7,000ft was assumed to indicate a reduced likelihood of adverse and other noise/overflight impacts on people from flights below 7,000ft. An example of the population density maps is shown in Figure 1 opposite.

Today's flight paths – were used as a reference point when considering where flights go today. This is particularly relevant to the government requirement[4] that states "where options for route design from the ground to below 4,000ft are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements". An example is shown in Figure 2 opposite.

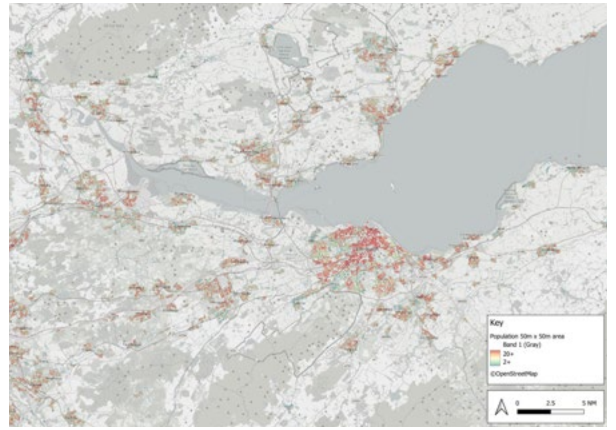


Figure 1: Example population density map.

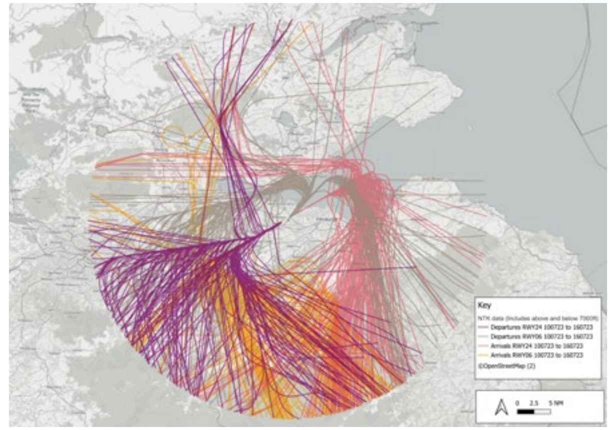


Figure 2: Example of flight paths data.

GoldSET – GoldSET is a multi-criteria spatial planning methodology. This was used to combine local spatial data from a number of sources to represent other local considerations, not just population.

The GoldSET multi-criteria dataset was developed from the criteria shown in Figure 3 on page 16 which can be linked back to design principles developed in the earlier stages of the CAP1616 process. Each criterion was identified as either a constraint to be avoided if possible (e.g. nature/conservation areas), or an opportunity to be flown over if possible (e.g. open water).

The outcome was a 'suitability surface' map combining the categories showing where the data suggested routes could be best positioned with respect to this range of criteria. This data was provided to our design experts as an additional input to help guide the positioning of routes. For full detail of the GoldSET methodology see Annex D. The suitability surface is shown in Figure 4 on page 16.

[4] The government's environmental priorities for airspace change are set out in the Air Navigations Guidance 2017. This includes a section on altitude-based priorities.

SLIDE ID	THEME	NAME	SHORT DESCRIPTION
1	ENVIRONMENTAL	Nature Conservation	Minimise overflying nature conservation areas
2	ENVIRONMENTAL	Nature Conservation Buffer	Minimise overflying nature conservation areas
3	ENVIRONMENTAL	Water (Firth of Forth)	Maximize overflying water
4	SOCIAL	Recreational Areas	Minimise overflying Country Parks, Gardens and Designed Landscapes
5	SOCIAL	Population Overflown	Minimize population overflown
6	SOCIAL	Newly overflown area	Minimize new population overflown
7	SOCIAL	New Developments	Minimize overflying areas with new planned developments
8	SOCIAL	Educational facilities	Minimise overflying educational facilities
9	SOCIAL	Hospitals/Health Receptors	Minimise overflying hospitals
10	SOCIAL	Areas of tranquillity	Minimise overflying areas of tranquillity
11	SOCIAL	World Heritage Sites	Minimise overflying heritage areas
12	SOCIAL	Registered Battlefields	Minimise overflying heritage areas
13	TECHNICAL	Transportation corridors	Parallel or overfly existing road transportation corridors
14	TECHNICAL	Minimize interference with existing airspace	Avoid airspace already in use by other groups

Figure 3: GoldSET criteria.

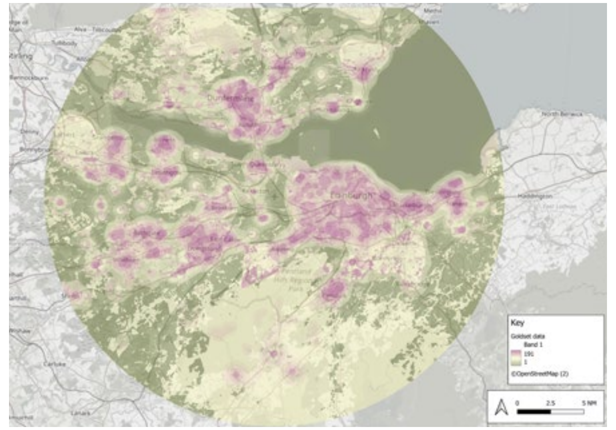


Figure 4: GoldSET suitability surface.

Feedback from Stage 2 including other airspace user requirements – Through CAP1616 Stage 2, we received feedback on potential positioning of routes. This has helped identify the requirements and requests of other airspace users that use the airspace around Edinburgh. This includes General Aviation (GA), gliders and the military. Feedback was also received from representatives of local communities regarding overflight. These requirements are listed in Annex I and were fed to the design team to take account of when designing the direction of individual routes.

2.1.1.3 Route length

Route length does not directly measure fuel burn and CO_2e, however, relative route length is a good proxy measure for comparing the potential for fuel burn and CO_2e benefits from different route designs. Assuming that the routes in question have continuous climb and descent and that other factors[5] that may effect overall emissions apply equally to the different designs being compared, then it is reasonable to assume that a shorter route would have less fuel burn and CO_2e. The design team therefore sought to design routes that were as short as possible whilst addressing the noise/overflight related objectives which are the government's priority below 7,000ft.

2.1.1.4 Consideration of respite and relief

Design for respite and relief was considered by our design team. This included an assessment of how respite and relief principles may be applied or not in general, and consideration of specific designs to provide respite or relief in specific areas. An overview of what respite and relief are, and our design outcomes with reference to them, are described later in Section 2.1.4.

2.1.1.5 Considerations for integration with the network airspace and neighbouring airports

When designing individual routes our design team had to take account of the parallel ACPs being developed by Glasgow Airport and NERL.

Our airport does not operate in isolation. It is part of the regional system of routes that must all be designed to be safe and efficient when operated as a whole.

As articulated in the UK Airspace Change Masterplan Iteration 3 – ScTMA, there are three interdependent Airspace Change Proposals (ACPs) that form the Scottish Terminal Control Area (ScTMA) Cluster of the FASI-N programme being co-ordinated by the Airspace Change Organising Group (ACOG) (referred to as Scottish Airspace Modernisation). Those ACPs are sponsored by Edinburgh Airport, Glasgow Airport and NERL.

The three ACPs are separate design projects, each following the CAP1616 process with their own gateways. However, the ACPs are dependent on each other as they each form part of a complete design that needs to integrate safely and efficiently. Edinburgh Airport and Glasgow Airport are responsible for the design of their flight paths to/from 7,000ft, with NERL responsible for the design above this height. However, in practice, the flight paths are continuous through 7,000ft.

Owing to the relationship between the three ACPs we worked closely, and will continue to work closely, with Glasgow Airport and NERL to establish the requirements that would make the overall system safe and operable.

[5] For example different fuel flow for take-off/climbing phases, wind and weather effects and different fleet fuel efficiencies

In Sections 2.1.2 and 2.1.3 we look at how this collaborative work to develop a safe overall system with Glasgow Airport and NERL influenced the development of individual routes.

In addition to work around safety, collaborative work was undertaken to establish the nature of any trade-offs required between the ACPs. This collaborative work was aligned with the **Cumulative Analysis Framework (CAF) Part 1** and overseen by ACOG. For full details of the interdependencies and trade-offs between our ACP and those of Glasgow Airport and NERL, please see the CAF1 document published as Appendix 3 of the **UK Airspace Change Masterplan Iteration 3 – ScTMA**. This is summarised in Section 2.1.5.

2.1.2 Detailed design of individual arrival routes

The description of how we have designed individual arrival routes from the concepts presented in the CAP1616 Stage 2 IOA is provided in this section.

This description has four parts:

- Section 2.1.2.1 provides an overview of the arrival concepts from our Stage 2 IOA.
- Section 2.1.2.2 describes the integration with the network airspace and neighbouring airports, in particular the positions of the new holding stacks.
- Section 2.1.2.3 describes the local considerations and design for runway 24 PBN approach transitions below 7,000ft.
- Section 2.1.2.4 describes the local considerations and design for runway 06 PBN approach transitions below 7,000ft.

2.1.2.1 Arrival Concepts from our Stage 2 IOA

Our arrival routes start at holding points defined in the NERL airspace change proposal. They end with a final approach which is a route extending down to the runway.

In CAP1616 Stage 2 we presented two concepts for the design between the hold and the final approach (as illustrated in Figure 5 on page 18) and described below.

The first concept was mainly a vectoring solution where a PBN approach transition (or just 'transition' for short) exists but used for planning purposes where most aircraft are vectored off the route. Vectoring is where, rather than following a predefined route, pilots are given instructions about where to fly based on compass headings and descent/climb instructions. Vectoring of arrivals is what happens today prior to final approach and leads to wide dispersion across the airspace. In our Stage 2 IOA we labelled options based on maintaining a high degree of vectoring the 'Baseline and RNAV'.

The second concept was for a PBN approach transition to be introduced which would be followed most of the time with vectoring only in order to ensure safety, for example where speed control is not able to ensure separation, or to avoid thunderstorms. In our Stage 2 IOA we referred to options based on this concept as the 'Vectoring and Approach transition'.[6]

[6] Note that the 'Vectoring and Approach transition' options for arrivals were also sometimes referred to as 'vectoring and systemisation' in the IOA. They both refer to the same options.

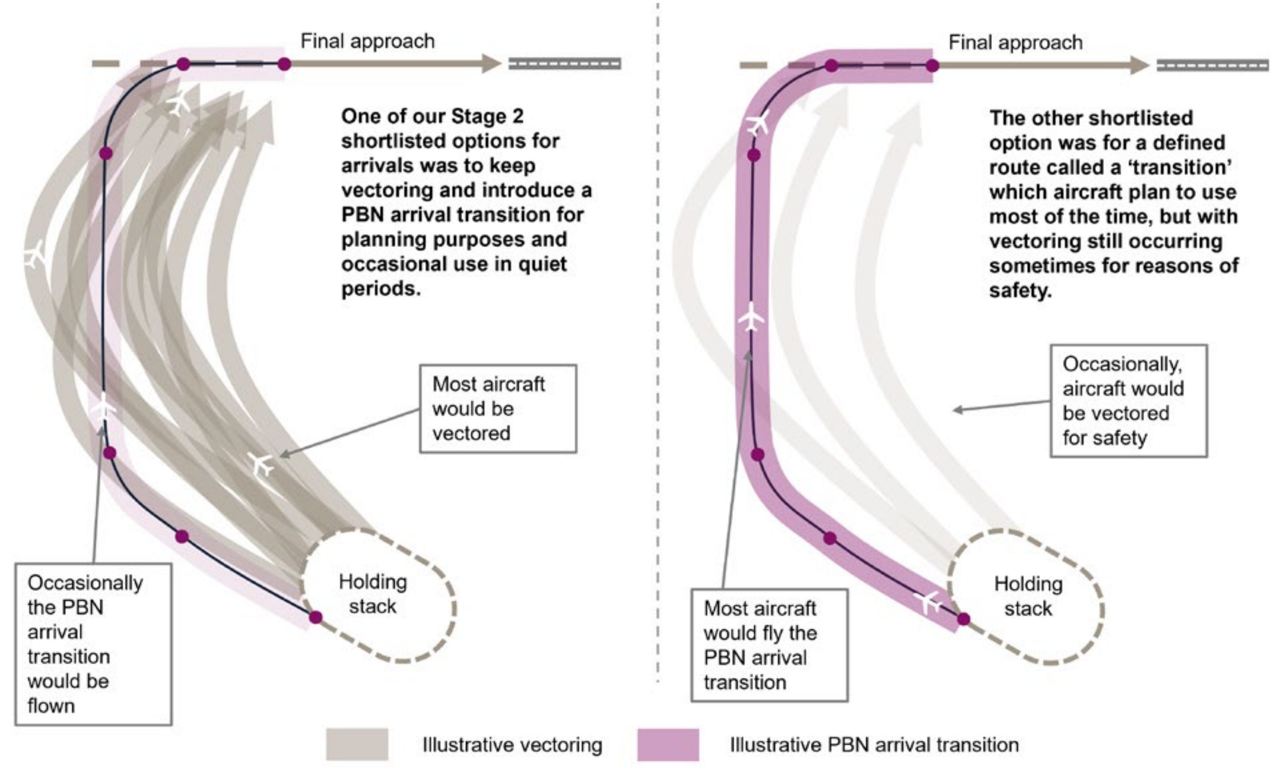


Figure 5: Illustration of arrival concepts brought forward from Stage 2.

2.1.2.1.1 The final approach

Final approach is where aircraft are aligned with the runway and fly a straight in path to descend before landing. Vectored aircraft don't all join final approach in the same place, however, those on a PBN approach transition will follow the set path. The point where a PBN approach transition joins the final approach must be far enough away from the runway to allow aircraft to stabilise before landing and for air traffic control to apply the correct spacing between successive arrivals.

2.1.2.1.2 Our Stage 2 arrivals option for 'Baseline and RNAV' (Options 38 and 42 as labelled in Stage 2 IOA submission)

In our Stage 2 IOA we had an option referred to as 'Baseline and RNAV'. This was stated to be the 'do minimum' option for both the easterly and westerly modes of operation (labelled Option 38 and 42 respectively in our Stage 2 IOA submission). These were to introduce PBN Approach transitions but to only use them as the exception, essentially meaning these were 'mainly vectoring' options (as illustrated in Figure 5 opposite).

The AMS aims to systemise airspace by introducing and following defined routes where it is safe and efficient to do so. The 'Baseline with RNAV' options did not propose to do this, because even though PBN approach transition would be introduced, they would primarily be used for planning purposes, with most aircraft being vectored. As such these were not in keeping with the aims of the AMS. They were included as an option in Stage 2 IOA in case the work in Stage 3 showed that keeping most arrivals on the PBN approach transition would not be safe and efficient.

However, the ongoing design process has identified that use of PBN approaches can be safe and efficient. Therefore, these 'Baseline and RNAV' options were discontinued in the early phase of our Stage 3 work[7].

2.1.2.1.3 Our Stage 2 arrivals option for Vectoring and Approach transition (Option 39 and 43 as labelled in Stage 2 submission)

Our Stage 2 submission presented two generic options for the design of arrivals based upon PBN approach transitions being followed most of the time. In Stage 2 we stated that 'vectoring of some aircraft will be required during busy periods'. Following our work in Stage 3 to determine how the system could work, we have determined that vectoring will only be required to maintain safety, for example where speed control is not able to ensure separation, or to avoid thunderstorms. These were labelled in our Stage 2 documents as Option 39 and Option 43 respectively for easterly and westerly modes of operation.

In Stage 2 the location of the holding stacks had not been established, and therefore the alignment of the PBN approach transitions was not determined.

Instead, our Stage 2 submission included conceptual diagrams illustrating how the designs might look if the holding stacks remained in their current positions, with holds to the north and south of the airfield. These showed that PBN approach transitions might feed directly on to the final approach, or in some cases they might cross over the top of the airport and approach from the opposite side. Diagrams also indicated the possibility of a track directly from the east to serve potential new arrival routes coming in via the Firth of Forth. These diagrams from Stage 2 are reproduced in Figure 6 on page 20 for reference only. The full Stage 2 submission can be found on the **CAA Airspace Change Portal**.

The remainder of this section is focused on the design of individual routes from the Stage 2 concept labelled as 'Vectoring and Approach transition'. As we are at looking into the detail behind the concept, this label from Stage 2 is no longer used.

[7] Note that the 'Baseline and RNAV' options for arrivals were also sometimes referred to as 'Modernised Baseline' in the IOA. They both refer to the same options.

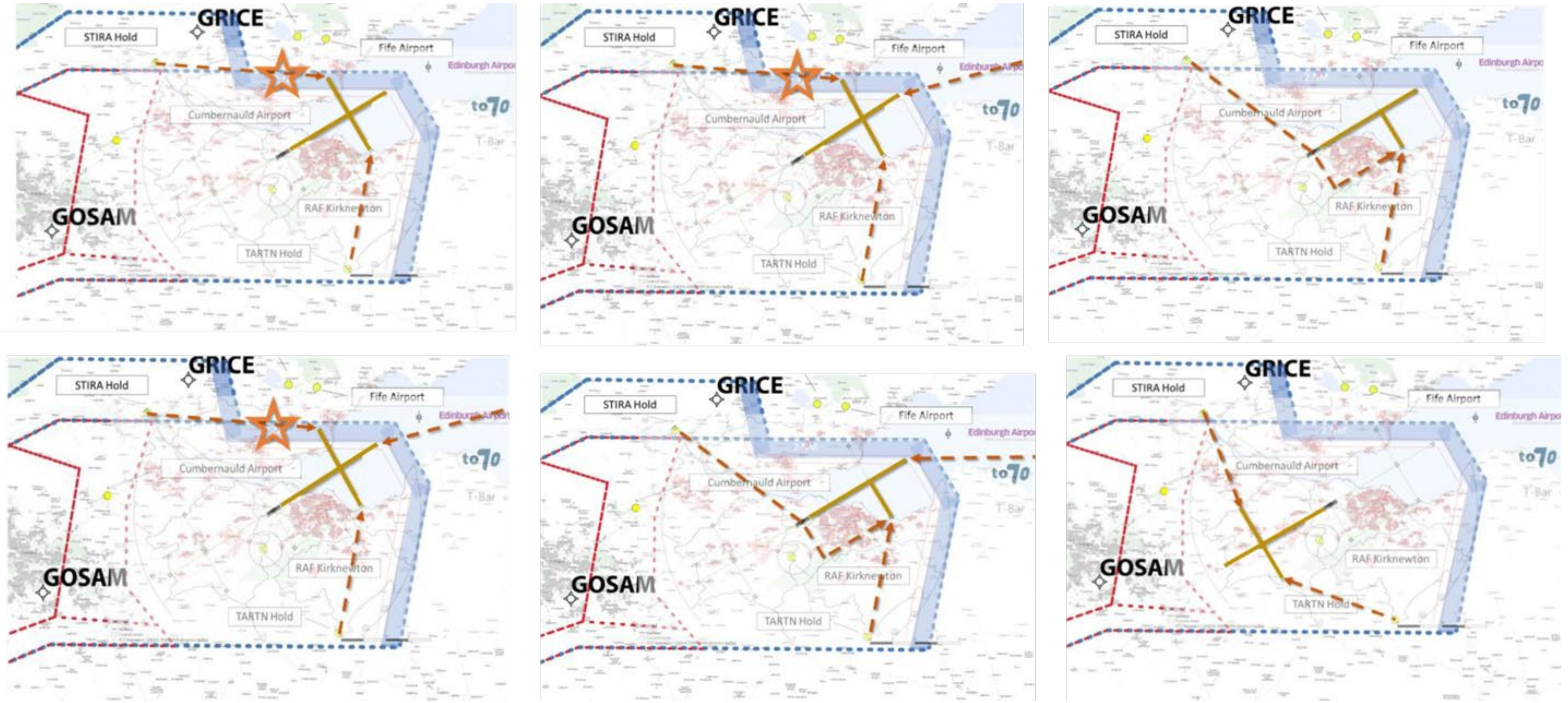


Figure 6: Diagrams from our Stage 2 submission illustrating the concept of transitions and final approach and the potential variation in their design.

2.1.2.2 Integration with the network airspace: the new positions of the holding stacks

A PBN approach transition joins the holding stack to the final approach.

Holding stacks are part of the network designed and operated by NERL, but as the holds are for our flights and have the potential to affect our design at lower levels, we worked collaboratively with NERL providing input to ensure that their designs for the holds and the wider network complement the lower level designs we are presenting in our ACP.

Holds are a necessary safety feature in the airspace and safety is the overall design priority (above the environmental priorities mentioned earlier). They also take up a lot of airspace. Establishing where holds need to be was therefore a key part of the overall design process for the cluster.

Because the transition provides the path from the holds to the runway, we need to describe this broader network design before we describe the detailed design of our individual PBN approach transitions. However, it is important to note that this collaborative work on the network was undertaken in parallel with the detailed design work we undertook for lower level routes, and at all stages we were ensuring that NERL's design of the holds and other elements of the network would complement our design of routes below 7,000ft.

NERL's redesign proposes to make the holding stacks for Edinburgh higher than they are today (10,000ft and above) and repositions them.

Figure 7 below shows the two extant holding stacks (STIRA and TARTN) that are in operation today, and Figure 8 below shows the three proposed holding stacks (STOBS, WORM2, and TARTN). The **NERL ACP** provides the details on how these hold locations have been chosen. This included input from us to ensure they would complement our lower level design.

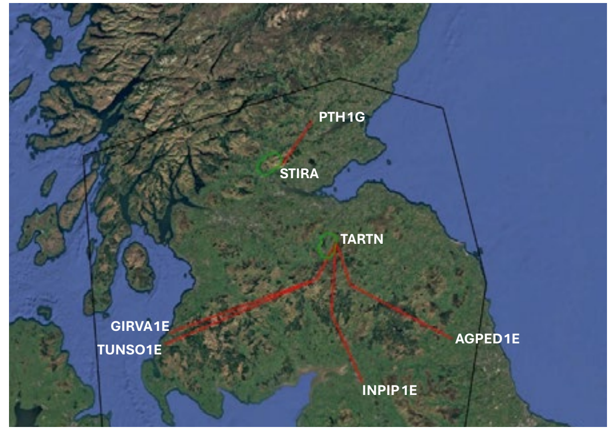


Figure 7: Network standard arrival route and holds (above 7,000ft) for today's airspace.

These pictures are reproduced from the NERL ACP and are shown here for information only. For full details see the NERL ACP.

The red routes show the Standard Arrival routes from the wider network to the holding stacks at 7,000ft. The green circuits show the holding stack pattern. The white text shows the names of the routes and holds.

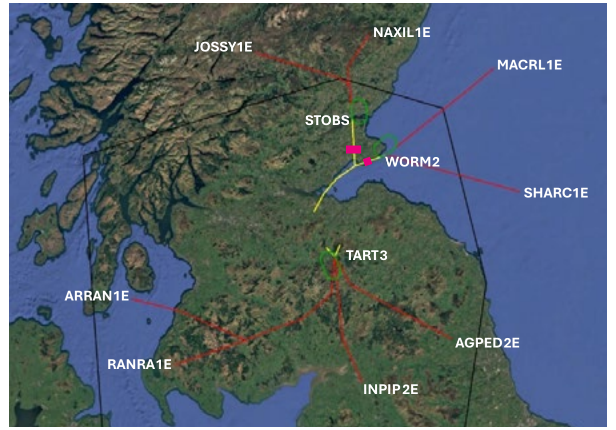


Figure 8: Network standard arrival route and holds (above 7,000ft) for NERL's proposed design).

These pictures are reproduced from the NERL ACP and are shown here for information only. For full details see the NERL ACP.

The red routes show the Standard Arrival routes from the wider network to the holding stacks at c.10,000ft or c.11,000ft. The green circuits show the holding stack pattern. The yellow routes show the part of the PBN approach transition above 7,000ft. Note that the runway 24 approach transitions from the north and east reach 7,000ft near the coast in Fife just before they converge. However, the runway 24 approach follows the same alignment and so the 7,000ft points on the runway 06 approach marked with a pink bar. The white text show the names of the routes and holds.

These figures show that today's hold to the north (STIRA) is replaced with two that are further east (STOBS and WORM2). They are also higher with a minimum level of c.11,000ft[8] and c.10,000ft respectively, compared to 7,000ft for STIRA. The hold to the South (TART3) remains in a similar position albeit higher; raising to c.10,000ft compared to today's 7,000ft for TARTN.

The part of the PBN transition above 7,000ft was established through collaboration with NERL to be safe, efficient and maintain or improve access for other airspace users, while maintaining flexibility for us to position routes below 7,000ft considering the local data outlined earlier in 2.1.1.2. More detail on the design of each of the PBN approach transitions is provided in the following sections.

Figure 8 on page 21 shows the part of the PBN Approach transitions above 7,000ft as yellow lines coming from the holds.

Equivalent yellow lines are not shown on Figure 7 on page 21 showing today's holds because the today's holds have a base of 7,000ft so there is no route needed to get from the hold to 7,000ft.

The remainder of this section describes how we have designed the detail for the individual PBN transitions below 7,000ft. Each of these is referred to by the holding stack they come from, and the runway they are going to.

2.1.2.3 Local considerations and design for runway 24 approach transitions

Figure 9 on page 23 shows the routes for the runway 24 PBN approach transitions below 7,000ft, overlaid population density, today's flight paths and GoldSET data.

These show three PBN approach transitions coming from the holding stacks and converging over the Firth of Forth before joining final approach.

The tracks from the north and east are almost entirely over the Firth of Forth, this is possible because of the proposed new positioning of the STOBS and WORM2 holding stacks.

The PBN approach transition coming from the north is directly from the STOBS holding stack and is designed to stay separated to the east of the north bound departures route via the point marked STOPP (discussed later in Section 2.1.3) and to cross the coast (at approximately 7,000ft) as early as possible[9]. This position for the transition takes the arrivals further from Portmoak airfield (by Loch Leven) than they are today and is therefore expected to improve access for gliders operating from there.

The PBN approach transition from the east is from the WORM2 holding stack. This segment descends from WORM2 at approximately 10,000ft and would cross 7,000ft somewhere along the line that tracks the northern coast of the estuary as shown by the start of the blue line in Figure 9. It cannot be further south due to a departure route at 9,000ft passing through the point GULLY. GULLY is shown in Figure 9. The full departure route design including restrictions to ensure safe separation is presented in Annex K.

The PBN approach transition has to be designed to turn onto final approach at a distance of 9NM or more from the runway[10]. Figure 9 shows Cramond is very close (c.2.5NM) from the airport so the arrival overflight of Cramond experienced today cannot be designed out. (Note that departures have been adapted to improve relief for Cramond when runway 06 is in use, this is described later in Section 2.1.4)

There was no further work to develop alternative PBN approach transitions from the north or east because these route segments are already over water as much as possible.

[8] The minimum level in the holding stacks is actually defined in Flight Levels (FL) rather than feet (ft) – the actual height inft of a FL above mean sea level (amsl) can vary with local pressure. For simplicity/accessibility in this document we describe the height of the holds here inft amsl – assuming standard atmospheric pressure.

[9] Note that the area of the Fife coast where the PBN approach transitions descend through 7,000ft is beyond the extent of the GoldSET data collection area that was established at the start of the design process. This data was missed because at that time it was not expected that any routes would extend over this area. The subsequent design of the holds from the north and east (discussed in Section 2.1.2.2) identified hold positions that would ensure that the approach transitions could be positioned mostly over water when below 7,000ft, but as a result they pass over part of the Fife coast beyond the GoldSET data. A manual review of potentially affected sites was therefore undertaken and fed into the design team to be considered alongside the GoldSET data. This data is detailed in Annex M.

[10] When we have both arrivals and departures using the runway we apply a minimum 6NM gap between successive arrivals, which gives enough time for a departure to take off in between. In order to achieve this spacing air traffic control need a PBN approach that has the aircraft lined up on the runway at least 9NM from touchdown otherwise the task of providing 6NM spacing (using speed control to avoid vectoring) becomes too difficult to judge safely and consistently.

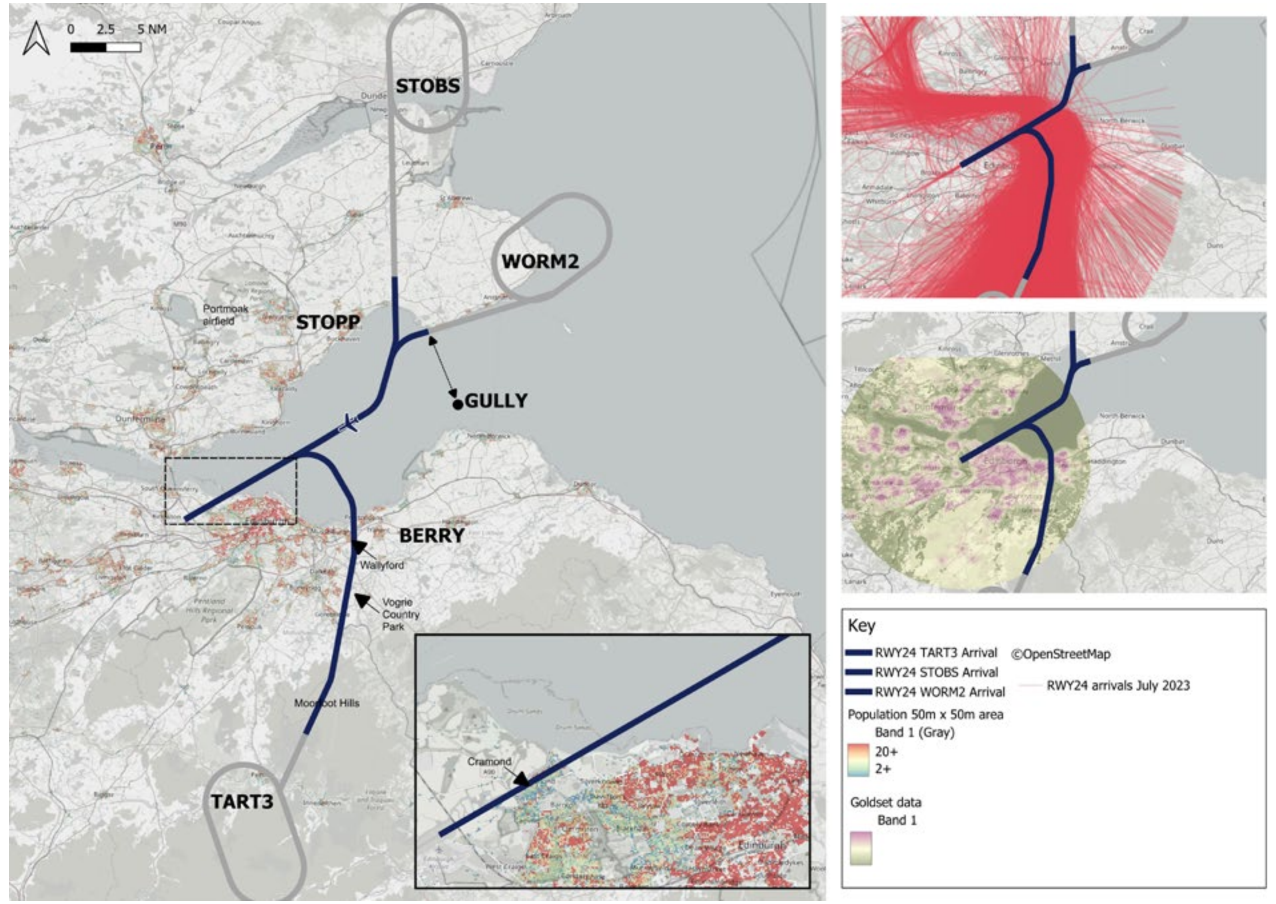


Figure 9: Design for runway 24 PBN approach transitions overlaid population, today's tracks and GoldSET data.

The proposed PBN approach transition from the south originates from the TART3 holding stack. The track data shown in Figure 9 shows that this entire area is already regularly overflown today.

Figure 9 also shows the proposed PBN approach transition, which comes from the relatively unpopulated area of the Moorfoot Hills and descends below 7,000ft approximately 7NM south of Gorebridge. The PBN approach transition has been positioned to cross the coast over the less populated area between Musselburgh and Prestonpans.

This means the PBN approach transition passes directly overhead Wallyford at c.5,000ft. It is not possible to avoid this area without resulting in more flights over the larger communities on either side, therefore we determined that developing alternative PBN approach transitions would not add value.

Further south the PBN approach transition is higher, crossing below c.7,000ft shortly before passing between the populated areas of Dalkeith, Mayfield and Gorebridge to the west, and Vogrie Country Park to the east. Moving the route further east is limited by the extent of controlled airspace.

We believed the best alignment was to fly directly over neither the population nor the country park[11] and so there was no further work to develop alternative PBN approach transitions from the south.

The PBN approach transition from the south joins final approach over the Firth of Forth and so like the arrivals for other directions has no option but to fly over Cramond.

[11] Note that although not directly beneath the route flights would still be noticeable from both as they would likely be within the CAA's definition of an overflight. See Section 3.3.2.

2.1.2.4 Local considerations and design for runway 06 approach scenario

Figure 10 opposite shows the routes for the runway 06 PBN approach transitions below 7,000ft, respectively overlaid population density, today's flight paths and GoldSET data.

These show PBN approach transitions coming from the holding stacks and converging in an area southwest of the airport before joining final approach.

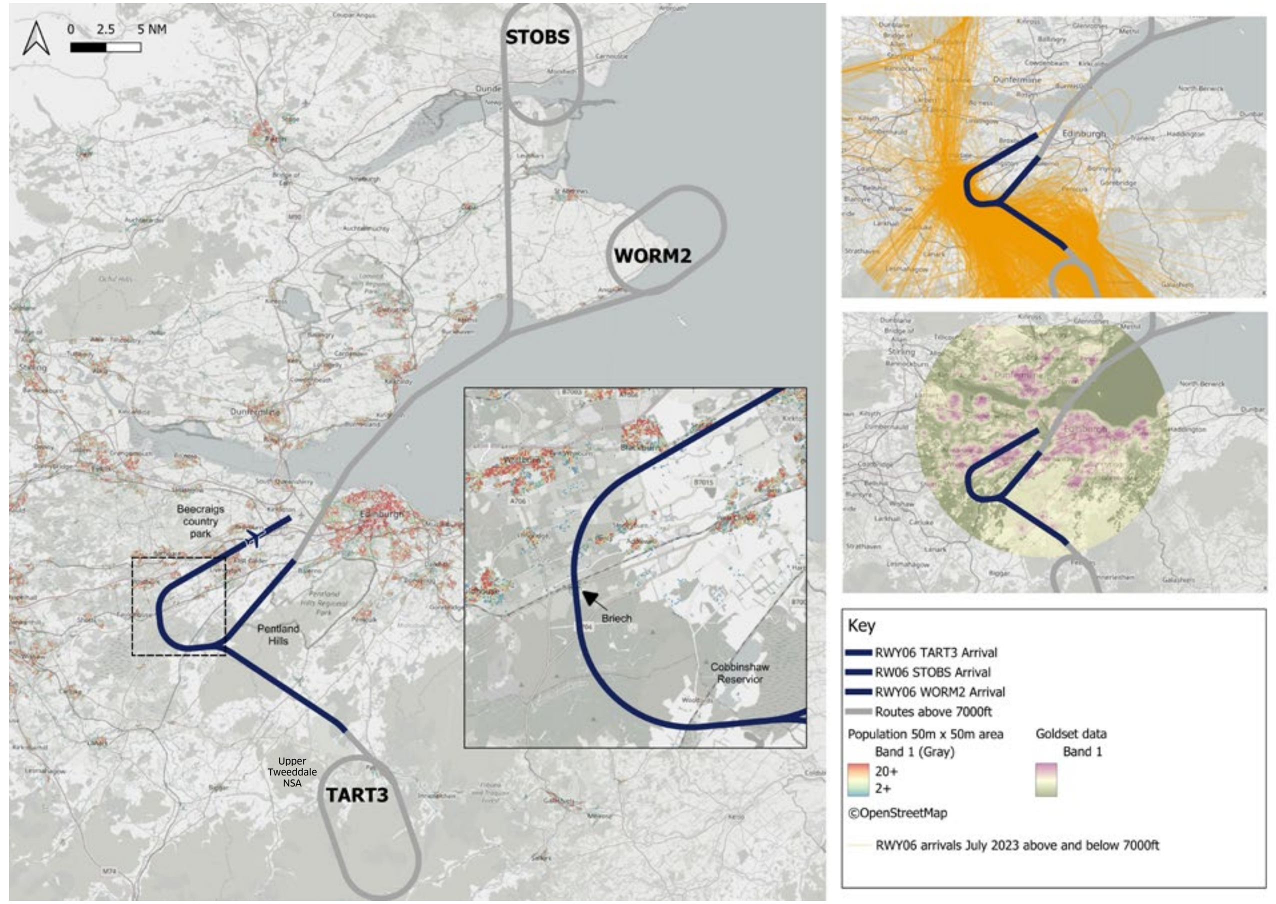


Figure 10: Design for runway 06 PBN approach transitions overlaid population, today's tracks and GoldSET data.

Figure 10 on page 24 shows the PBN approach transition from TART3 comes over the relatively unpopulated area of the Pentland Hills to join final approach south of Whitburn. The Pentland Hills regional park and the Upper Tweeddale NSA in between are coloured yellow in the inset GoldSET picture in Figure 10. This reflects their relative tranquillity compared to greener areas.

The track picture (also inset in Figure 10) shows that this entire area is overflown today and it can be seen from Figure 10 that there is no alternative route that can connect the hold to runway 06 that avoids the yellow areas. We have therefore designed the route to stay south of the Pentland Hills Regional Park and north of the Upper Tweeddale NSA.

The design of our PBN approach transition must turn on to final approach at a minimum distance of 9NM or more[12]. Livingston is 5NM from the airport so the arrival overflight of Livingston experienced today cannot be designed out[13].

However, the chosen alignment seeks to best minimise the impact on the villages in the area north of the A71 by joining from the gap with Fauldhouse on the west and Stoneyburn and Addiewell on the east. This means a joining point at around 10NM from the airport. Note that joining further out also offers more resilience to the operation, as it provides more flexibility for air traffic control to efficiently space successive arrivals.

Designing routes which industrial areas east of Addiewell was considered but was found to join the final approach at less than the 9NM required to ensure safe spacing of successive arrivals.

With the alignment shown in Figure 10 only the small village of Breich is directly beneath the PBN approach transition as it turns on to final approach. Alternative alignments for the PBN approach transition would mean more flights over the neighbouring villages, which are all of greater size and so the overall impact in terms of population overflown would be expected to be greater.

Since avoiding this area without affecting the larger communities on either side was not feasible, we determined that developing alternative PBN approach transitions from TART3 would not add value.

Figure 10 also shows the proposed PBN approach transitions from STOBS and WORM2. The PBN approach transitions from STOBS and WORM2 initially follow the same path as the westerly arrivals mentioned earlier, tracking over the Firth of Forth. However, these transitions remain at a higher altitude, only dropping below 7,000ft on passing Balerno. From here they track southwest over a relatively unpopulated area of farmland along the edge of the Pentland Hills.

This PBN approach transition passes east of the airport to merge with the transition from TART3 that joins final approach from the south (as discussed in the preceding pages). The PBN approach transitions from STOBS and WORM2 are designed this way, rather than joining final approach from the north, because the areas to the north of the final approach are relatively densely populated. Joining the final approach from the south avoids arrivals overflying Whitburn, Bathgate, Armadale, Blackridge, and Linlithgow.

Additionally, joining the final approach from the south provides the necessary space to facilitate systemisation, because it provides space that allows the departure routes to the north of the airport to have a continuous climb.

The PBN approach transition from STOBS/WORM2 join those from TART3 east of the Cobbinshaw Reservoir where the aircraft would be above 5,000ft. As discussed above, the final part of the transition, from where it merges with the TART3 transition down to final approach, is designed to minimise overflying the villages north of the A71 such as Fauldhouse, Stoneyburn and Addiewell. The same arguments presented for the TART3 PBN approach transition therefore apply equally here, and so we determined that developing alternative PBN approach transitions for the STOBS and WORM2 arrivals would not add value.

[12] See 2.1.2.1 for discussion of joining point.

[13] Note that options to update departures have been adapted to potentially improve relief for Livingston when the runway switches – see 2.1.4.4.

2.1.3 Detailed design of departure individual routes

The description of how we have evolved our departure routes from the swathes presented in the CAP1616 Stage 2 IOA is provided in this section. This description is split into a number of subsections:

- Section 2.1.3.1 provides an overview of the departure options in our Stage 2 IOA which were presented as swathes.
- Section 2.1.3.2 describes the integration with the network airspace and neighbouring airports.
- Section 2.1.3.3 outlines the framework for the departure routes and the naming convention for the routes.
- Sections 2.1.3.4 to 2.1.3.14 describe the local considerations for the design of each individual departure route.

2.1.3.1 Departure concepts described in Stage 2 IOA

Our Stage 2 IOA described departure concepts. Each provided a high-level description, a set of departure routes, and associated 'swathes' which defined the areas in which routes could be positioned. Each departure route starts from the end of a runway and heads off in a particular direction to join the network of routes that connect our region with the rest of the world. This network of routes is being redesigned in parallel by NERL as part of the ScTMA Cluster. The NERL proposal and consultation can be found at **here**.

Today, we have three departure routes off each runway. These routes are referred to by points in the airspace system where they terminate, which are GRICE, GOSAM, and TALLA. The new routes will terminate at different points and therefore have new names. From herein we therefore primarily refer to the routes by the direction they head, which is north, west, and south respectively.

Today, flights heading east have to take the southbound route (TALLA) initially and are then turned east once they are established in the air traffic network. Our Stage 2 options could be put into two broad groups: those which maintain this three-route structure and those that also have a new route to the east.

These were labelled in our Stage 2 IOA as shown in Table 1 on page 27 and represented by 'swathes' indicating the areas in which routes could be positioned (Figure 11 to Figure 14 on pages 29-31).

Note that we are showing these labels for information only to allow the design story to trace back to our Stage 2 submission – it was necessary to develop a new naming convention for Stage 3. The names of departure routes are explained later in Section 2.1.3.3.

Note also that each of Figure 11 to Figure 14 represents two options from our Stage 2 IOA. This is because in Stage 2 we presented pairs of options where both were represented by the same set of departure 'swathes' in which routes heading in a particular direction could be positioned. In each pair of options the only difference was in respect to the description of where one of the turns was proposed to start. However, as the Stage 3 design process was open to consider routes anywhere within the swathes, the options from Stage 2 that were covered by the same swathe were effectively considered as a single option represented by the swathe.

2.1.3.1.1 Our Stage 2 departures option for 'Baseline modernised' (Options 2 and 14 as labelled in Stage 2 IOA submission)

In our Stage 2 IOA we had departure options referred to as 'Baseline modernised'. This was stated to be the 'do minimum' option for both the easterly and westerly modes of operation (labelled Option 2 and 14 respectively in our Stage 2 IOA submission). These were to introduce PBN departure routes that replicated those in place today.

The AMS aims to systemise airspace by introducing and following safety separated routes for Edinburgh and the wider ScTMA. The ongoing design process in Stage 3 identified that simply replicating the existing routes would not enable this systemisation. In practical terms keeping the routes where they are today would result in similar vectoring as seen today, which would undermine systemisation for the whole of the ScTMA area. Therefore, these "Baseline modernised' departure options were discontinued in the early phase of our Stage 3 work.

Table 1: Departure options from our Stage 2 IOA

Stage 2 options for runway 24	Figures (reproduced from Stage 2)
Options from IOA with three departure routes:	
Option No 15 – Rwy 24 3xt #1 '3 exits with no early turn' Option No 17 – Rwy 24 3xt #3 – '3 exits with one early turn for capacity'[14]	Stage 2 Option No 15 and Option No 17 where both represented by the same swathes as shown in Figure 11 on page 29
Four Route options: Option No 22 – Rwy 24 4xt #1– '4 exits with no early turn' Option No 25 – Rwy 24 4xt #4. '4 exits with one early turn for capacity'	Stage 2 Option No 22 and Option No 25 where both represented by the same swathes as shown in Figure 12 on page 29
Stage 2 options for runway 06	
Options from IOA with four departure routes:	
Option No 3 – Rwy 06 3xt #1 – '3 exits with no early turn' Option No 4 – Rwy 06 3xt #2 – '3 exits with one early turn for capacity'	Stage 2 Option No 3 and Option No 4 where both represented by the same swathes as shown in Figure 13 on page 30
Four Route options: Option No 8 – Rwy 06 4xt #1 – '4 exits with no early turn' Option No 9 – Rwy 06 4xt #2 – '4 exits with one early turn for capacity'	Stage 2 Option No 8 and Option No 9 where both represented by the same swathes as shown in Figure 14 on page 31

The illustrations of these Stage 3 options are shown in the figures on pages 28 -31 for reference only.
The full Stage 2 submission can be found on the **CAA Airspace Change Portal**.

[14] We was established in Stage 3 that none of the options labelled 'early turns for capacity' would in fact provide additional capacity, however, early turns were still considered in the designs going forward because of their potential benefit to noise and other categories of impact.

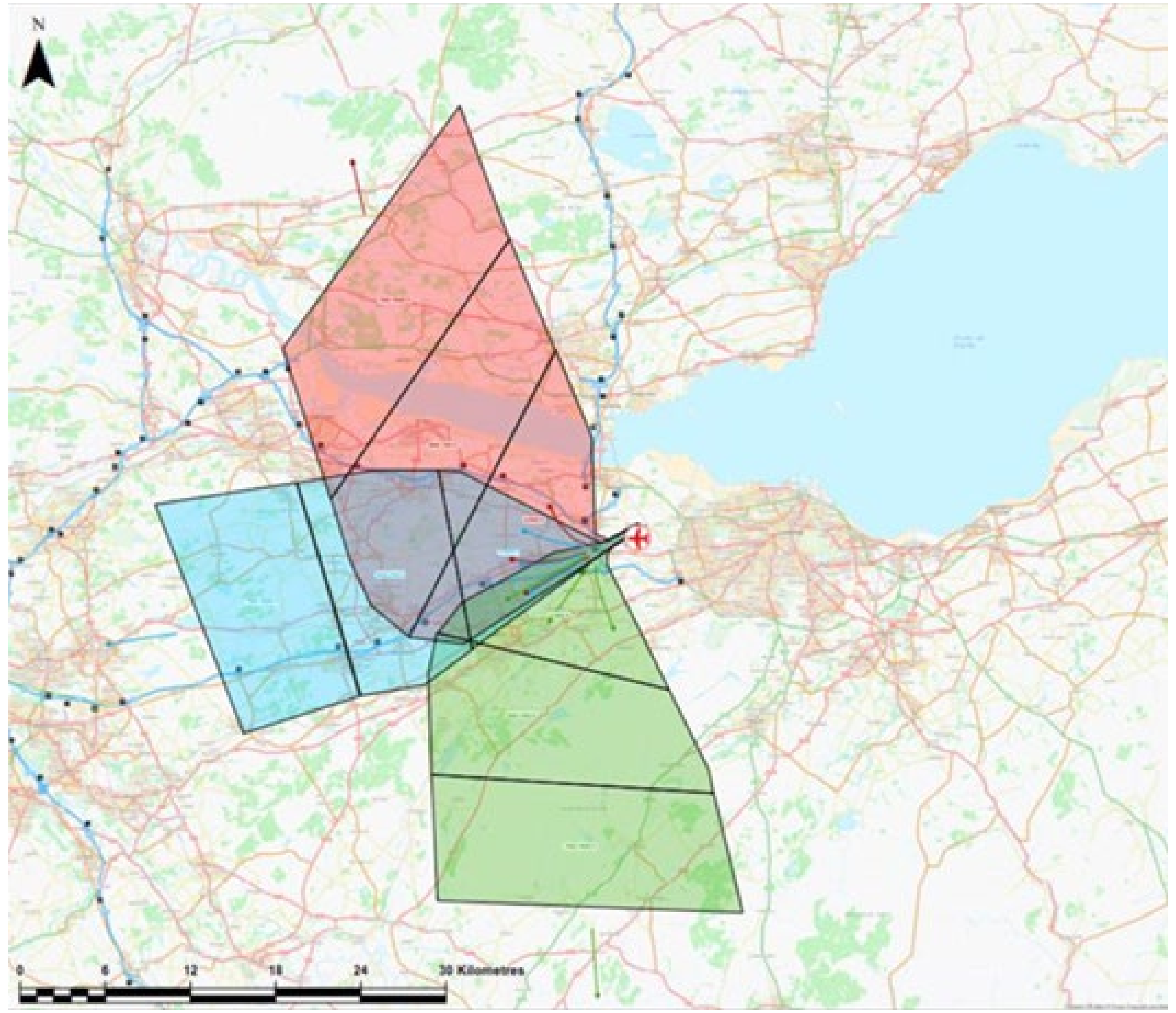


Figure 11: Stage 2 swathes for runway 24 three route options (No 15 & No 17).

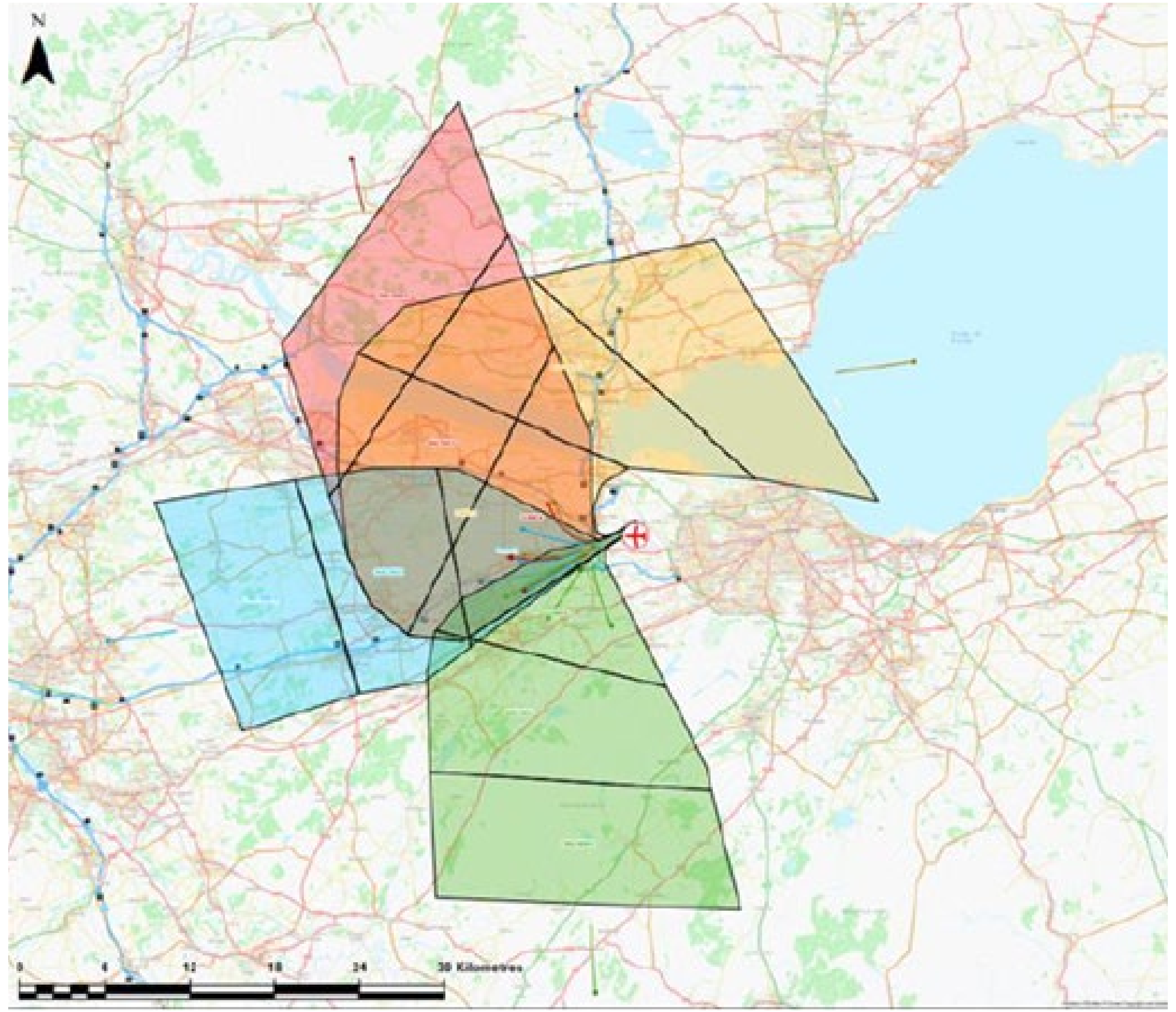


Figure 12: Stage 2 swathes for runway 24 four route options (No 22 & No 25).

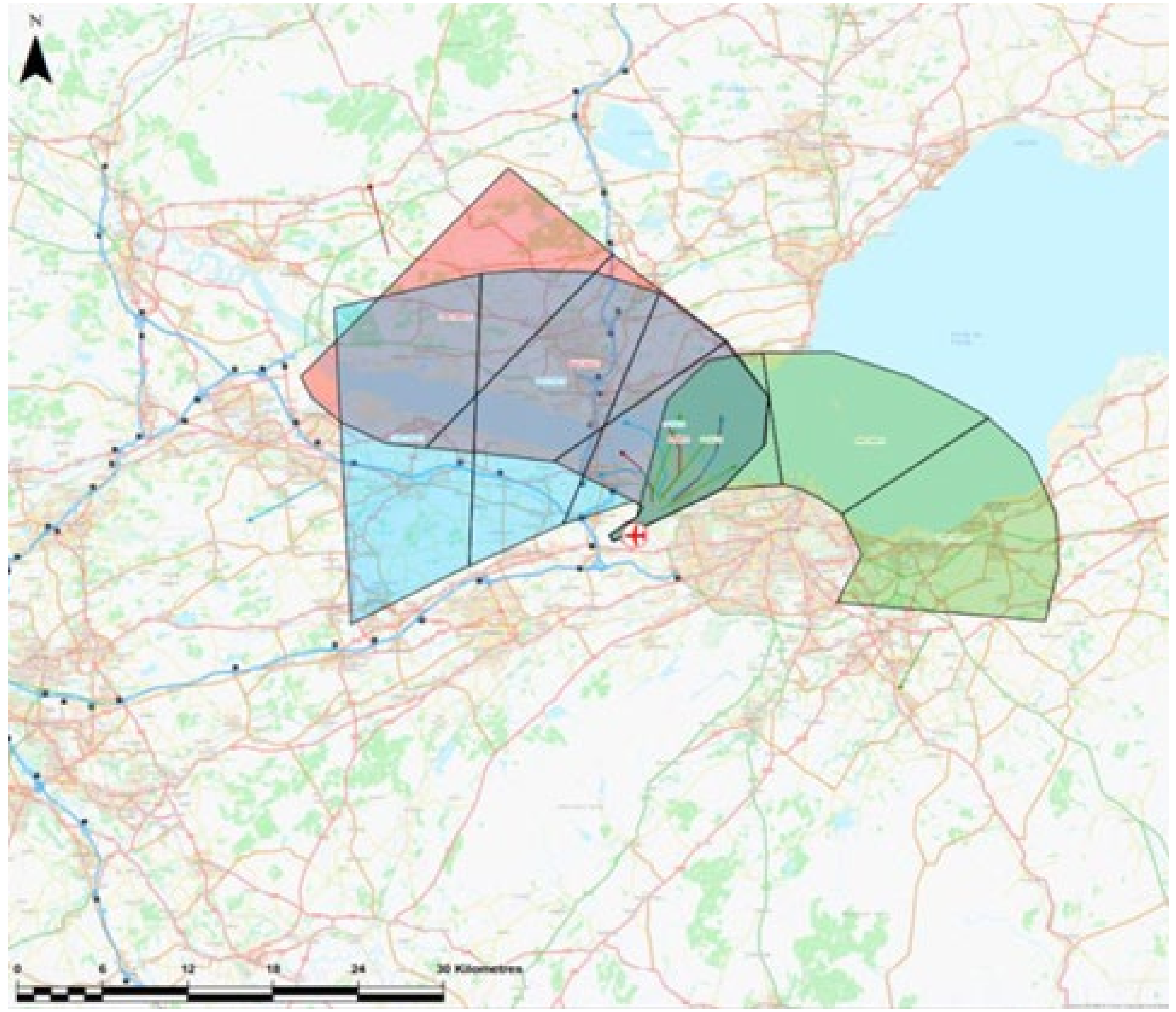


Figure 13: Stage 2 swathes for runway 06 three route options (No 3 & No 4).

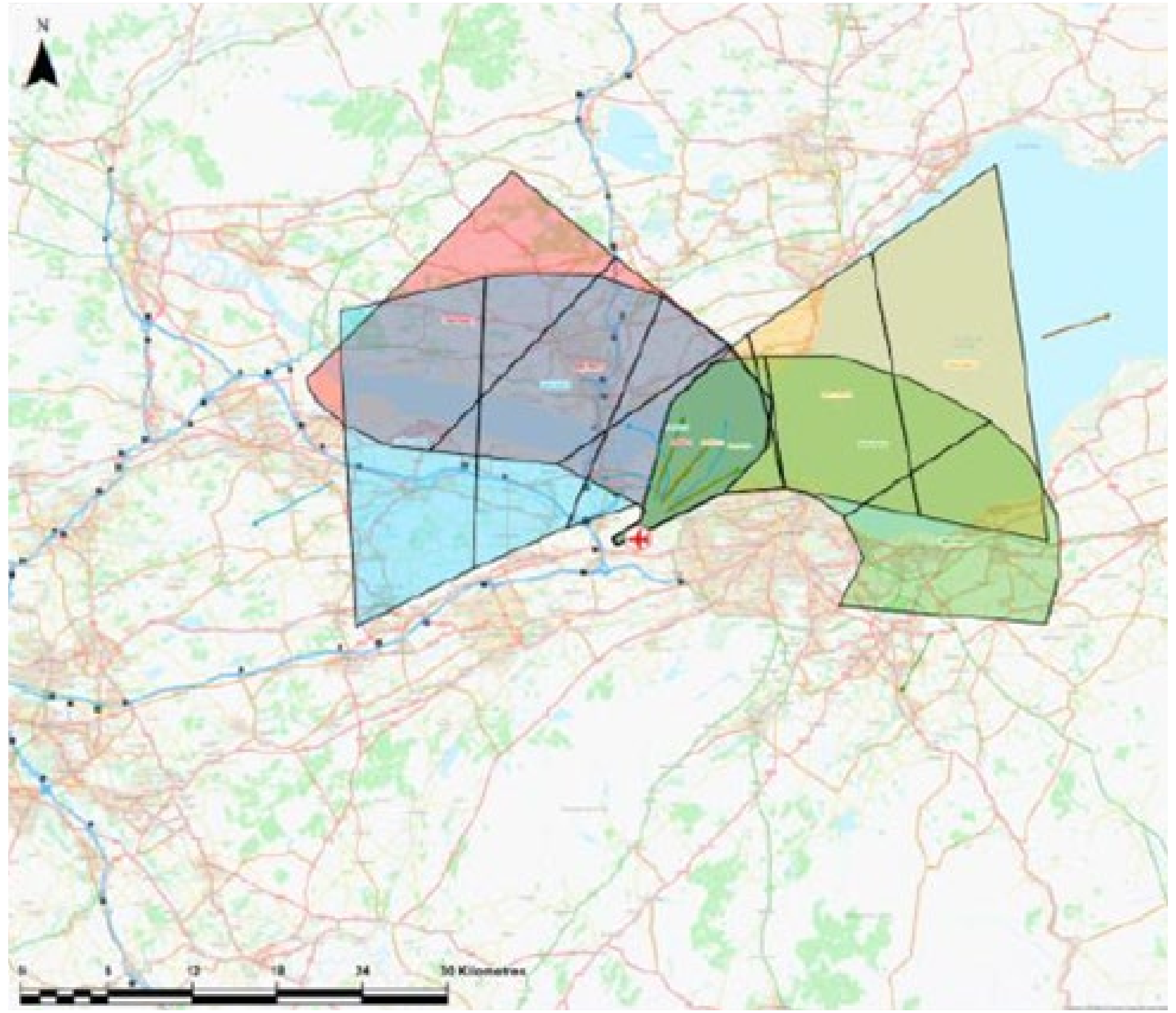


Figure 14: Stage 2 swathes for runway 06 four route options (No 8 & No 9).

2.1.3.2 Integration with the network airspace and neighbouring airports

This section describes the outcomes of collaborative work with NERL and Glasgow Airport to integrate our designs with those being developed by our neighbours, to ensure that the overall system is safe. This work helped form the broad framework of routes for the whole ScTMA system with regard to the requirements of a safe operation. We need to explain this work before we talk about the detailed design of our low-level departure routes because our routes must fit safely within the wider framework.

Note that this collaborative work on the network was undertaken in parallel with the detailed design work we undertook for lower-level routes, and at all stages we were ensuring that the integrated design of the network would not constrain our design of routes below 7,000ft unless for safety reasons.

2.1.3.2.1 Network integration for eastbound departures

In today's airspace, a dedicated departure route to the east is not possible because of an area of airspace reserved for military activity over the adjacent area of the North Sea to the east. However, as part of the redesign of the network of routes, NERL is proposing sharing arrangements with the military that will allow use of this airspace, enabling us to develop a dedicated route to the east. At the start of Stage 3, development of these arrangements reached a sufficient stage of maturity for routes heading east to be considered feasible.

Routes heading directly east are beneficial because they take flights away from the congested airspace south of the airport that runs from the ScTMA down to the airspace over the north of England before turning east. This helps reduce complexity in the airspace, which is a safety objective for the redesign.

An eastbound route also provides an opportunity for us to design routes that fly less overland and a direct route to the east has benefits in terms of CO_2e and fuel efficiency, and of potential delay reduction[15].

As a consequence of this opportunity, we discontinued our Stage 2 options with only three routes (as listed in Table 1 on page 27) before we designed individual routes, and the designers were tasked to include departure routes that overfly the Firth of Forth in the design, as illustrated in Figure 15.

Figure 15: Illustration showing how eastbound routes can fly mainly over the Firth of Forth and the North Sea.

Eastbound routes heading over the North Sea are dependent on an airspace sharing protocol with the military, as it routes through an area they occasionally activate referred to as Danger Area 514 (D514). Activation is estimated to be approximately 55 times per year for up to 4 hours at a time). When D514 is active the main eastbound route has to close. Therefore, as part of the network integration we also determined the eastbound departure route must split before its end, with an alternate route that avoids D514 providing a fall-back route for when D514 is active.

[15] These benefits are described in detail in Section 4.

2.1.3.2.2 Network integration for southbound departures

In today's airspace design, routes heading to the southeast initially follow the SID to the south. This takes them close to the existing TARTN holding stack and the network arrival routes that feed into it. This means that air traffic control vector most flights to keep them separated or sometimes provide more direct routes towards their destinations. This results in aircraft being spread across a wide area, as shown by the coloured tracks in Figure 16.

The arrows indicate the general direction of the flights in each flow.

The AMS aims to systemise airspace by introducing and following defined routes where it is safe and efficient to do so. During the collaborative work at the start of Stage 3 of the network design we found that there was no reasonable PBN design for jet aircraft for a departure route heading directly south that would be safely separated from a new PBN holding stack and/or PBN arrival routes coming from the south. The interaction is further complicated by Glasgow arrivals from the south which also pass through the same area. Any route design would inevitably result in jet aircraft being held down for an extended period and taken off their routes through similar levels of tactical intervention as seen today.

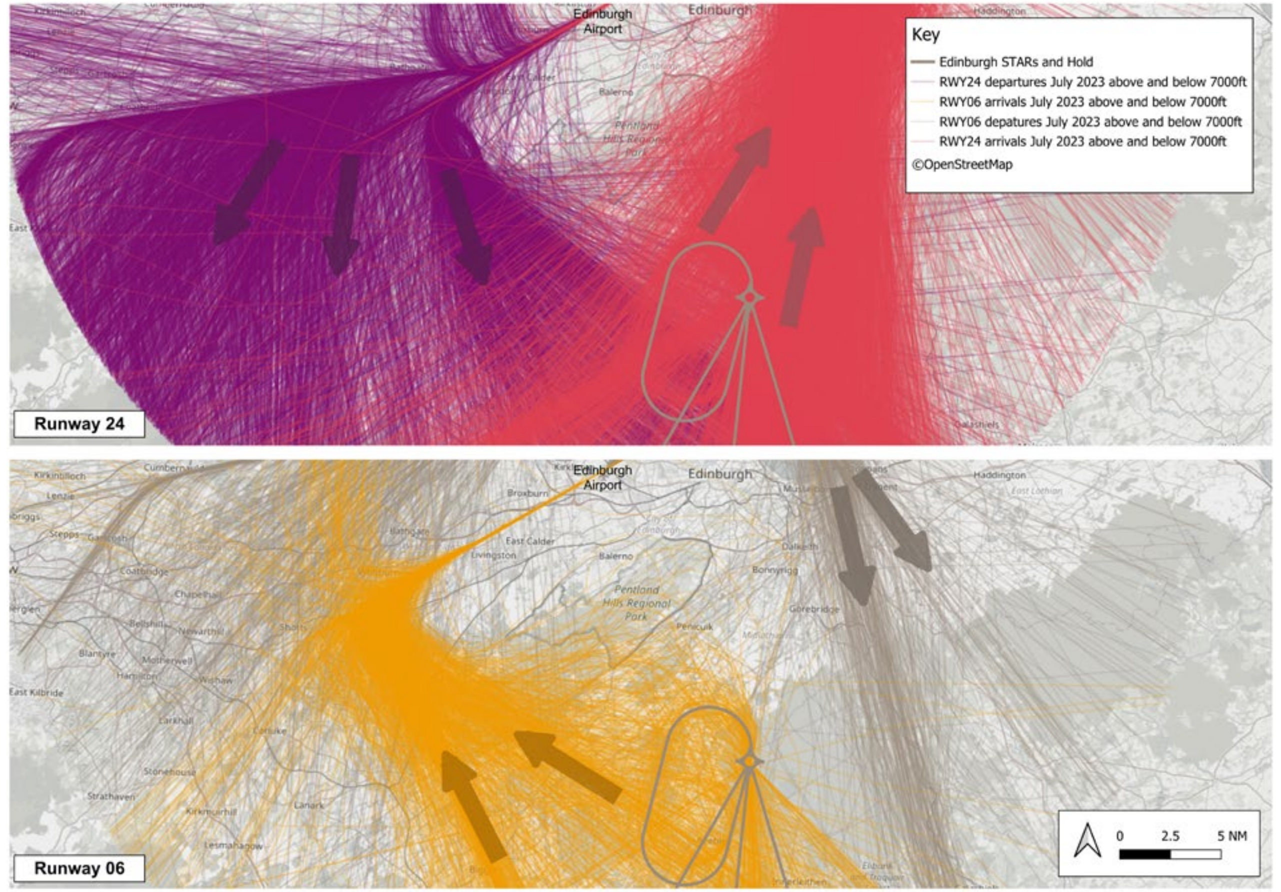


Figure 16: Today's tracks showing the spread of flights and complexity of interactions between departures and arrivals in the network south of the airport for both runway directions.

The safely separated alternative was for our southbound PBN departure route to initially turn west, before turning back south once clear of the congested airspace. This could be achieved by the southbound traffic sharing the same route as used by westbound traffic (i.e. a single PBN departure route for destinations in the west and south), or it could be achieved by adding a second PBN route, parallel to, and south of the westbound route (i.e. two routes initially heading west, one serving the west and southwest and another for southerly destinations). Both the single and dual route concepts are illustrated in Figure 17.

Either of these solutions leads to a potential design conflict with Glasgow inbounds also shown in Figure 17. However, further analysis identified that the majority of our southbound jet departures could climb above the Glasgow inbounds in either solution, and so either would be feasible from the NERL (network) and Glasgow perspective. (As this was an interdependency between the Edinburgh ACP and that of both the Glasgow and NERL ACPs, this assessment was undertaken as part of the CAF Part 1. On closer inspection it was, however, found that there was no design conflict. For further details of CAF Part 1 see Section 2.1.5).

Both scenarios single and dual PBN route concepts fed into the process for designing the individual routes.

Solution 1: The southbound route shares the same alignment as the westbound route before turning south.

Solution 2: The southbound route has a separate parallel route to the westbound route before turning south.

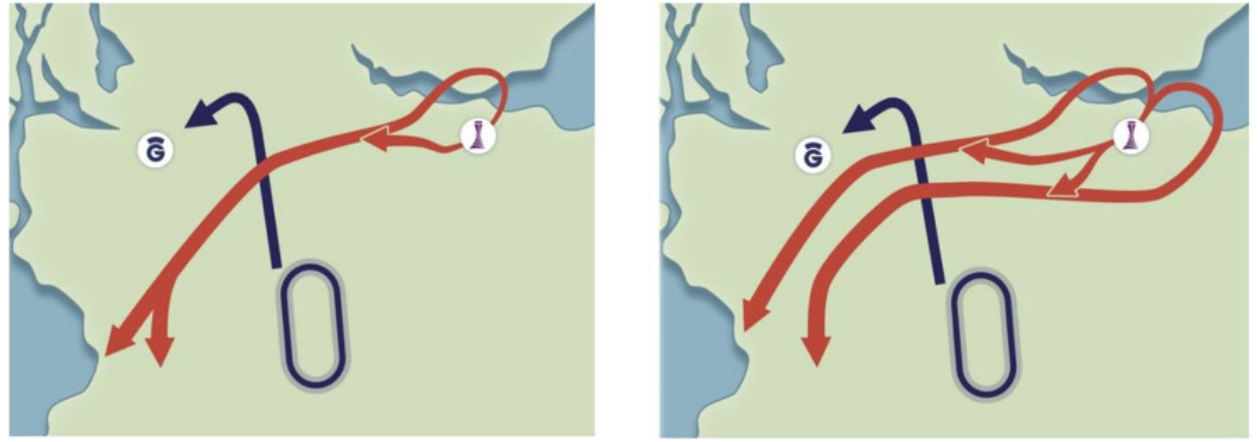


Figure 17: Two solutions for a southbound departure route that initially heads west (reproduced for the UK Airspace Change Masterplan Iteration 3 – ScTMA.

2.1.3.2.3 Network integration for slow climbing departures to west or south

Figure 17 on page 34 shows that departures to the southwest have to climb above Glasgow arrivals from the south. As part of the design process, we reviewed the climb profiles of all flights to ensure that routes that make this cross are safely separated for all flights.

We found that some turboprop (propeller) aircraft with particularly poor climb performance could not be relied on to climb above the Glasgow inbounds, and that the complexity this would generate for air traffic control in a future systemised PBN design would represent a safety risk.

Safety is our priority and so an alternative route was sought for slow climbing turboprops.

This alternative was for slow climbers to follow a different route that joins the network to the east of the Glasgow holding stack in an area from where they could be kept beneath the Glasgow arrivals if necessary, as shown in Figure 18. This concept was fed into the process for designing individual routes.

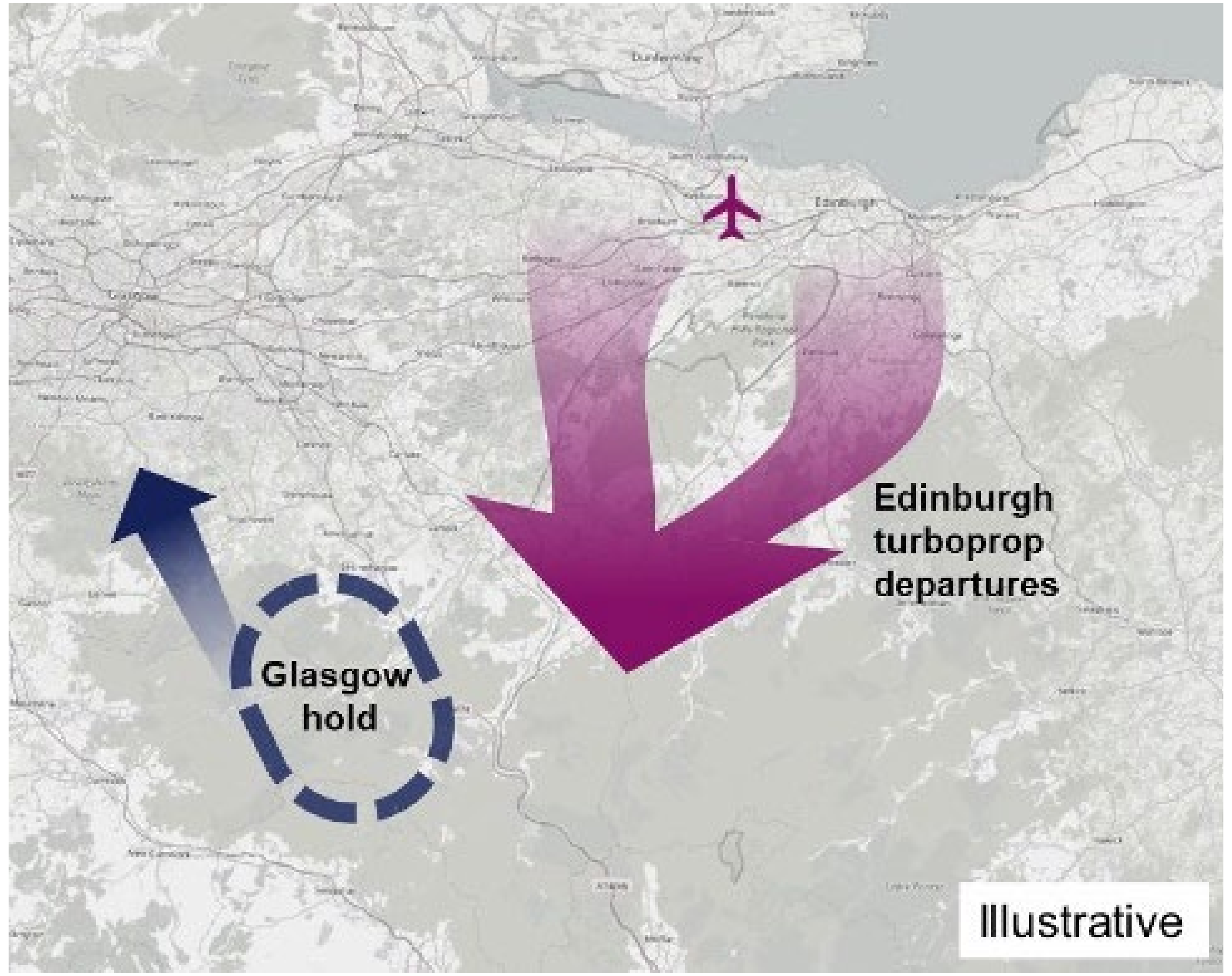


Figure 18: Conceptual illustration of proposed network entry point for westbound turboprops.

2.1.3.2.4 Network integration for northbound departures

In today's airspace, the northbound departures from either runway cross the Firth of Forth and head to a point northwest of Dunfermline near to the town of Dollar. From here, they join the wider network of northbound ATS routes. The initial segment of these northbound ATS routes take traffic northeast towards Aberdeen, as shown on the left in Figure 19. This area is popular with gliders and other airspace users, however, the controlled airspace required to protect today's departure route restricts access for those other users despite the low number of departures using this route (only 5% of our departures use this route).

The flexibility in design offered by airspace modernisation has provided the opportunity to redesign this departure route to release some controlled airspace while also routing more low-level flights over water. Therefore, as part of our collaborative work with NERL, the network entry point for northbound flights has been repositioned further east in an area east of Glenrothes (on the right in Figure 19).

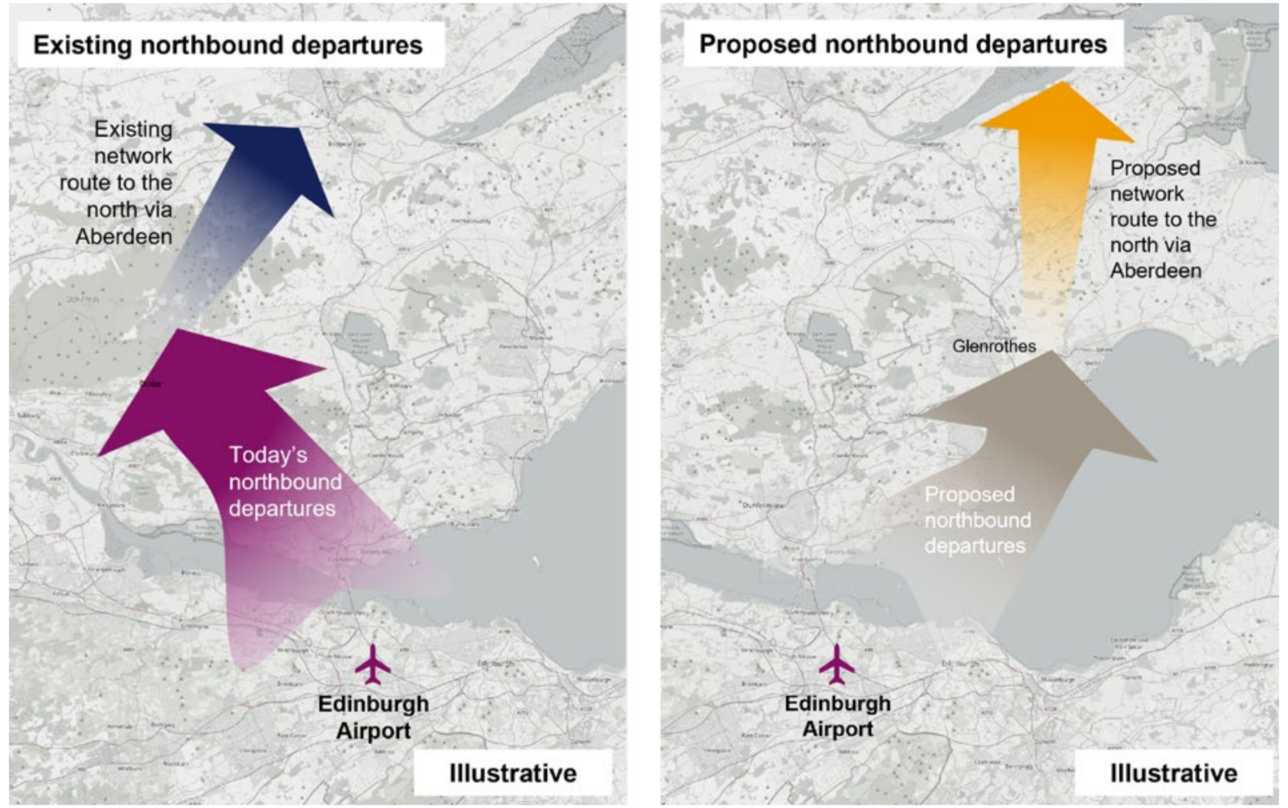


Figure 19: Conceptual illustration of today's network entry point for northbound departures, and the proposed alternative.

2.1.3.3 Proposed departure route framework and naming convention

The network integration work described above established the broad framework that was required for a system based on four departure routes off each runway (as per the Stage 2 options shown in Figure 12 on page 29 and Figure 14 on page 31) that integrated with the neighbouring ACPs.

This consisted of six new departure routes for each runway end. These are listed opposite in Table 2. The names are working names that will need to be changed in Stage 4 when formal names in line with international naming conventions are allocated[16]. Departure routes are named by the point at which they transfer into the wider network, and so these working names for the new routes were also agreed collectively and tie in with the neighbouring ACPs.

Table 2: Naming convention for proposed departure routes

New departure route name	Direction and example destinations – this is not an exhaustive list	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	GRICE
GULLY	East (e.g. central Europe and the Gulf)	TALLA
BERRY	East (GULLY alternative when Danger Area 514 is in use)	N/A
STRAT	South (e.g. southern UK, Spain, France)	TALLA
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	GOSAM
SKIRL	West – Turboprops only (e.g. Ireland)	GOSAM

[16] See SARG policy statement '**Significant Point Name Codes (5LNC) And ATS Route Designators**'.

2.1.3.4 Local considerations for initial segment for all runway 24 departures

Figure 20 on page 39 shows the alignment of today's runway 24 departures. It also shows current day (2023) LAeq 8hr night-time contours which are used as a reference point to see the extent of current adverse noise effects.[17]

All today's departures pass overhead Newbridge. Note that Newbridge is obscured on the map by the noise contours; it sits alongside the M9 south of Kirkliston which is also partially within the noise contour. Newbridge is just off the end of the runway and so cannot be avoided.

The departures then continue on a straight path over an area of relatively unpopulated countryside between Uphall and Broxburn to the north, and East Calder and Camps to the south. The current day night-time LAeq 8hr contours can also be seen to largely fit within this gap although the northern edge captures part of Broxburn.

Turning the routes to the right (north) before passing Uphall would be expected to shift these contours north, bringing more people in Broxburn and Uphall into the higher contour bands.

Turning the routes to the left (south) before Pumpherston, which is at the edge of the Livingston conurbation, is precluded by the presence of Kirknewton Airfield. We have treated the Kirknewton gliding area (shown on Figure 20 on page 39) as if it were an edge to controlled airspace. The extended centreline from the runway that today's departure routes follow passes 2.5NM north of this area. An earlier left turn to avoid overflying areas of Livingston would erode this separation, which we considered would be less safe than today.

Furthermore, our design team considered the fact that the western boundary of the glider area does not follow a clear geographical boundary like a road or river, which increases the risk that gliders may occasionally cross that boundary. The boundary of the Livingston conurbation would provide a clear visual reference point for gliders. We therefore determined that a left hand turn to the south before the Livingston boundary would be less safe. Safety is our number one priority and so for the above reasons an early left turn was discounted.

Our designs therefore all maintain the same initial segment as today that follows the extended runway centreline, with no right turns considered until past Uphall, and in order to remain safely separated from Kirknewton, no left turns were considered until aircraft have passed Kirknewton Airfield and are overhead the Livingston conurbation.

[17] We have chosen to show the LAeq 8hr rather than the LAeq 16hr contours (daytime) because they exhibit both the same general shape and characteristics, albeit the night-time are larger, and so the features slightly more defined, at the Lowest Observable Adverse Effect Level (LOAEL). Conclusions drawn from referring to the night-time contours therefore apply equally to the daytime contours and so showing both would make the figure too complex for no added value. The full set of contours for 2023 can be found in Annex L. Note that the LOAEL is a noise level defined by the government as the point at which adverse effects should be measured. The LOAEL for LAeq 8hr night-time contours the LOAEL is 45dBA whereas for the LAeq 16hr daytime contours it is 51dBA. For background on the LOAEL see Section 3.3.2.

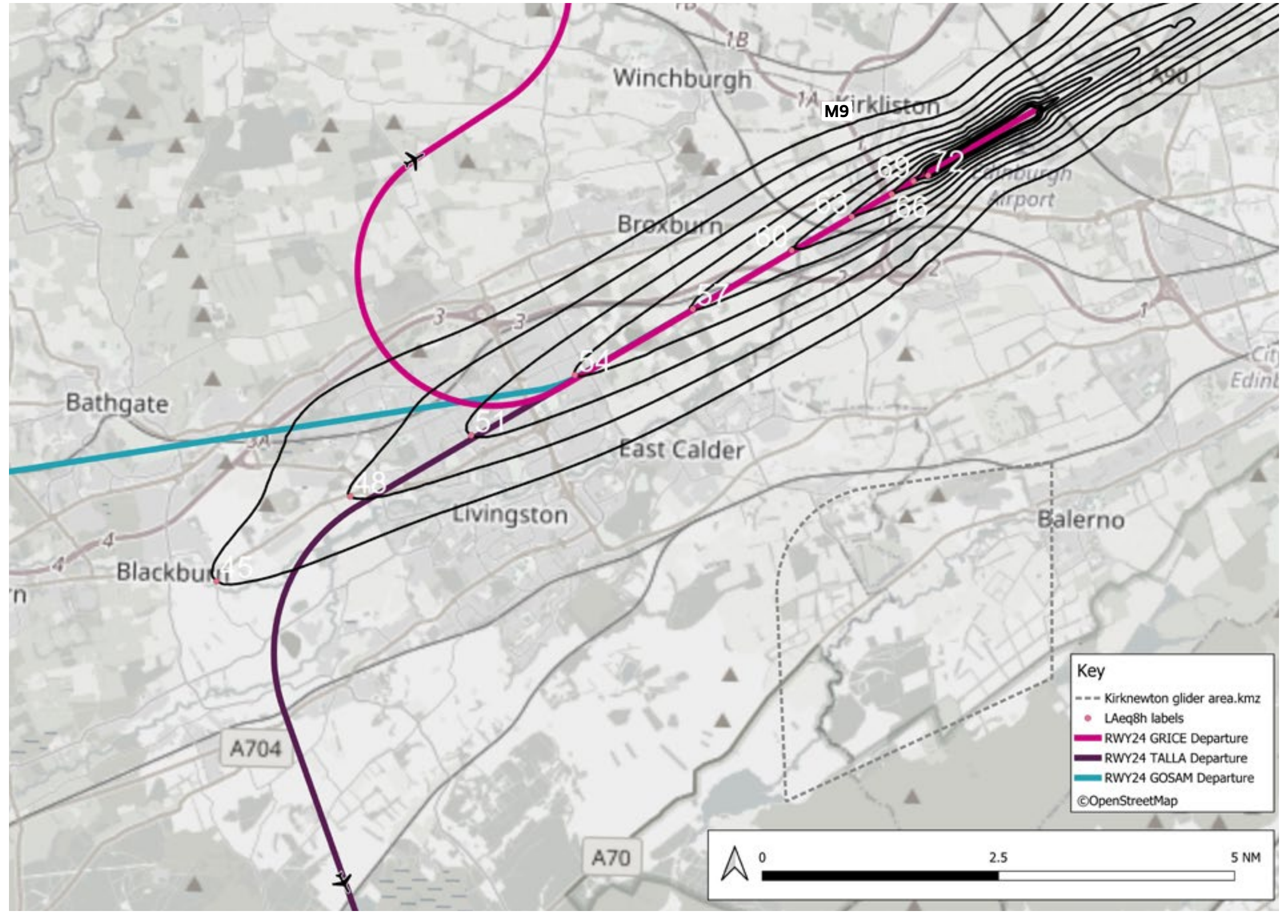


Figure 20: Initial straight-out segment for today's runway 24 departures overlaid current day 2023 LAeq 8 hour contours.

2.1.3.5 Local considerations for runway 24 north and eastbound routes (STOPP, GULLY and BERRY)

A series of right hand turns for runway 24 north and eastbound flights take them through approximately 180 degrees until over the Firth of Forth. This initial turn is shared by all northbound and eastbound flights from runway 24 (i.e. the turns for runway 24 STOPP, GULLY and BERRY routes are the same until they are over the Firth of Forth) by which time we expect most aircraft are above 7,000ft. We therefore grouped these routes together for the purposes of developing the low-level designs.

A similar departure route to the east was trialled in 2015. This was referred to as TUTUR. That trial highlighted the local sensitivity to more flights turning right off runway 24 (see Annex I). We have therefore developed four potential designs for this turn so that a range of potential solutions can be considered.

Figure 21 on page 40 shows each of the potential designs overlaid on population density maps, today's track and the GoldSET data. This includes two potential designs for a turn that initiates before passing directly over Livingston (shown as red and green). The centre of these routes pass west of Uphall but directly over Dechmont. Aircraft on this route then continue to turn over the less populated countryside north of Livingston and east of Linlithgow. Both of these routes would increase overflight of the eastern end of the Beecraigs Country Park, red more so than green. The Beecraigs Country Park can be seen as the light pink area south of Linlithgow on the GoldSET map.

The track picture insert in Figure 21 shows that aircraft do currently make a right turn over these areas but today it only serves routes to the north which is only 2% of our flights. The designs shown in Figure 21, which would include eastbound flights also, would increase this to 14%.

The green route most closely resembles the TUTUR trial route.

Figure 21 also shows two potential designs for later turns that fly over Livingston (orange and blue) and turn north over Boghall and track north-north-west, and which avoid both Linlithgow and the Beecraigs Country Park.

Each potential design for this route is referred to by this colour coding from herein.

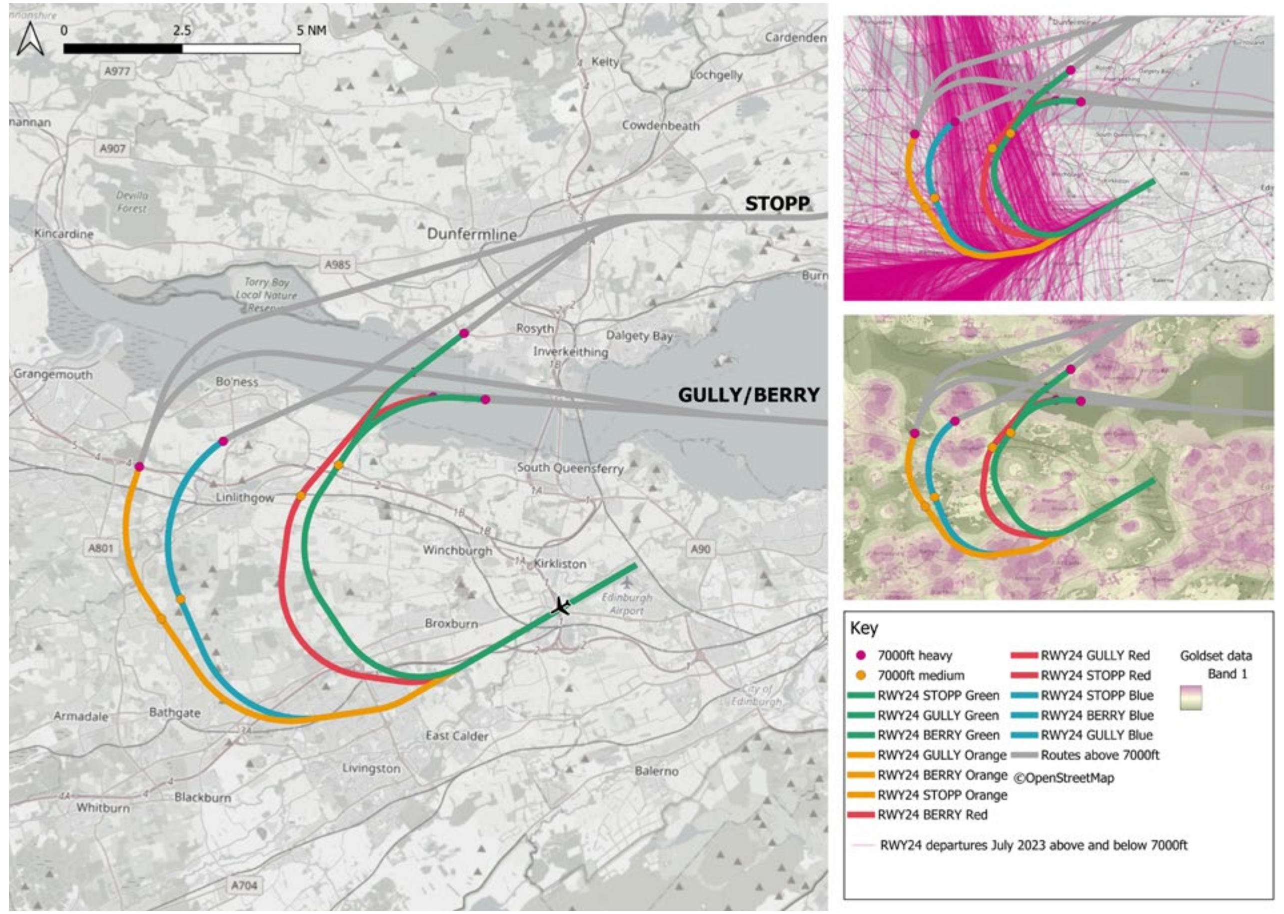


Figure 21: Alternative designs for runway 24 eastbound (STOPP, GULLY and BERRY) overlaid population, today's tracks and GoldSET.

2.1.3.6 Local considerations for runway 24 westbound route

The alignment of the westbound route has been left in the same place as today's GOSAM route. This means it routes where flights to the south and west are currently most dense today, this is shown in the top right insert in Figure 22.

The main picture in Figure 22 shows that this alignment west of Livingston overflies areas of population and areas where there are receptors in the GoldSET data, however, this was beyond the extent of expected LOAEL (Figure 20 on page 39 shows how the 2023 baseline LOAEL -45dBA LAeq 8hr – does not reach Boghall). Furthermore, the splitting of departures over six routes rather than three (see Section 2.1.3.2.1) would reduce usage of this route from around 21% of our traffic on the existing GOSAM route, to around 5% on the new westbound STEPS route.

The introduction of PBN and route systemisation will also enable more continuous climb than today. The yellow spot on Figure 22 indicates that the typical climb profiles for medium aircraft will mean the majority of aircraft will be approaching 7,000ft at Bathgate.

We therefore determined that maintaining today's route alignment for westbound aircraft, but with the significantly reduced impact due to the reduced route usage, was the most appropriate design to progress, so no alternatives were designed.

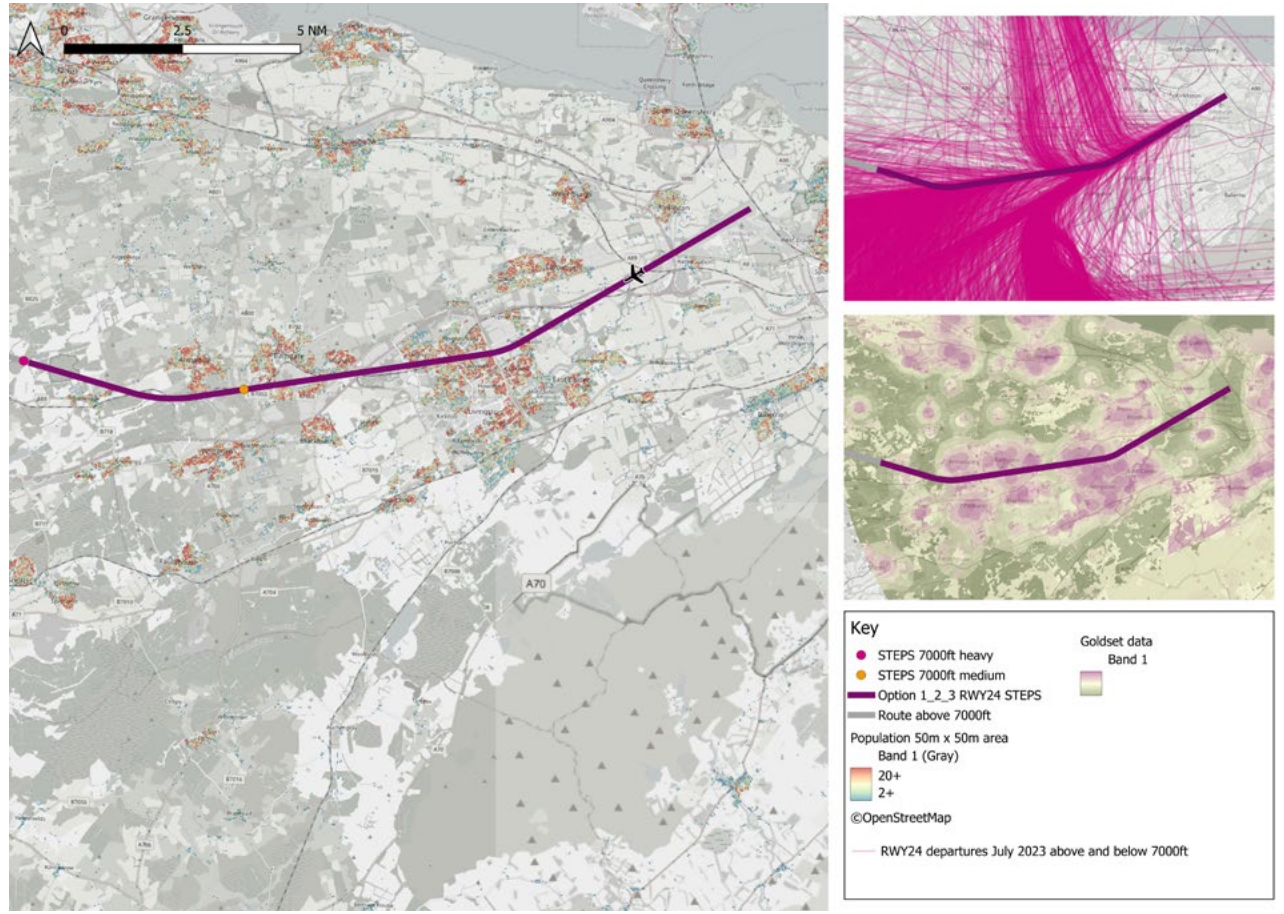


Figure 22: Design for runway 24 westbound (STEPS) overlaid population map overlaid population, today's tracks and GoldSET.

2.1.3.7 Local considerations for runway 24 southbound route

Section 2.1.3.2.2 describes how the southbound departures have to head west and climb over Glasgow arrivals before heading off to the south. It goes on to describe how this could either be achieved through sharing the westbound (STEPS) route before turning south, or through a second parallel route heading west before turning south.

The Section 2.1.3.6 above describes how the westbound route (STEPS) has been left in the same place as today's GOSAM route, and that this is beneficial because it would have reduced traffic on it.

Sending southbound flights on the same route would significantly increase the number of flights on the westbound route (STEPS) thereby negating this benefit, and so we determined it would be better to design a second parallel route that avoids a single route having both west and south bound flows.

To achieve this the southbound route (STRAT) must make an initial turn left (roughly towards the southwest) before turning right (roughly towards the west).

Two potential designs for the initial left turn on the runway 24 southbound (STRAT) route were developed as shown in Figure 23 on page 43 overlaid on population density maps, today's track and the GoldSET data.

Our focus was on the initial turn south as this is where flights are likely to be below 7,000ft.

The orange version maintains a straight path over Ladywell and Eliburn before turning south to pass over the prison and industrial areas west of West Calder before turning right towards the west. The track picture insert in Figure 23 shows that this initial turn south matches the densest area of flight paths making that turn today.

The red version turns to the south earlier over Howden, Dedridge and Bellsquarry. This passes over the countryside east of West Calder before turning right towards the west.

Each potential design for this route is referred to by this colour coding from herein.

Note that an earlier turn that avoids overflying Livingston was not feasible due to the proximity of the airfield at RAF Kirknewton (see Section 2.1.3.4).

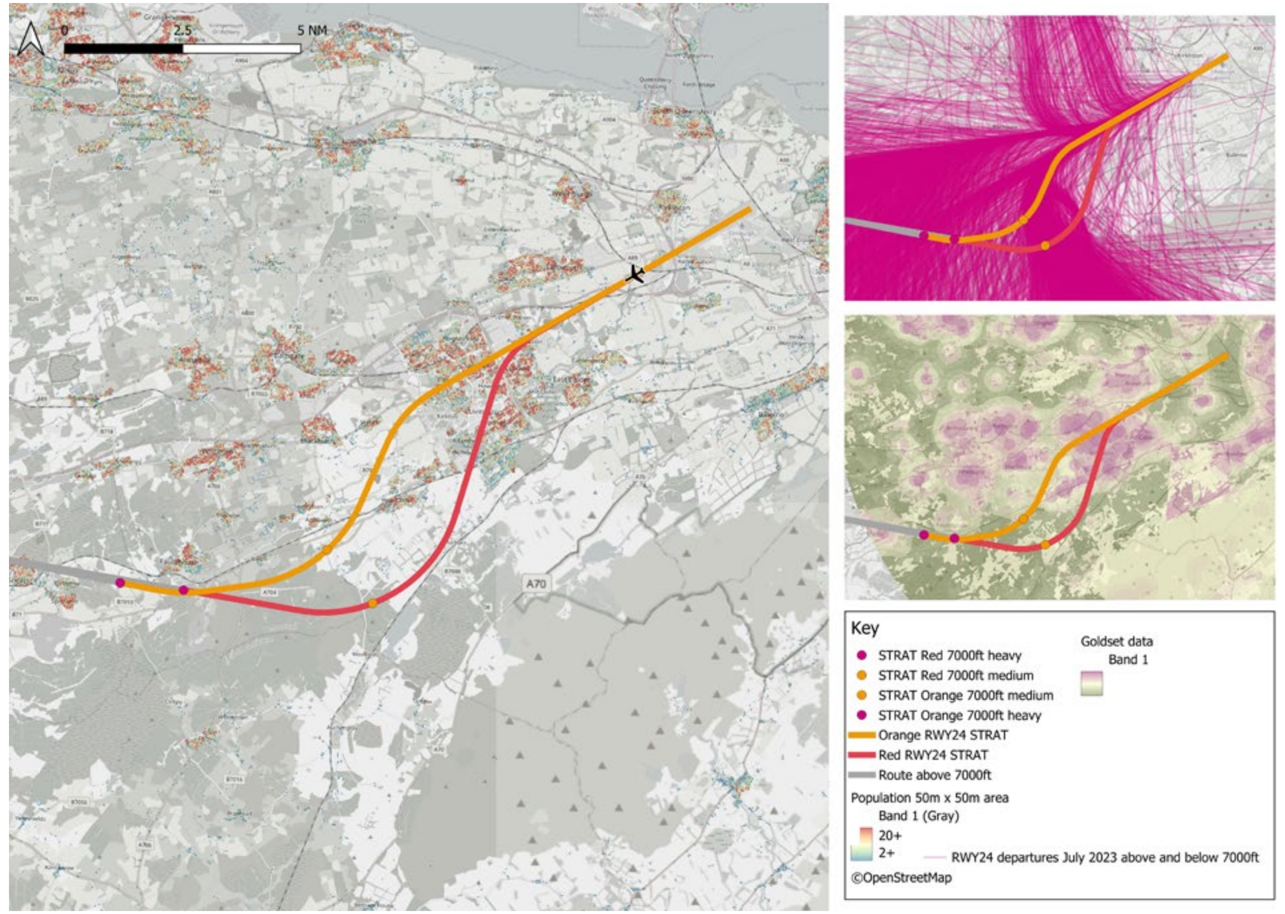


Figure 23: Alternative designs for runway 24 southbound (STRAT) overlaid population, today's tracks and GoldSET.

2.1.3.8 Local considerations for runway 24 west/southbound route for turboprops

The need for a dedicated departure route for turboprops heading west or south avoiding Glasgow arrivals is described previously in Section 2.1.3.2.3. The design for this route is shown in Figure 24 which shows the route overlaid on population, today's tracks and GoldSET data.

This would only be used by 2% of our flights (on average 8 flights per day in 2036).

Because the departure route ends close to a Glasgow holding stack it must have a default 'procedural level off' at 6,000ft to keep it below any Glasgow arrivals that may be in this holding stack. This is called a procedural level off because it is written into the definition of the route and therefore on the aircraft's flight plan. This level off also keeps it below our own arrivals which the route must cross earlier on.

However, in reality, it will be rare for there to be a departure on this route and a conflicting aircraft in the holding stack for Glasgow at the same time. When there is no conflicting Glasgow arrival, air traffic control would issue instructions for our departing aircraft to continue to climb through 6,000ft before reaching the end of the route. However, the procedural level is required for safety reasons in case there is Glasgow traffic in the way, and so the pictures show the worst case of the aircraft staying at 6,000ft until past the holding stack.

No alternative designs were developed for this route given its relatively light use.

Figure 24: Design for runway 24 west/southbound turboprop only (SKIRL) overlaid population, today's tracks and GoldSET.

2.1.3.9 Local considerations for initial segment for runway 06 departures

Figure 25 on page 46 shows today's runway 06 departures and our proposed design for the initial segment for all our runway 06 departures.

These departures currently climb straight ahead before turning left on to a heading of 043° when they reach 635ft above mean sea level (approximately 500ft above the ground at the airport)[18] or when they are 0.5NM from a navigation aid which is sited at the airport. Most aircraft reach 635ft before they are 0.5NM from the navigation aid, and so this results in a spread of flights as shown in Figure 25 because different aircraft types reach 635ft at different points. This early turn has been designed to help ensure aircraft turn away from Cramond as soon as possible.

In the rest of our design we are designing PBN routes that minimise variations in track keeping. This generally means designing to a set of criteria that all aircraft types can fly accurately. In the case of first turn for runway 06 departures applying such a rule would mean the turn would need to be defined at the point where the slowest aircraft reaches 635ft because we could not design a procedure that some aircraft could not fly. This would push more flights out towards Cramond before making the turn.

We have therefore designed the new PBN route which also initiates the turn at 635ft. However, in addition we have been able to reduce the noise impact upon Cramond by positioning the next waypoint such that the aircraft will turn left more than today's 043° heading. This will take most aircraft further from Cramond than they are today.

Aircraft climb rates depend on a range of factors such as their type, their weight and weather. Therefore, maintaining a design that turns at a height means that the proposed design will have a spread of tracks as a result of aircraft climbing at different rates and reaching 635ft at different points. This is no different to today.

Figure 25 therefore shows the new design as a range of flight paths showing how different aircraft types in different conditions would typically make the turn. The new design would mean that on average aircraft on the new design would be approximately 100m further from Cramond at the crossing with the A90 and 300m further from Cramond, near the shoreline.

[18] The turn is made at the earlier of these criteria. For more details see the Edinburgh entry in the **UK AIP**.

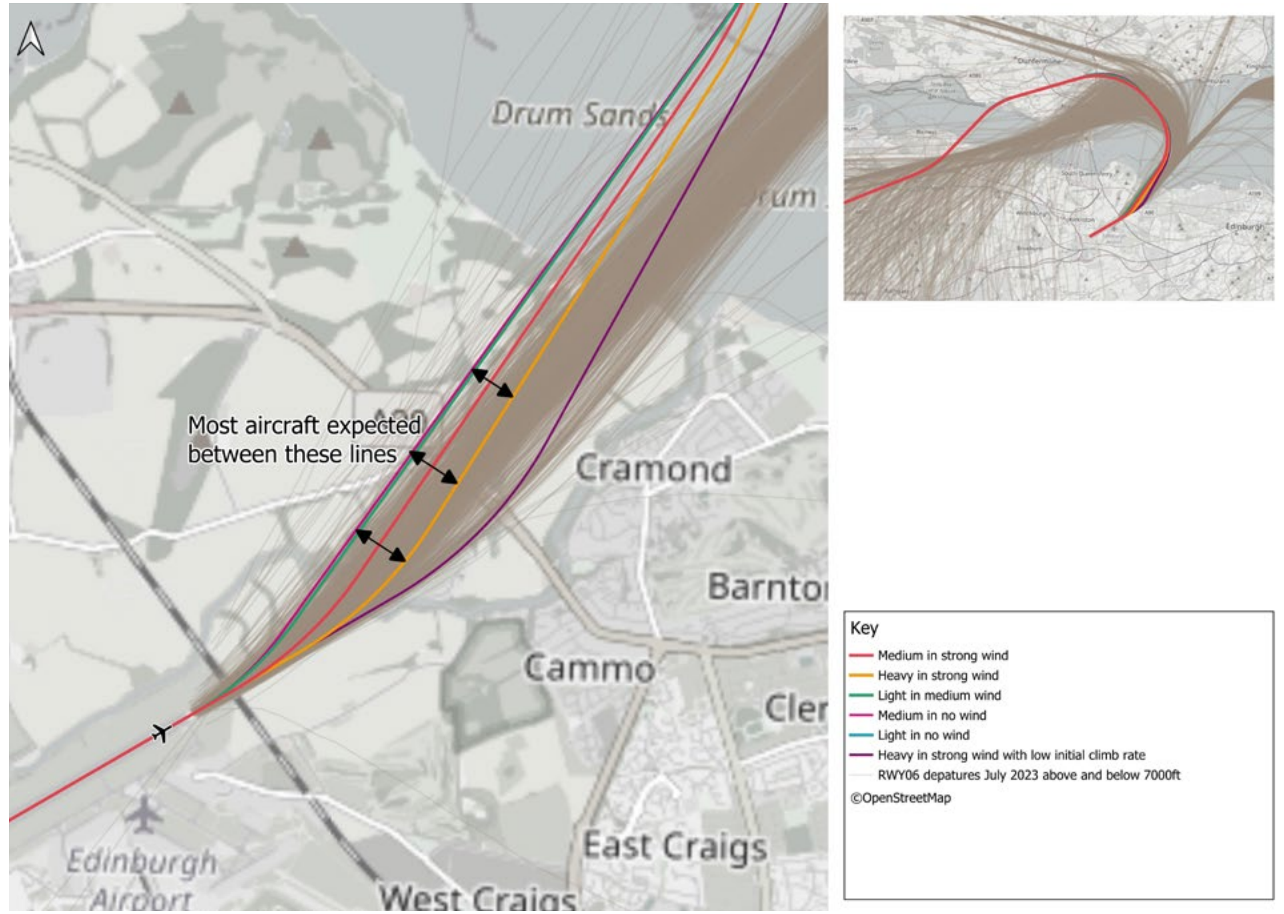


Figure 25: Flight paths for initial segment for today's runway 06 departures and illustration of how our design will change them.

2.1.3.10 Local considerations for runway 06 westbound routes

The runway 06 westbound route turns left over the Firth of Forth in order to head off in a westerly direction.

Figure 26 on page 47 show that two potential designs were developed for this turn; orange has an earlier turn routing aircraft between Dalgety Bay and Aberdour while red turns later to route between Aberdour and Burntisland. Each potential design for this route is referred to by this colour coding from herein.

The track picture shows neither design turns as early as today's equivalent. Both orange and red avoid the lower level overflight of populations in Dalgety Bay, Inverkeithing and Rosyth.

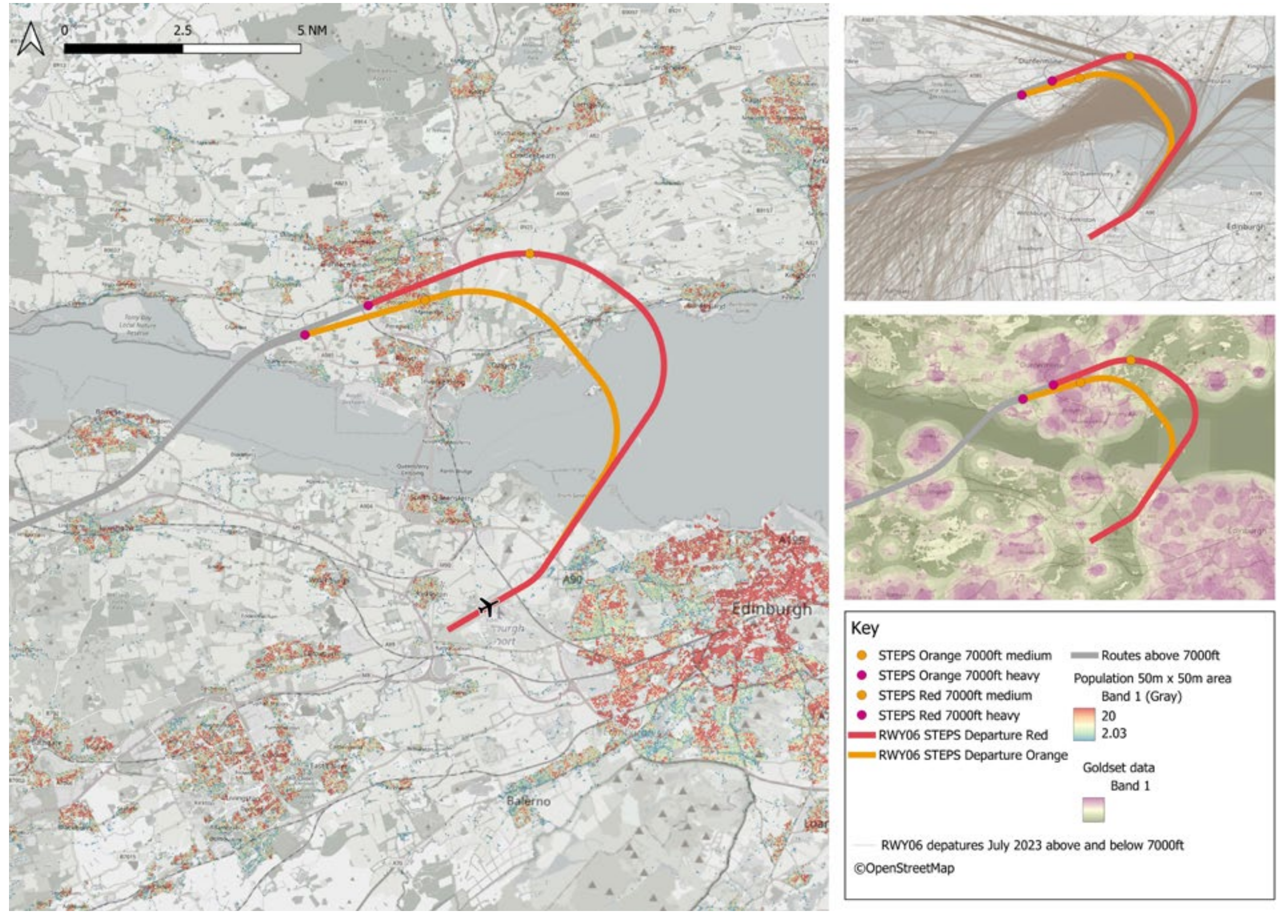


Figure 26: Alternative designs for runway 06 westbound (STEPS) overlaid population, today's tracks and GoldSET data.

2.1.3.11 Local considerations for runway 06 northbound routes

The runway 06 northbound route design is as shown Figure 27. This route is designed to be aligned as far east as possible while not crossing beneath the arrivals coming from STOBS and WORM2 (described in Section 2.1.2.4). This means the departure route tracks up the coastline over Burntisland and Kinghorn (roughly parallel, 0.7NM to the west of the arrival route).

Moving the departure route further east over the sea to better avoid Burntisland and Kinghorn would mean crossing beneath the arrivals that are heading towards the runway 06 approach by flying just south of the airport. The departures would be vertically separated from the arrivals at this point and so could, in theory, cross beneath the arrivals to stay over the sea longer. However, the departure route ultimately heads north on a track that is west of the arrival tracks, and so they would have to cross again south of STOPP. Crossing twice adds additional complexity. Additional complexity is a factor in safety assessments and so a design to stay over the sea longer, by crossing arrivals twice was not progressed.

Alternatives to the west were not developed because they would be more overland and therefore have a greater overflight impact, and it would further impinge on the overland airspace more valued by gliders and GA.

This route is used on average by 1% of flights.

Figure 27: Design for runway 06 northbound (STOPP) overlaid population, today's tracks and GoldSET data.

2.1.3.12 Local considerations for runway 06 eastbound routes

The runway 06 eastbound routes turn right over the Firth of Forth in order to head off in an easterly direction. Figure 28 shows that after the initial Cramond offset, these routes are over the Firth of Forth with uninhabited Inchkeith Island being the only landfall below 7,000ft.

No alternative designs were developed for runway 06 eastbound routes.

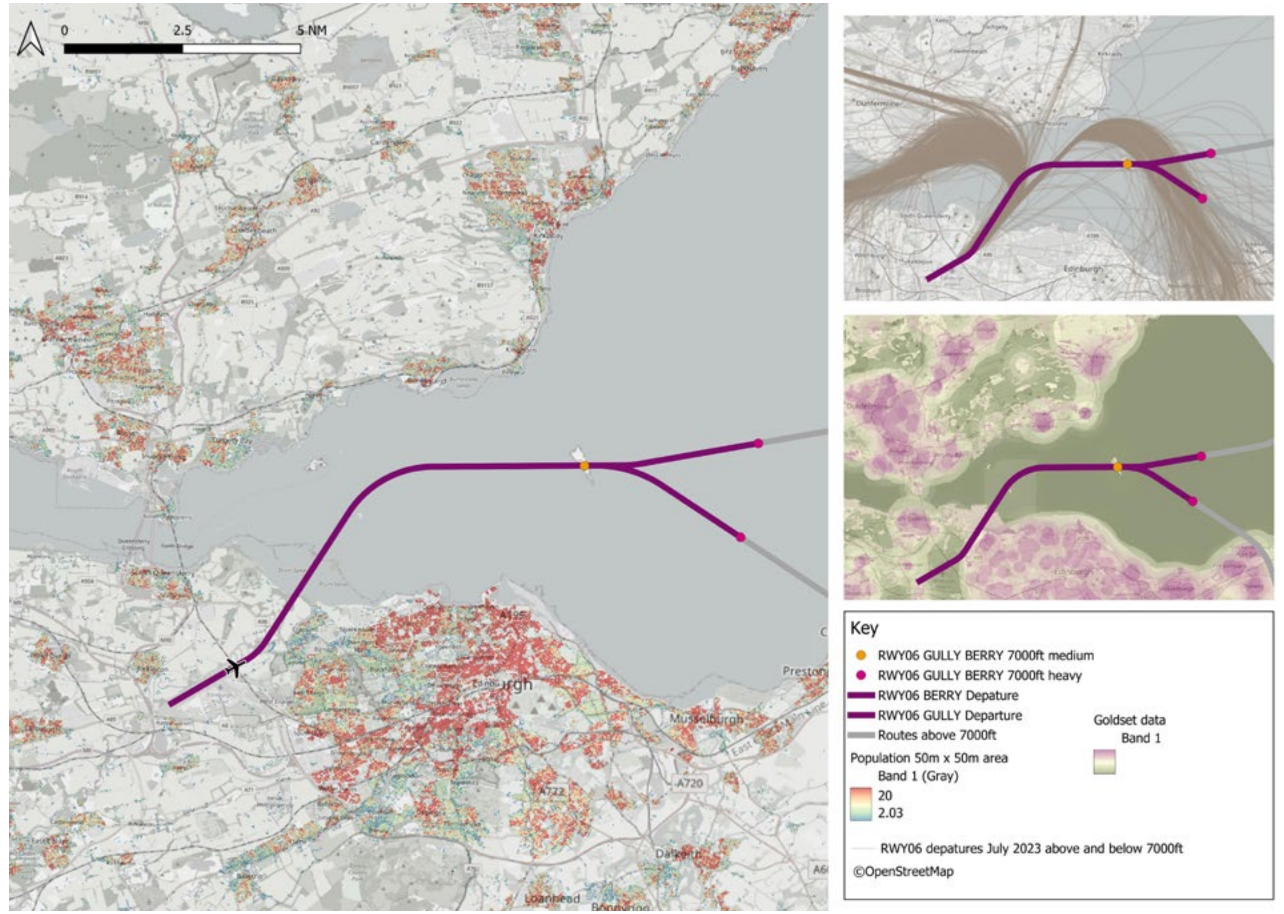


Figure 28: Design for runway 06 eastbound (GULLY and BERRY) overlaid population, today's tracks and GoldSET data.

2.1.3.13 Local considerations for runway 06 southbound routes

Runway 06 southbound routes turn right over the Firth of Forth and make a wide run to the south. Figure 29 shows that after the initial Cramond offset, flights on this route stay over the Firth of Forth until we would expect most to be above 7,000ft.

No alternative designs were developed for runway 06 southbound routes.

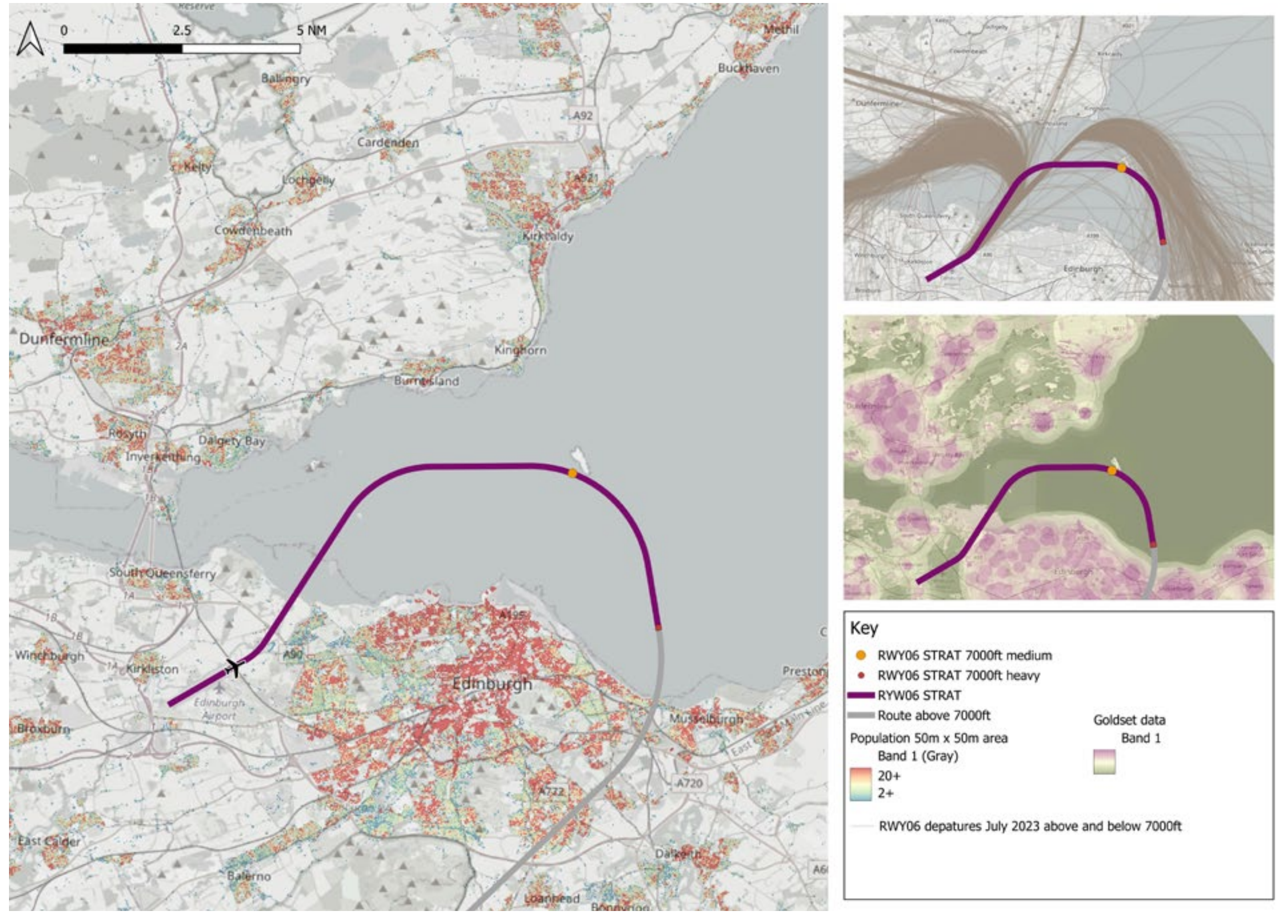


Figure 29: Design for runway 06 southbound (STRAT) overlaid population, today's tracks and GoldSET data.

2.1.3.14 Local considerations for runway 06 west/southbound route for turboprops

The need for a dedicated departure route for turboprops heading west or south avoiding Glasgow arrivals is described in Section 2.1.3.2.3.

The design for this route is shown in Figure 30 which shows the route overlaid on population, today's tracks and GoldSET data.

This would only be used by 1% of our flights (on average 3 flights per day in 2036).

Because the route passes close to a Glasgow holding stack it must have a default 'procedural level off' at 6,000ft to keep it below any Glasgow arrivals that may be in this holding stack. This is called a procedural level off because it is written into the definition of the route and therefore on the aircraft's flight plan. However, in reality, it will be rare for there to be a departure on this route and a conflicting aircraft in the holding stack for Glasgow at the same time. When there is no conflicting Glasgow arrival, air traffic control would issue instructions for our departing aircraft to continue to climb through 6,000ft without levelling off. However, the procedural level is required for safety reasons in case there is Glasgow traffic in the way, and so the pictures show the worst case of the aircraft staying at 6,000ft until past the holding stack.

No alternative designs were developed for this route given its relatively light use.

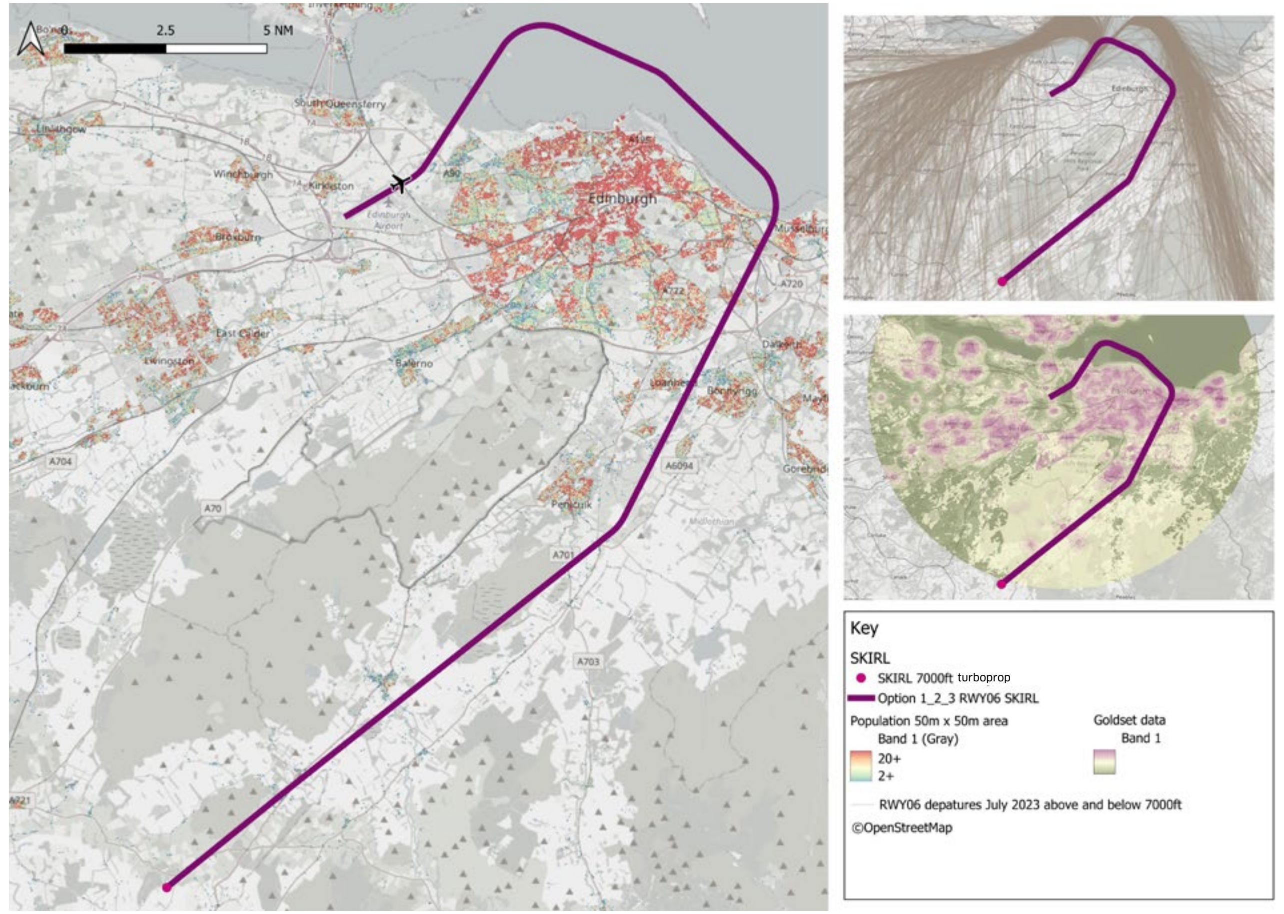


Figure 30: Design for runway 06 west/southbound turboprop only (SKIRL) overlaid population, today's tracks and GoldSET data.

2.1.4 Application of concentration, respite and relief

We have considered where track concentration and/or track dispersal to provide noise respite or relief could be applied in our design.

2.1.4.1 Application of track concentration

In today's system vectoring is common on routes, mainly above 3-4,000ft. The published routes are used for planning purposes but often not flown. The proposed PBN routes will be flown accurately most of the time with vectoring only in order to maintain safety, for example where speed control is not able to ensure separation, or to avoid thunderstorms. This will concentrate traffic and has allowed us to find positions for the concentrated traffic flows that avoid overflying the more populated and sensitive areas at low levels, which aims to reduce the overall noise impact. The previous section describes how we have sought to design routes to avoid populations and other sensitive areas, and the overall beneficial effect on noise is demonstrated later in the noise analysis presented in Section 4.

2.1.4.2 Application of track dispersal

Our local geography has a mix of populated urban areas and relatively unpopulated countryside. This means that in most cases, utilising track concentration to avoid the more populated areas as described above is effective at reducing the overall impact.

However, it is not always possible to avoid populations and so we have considered design to provide relief or respite through track dispersal. These terms are summarised as:

- **Relief** is a break or reduction in aircraft noise, which could potentially be achieved by spreading noise over a wider area or over more than one route, rather than concentrating it on a single route. Alternatively, relief can be achieved by positioning routes related to each runway direction over different areas so that when the runway switches, the impacts also switch.
- **Respite** which can be defined as scheduled relief from aircraft noise for a period of time, which is generally achieved by having two (or more) routes heading to the same point but by different routes which can be toggled on and off according to a set schedule to alternate the areas impacted.

Our consideration of building respite or relief into our designs is outlined below.

2.1.4.3 Improved relief for Cramond

In Section 2.1.3.9 we described how the arrivals on runway 24 must fly directly over Cramond, as it lies in a straight line with the runway. We also describe how runway 06 departures initially point toward Cramond but then turn away. Turning the departures away is specifically to provide relief for Cramond when the runway switches to runway 06 (note that this is not considered respite because runway switching is weather dependent, rather than being to a set schedule).

Section 2.1.3.9 also describes how in the proposed design increases the turn away from Cramond. This will improve the quality of the relief it receives.

2.1.4.4 Relief from spreading runway 24 departure over more routes

By utilising the Firth of Forth as much as possible, all our designs spread runway 24 departures over four low level routes rather than three (note that traffic is actually spread over six departure routes, but the three north and eastbound routes share the same alignment at lower levels).

In particular this provides the opportunity to improve relief for Livingston. Livingston is on the line of the final approach to runway 06 and also under the path of all departures from runway 24. We have developed some designs that turn north and eastbound aircraft from runway 24 to the north before overflying Livingston so there would be fewer flights directly over the town when the airport switches to runway 24. This relief is demonstrated by the reduction in adverse effects described in relevant options in Section 4.

Figure 31: Redistribution of flights using Option 1 departure route designs as an example.

Note that the percentages show 2036 forecast usage. For simplicity these percentages are rounded to the nearest whole number. In both cases the unrounded percentages add up to 35%, which represents the proportion of our overall flights that are runway24 departures.

2.1.4.5 Consideration respite

We considered designing two or more flight paths heading to the same point, either for concurrent use to achieve dispersal (relief), or toggled on and off according to a published schedule to provide respite.

However, when considering such routes we identified the following safety issues:

- The risk that aircraft fly the incorrect version of the route (this could be an issue for the cockpit, the tower air traffic controllers or the en-route air traffic control centre where flight data processing systems are not currently capable of accommodating different routes heading from a single runway to the same point).
- The risk of catch-up conflicts at the point where the different routes come back together, this would occur if routes are in use concurrently or when routes are being switched from one to the other.
- Increased complexity and how it may affect the situational awareness of the air traffic controllers where the route system and traffic patterns shift from day to day, or perhaps at different times throughout the same day.

At the time of writing these issues remain unresolved. Safety remains the number one priority and we do not believe that we should progress designs unless we are confident they would be safe. To do so would be misleading. As a consequence, we did not attempt to develop designs for FOA that included daytime respite routes.

2.1.4.6 Consideration of night-time respite

In our Stage 2 engagement we considered using a single 'quietest' departure route during the night-time period which is defined as 2300-0700 by the day/night metrics required by CAP1616 and which are drawn from government policy. The idea was that as night-time has few flights overall an alternative set of procedures could be put in place to use a single departure route. This would provide respite to those communities under the departure routes that are not used at the expense of those communities under the route designated as the 'quietest'.

We have examined this carefully as part of our design process.

The formal definition of night-time is 2300-0700 local time. Figure 32 opposite shows 2023 departures by hour (BST) for the 92 day summer period defined by the CAA for noise analysis. This shows 0500-0700 are our busiest hours for departures. At night 2300-0000 can also be relatively busy.

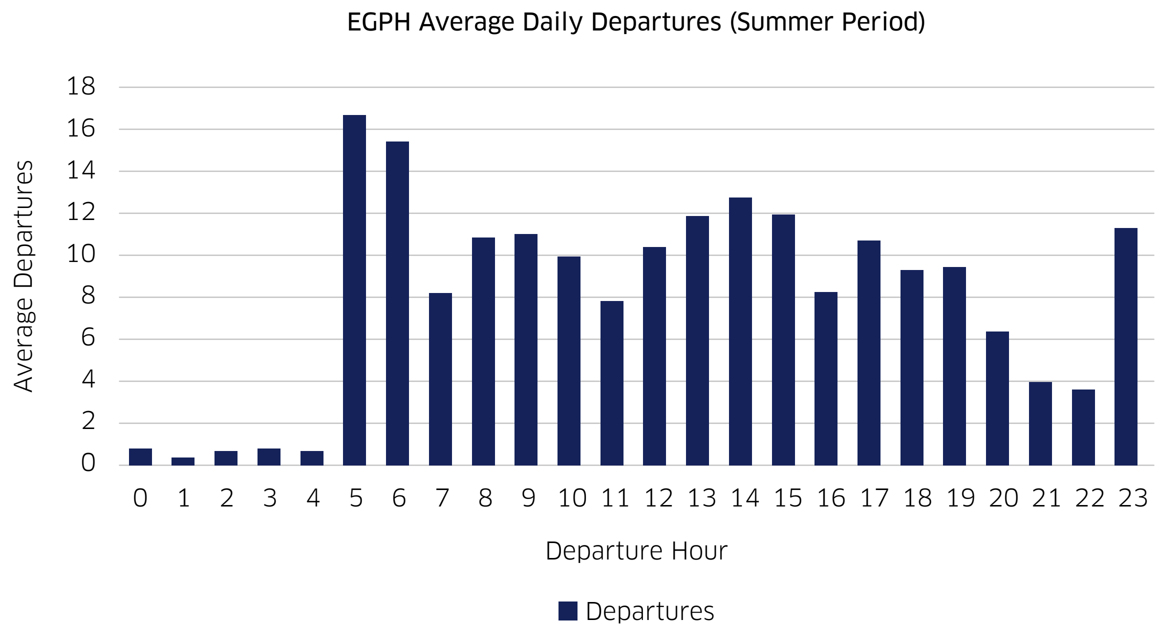


Figure 32: Hourly movements – summer 2023.

Establishing a restriction to only use one SID during a night period would mean that the majority of flights would enter the enroute network in the wrong place (i.e. if a northbound route was chosen, flights to the south would have to fly to the north first before being turned south)[19].

It is not feasible for the enroute network to have a separate set of routes for the night period, and so these aircraft would need to be vectored to get back on to their planned routes.

The aim of the AMS is to minimise vectoring. Introducing a requirement to vector the majority of flights is against the principle of the AMS and would generate excessive complexity for both ATC and the flight deck. This complexity was deemed to be an unacceptable safety issue given that the night period includes some of our busiest hours (see Figure 32 on page 54). Managing the safety issue by restricting departures in the morning and evening periods would not be possible without a significant impact on capacity and runway throughput which would also be against the principles of the AMS and commercially unviable.

We therefore determined that night-time respite through use of a single departure route would not be progressed[20].

2.1.5 Summary of CAF part 1 with respect to our ACP

Edinburgh Airport, Glasgow Airport, and NERL conducted the CAF part 1 review for the proposed ScTMA design. The review identified 18 specific areas across the proposed ScTMA design where interdependencies may arise between the routes developed by the ACPs (i.e. where one sponsor's design had the potential to affect those in another's ACP). Of these, five were between Glasgow Airport and NERL routes and so had no relevance to our proposal. This left 13 interdependencies in which our routes were involved.

Eight of the interdependencies arose from the possibility of interactions between our proposed PBN arrival and departure routes and those developed by Glasgow Airport. However, the CAF part 1 analysis demonstrated that none of these potential interdependencies would result in a specific design conflict. In other words, all the designs for new PBN arrival and departure routes that are considered for inclusion in the proposed ScTMA design are compatible in their current form.

In all eight cases where our proposed PBN arrival and departure designs were positioned in the same portions of airspace as the Glasgow Airport designs, either:

- The departure routes designs climbed quickly enough to jump the arrival route options without a design conflict; or
- The arrival route designs all remained high enough for the departure route options to climb continuously beneath them without the need to level off.

As a result, the CAF part 1 review concluded that there are no design conflicts hence no proposed trade-offs, between our ACP and that of Glasgow Airport and there are no cumulative impacts below 7,000ft created by the ScTMA ACPs.

The remaining five interdependencies involving our ACP concerned the proposed locations and orientations of the airborne holds being developed by NERL and the possibility that they may affect the position of new PBN arrival and departure route options. However, the CAF part 1 review determined that design conflicts did not arise for any of these interdependencies because the preferred positions of the proposed PBN arrival and departure routes were vertically or laterally separated from the preferred hold locations (allowing for continuous climb and descent operations where appropriate). Therefore, our developing designs were compatible with NERL's in their current form[21].

For full details of the CAF1 output see the **UK Airspace Change Masterplan Iteration 3 – ScTMA**.

[19] The busiest departure route has more than approximately 45% of flights on it and so that means that if that was chosen as the quietest then 55% flights would enter the network in the wrong place. This figure would be greater if the chosen night-time route was a less often used one.

[20] We also note that there is no definition of a 'quietest' departure route. The interpretation of this is very likely to differ depending on stakeholder location, as stakeholders are likely to favour a definition that means the route nearest them is not chosen. We believe that the issue would be divisive for our local communities.

[21] Note that two of the interactions between our design and Glasgow Airport's, and one between our design and NERL's were found to be related, effectively being part of one larger, three way interaction in the airspace between the airports. Despite this complexity it was assessed that none of the component interactions between our designs and those of the other sponsors were design conflicts. For further detail see Section 2.1.3.2.2.

2.2 Step 2: Combining the individual routes for each runway into full airport system scenarios

2.2.1 Runway 24 scenario summary

In summary, there are:

- Four potential designs for the runway 24 north and eastbound departure routes (STOPP, GULLY and BERRY) used by 13%[22] of our flights.
- One design for the runway 24 westbound departure route (STEPS) used by 5% of our flights.
- Two potential designs for the runway 24 southbound departure route (STRAT) used by 15% of our flights.
- One design for the runway 24 west/southbound turboprops flights (SKIRL) used by 2% of our flights.
- One design for the runway 24 PBN approach transition from STOBS holding stacks used by 1% of our flights.
- One design for the runway 24 PBN approach transition from WORM2 holding stacks used by 6% of our flights.
- One design for the runway 24 PBN approach transition from TART3 holding stacks used by 28% of our flights.

From this we built eight scenarios for runway 24 as shown in Table 3.

Table 3: Runway 24 departure scenarios built from individual routes

Runway 24 features for:		
North and Eastbound (STOPP/GULLY/BERRY)	Southbound (STRAT)	
	Red (turns overhead Livingston)	Orange (turns after Livingston)
Green (turns east of Linlithgow)	Scenario 1A	Scenario 1B
Red (turns east of Linlithgow)	Scenario 2A	Scenario 2B
Orange (turns west of Linlithgow)	Scenario 3A	Scenario 3B
Blue (turns west of Linlithgow)	Scenario 4A	Scenario 4B

NOTES:

Routes for which there was only one design are not listed as they are common across all the scenarios.

Note that colours for each route in this table match those shown on the maps earlier in Section 2.1.3.

[22] These are average annual usage figures for 2036 taking into account that runway 24 is, on average, in operation 70% of the time. For simplicity these percentages are rounded to the nearest whole number. The unrounded percentages add up to 70%.

2.2.2 Runway 06 scenario summary

In summary, there are:

- Two potential designs for the runway 06 westbound departure route (STEPS) used by 2%[23] of departures.
- One design for the runway 06 northbound departure routes (STOPP) used by 1% of departures.
- One design for the runway 06 eastbound departure route (GULLY) used by 5% of departures which, with the exception of the initial segment, would be entirely over the Firth of Forth when below 7,000ft.
- One design for the runway 06 alternative eastbound departure route (BERRY) for use when the D514 military danger area is active. This means it will on average be used by less than 1% of departures which, with the exception of the initial segment, would be entirely over the Firth of Forth when below 7,000ft.
- One design for the runway 06 southbound departure route (STRAT) used by 6% of departures which are, with the exception of the initial segment, entirely over the Firth of Forth when below 7,000ft.
- One design for the runway 06 west/southbound turboprop flights (SKIRL) used by 1% of departures.
- One design for the runway 06 PBN approach transition from STOBS holding stacks used by less than 1% of our flights, which are mostly over the Firth of Forth when below 7,000ft.
- One design for the runway 06 PBN approach transition from WORM2 holding stacks used by 3% of our flights, which are mostly over the Firth of Forth when below 7,000ft.
- One design for the runway 06 PBN approach transition from TART3 holding stacks used by 12% of our flights.

From this we built two scenarios for runway 06 as shown in Table 4.

Table 4: Runway 06 departure scenarios built from individual routes

Southbound (STRAT)	
Orange (turns west of Aberdour)	Red (turns east of Aberdour)
Scenario 1C	Scenario 2C

NOTES:

Routes for which there was only one design are not listed as they are common across all the scenarios.

Note that colours for each route in this table match those shown on the maps earlier in this section.

[23] These are average annual usage figures for 2036 taking into account that runway 06 is, on average, in operation 30% of the time. For simplicity, these percentages are rounded to the nearest whole number, or if it is 0.5 or less it is shown as 'less than 1%'. The unrounded percentages add up to 30%.

2.2.3 Full airport system scenarios

Stage 3 Full Options Appraisal (FOA) for major airspace change requires airspace change sponsors to generate analysis which reflects the overall airport's air traffic operation (taking into account operations to/from all runways including arrivals and departures). This means that it needs designs for the full airport system which is a combination of runway 24 and runway 06, arrival and departure individual routes.

runway 24 arrival scenario
+ runway 24 departure scenario
+ runway 06 arrival scenario
+ runway 06 departure scenario

=

full airport system scenario

Combining the scenarios listed in the previous section for each runway end produced 16 potential full airport system scenarios as shown in Table 5 opposite.

Table 5: Full airport system scenarios

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

NOTES:

Routes for which there was only one design are not listed as they are common across all the scenarios.

Note that colours for each route in this table match those shown on the maps earlier in this section.

CAP1616f para 4.13 states that *"The change sponsor may undertake further work as part of the design process to rationalise and refine their design options before completing the full options appraisal"*.

We therefore undertook a pre-FOA review of each scenario to identify which scenarios to take through to FOA.

2.3 Step 3: Pre-FOA review

This section is structured as follows.

- Section 2.3.1 presents an overview of the data considered in the pre-FOA scenario review.
- Sections 2.3.2 to 2.3.17 present the data outcomes of the pre-FOA scenario review for each of the 16 full airport system scenarios.

The conclusion of the pre-FOA scenario review, with the rationale for the selection of the full airport system scenarios to become the options is presented in Section 2.4.

2.3.1 Overview of the data considered in the pre-FOA scenario review

As this is a rationalising step before the FOA, we did not have the benefit of the complete FOA dataset. Some 'without airspace change' data was available along with overflight footprints for the pre-FOA scenarios, but neither noise nor overflight contour modelling of the pre-FOA scenarios were available as we were yet to undertake the FOA. We therefore used the following indicators, that were available pre-FOA. These were used to assess which of the pre-FOA scenarios would be likely to perform best against the CAP1616 FOA impact categories:

2.3.1.1 Indicators for potential adverse noise effects

The first two of the government's altitude-based environmental priorities for airspace[24] are:

a. *in the airspace from the ground to below 4,000ft the government's environmental priority is to limit and, where possible, reduce the total adverse effects on people;*

b. *where options for route design from the ground to below 4,000ft are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements;*

LAeq metrics are the measure of noise exposure adopted by the government for the purposes of considering adverse effects from aircraft noise.

LAeq metrics for options are generated during the FOA. They were therefore not available during this pre-FOA review of scenarios. However, at that stage we had undertaken LAeq analysis for the 'without airspace change' baseline scenario. This enabled us to undertake a qualitative review of each pre-FOA scenario by visually comparing the proposed routes against the 'without airspace change' LAeq contours. The aim was to assess whether each of our scenarios would be likely to reduce total adverse effects on people, and if not, how consistent the scenarios are to the existing published arrangements.

All our scenarios involve a redesign of all our routes to PBN standards and redistribution of flights across the new route structure, and so in terms of route design none of the routes are consistent with current arrangements. We therefore assessed the 'consistent with existing published airspace arrangements' criteria by considering whether adverse effects as a result of each pre-FOA scenario would likely be consistent with those that result from existing published arrangements, or by contrast, whether the adverse effects would be moved to/from different areas.

This visual comparison of the pre-FOA scenarios against 'without airspace change' contours is valid because we do not expect our proposal to have an impact on growth rates and so the flights in our 'without airspace change' sample are the same as those in our 'with airspace change' sample. This means that we can assume the scale of contours for the pre-FOA scenarios would be of the same order of magnitude as those for the 'without airspace change' scenario.

However, while the scale may be representative, differences in the shape and areas covered were to be expected where route alignment and traffic loading on routes in the pre-FOA scenarios differed from those in the 'without airspace change' scenario. For example, the pre-FOA scenarios were likely to have additional bulges, referred to as nodes, where the scenario included different route alignment to those seen in the 'without airspace change' scenario, and/or an absence of nodes where routes that exist in the 'without airspace change' scenario have moved, or are to be used less.

[24] Air Navigations Guidance 2017.

When assessing the scenarios against the baseline contours, we used the 2036 baseline year sample as this is based on more flights than the current day or 2027 baseline data.

Furthermore, on review the 2036 baseline LAeq 16 hour daytime and LAeq 8 hour night-time contours at the respective LOAEL (51dBA and 45dBA respectively) were seen to display the same features in terms of nodes, with the LAeq 8 hour being larger with more defined features. We therefore referenced the review against the 2036 baseline LAeq 8hr contours[25].

The visual comparison of the scenarios assessed for two characteristics:

1. whether there was a suggestion that the route changes could reduce adverse noise effects compared to the 'without airspace change' scenario
2. whether the routes align with today's published routes and therefore are less likely to change the shape contours (i.e. location/scale of nodes)

As this assessment is on how route changes may affect the contours, we undertook the visual comparisons on a route-by-route basis. The route-by-route conclusions are described below. The relevant conclusions were then applied to the results for each scenario in Sections 2.3.2 to 2.3.17 based on the combination of routes they involved.

[25] We visually compared the 2036 baseline LAeq 8hr that we used in this review against the 2036 baseline LAeq 16hr, and both 2027 baseline LAeq 8hr and LAeq 16hr contours, to ensure that these other contours did not display a pattern of nodes that would affect the conclusion of the review. In all cases the other contours displayed similar characteristics (albeit on a slightly smaller scale).

2.3.1.1.1 Potential adverse noise effects as a result of alternative designs runway 24 north and eastbound departures (STOPP, GULLY, BERRY)

Today's departure route configuration shown in Figure 33 has only one runway 24 route that turns north. This is the GRICE departure route which is used by only 2% of flights, with a significant proportion of smaller aircraft types flying to the Highlands and Islands, and generally these aircraft are vectored so that the turn is not made at a consistent location. As a result, there is not currently a node in the contour to the north. Today's GOSAM route (21% of flights) to the west turns slightly to the right overhead Livingston and this creates a node over the Deans area.

The alternative designs for the runway 24 north and eastbound routes are shown in Figure 34 on page 62 in relation to LAeq 8 hour contours for 2036.

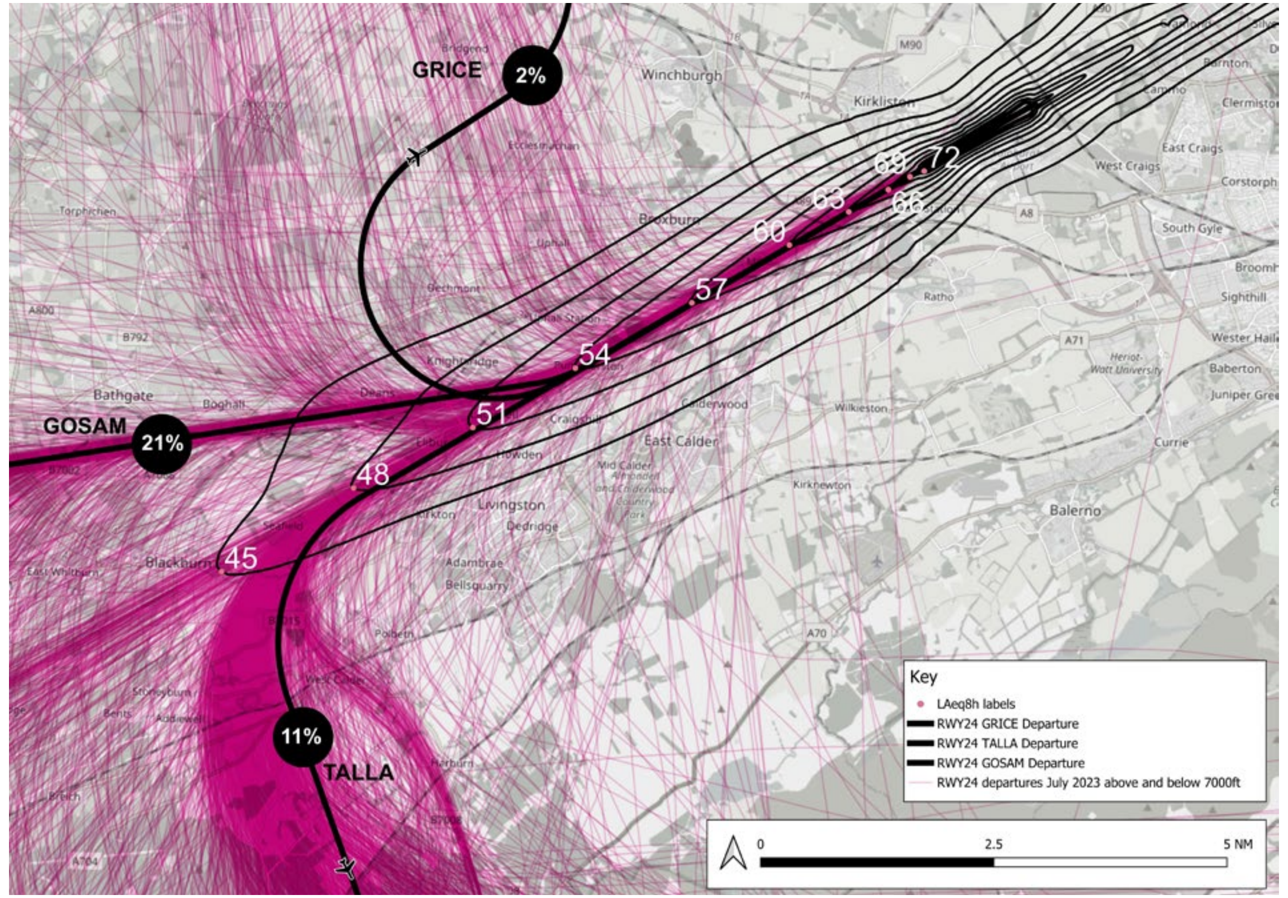


Figure 33: Today's departures routes, today's departure flight paths and 'without airspace change' 2036 baseline LAeq 8hr contours.[26]

[26] These departures make up 35% of the overall traffic. The numbers shown are rounded for presentational purposes. The unrounded numbers add up to 35%.

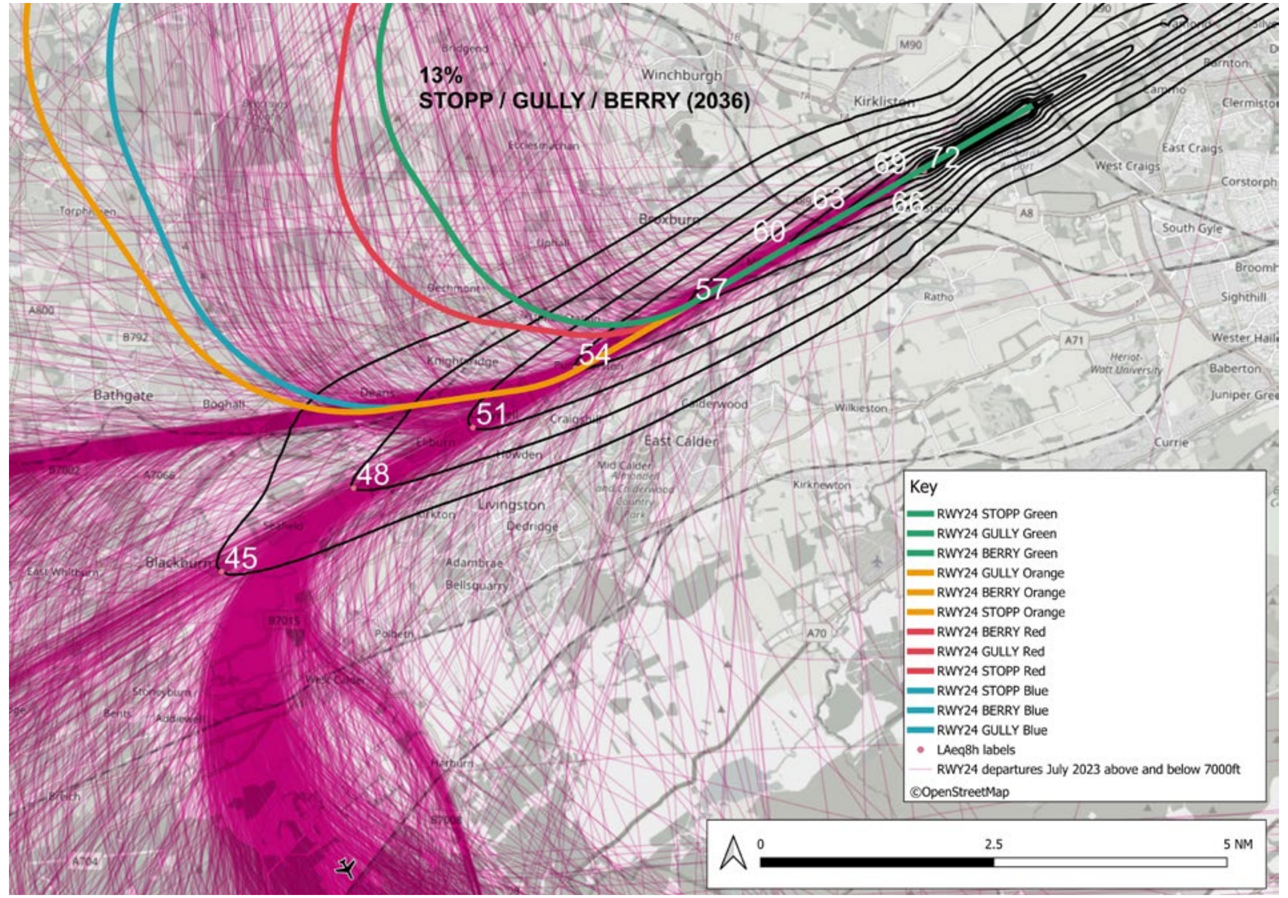


Figure 34: Alternative designs for runway 24 north and eastbound (STOPP, GULLY, BERRY) vs 'without airspace change' 2036 baseline LAeq 8hr contours and today's departure flight paths.

All the alternative designs of the runway 24 north and eastbound routes in this scenario will accommodate 13% of flights, with more medium and heavy types than use today's northbound GRICE. They will all also turn at a consistent point. This means they have the potential to change the shape of the contours.

The first conclusion of the assessment was that the alternative designs could be put in two generic groups, with the green and red having the initial right turn initiating before overflying Pumpherston which approximately marks the north eastern edge of the Livingston conurbation (this is below the '54' label on Figure 34), whereas the blue and orange initially continue straight ahead before turning slightly once past Pumpherston and overhead Livingston (matching today's GOSAM) and only making the full right turn once past Livingston.

As the blue and orange grouping follow today's GOSAM route until past Livingston, and only start turning north at the edge of the 45dBA contour, the assessment concluded there was no evidence to suggest either would have a significant influence on the shape of the contours.

However, both the green or red turn north before Livingston and would be expected to create a new node on the contour pointing to the north.

This node would be centred on the green or red routes which are both over largely unpopulated land, but it would also extend either side. Communities in Dechmont and the western end of Uphall would therefore potentially be brought into the LOAEL. The assessment concluded:

- Both green and red were assessed as to likely bring Dechmont into the night-time LOAEL.
- Green was assessed as would likely have a greater impact on communities in Uphall, whereas.
- Red would also potentially bring part of the new Bangour Village development (west of Dechmont but not marked on the map) into the LOAEL.

Critically, however, it was assessed that both green and red were also likely to draw back the LOAEL over the more densely populated area of Deans. Higher contours over Livingston would also likely be drawn back in from the northwest as a result of either the red or green route peeling away to the north before overflying the centre of Livingston. Overall, this potential benefit for the more populated areas of Livingston was assessed as likely to be greater than the negative effect on communities under the early turn north.

The pre-FOA review therefore categorises each scenario with respect to the runway 24 north and eastbound routes as either:

- **Positive assessment** as result of potential improvements to adverse effects because the area the route overflies is generally less densely populated (this applies to scenarios with green or red designs).
- **Neutral assessment** because routes within the contours resemble today's GOSAM so no evidence to suggest significant change to contours (this applies to scenarios with the blue or orange designs).

2.3.1.1.2 Potential adverse noise effects as a result of alternative designs for runway 24 southbound departures (STRAT)

Figure 33 on page 61 shows today's route configuration has the TALLA route to the south (11%) initially heading straight ahead over the Eliburn area of Livingston and generally turning south only once past the western edge of Livingston. The aircraft are mostly vectored at the initial turn meaning the turn is not made in a consistent place. As such there is no clear node in the contour where flights turn south, although these flights following will contribute to size of the node along the alignment of the runway (adding to the effects of the runway 06 arrivals which also have a flight path that generally aligns on the runway from beyond Livingston).

The alternative designs for the runway 24 southbound departure route are shown in Figure 35 on page 64 in relation to LAeq 8 hour contours for 2036. This route will accommodate 15% of flights.

The orange design turns south in a similar place to today's TALLA route, turning at the western edge of Livingston. Given this similarity, the assessment concluded there was no evidence to suggest orange would have a significant effect on the shape of the contours.

The red design turns south at the eastern edge of Livingston. This would be expected to draw in the node along the extended centreline over Eliburn at the expense of a new node south towards Dedridge. As both the area in which the contour would draw back, and the area that the new node would cover are similarly populated, the assessment concluded that there was insufficient evidence at this stage to suggest either positive or negative net change in adverse effects from the red design. However, it could be concluded that red would represent a greater change to contour areas (i.e. more people who would experience either positive or negative change) than the orange design.

The pre-FOA review therefore categorises each scenario with respect to the runway 24 westbound routes as either:

- **Neutral assessment**, because there is no evidence to suggest a net improvement to adverse effects outcomes and follows a segment of one of today's published routes and so changes to contours will be minimised (this applies to scenarios with the orange design).
- **Moderately negative assessment**, because there is no evidence to suggest a net improvement to adverse effects outcomes but as it doesn't follow today's published route, more areas will experience change (this applies to scenarios with the red design).

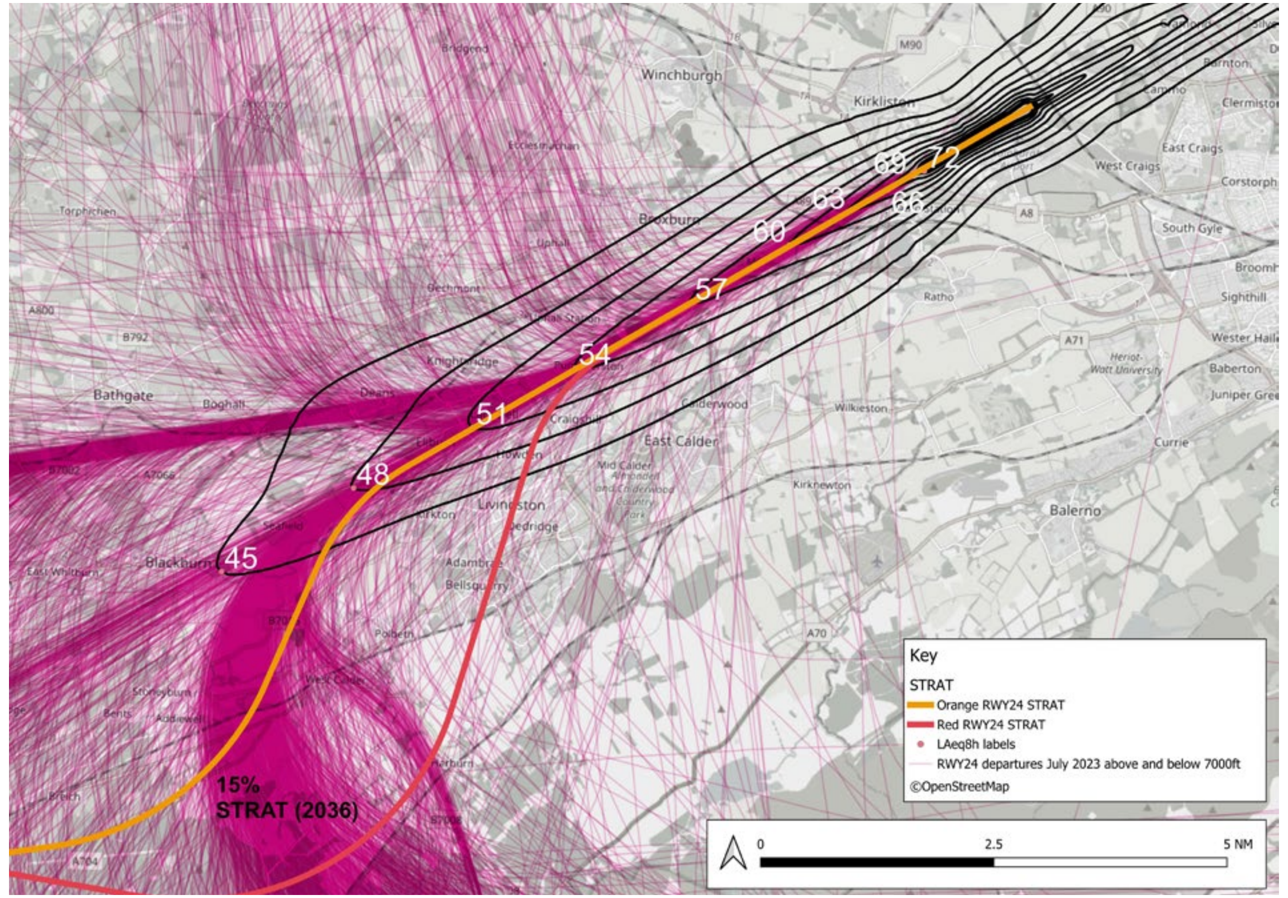


Figure 35: Alternative designs for runway 24 southbound (STRAT) vs 'without airspace change' 2036 baseline LAeq 8hr contours.

2.3.1.1.3 Potential adverse noise effects as a result of alternative designs for runway 06 westbound departures (STEPS)

Figure 36 shows that the turn to the west on both designs for the runway 06 westbound route are over the Firth of Forth. The assessment concluded that the choice of either red or orange for this route would have no effect on adverse effect outcomes, although it noted that in both designs the shift of the route slightly further away from Cramond (with either the red or the orange design) would likely have a small but positive impact on adverse effects.

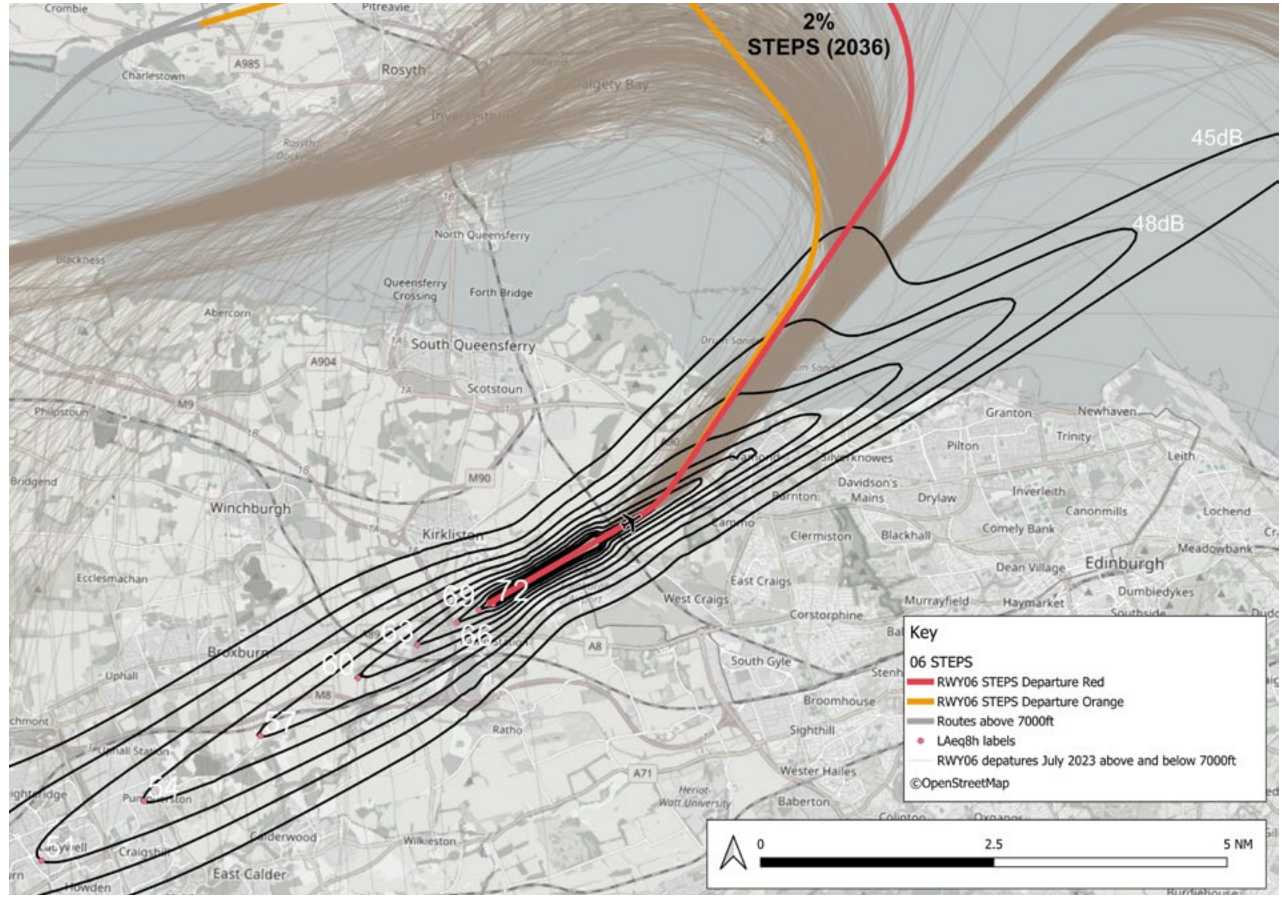


Figure 36: Alternative designs for runway 06 westbound (STEPS) vs 'without airspace change' 2036 baseline LAeq 8hr contours.

2.3.1.1.4 Potential adverse noise effects as a result of other routes

The scenarios all shared the same routes for all other departures and all approach routes. As the pre-FOA review was an exercise to compare scenarios no assessment was undertaken[27].

2.3.1.2 Indicators for overflight, tranquillity and related sensitive receptors

Full overflight contours were not available for this pre-FOA scenario review, however, overflight footprints for the individual routes in each scenario were. Overflight footprints show the areas overflown by aircraft on a route according to the CAA's definition of overflight[28]. The overflight footprints used for the pre-FOA scenario review were based on the CAA's 48.5° definition and reach to 7,000ft above mean sea level. One or two footprints are shown for each departure route extending out to where we would expect a typical medium and typical heavy aircraft (the latter being slower climbing), to pass 7,000ft. For the turboprop routes only routes (SKIRL) we show the footprint for a typical turboprop. Arrivals descent is not based on aircraft weight and so one typical profile is shown for each PBN approach transition.

All the footprints extend beyond the 51dBA LAeq 16hr (daytime) contour, and the 45dBA LAeq 8hr (night-time) contours, which cover an area where we expect most aircraft to still be at 4,000ft or below. A comparison of footprints to 7,000ft can therefore tell us something about how each scenario might affect impacts from overflight beyond the contours listed above. We did this by generating population data and GoldSET suitability scores from the overflight footprints for each scenario.

In addition to the basic population counts, the population data includes Overflight Event Index (OEI) which accounts for route usage, and the Weighted OEI which accounts for both route usage and height[29] and so allows for a meaningful numerical comparison between scenarios.

GoldSET suitability scores were generated from the GoldSET suitability surface described in the previous section. These were also weighted for route usage and aircraft height to allow for meaningful comparison between scenarios.

For details of the methodology see Annex D.

Note that we did not attempt to compare against overflight footprints for today's published routes because we know that vectoring means that aircraft today are rarely left on those routes to the end and so this comparison would not be helpful (and potentially misleading).

2.3.1.3 Indicators for fuel burn

The pre-FOA scenario review was undertaken before any fuel burn modelling had been undertaken for either the 'without airspace change' baseline or the full airport system scenarios. Fuel burn for the scenarios was therefore reviewed using route length as an indicator.

Route length is a reasonable indicator of relative fuel burn performance for the scenarios for two reasons:

Firstly there are consistent start and end points for the routes in all the full airport system scenarios. For departures the route length is measured between the end of the runaway and the end of the departure route. Both these points are the same for the routes in each scenario. Similarly, the arrival route length is measured from the holding stack to the runway, again these are the same for the routes in each scenario.

Secondly the climb/descent profiles for the route in each full airport system scenario are the same. Continuous climb is achieved for most departure routes and where it is not the case, the restrictions below 7,000ft are similar for each scenario. Likewise for arrivals we expect that continuous descent would be equally achieved for arrivals in each of the scenarios.

[27] At this stage in the process there was no data for secondary metrics, i.e. 'number above' contours. Therefore the pre-FOA review focused on qualitative assessment of potential adverse noise effects as these are the primary noise metric for decision making.

[28] see CAP1489.

[29] These additional metrics enable a more robust comparison of scenarios to each other, rather than using a simple population count of people within each overflight footprint, because whilst a simple population count is easy to understand, it could lead to poor design decisions. For example, consider a choice between option X: a little used route overflying 1,000 people at 6,000ft versus Option Y: a more commonly flown route overflying 900 people at 1,000ft. A simple population count would say option Y at 900 people overflown is better than Option X with 1,000 overflown, when in fact the greater impact of additional flights/lower altitude would mean that the opposite is more likely to be true. This can be addressed by applying weighting that takes into account both the relative usage of the route and the height of the overflight along the footprint. The methodology for the analysis is detailed in Annex D.

However, these two factors do not apply to the baseline because the wider network changes mean the departure end point and the locations of holding stacks differ from those in the new full airport system scenarios. We also expect that continuous climb and continuous descent profiles will differ between the baseline and the new full airport system scenarios (they would be improved). For both these reasons, route length could be used in this pre-FOA scenario review as an indicator of comparative performance between the scenarios, but not between the scenarios and the baseline (a comparison of fuel burn with the baseline is done in the full FOA through modelling of the whole ScTMA Cluster for both the baseline and the FOA options, which was not available in the pre-FOA scenario review).

A further factor to consider when using route length as an indicator is how often each route is flown. Each route accommodates a different volume of flights and therefore a small route length reduction on a heavily used route may have a greater impact than a large reduction in a less used route. We therefore generated a weighted route length according to the proportion of flights on each route. This allowed the comparison of the route length indicator for fuel burn to take route usage into consideration.

2.3.1.4 Indicators for CO_2e performance

Fuel burn and CO_2e are directly proportional so the same route length indicator applies to both. However, it should be noted that the beneficiaries of each are different; reduced fuel burn is a benefit to the airlines which can be passed on to the travelling public, whereas CO_2e reduction is a global benefit to the wider community. Therefore, even though we use the same indicator for fuel burn and CO_2e the benefits should be considered separately.

2.3.1.5 Other performance categories

All the full airport system scenarios have been designed to meet the same safety, network integration and technical criteria and so a comparison of these categories would not provide an indicator of relative performance. Likewise, all the scenarios have the same controlled airspace requirements, the same impact on airport capacity and the same costs for either airlines and/or air traffic service providers. Therefore, none of these criteria were considered in the pre-FOA scenario review.

2.3.1.6 Usage figures

Note that the percentages of flights on each route show 2036 forecast usage. For simplicity, these percentages are rounded to the nearest whole number, or if it is 0.5 or less it is shown as 'less than 1%'. In all cases the *unrounded* percentages for runway 24 add up to 70%, which represents the proportion of our overall flights that are to/from runway 24. Likewise, all *unrounded* percentages for runway 06 add up to 30%, which represents the proportion of our overall flights that are to/from runway 06.

2.3.2 Pre-FOA scenario review for full airport system scenario 1A&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 1A&1C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 37 opposite and Figure 38 on page 70 show the route configuration for scenario 1A&1C.

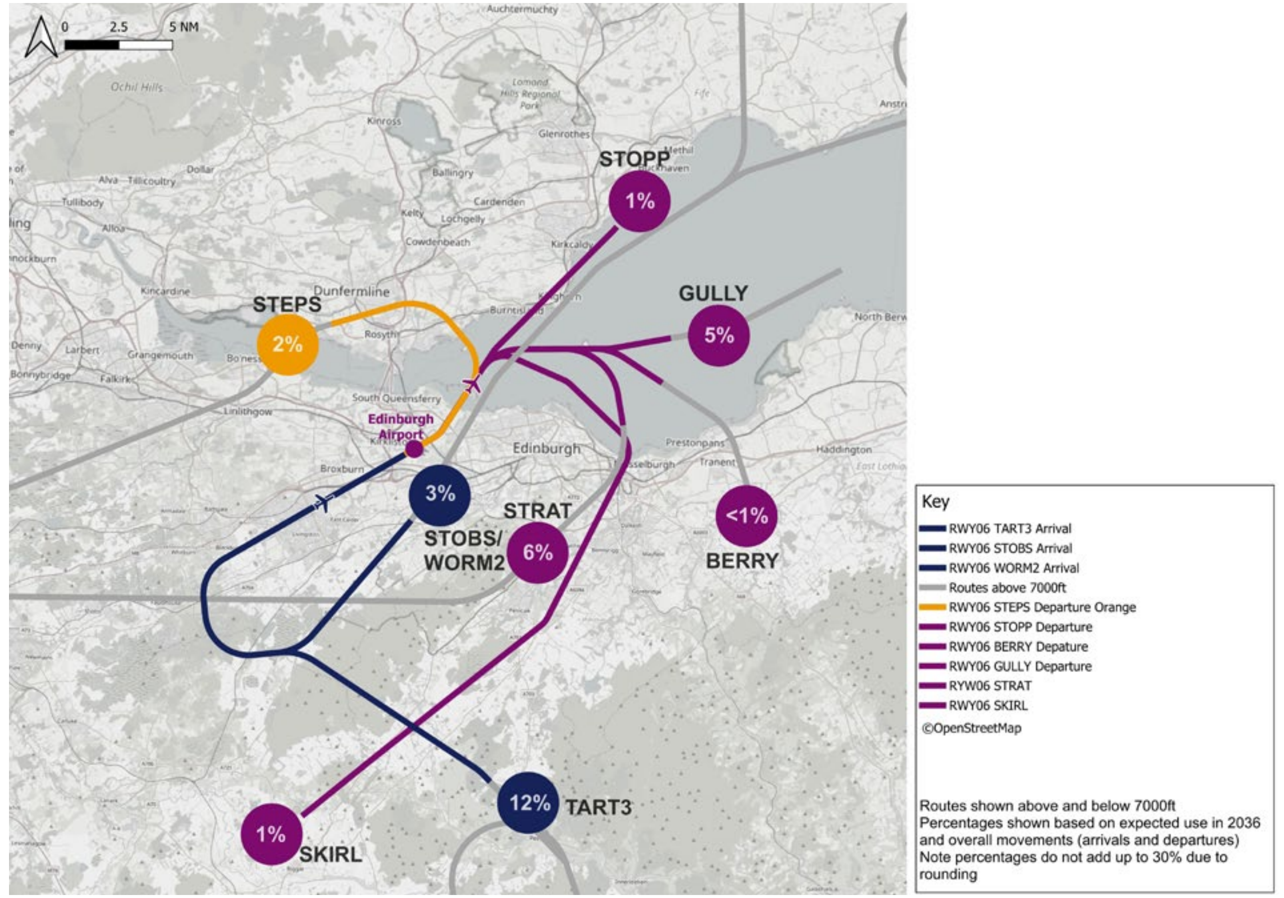


Figure 37: Design for scenario 1A&1C – runway 06.

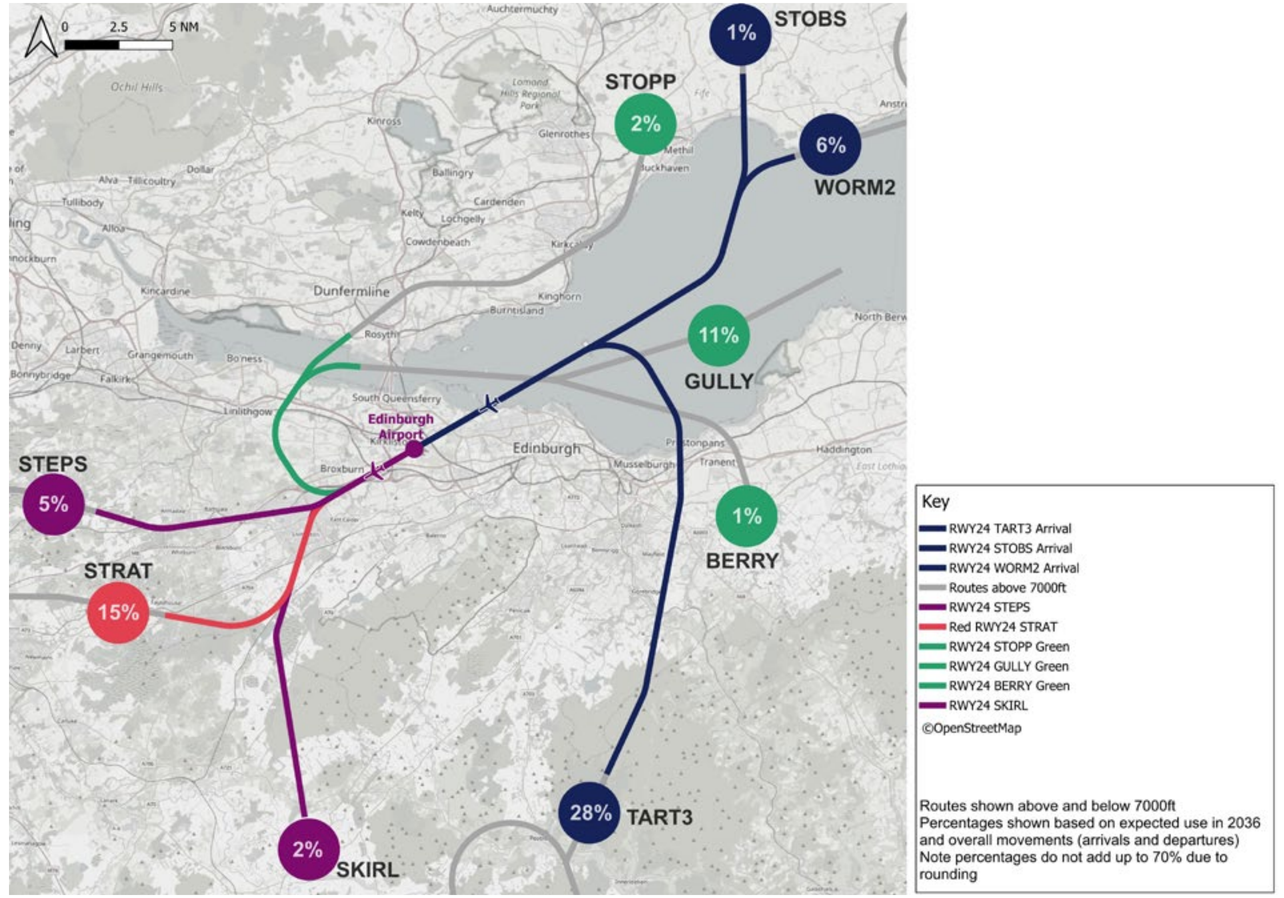


Figure 38: Design for scenario 1A&1C – runway 24.

2.3.2.1 Scenario 1A&1C indicators for potential adverse noise effects

Section 2.3.1.1 describes how the assessment with respect to potential impacts of the alternative designs.

Table 6: Qualitative assessment of potential adverse noise effects for scenario 1A&1C

Scenario	**RWY24 North & Eastbound –** Potential improvements to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvements to net adverse effects
1A&1AC	yes	no	yes – small

2.3.2.2 Scenario 1A&1C indicators for overflight footprints vs population density and GoldSET suitability surface

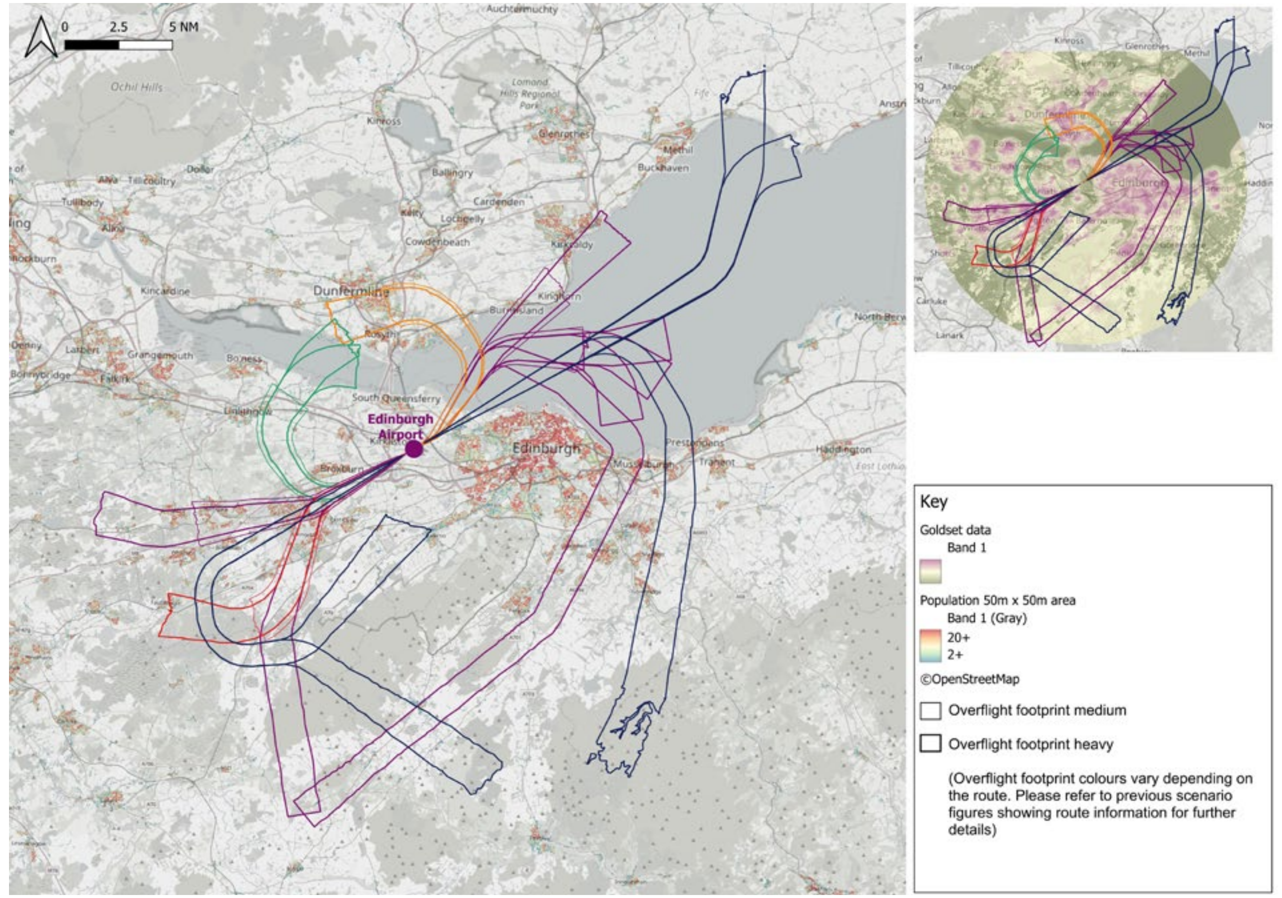


Figure 39: Scenario1A&1C overflight footprints vs population density and GoldSET suitability surface.

Table 7: Scenario1A&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
1A&1AC	93,143,006	96.42

2.3.2.3 Scenario 1A&1C indicators for fuel burn and CO_2e efficiency review

Table 8: Scenario 1A&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Green	30.8	3,006	92,571
24	To east (GULLY)	Green	36.7	14,166	519,901
24	To east (BERRY)	Green	33.7	899	30,289
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,177,708

2.3.3 Pre-FOA scenario review for full airport system scenario 1B&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 1B&1C.

Runway 24 features for:		**Runway 06 features for Westbound (STEPS)**	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 40 and Figure 41 show the route configuration for scenario 1B&1C.

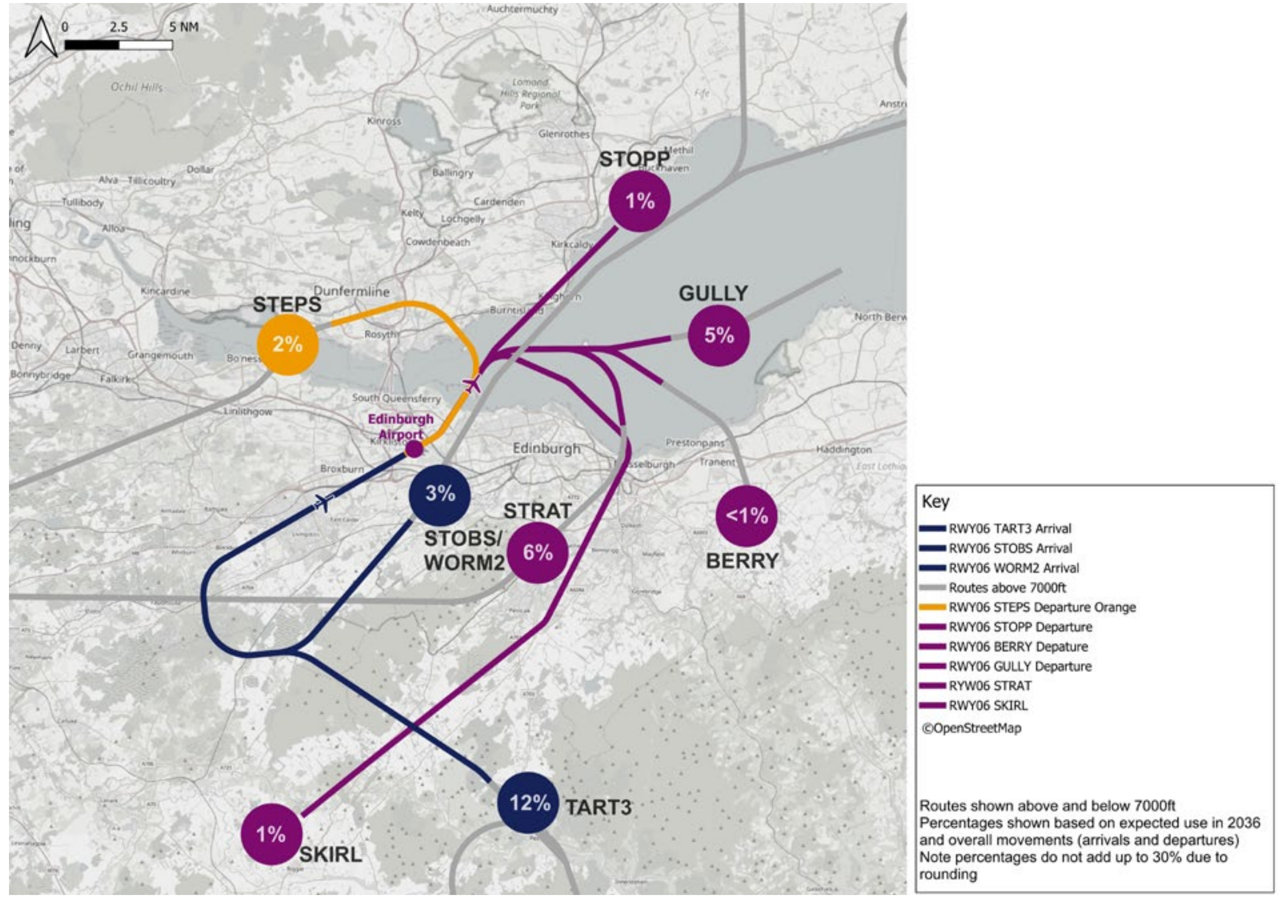


Figure 40: Design for scenario 1B&1C – runway 06.

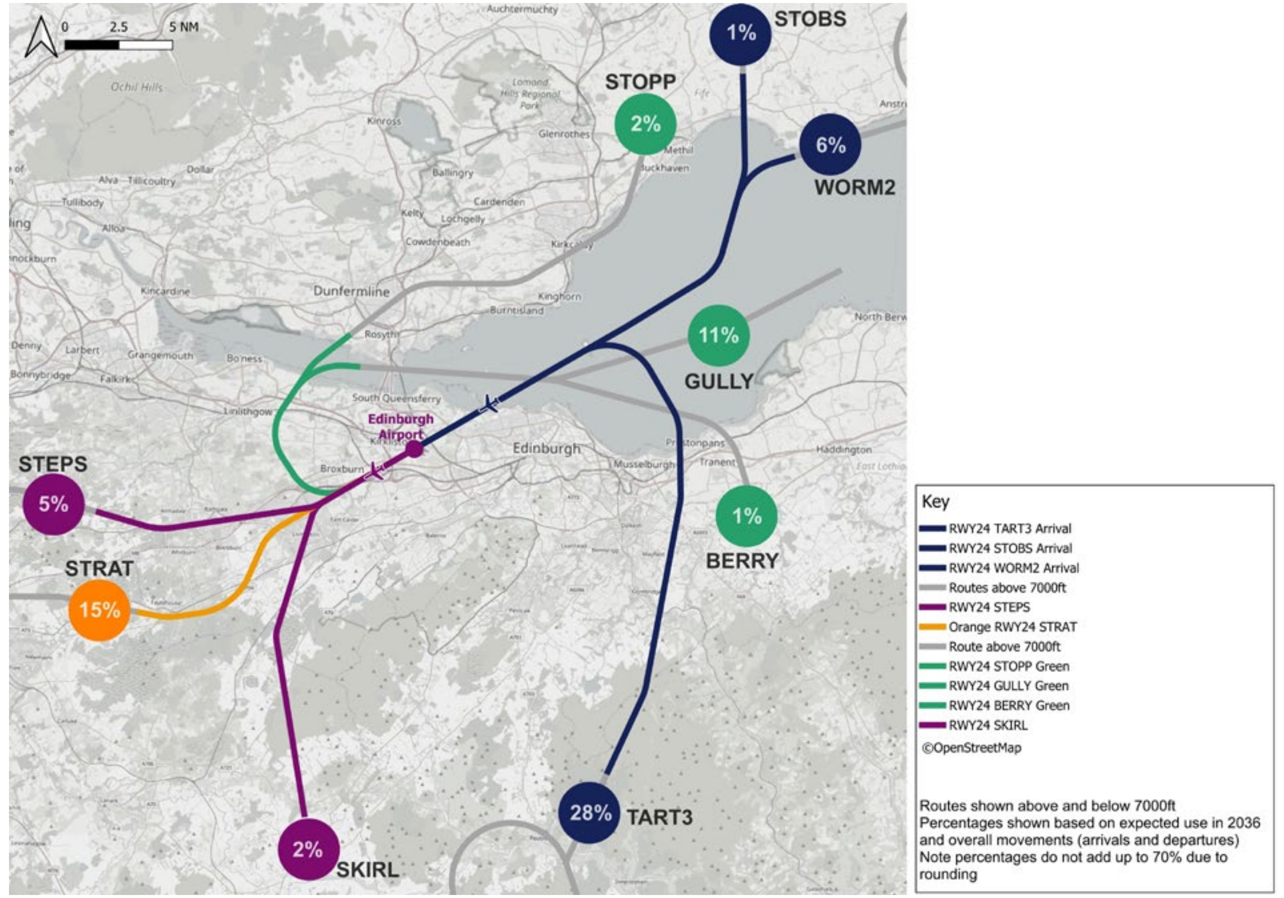


Figure 41: Design for scenario 1B&1C – runway 24.

2.3.3.1 Scenario 1B&1C indicators for potential adverse noise effects

Table 9: Qualitative assessment of potential adverse noise effects for scenario 1B&1C

Scenario	RWY24 North & Eastbound – Potential improvement to net adverse effects	RWY24 Southbound – Routes resemble to today's, so minimal change	RWY06 Westbound – Potential improvement to net adverse effects
1B&1C	yes	yes – neutral	yes – small

2.3.3.2 Scenario 1B&1C indicators for overflight footprints vs population density and GoldSET suitability surface

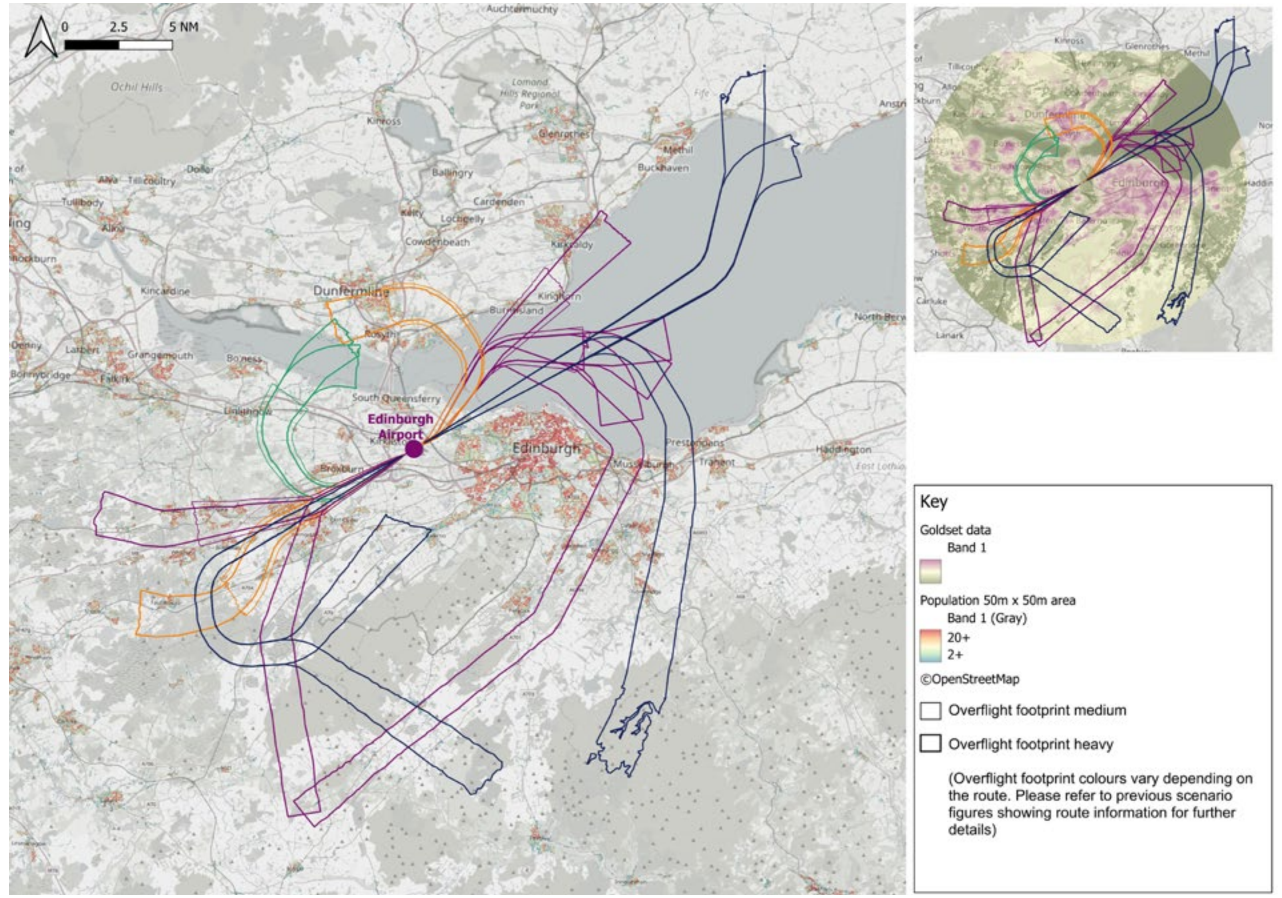


Figure 42: Scenario1B&1C overflight footprints vs population density and GoldSET suitability surface.

Table 10: Scenario 1B&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
1B&1C	93,573,806	94.40

2.3.3.3 Scenario 1B&1C indicators for fuel burn and CO_2e efficiency review

Table 11: Scenario 1B&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Green	30.8	3,006	92,571
24	To east (GULLY)	Green	36.7	14,166	519,901
24	To east (BERRY)	Green	33.7	899	30,289
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,149,705

2.3.4 Pre-FOA scenario review for full airport system scenario 2A&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 2A&1C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 43 opposite and Figure 44 on page 82 show the route configuration for scenario 2A&1C.

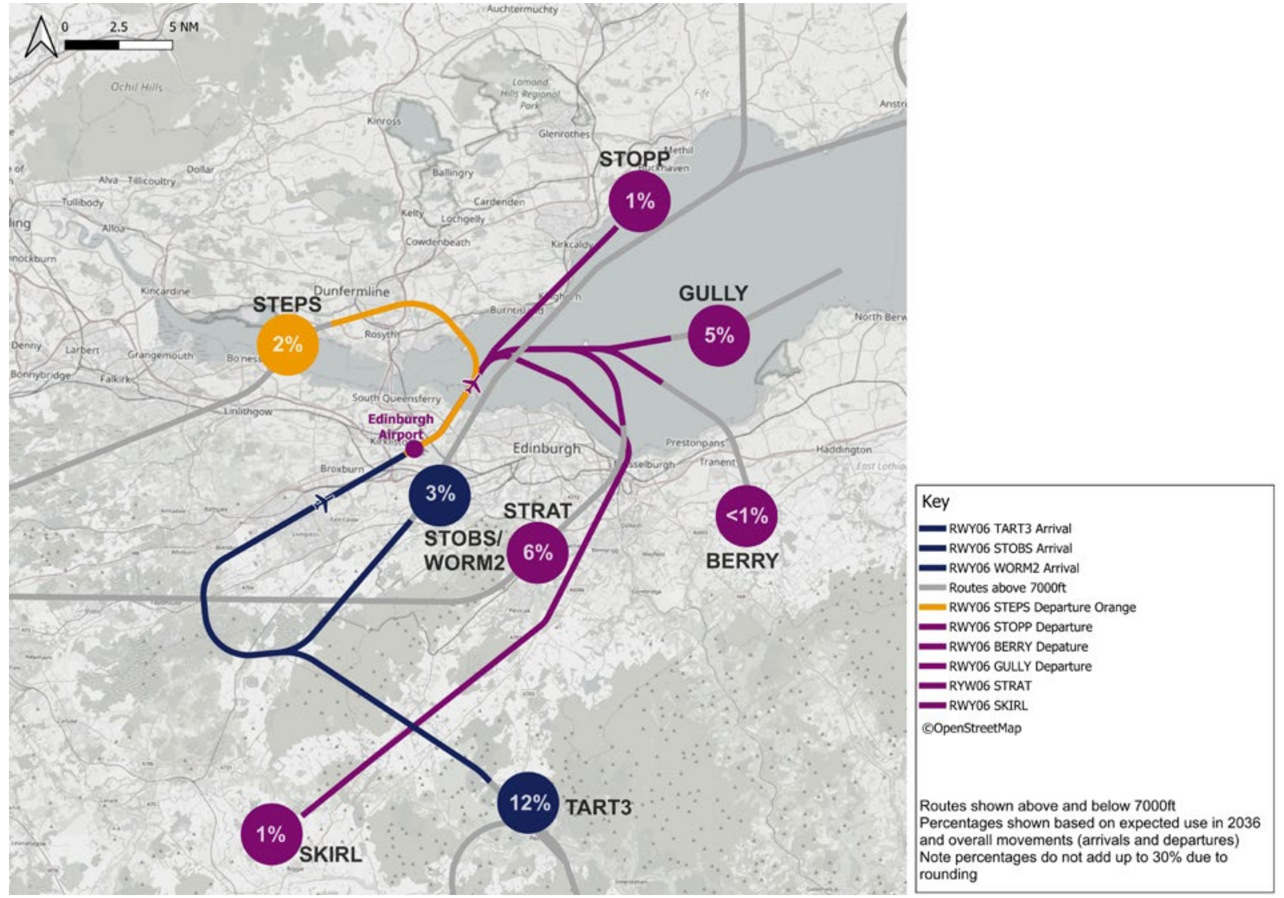


Figure 43: Design for scenario 2A&1C – runway 06.

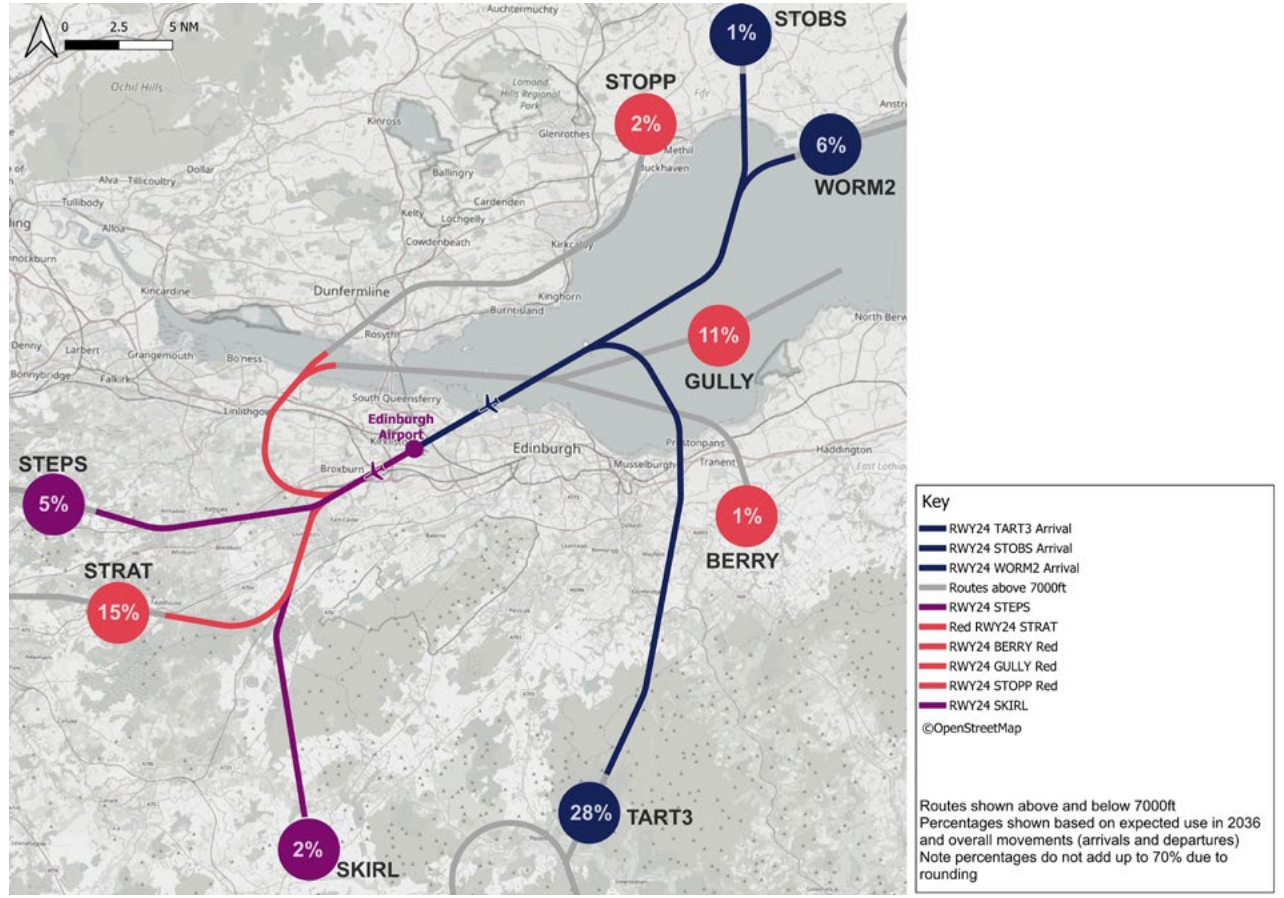


Figure 44: Design for scenario 2A&1C – runway 24.

2.3.4.1 Scenario 2A&1C indicators for potential adverse noise effects

Table 12: Qualitative assessment of potential adverse noise effects for scenario 2A&1C

Scenario	RWY24 North & Eastbound – Potential improvement to net adverse effects	RWY24 Southbound – Routes resemble to today's, so minimal change	RWY06 Westbound – Potential improvement to net adverse effects
2A&1C	yes	no	yes – small

2.3.4.2 Scenario 2A&1C indicators for overflight footprints vs population density and GoldSET suitability surface

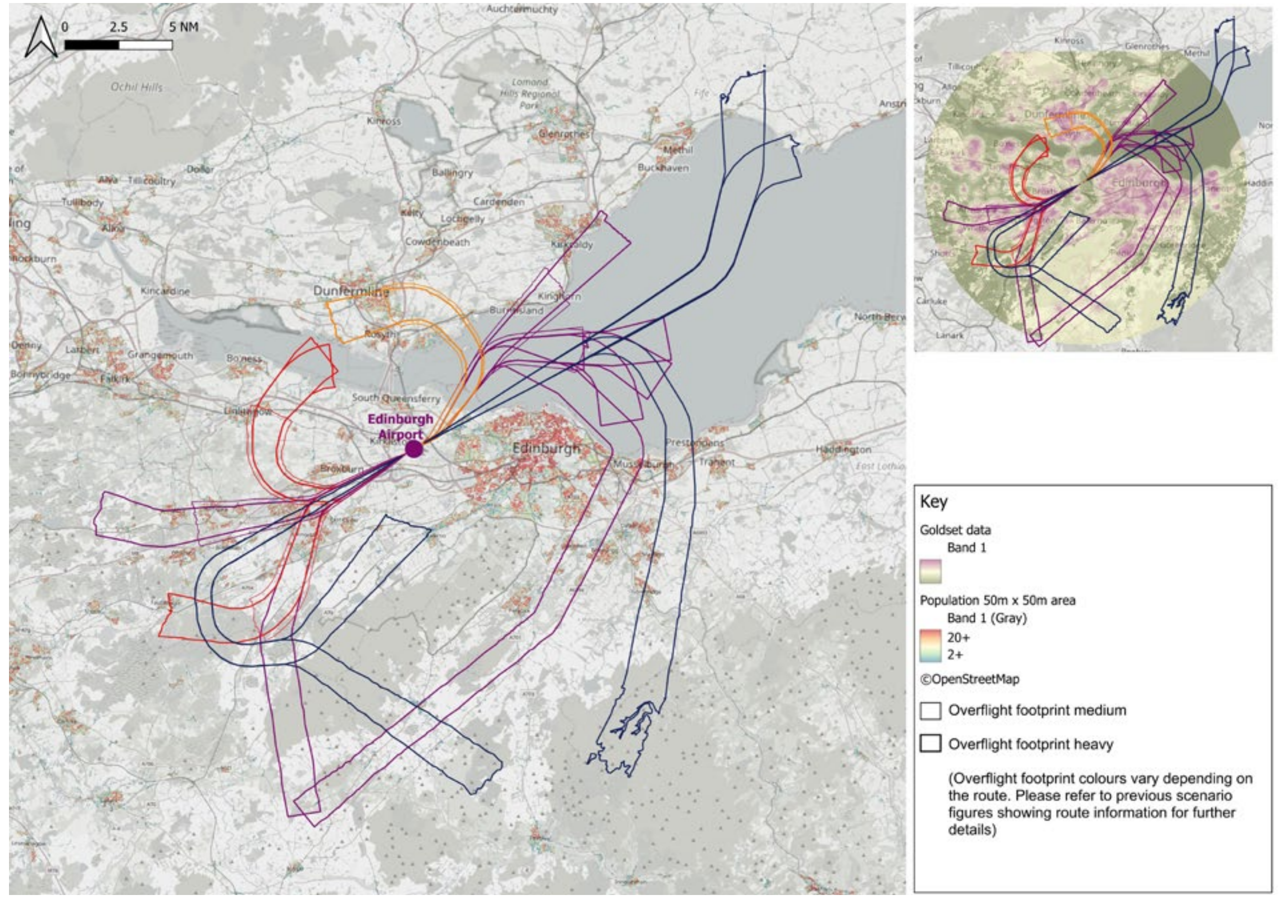


Figure 45: Scenario 2A&1C overflight footprints vs population density and GoldSET suitability surface.

Table 13: Scenario 2A&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
2A&1C	93,865,106	96.39

2.3.4.3 Scenario 2A&1C indicators for fuel burn and CO_2e efficiency review

Table 14: Scenario 2A&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Red	31.9	3,006	95,877
24	To east (GULLY)	Red	37.8	14,166	535,484
24	To east (BERRY)	Red	34.8	899	31,277
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,197,586

2.3.5 Pre-FOA scenario review for full airport system scenario 2B&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 2B&1C.

Runway 24 features for:		**Runway 06 features for Westbound (STEPS)**	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 46 opposite and Figure 47 on page 88 show the route configuration for scenario 2B&1C.

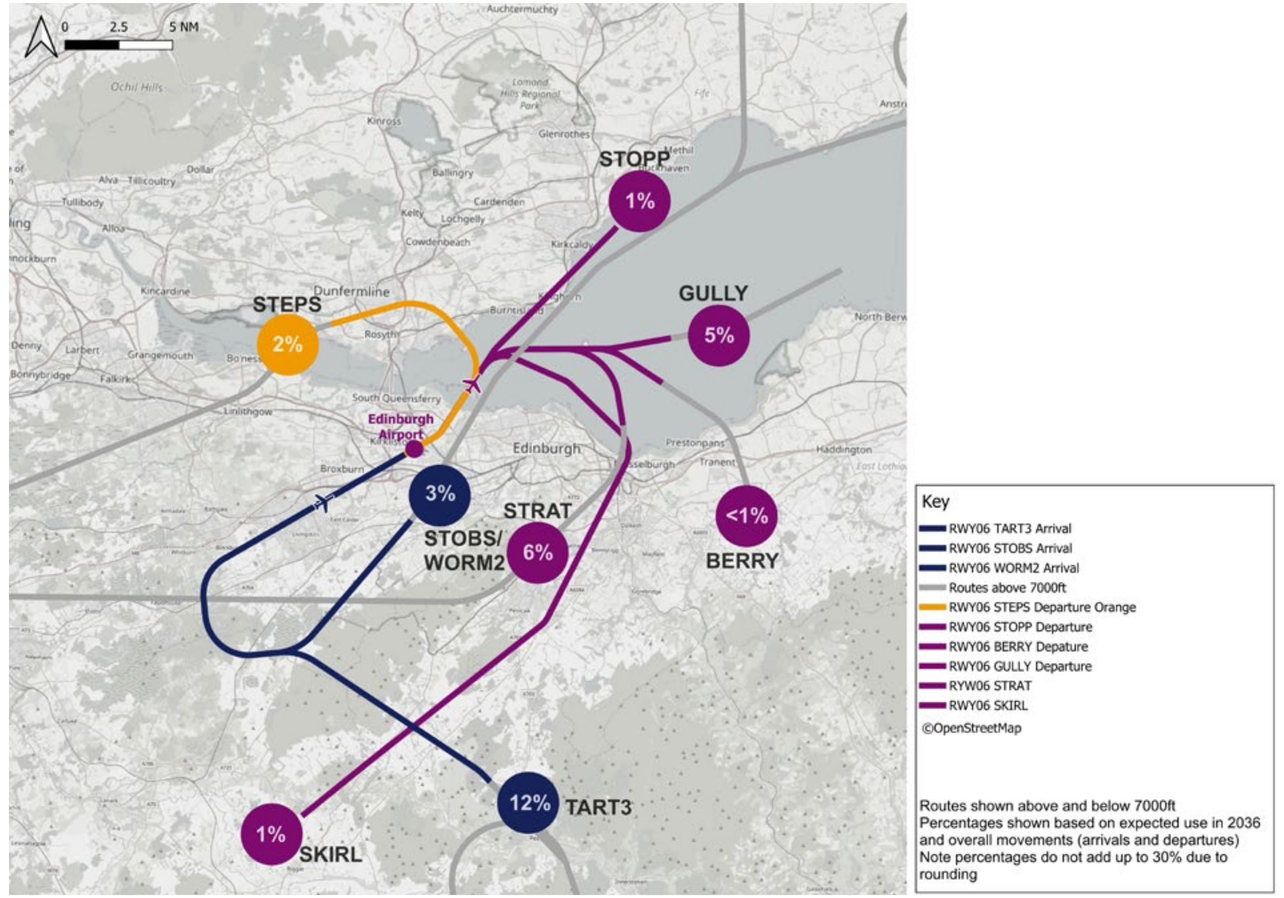


Figure 46: Design for scenario 2B&1C – runway 06.

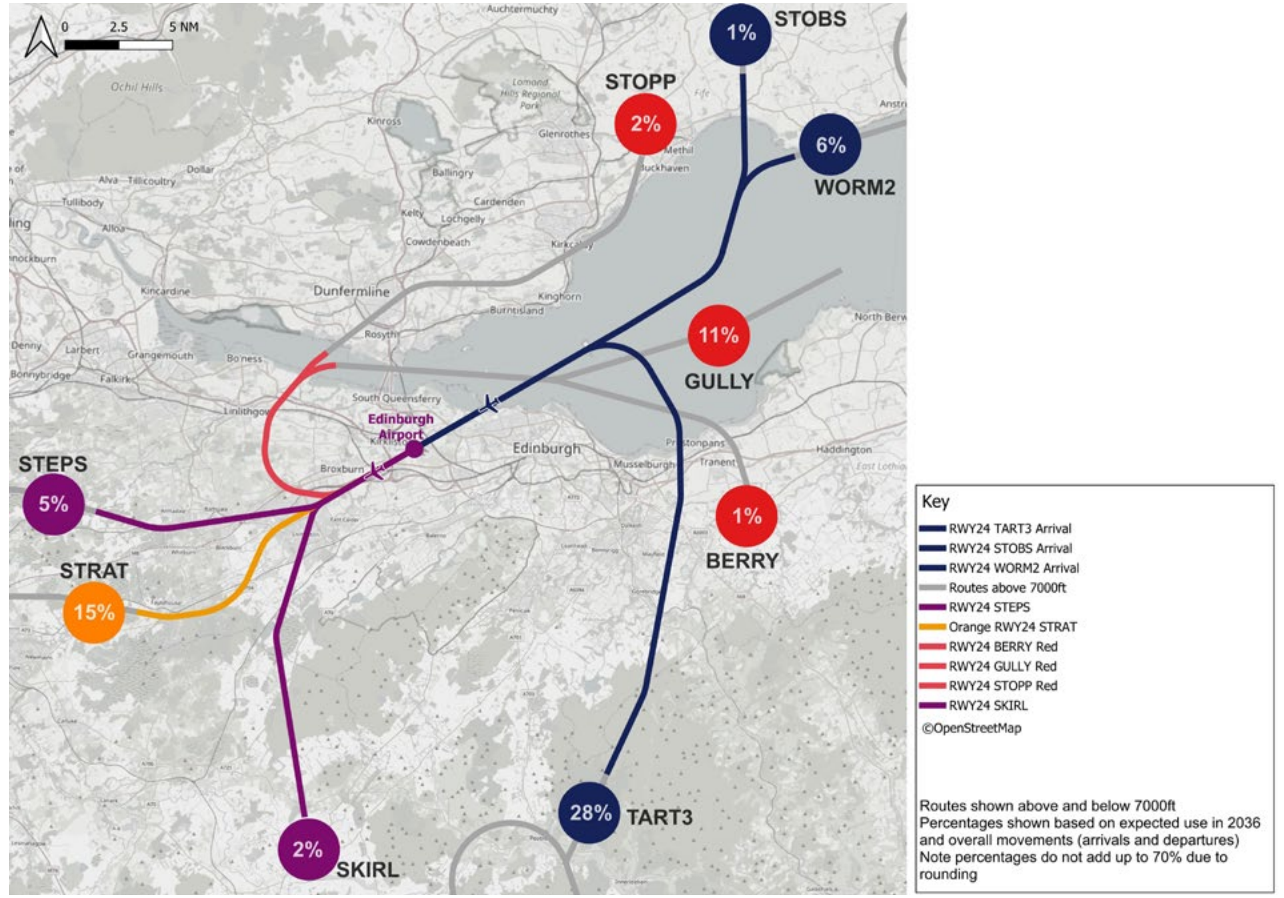


Figure 47: Design for scenario 2B&1C – runway 24

2.3.5.1 Scenario 2B&1C indicators for potential adverse noise effects

Table 15: Qualitative assessment of potential adverse noise effects for scenario 2B&1C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
2B&1C	yes	yes – neutral	yes – small

2.3.5.2 Scenario 2B&1C indicators for overflight footprints vs population density and GoldSET suitability surface

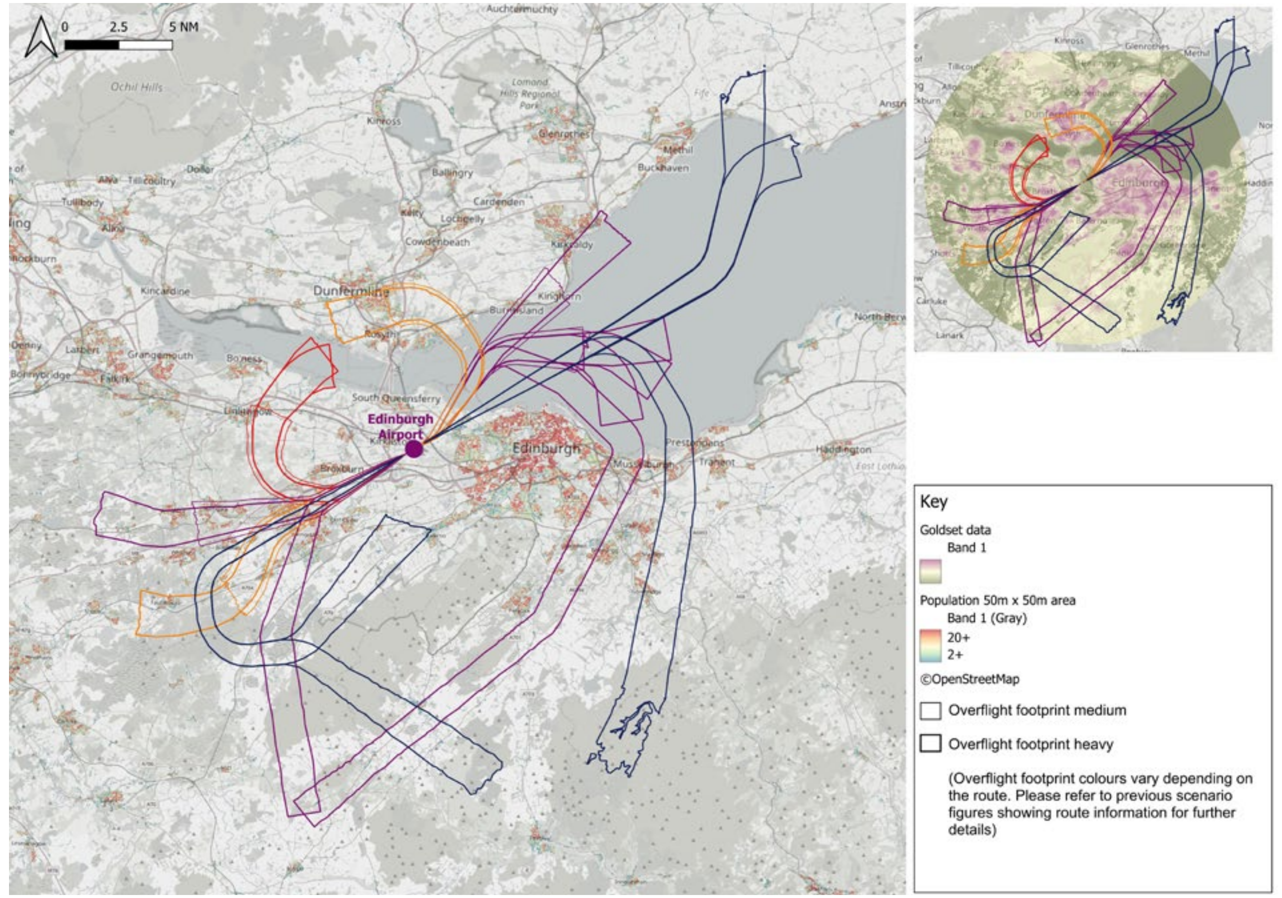


Figure 48: Scenario 2B&1C overflight footprints vs population density and GoldSET suitability surface.

Table 16: Scenario 2B&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
2B&1C	94,295,906	96.37

2.3.5.3 Scenario 2B&1C indicators for fuel burn and CO_2e efficiency review

Table 17: Scenario 2B&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Red	31.9	3,006	95,877
24	To east (GULLY)	Red	37.8	14,166	535,484
24	To east (BERRY)	Red	34.8	899	31,277
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,169,583

2.3.6 Pre-FOA scenario review for full airport system scenario 3A&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 3A&1C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	Southbound (STRAT)	Orange (turns west of Aberdour)	Red (turns east of Aberdour)
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 49 opposite and Figure 50 on page 94 show the route configuration for the scenario 3A&1C.

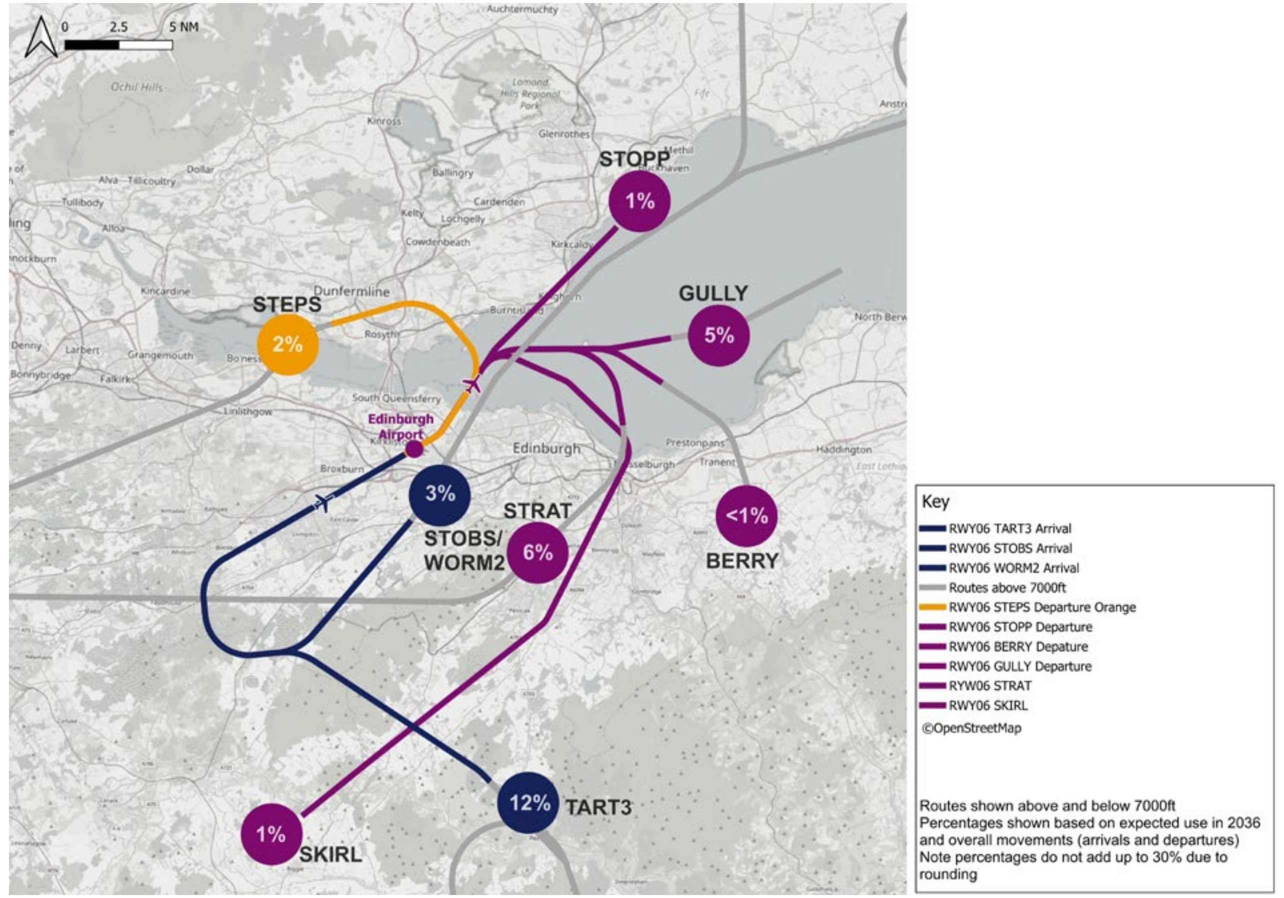


Figure 49: Design for scenario 3A&1C – runway 06.

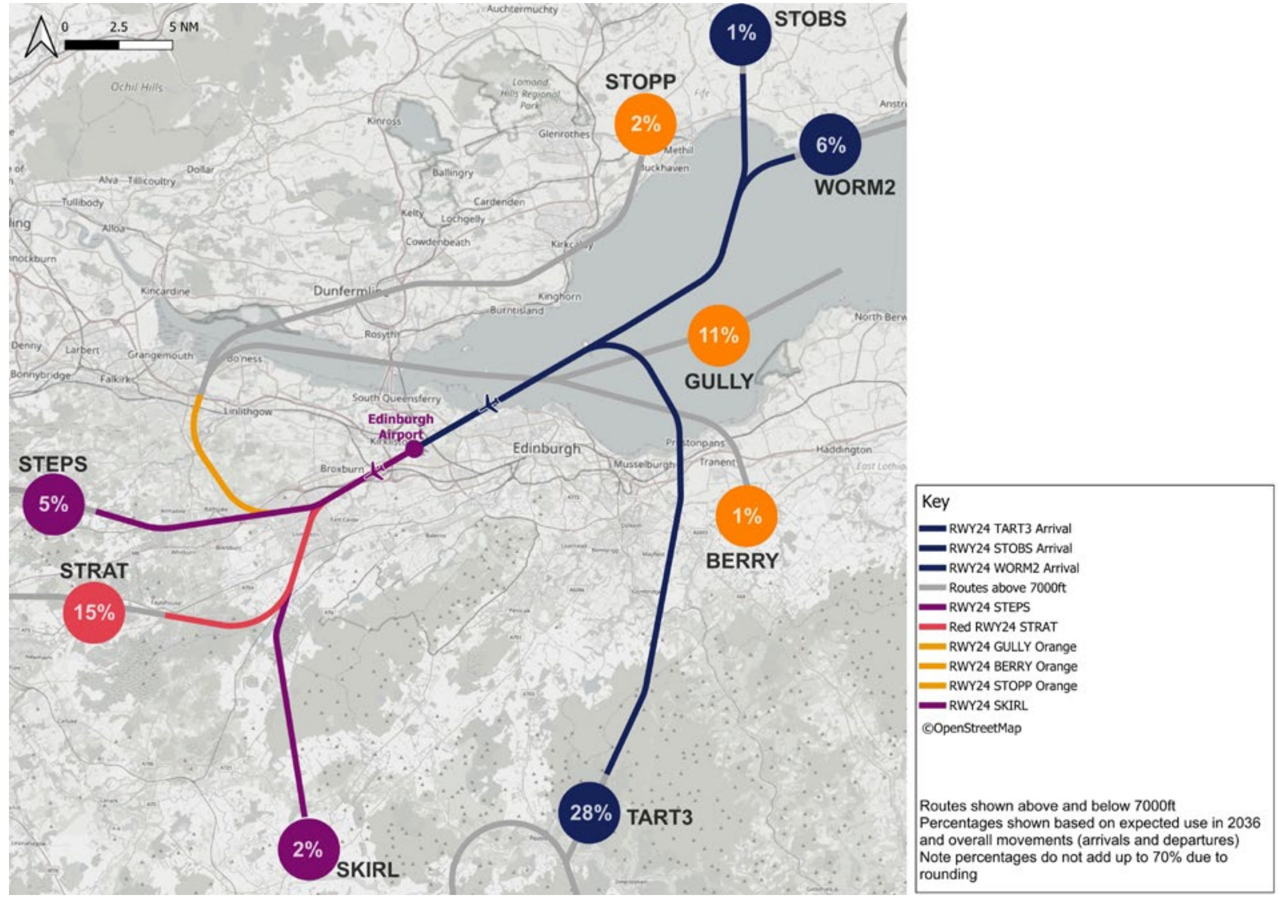


Figure 50: Design for scenario 3A&1C – runway 24.

2.3.6.1 Scenario 3A&1C indicators for potential adverse noise effects

Table 18: Qualitative assessment of potential adverse noise effects for scenario 3A&1C

Scenario	RWY24 North & Eastbound – Potential improvement to net adverse effects	RWY24 Southbound – Routes resemble to today's, so minimal change	RWY06 Westbound – Potential improvement to net adverse effects
3A&1C	no evidence – neutral	no	yes – small

2.3.6.2 Scenario 3A&1C indicators for overflight footprints vs population density and GoldSET suitability surface

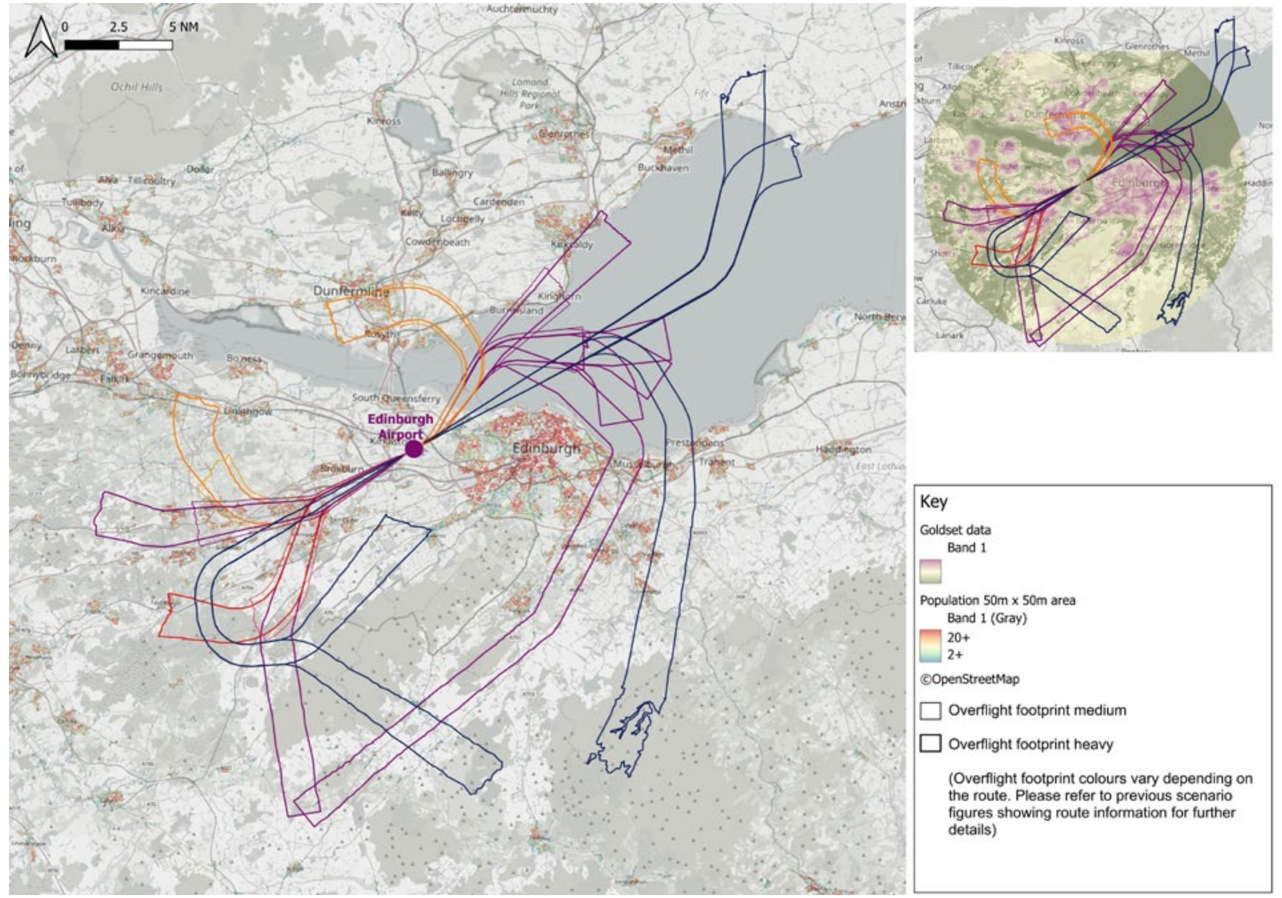


Figure 51: Scenario 3A&1C overflight footprints vs population density and GoldSET suitability surface.

Table 19: Scenario 3A&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
3A&1C	98,584,543	96.36

2.3.6.3 Scenario 3A&1C indicators for fuel burn and CO_2e efficiency review

Table 20: Scenario 3A&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Orange	39.2	3,006	117,817
24	To east (GULLY)	Orange	45.8	14,166	648,813
24	To east (BERRY)	Orange	42.8	899	38,469
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,340,046

2.3.7 Pre-FOA scenario review for full airport system scenario 3B&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 3B&1C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 52 opposite and Figure 53 on page 100 show the route configuration for the scenario 3B&1C.

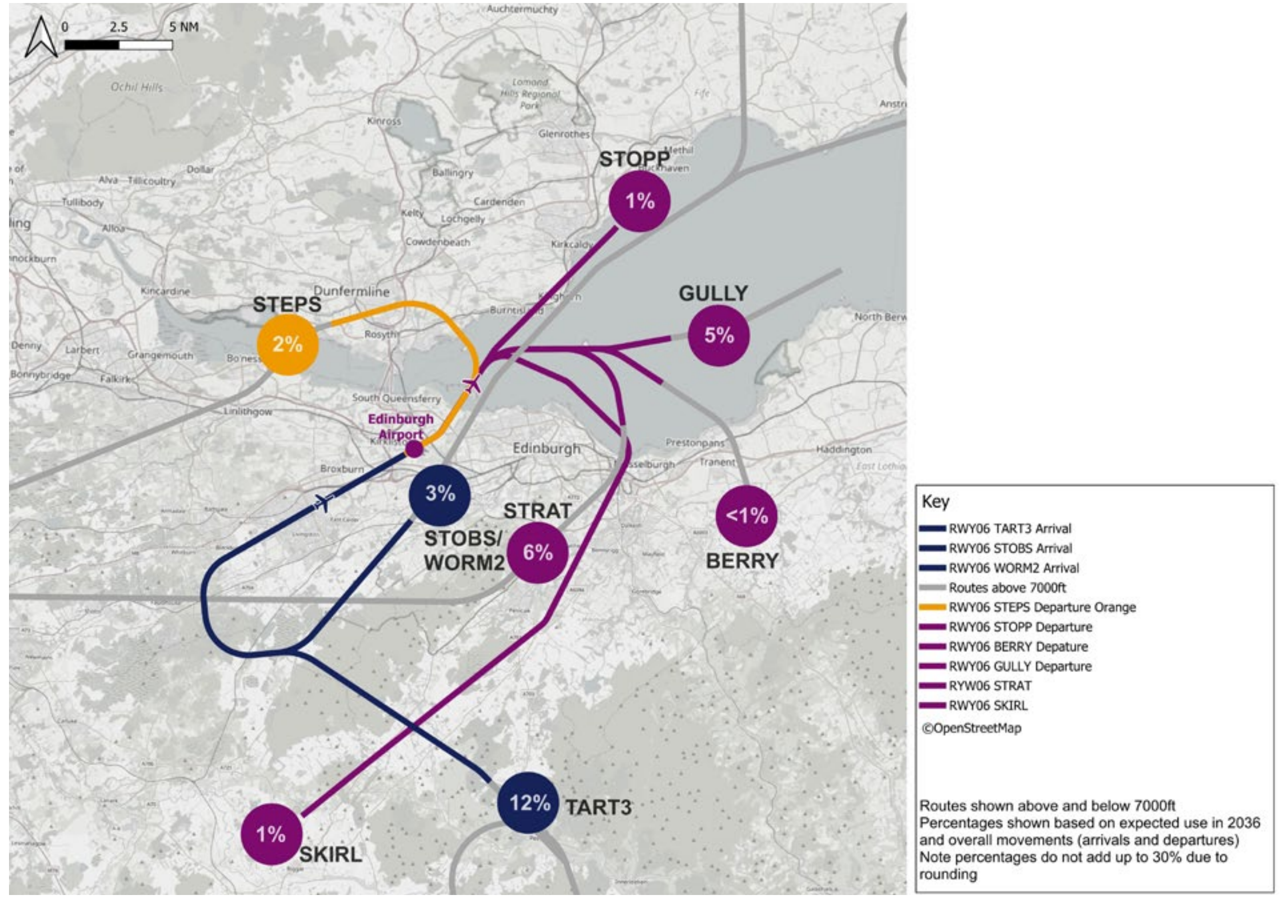


Figure 52: Design for scenario 3B&1C – runway 06.

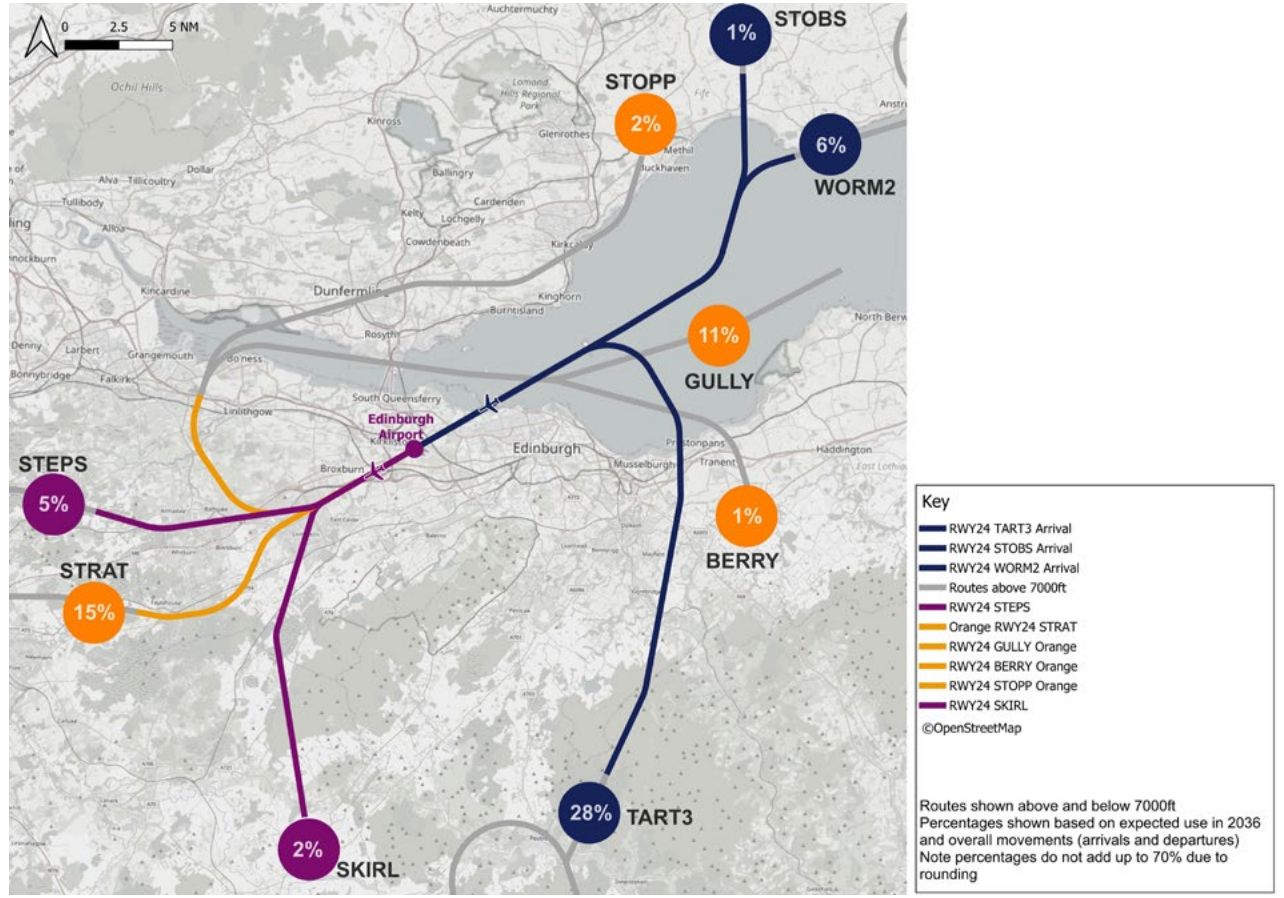


Figure 53: Design for scenario 3B&1C – runway 24.

2.3.7.1 Scenario 3B&1C indicators for potential adverse noise effects

Table 21: Qualitative assessment of potential adverse noise effects for scenario 3B&1C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
3B&1C	no evidence – neutral	yes – neutral	yes – small

2.3.7.2 Scenario 3B&1C indicators for overflight footprints vs population density and GoldSET suitability surface

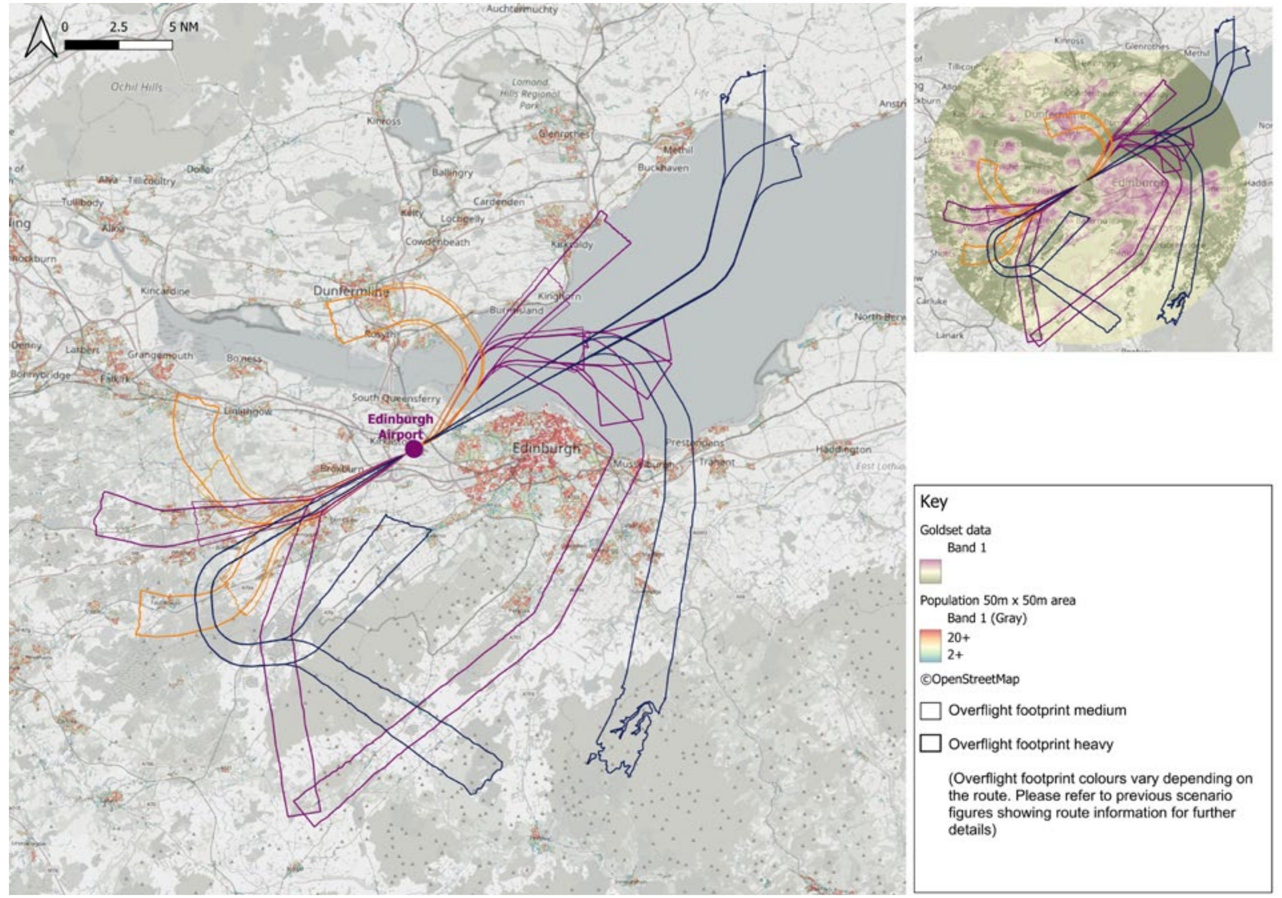


Figure 54: Scenario 3B&1C overflight footprints vs population density and GoldSET suitability surface.

Table 22: Scenario 3B&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
3B&1C	99,015,343	96.34

2.3.7.3 Scenario 3B&1C indicators for fuel burn and CO_2e efficiency review

Table 23: Scenario 3B&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Orange	39.2	3,006	117,817
24	To east (GULLY)	Orange	45.8	14,166	648,813
24	To east (BERRY)	Orange	42.8	899	38,467
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,312,043

2.3.8 Pre-FOA scenario review for full airport system scenario 4A&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 4A&1C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 55 opposite and Figure 56 on page 106 show the route configuration for the scenario 4A&1C.

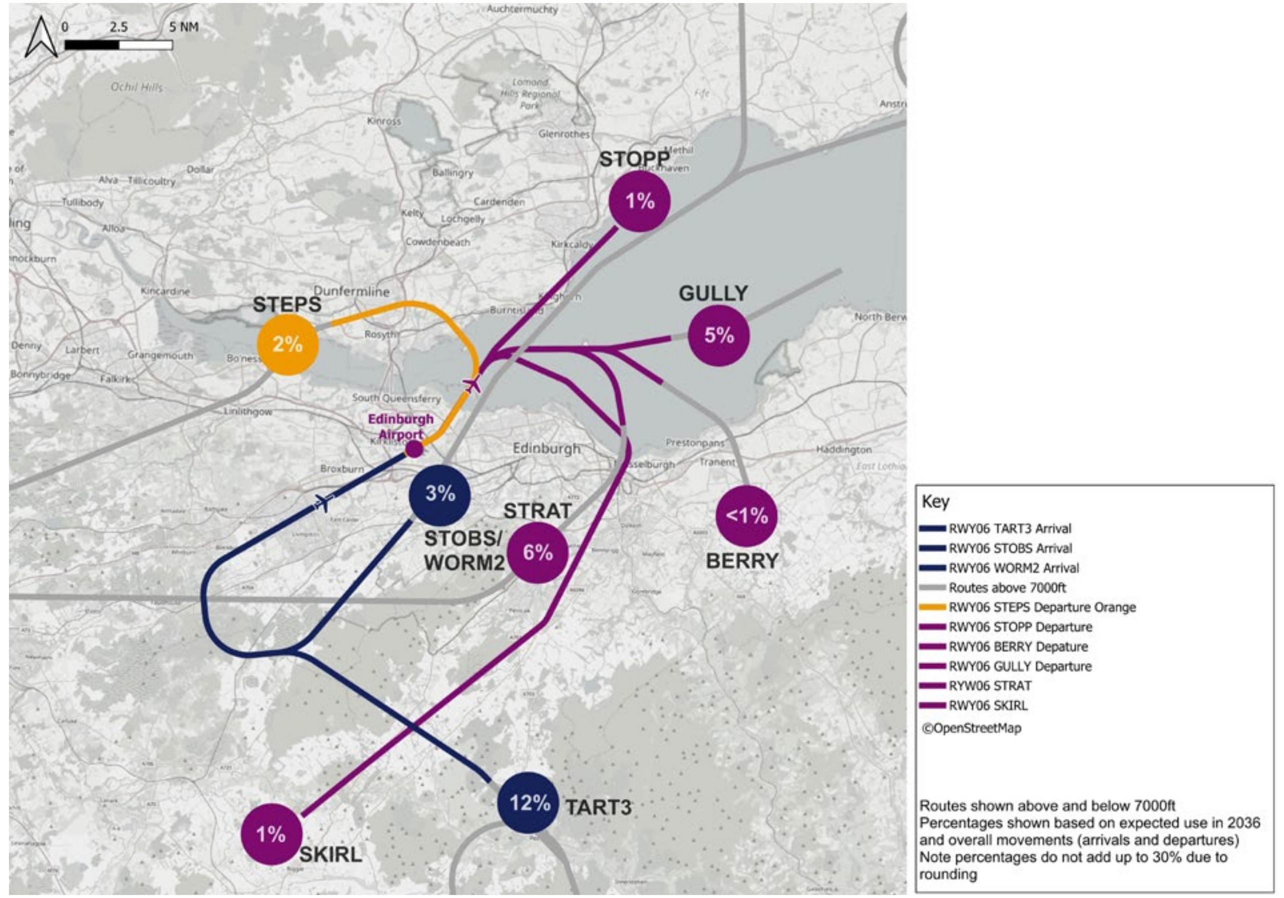


Figure 55: Design for scenario 4A&1C – runway 06.

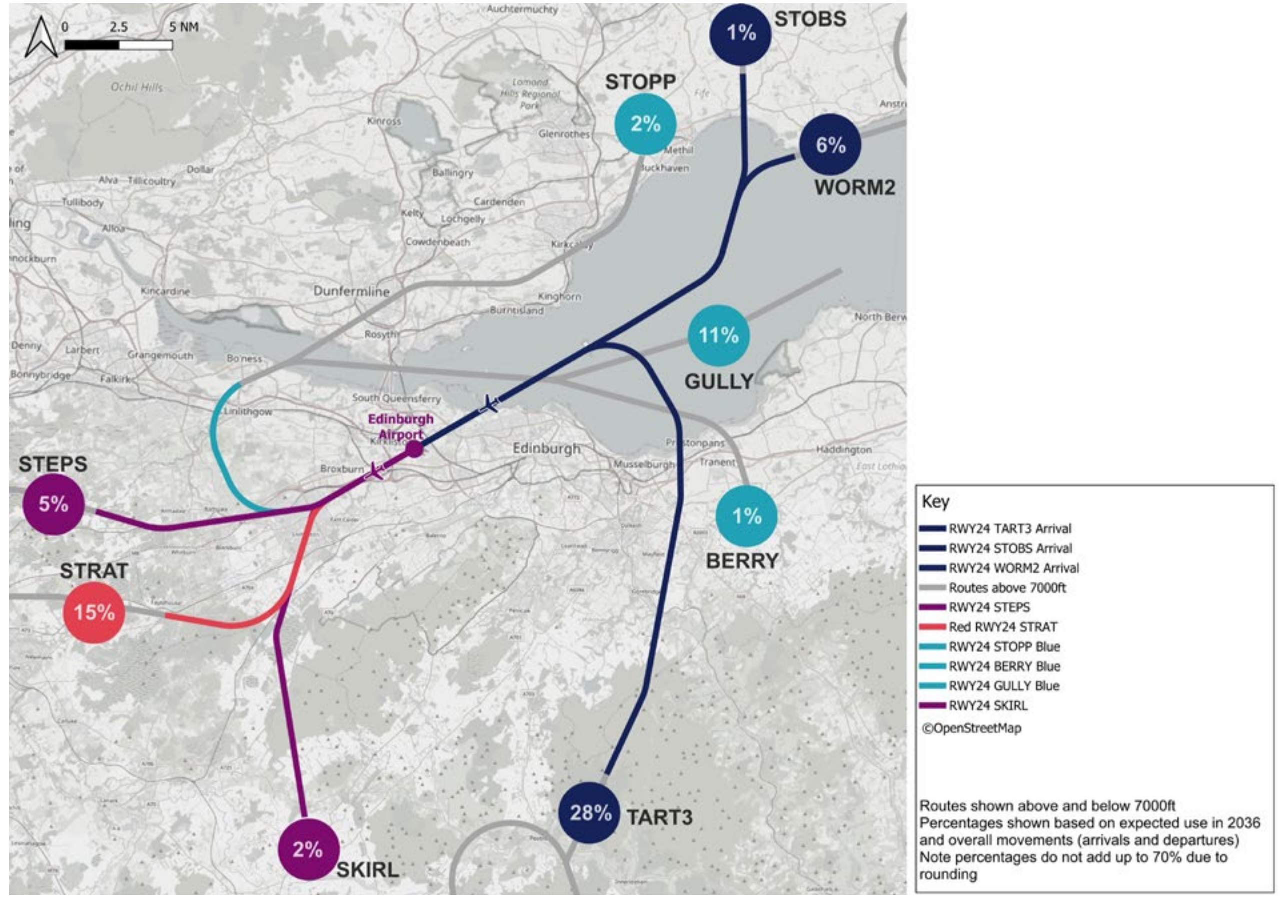


Figure 56: Design for scenario 4A&1C – runway 24.

2.3.8.1 Scenario 4A&1C indicators for potential adverse noise effects

Table 24: Qualitative assessment of potential adverse noise effects for scenario 4A&1C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
4A&1C	no evidence – neutral	no	yes – small

2.3.8.2 Scenario 4A&1C indicators for overflight footprints vs population density and GoldSET suitability surface

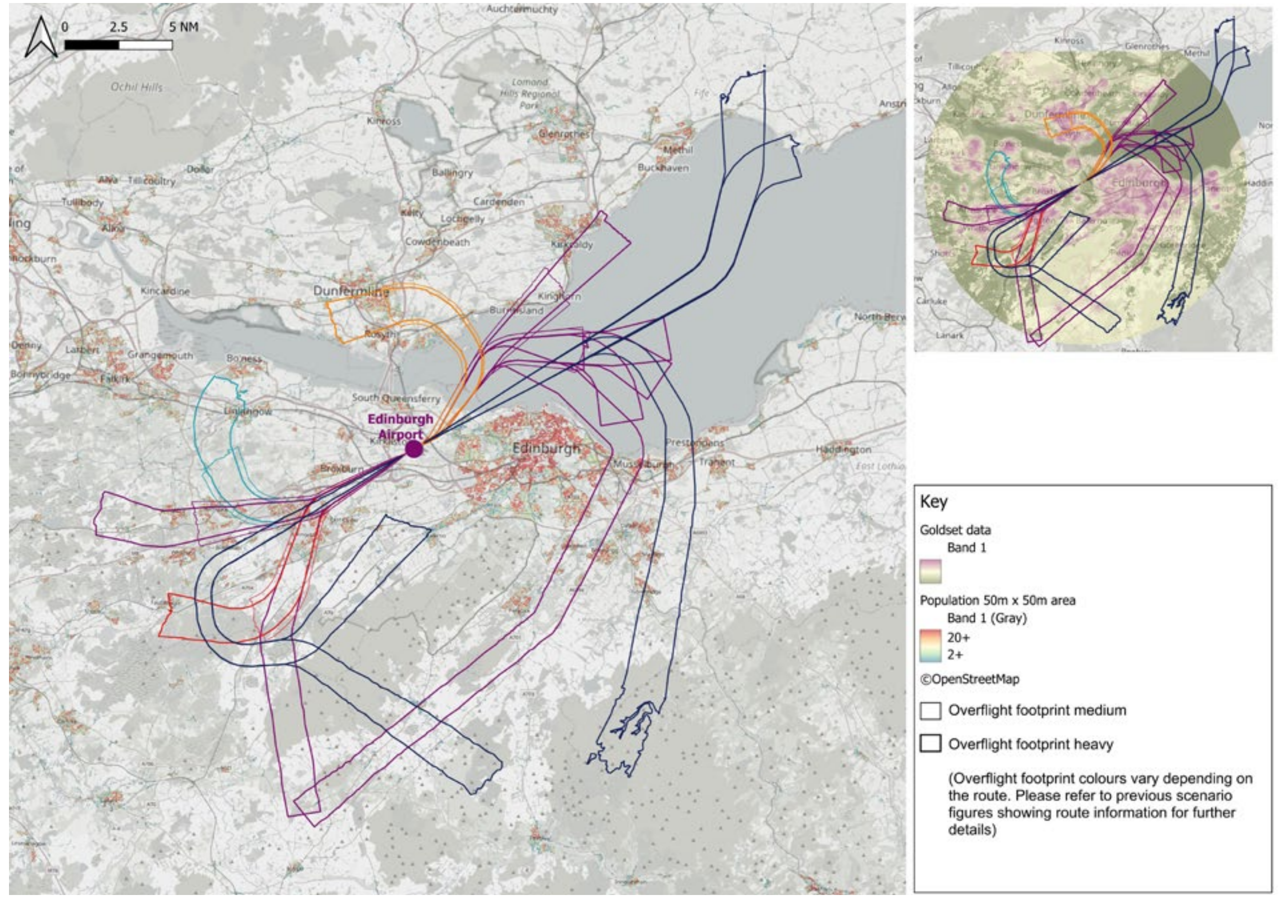


Figure 57: Scenario 4A&1C overflight footprints vs population density and GoldSET suitability surface.

Table 25: Scenario 4A&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
4A&1C	98,213,354	96.37

2.3.8.3 Scenario 4A&1C indicators for fuel burn and CO_2e efficiency review

Table 26: Scenario 4A&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Blue	36.9	3,006	110,905
24	To east (GULLY)	Blue	43.2	14,166	611,981
24	To east (BERRY)	Blue	40.2	899	36,131
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,293,965

2.3.9 Pre-FOA scenario review for full airport system scenario 4B&1C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 4B&1C.

Runway 24 features for:		**Runway 06 features for Westbound (STEPS)**	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 58 opposite and Figure 59 on page 112 show the route configuration for the scenario 4B&1C.

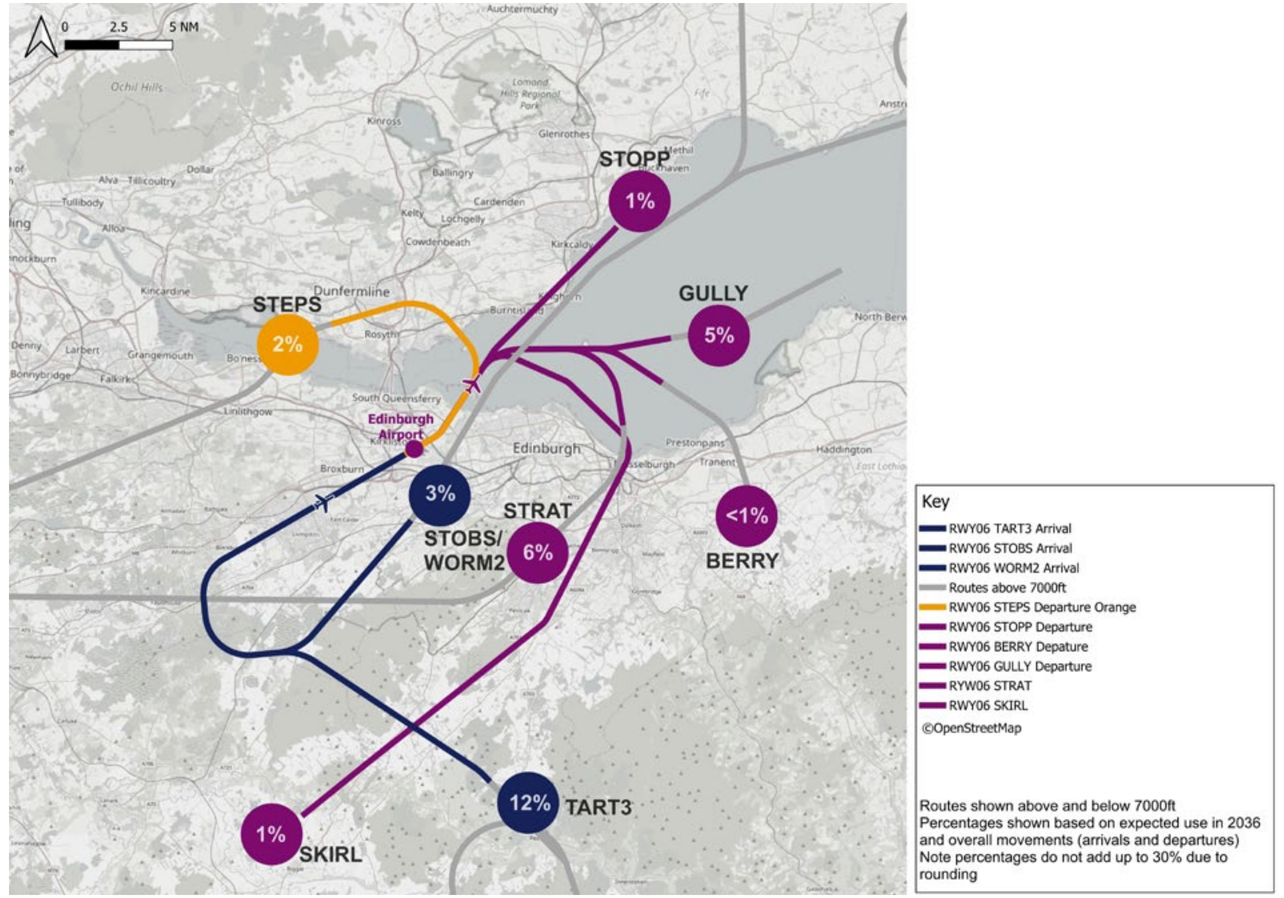


Figure 58: Design for scenario 4B&1C – runway 06.

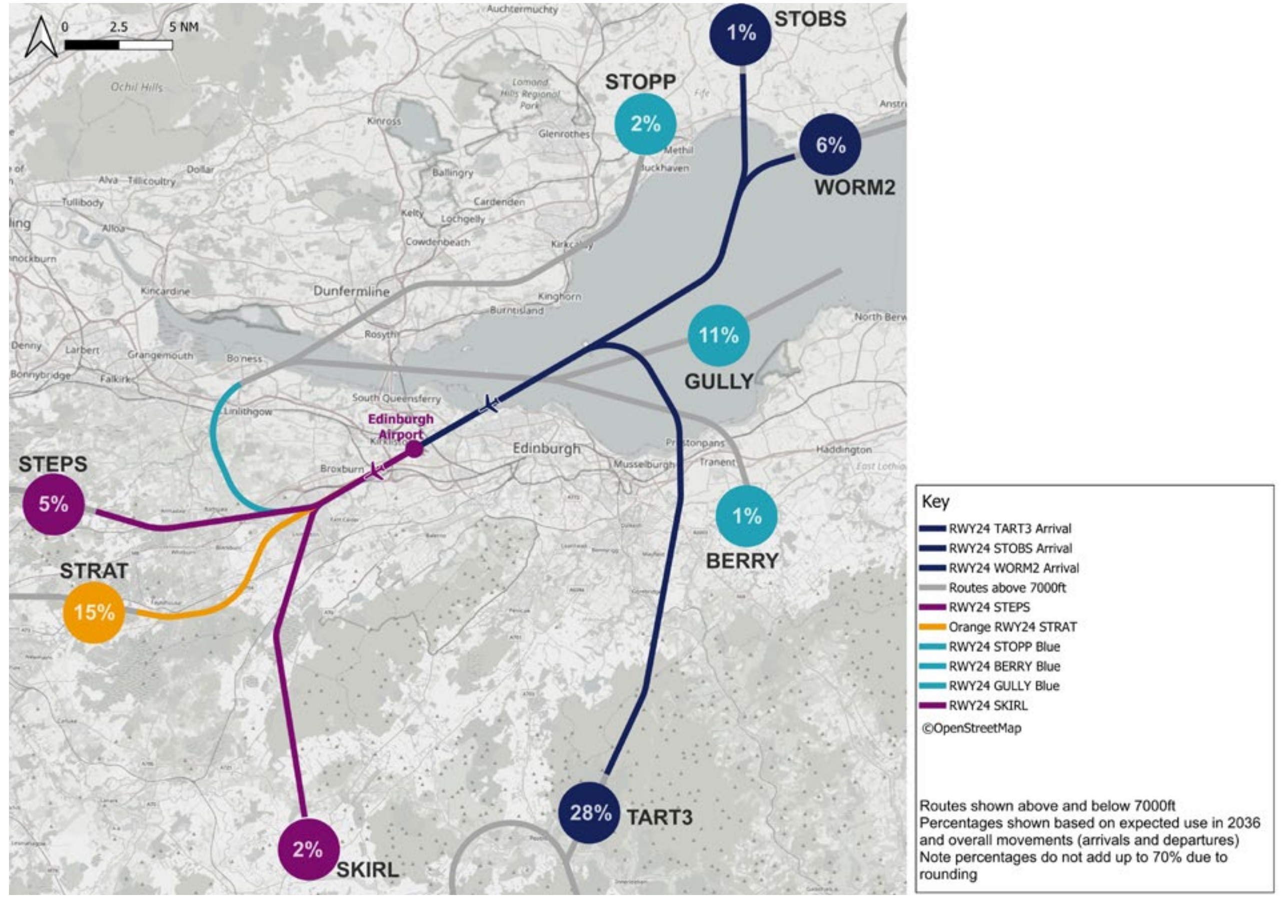


Figure 59: Design for scenario 4B&1C – runway 24.

2.3.9.1 Scenario 4B&1C indicators for potential adverse noise effects

Table 27: Qualitative assessment of potential adverse noise effects for scenario 4B&1C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
4B&1C	no evidence – neutral	yes – neutral	yes – small

2.3.9.2 Scenario 4B&1C indicators for overflight footprints vs population density and GoldSET suitability surface

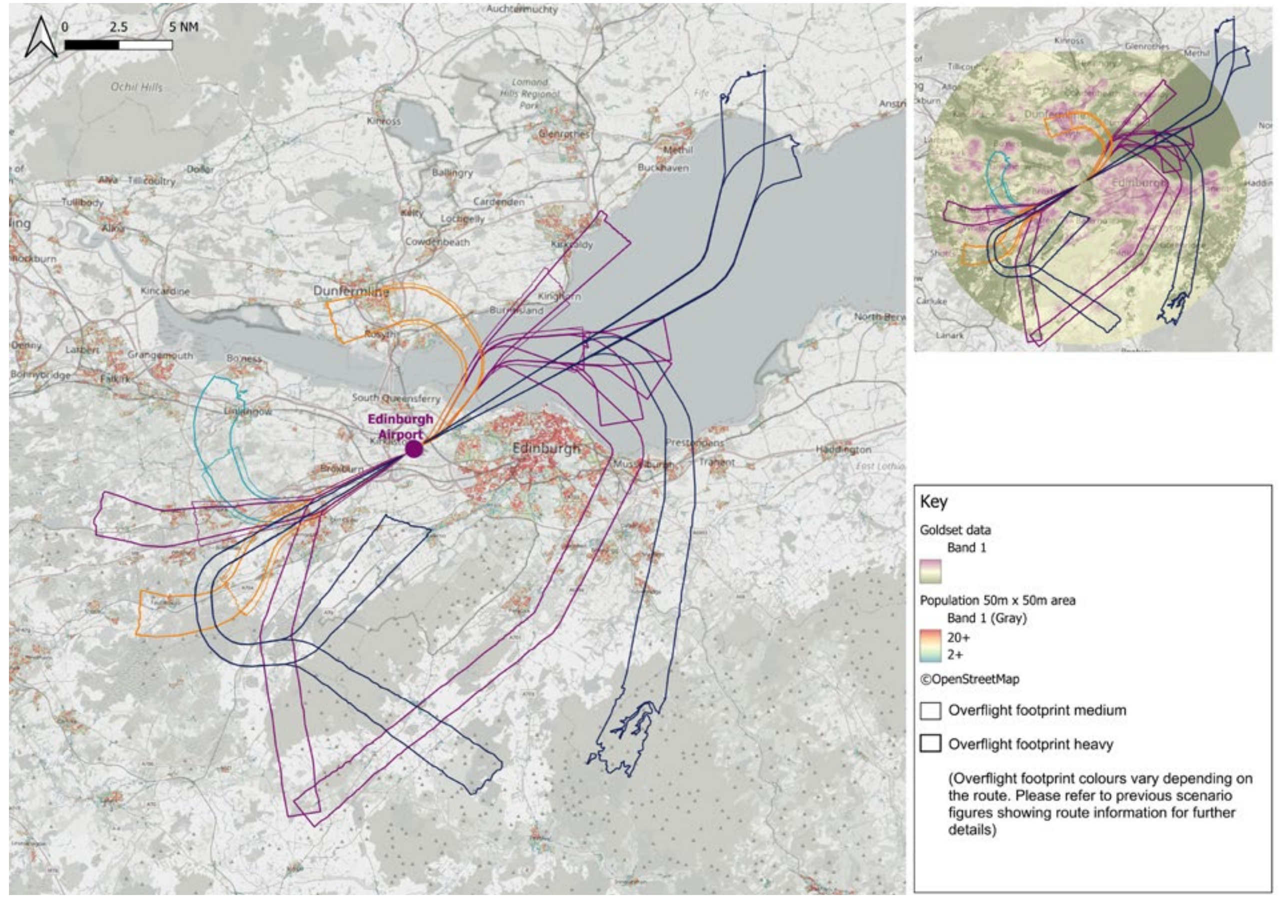


Figure 60: Scenario 4B&1C overflight footprints vs population density and GoldSET suitability surface.

Table 28: Scenario 4B&1C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
4B&1C	98,644,155	96.35

2.3.9.3 Scenario 4B&1C indicators for fuel burn and CO_2e efficiency review

Table 29: Scenario 4B&1C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Orange	41.0	3,235	132,619
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Blue	36.9	3,006	110,905
24	To east (GULLY)	Blue	43.2	14,166	611,981
24	To east (BERRY)	Blue	40.2	899	36,131
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,265,962

2.3.10 Pre-FOA scenario review for full airport system scenario 1A&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 1A&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 61 opposite and Figure 62 on page 118 show the route configuration for scenario 1A&2C.

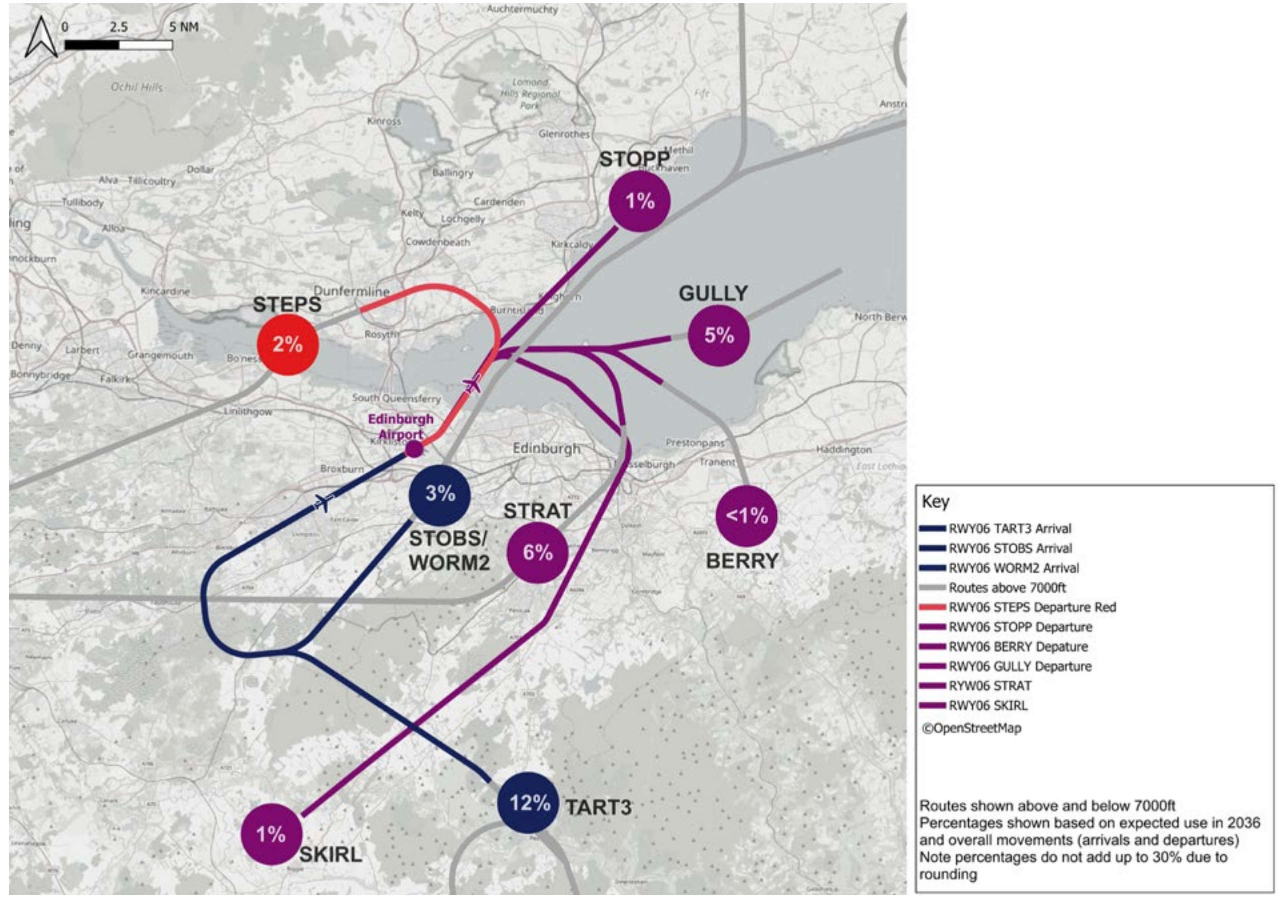


Figure 61: Design for scenario 1A&2C – runway 06.

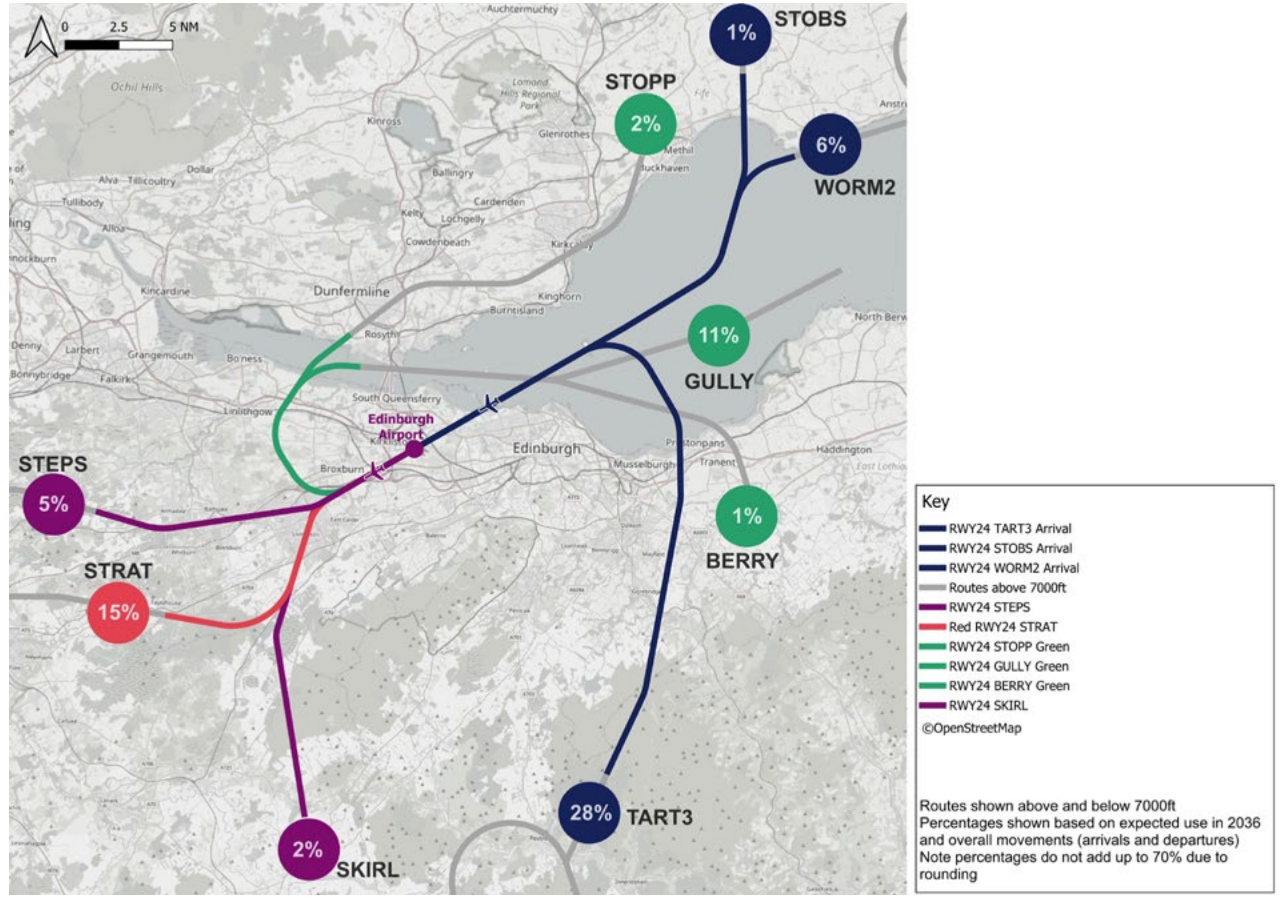


Figure 62: Design for scenario 1A&2C – runway 24.

2.3.10.1 Scenario 1A&2C indicators for potential adverse noise effects

Table 30: Qualitative assessment of potential adverse noise effects for scenario 1A&2C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
1A&2C	yes	no	yes – small

2.3.10.2 Scenario 1A&2C indicators for overflight footprints vs population density and GoldSET suitability surface

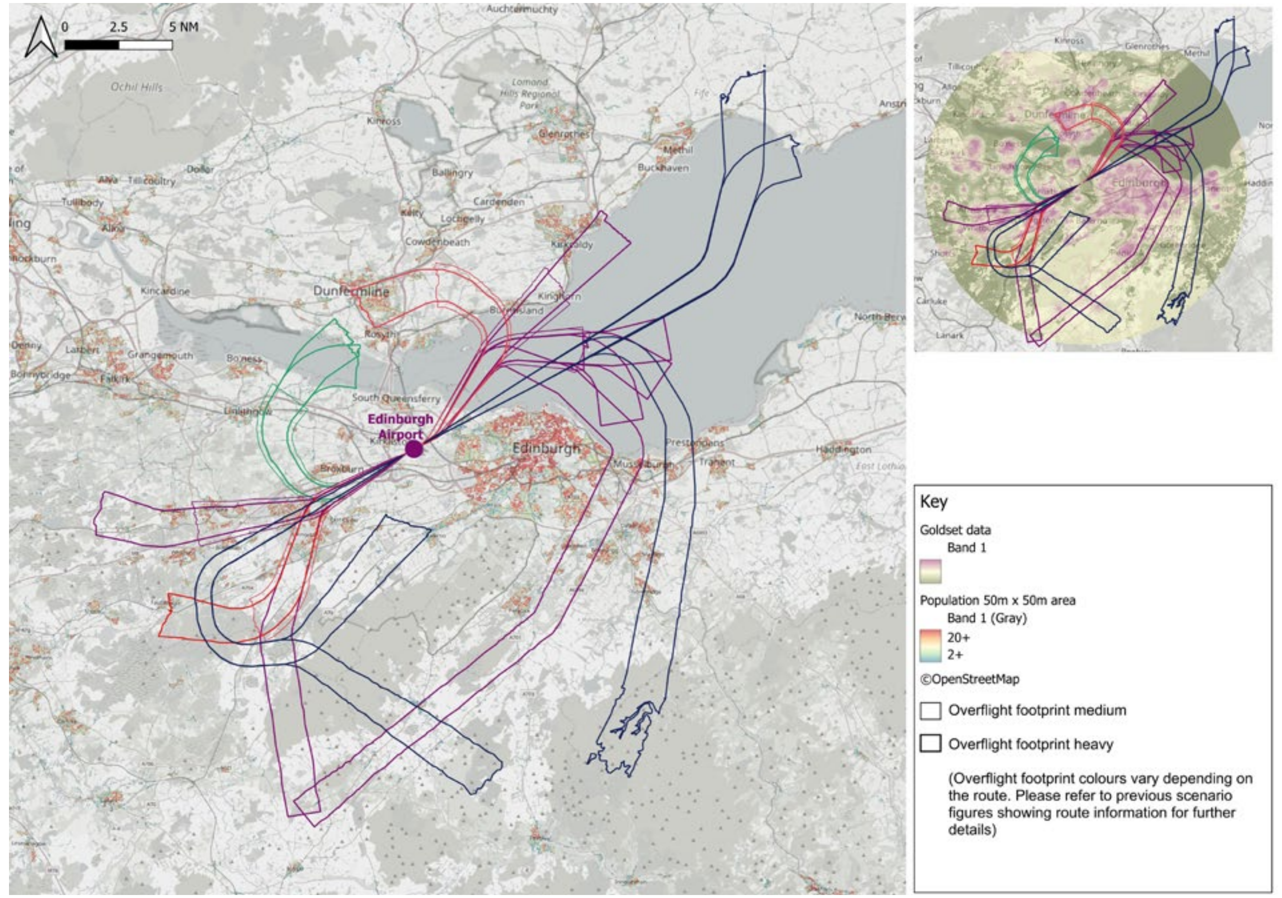


Figure 63: Scenario 1A&2C overflight footprints vs population density and GoldSET suitability surface.

Table 31: Scenario 1A&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
1A&2C	92,965,821	96.44

2.3.10.3 Scenario 1A&2C indicators for fuel burn and CO_2e efficiency review

Table 32: Scenario 1A&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Green	30.8	3,006	92,571
24	To east (GULLY)	Green	36.7	14,166	519,901
24	To east (BERRY)	Green	33.7	899	30,289
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,186,188

2.3.11 Pre-FOA scenario review for full airport system scenario 1B&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 1B&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	Southbound (STRAT)	Orange (turns west of Aberdour)	Red (turns east of Aberdour)
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 64 opposite and Figure 65 on page 124 show the route configuration for scenario 1B&2C.

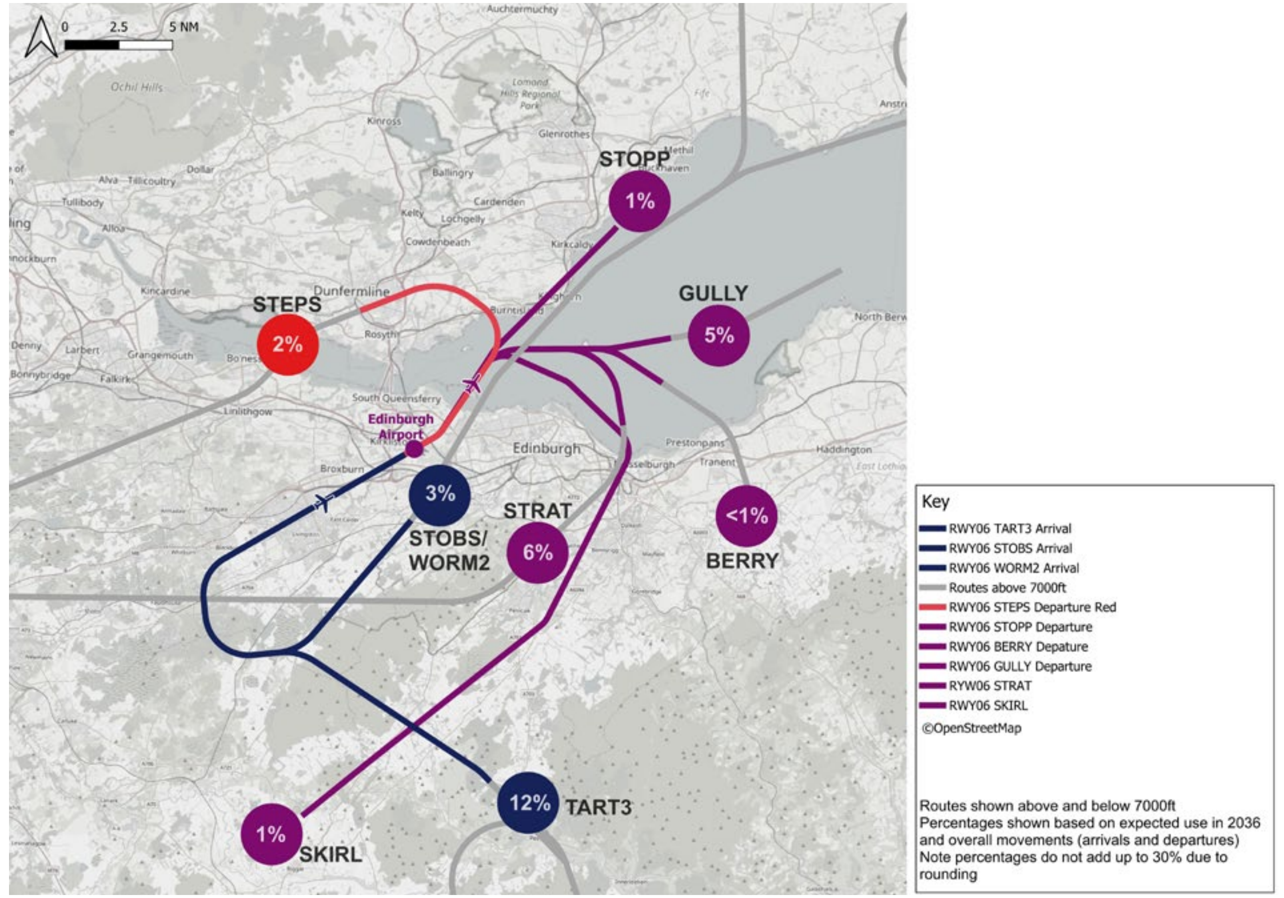


Figure 64: Design for scenario 1B&2C – runway 06.

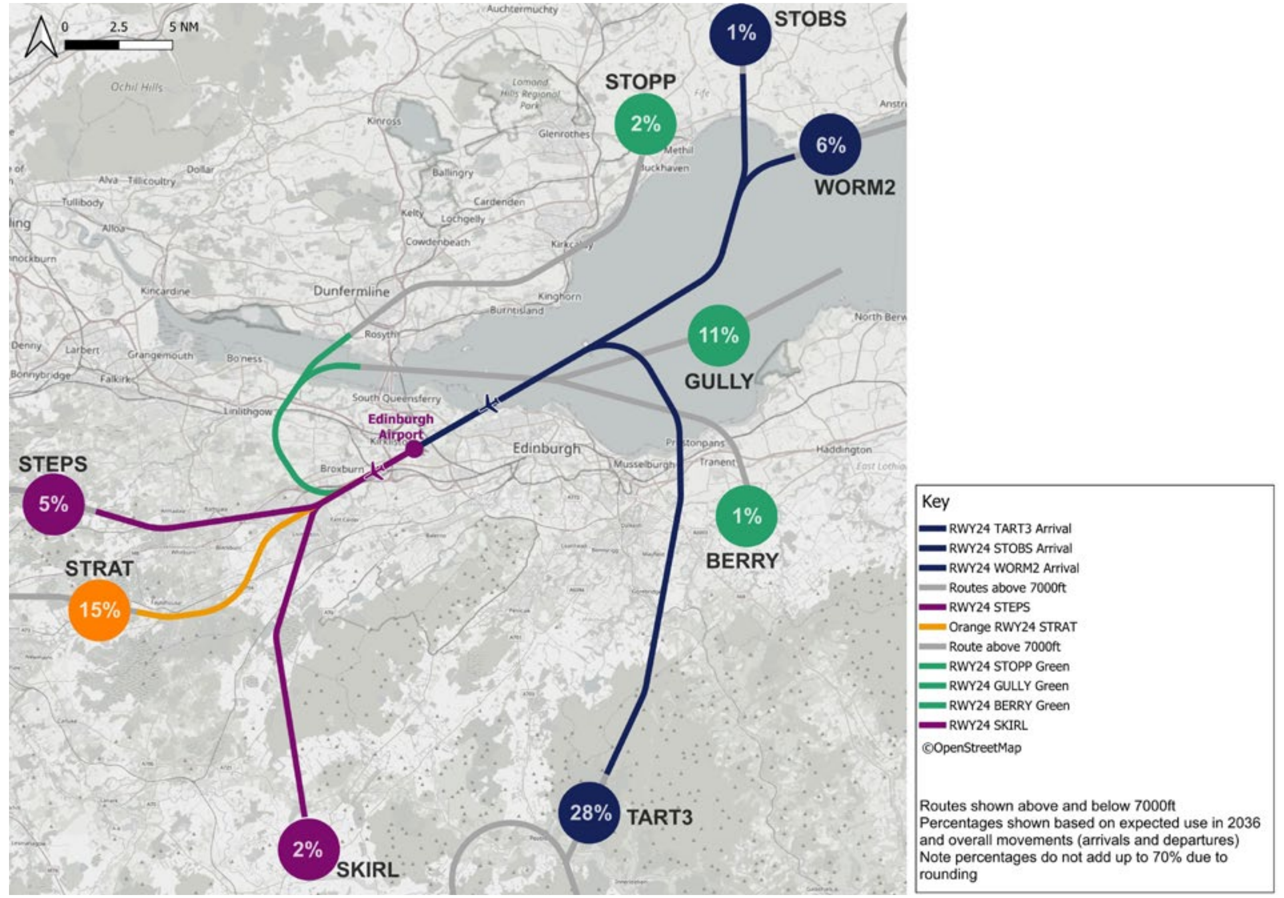


Figure 65: Design for scenario 1B&2C – runway 24.

2.3.11.1 Scenario 1B&2C indicators for potential adverse noise effects

Table 33: Qualitative assessment of potential adverse noise effects for scenario 1B&2C

Scenario	RWY24 North & Eastbound – Potential improvement to net adverse effects	RWY24 Southbound – Routes resemble to today's, so minimal change	RWY06 Westbound – Potential improvement to net adverse effects
1B&2C	yes	yes – neutral	yes – small

2.3.11.2 Scenario 1B&2C indicators for overflight footprints vs population density and GoldSET suitability surface

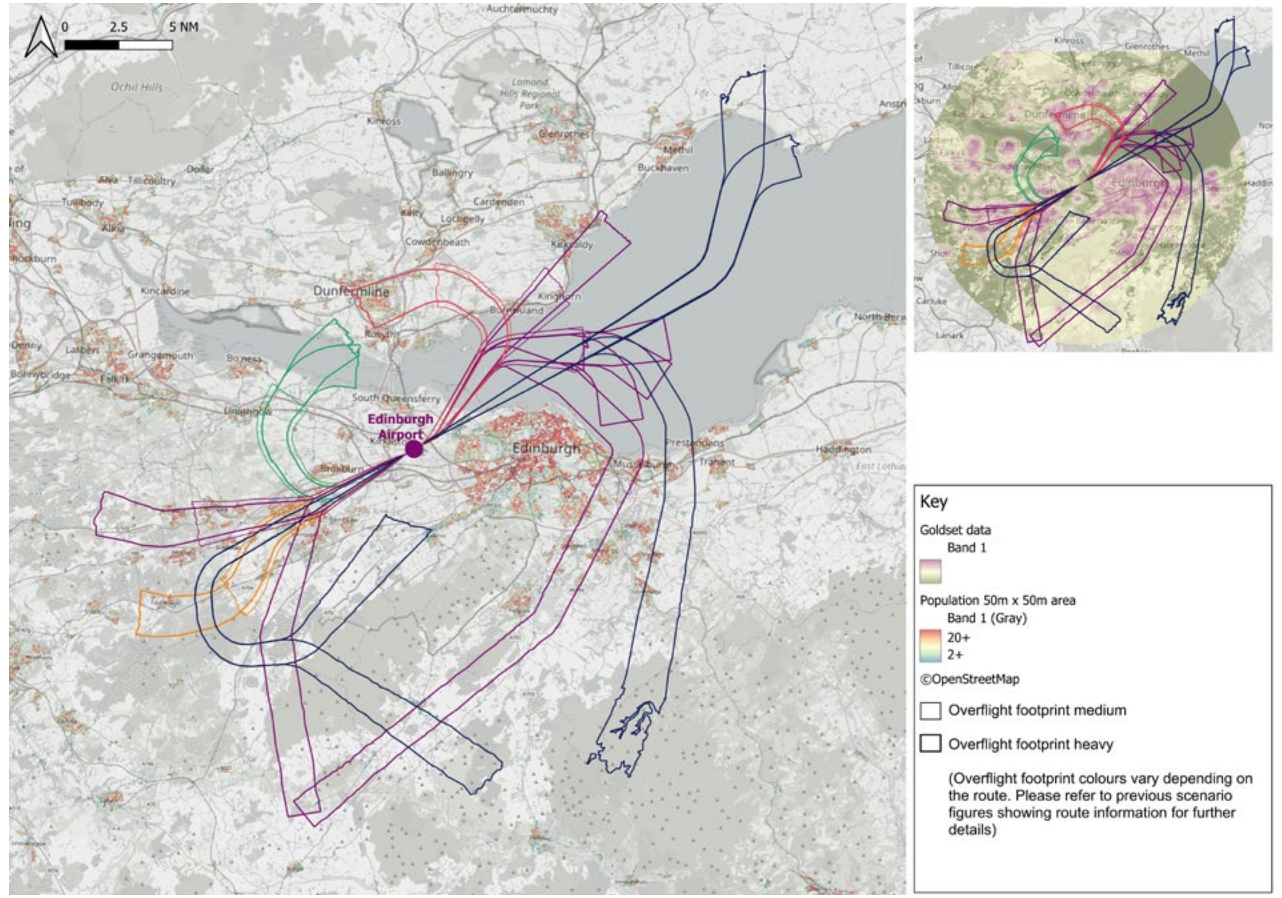


Figure 66: Scenario 1B&2C overflight footprints vs population density and GoldSET suitability surface.

Table 34: Scenario 1B&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
1B&2C	93,396,621	96.41

2.3.11.3 Scenario 1B&2C indicators for fuel burn and CO_2e efficiency review

Table 35: Scenario 1B&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Green	30.8	3,006	92,571
24	To east (GULLY)	Green	36.7	14,166	519,901
24	To east (BERRY)	Green	33.7	899	30,289
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,158,115

2.3.12 Pre-FOA scenario review for full airport system scenario 2A&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 2A&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 67 opposite and Figure 68 on page 130 show the route configuration for scenario 2A&2C.

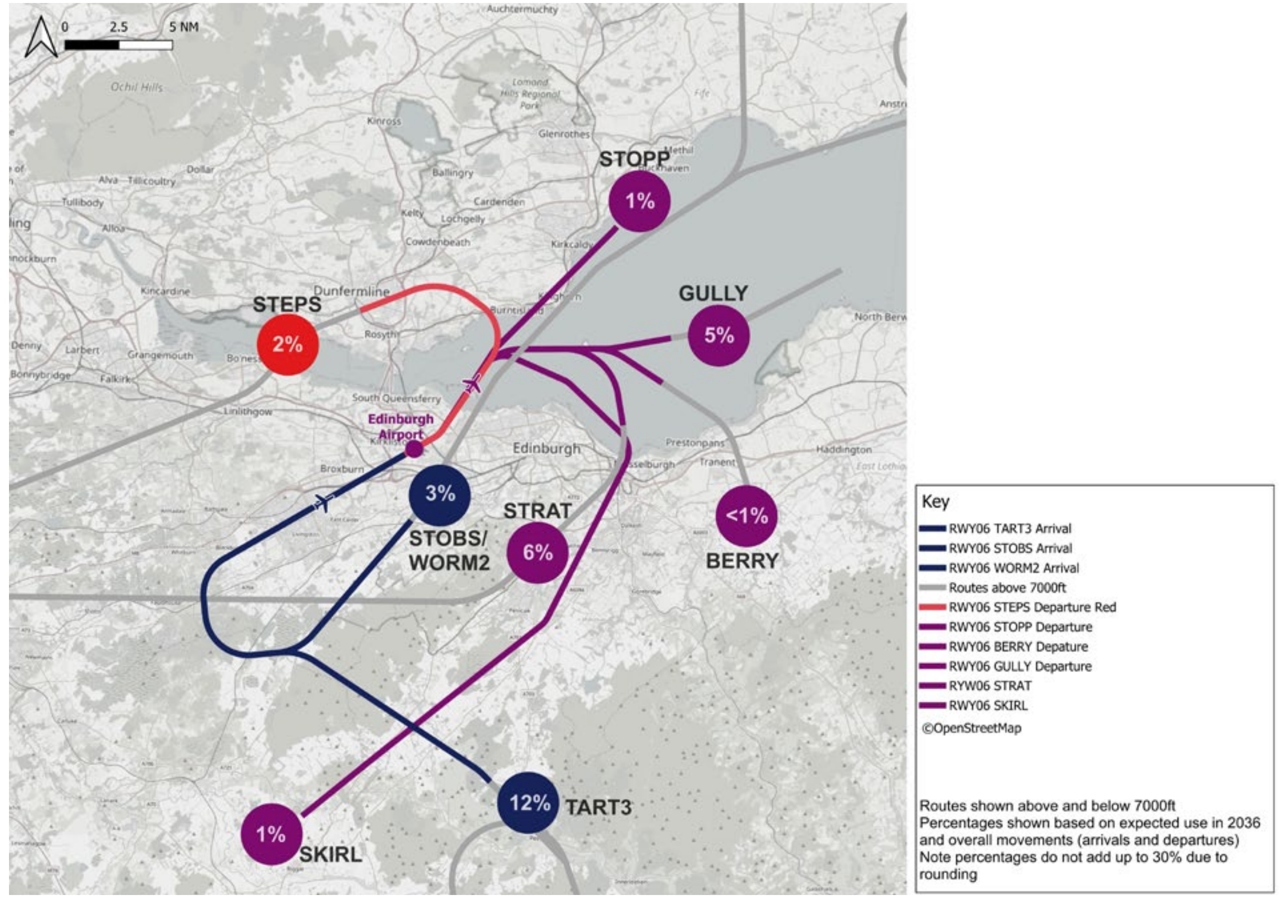


Figure 67: Design for scenario 2A&2C – runway 06.

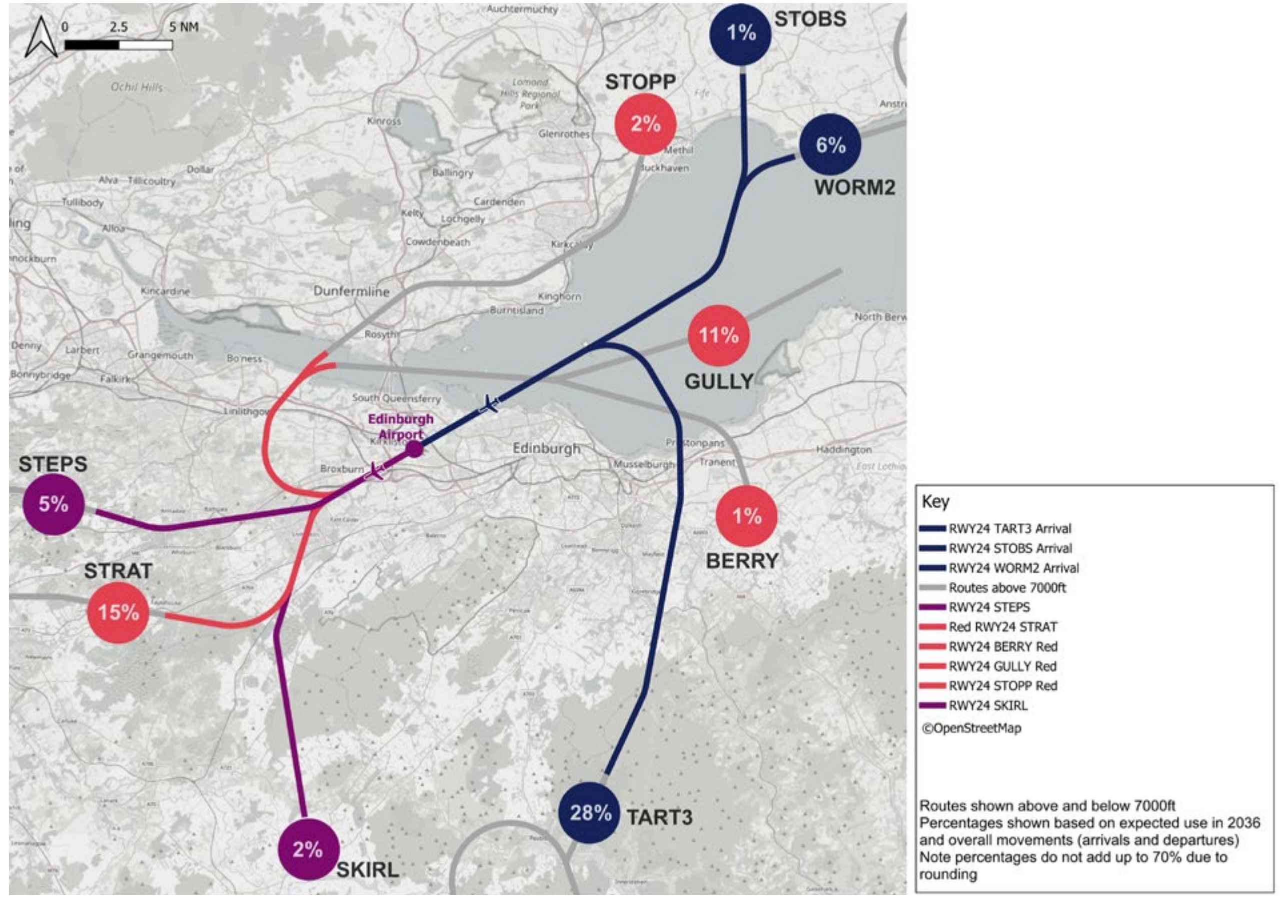


Figure 68: Design for scenario 2A&2C – runway 24.

2.3.12.1 Scenario 2A&2C indicators for potential adverse noise effects

Table 36: Qualitative assessment of potential adverse noise effects for scenario 2A&2C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
2A&2C	yes	no	yes – small

2.3.12.2 Scenario 2A&2C indicators for overflight footprints vs population density and GoldSET suitability surface

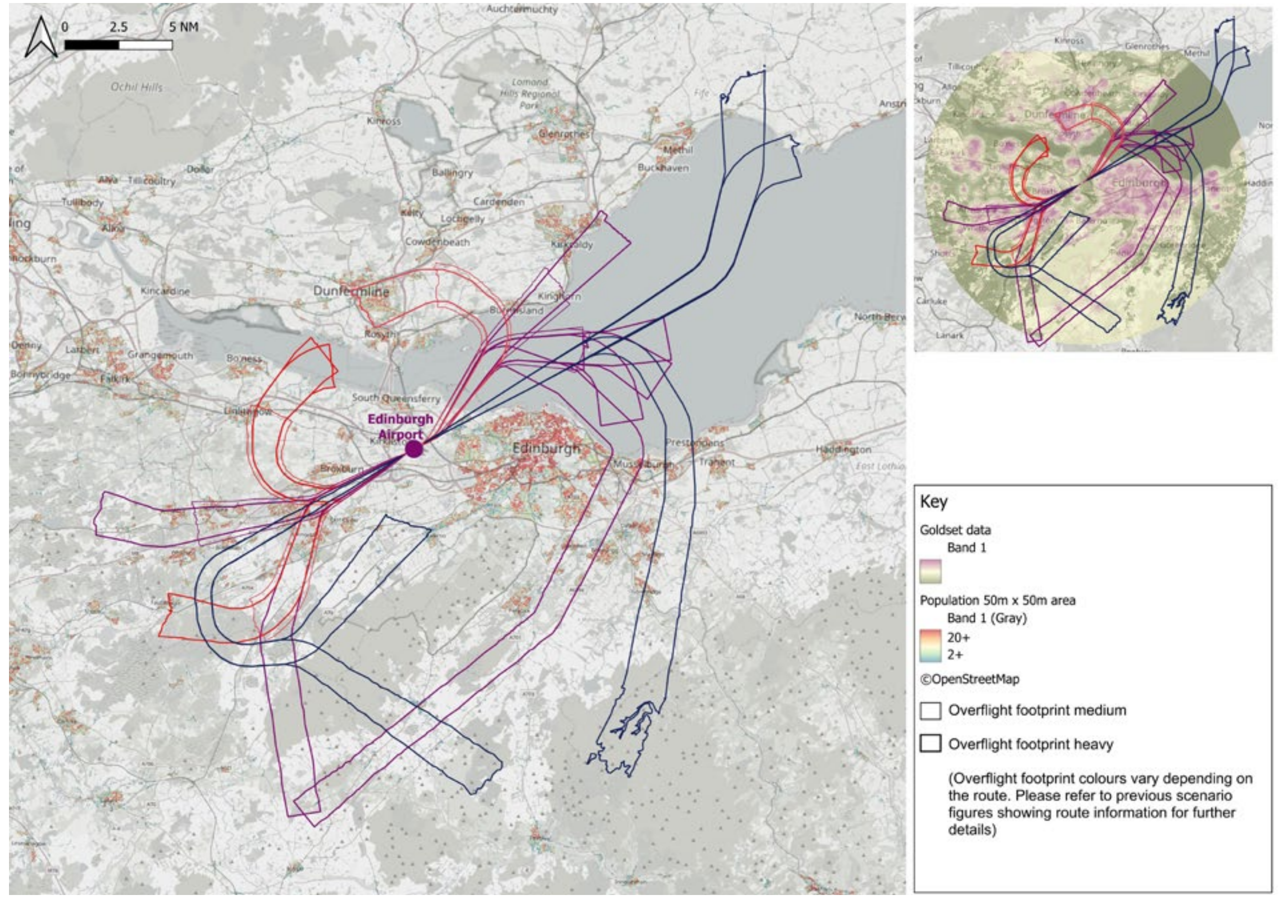


Figure 69: Scenario 2A&2C overflight footprints vs population density and GoldSET suitability surface.

Table 37: Scenario 2A&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
2A&2C	93,687,921	96.40

2.3.12.3 Scenario 2A&2C indicators for fuel burn and CO_2e efficiency review

Table 38: Scenario 2A&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Red	31.9	3,006	95,877
24	To east (GULLY)	Red	37.8	14,166	535,484
24	To east (BERRY)	Red	34.8	899	31,277
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,205,996

2.3.13 Pre-FOA scenario review for full airport system scenario 2B&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 2B&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 70 opposite and Figure 71 on page 136 show the route configuration for scenario 2B&2C.

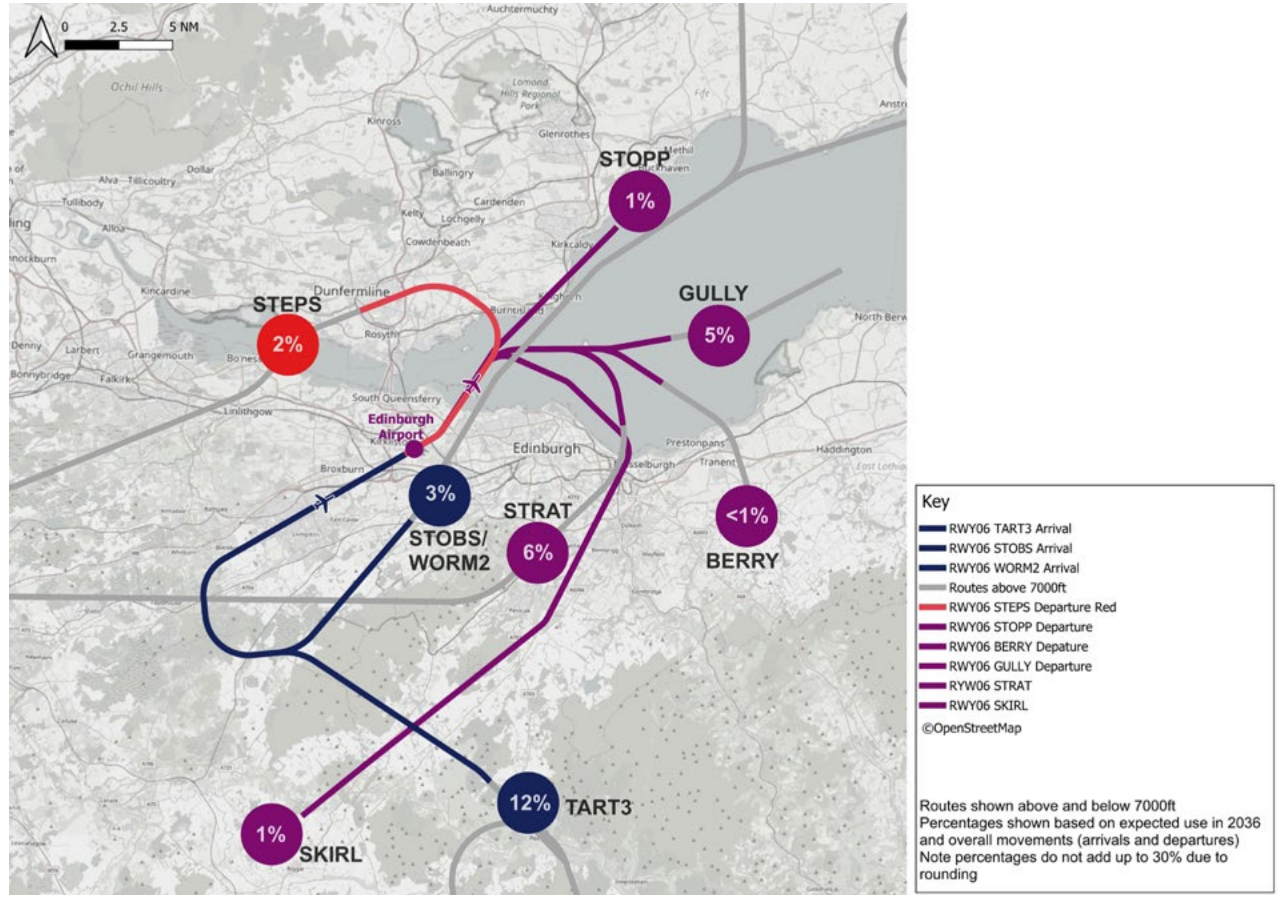


Figure 70: Design for scenario 2B&2C – runway 06.

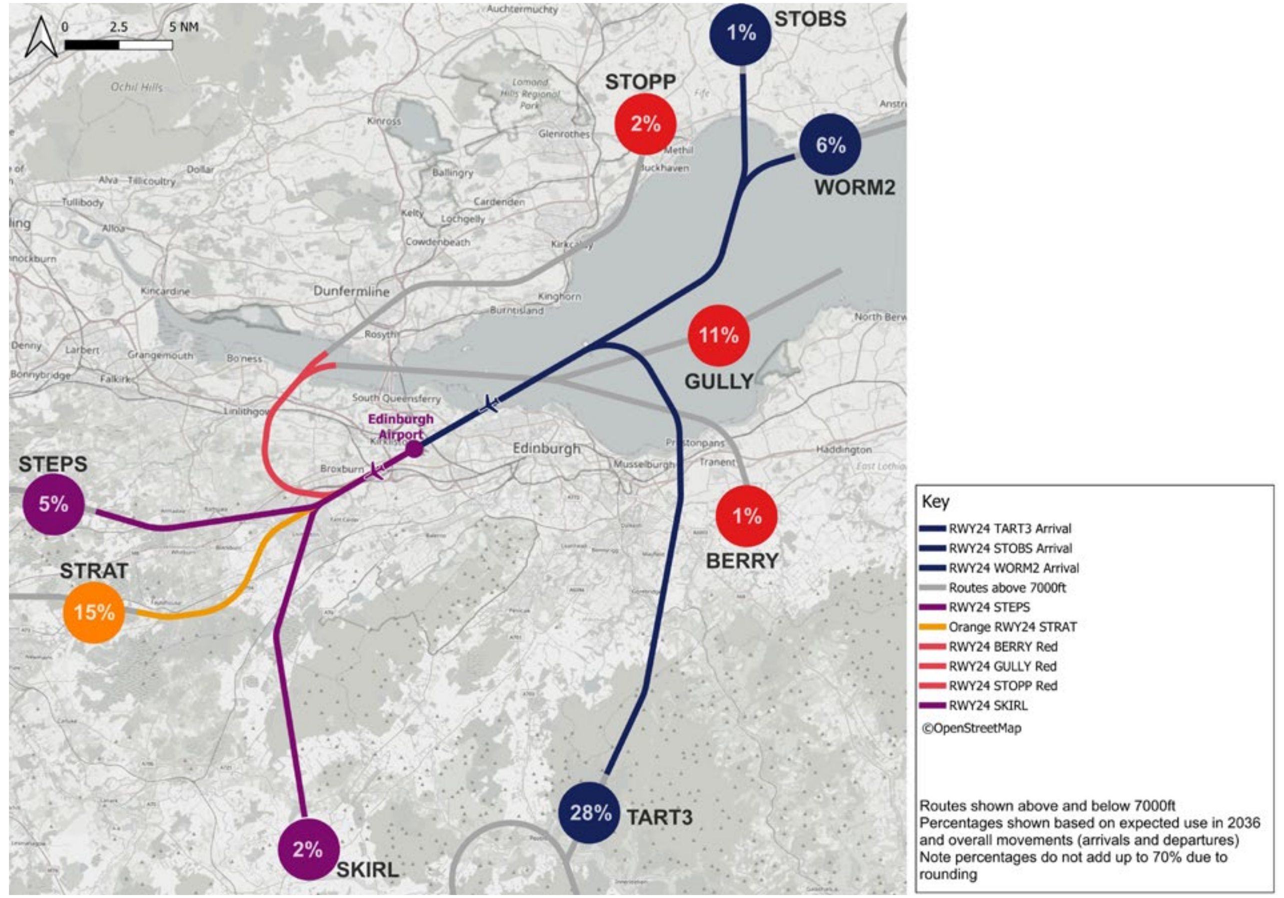


Figure 71: Design for scenario 2B&2C – runway 24.

2.3.13.1 Scenario 2B&2C indicators for potential adverse noise effects

Table 39: Qualitative assessment of potential adverse noise effects for scenario 2B&2C

Scenario	RWY24 North & Eastbound – Potential improvement to net adverse effects	RWY24 Southbound – Routes resemble to today's, so minimal change	RWY06 Westbound – Potential improvement to net adverse effects
2B&2C	yes	yes – neutral	yes – small

2.3.13.2 Scenario 2B&2C indicators for overflight footprints vs population density and GoldSET suitability surface

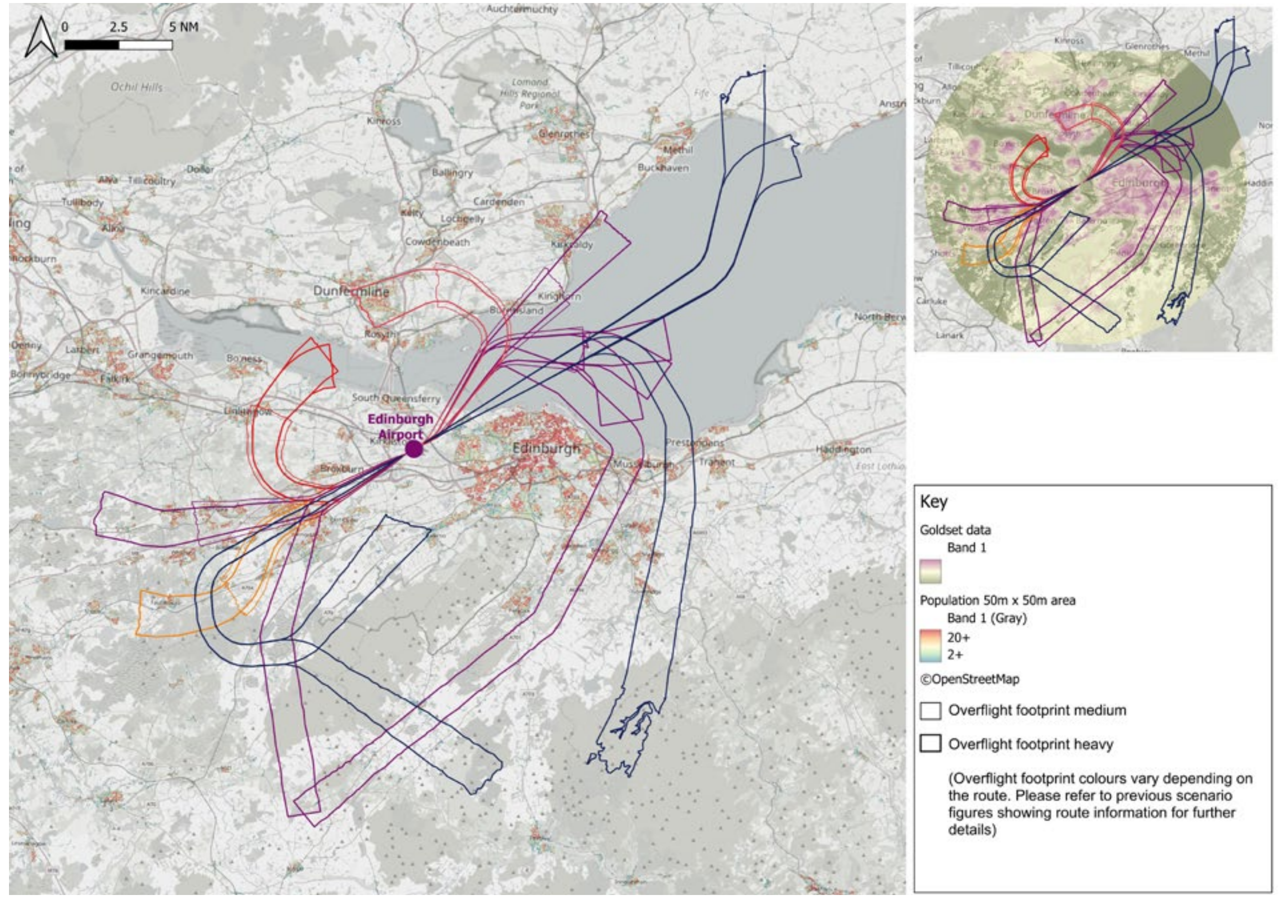


Figure 72: Scenario 2B&2C overflight footprints vs population density and GoldSET suitability surface.

Table 40: Scenario 2B&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
2B&2C	94,118,721	96.38

2.3.13.3 Scenario 2B&2C indicators for fuel burn and CO_2e efficiency review

Table 41: Scenario 2B&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Red	31.9	3,006	95,877
24	To east (GULLY)	Red	37.8	14,166	535,484
24	To east (BERRY)	Red	34.8	899	31,277
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,177,993

2.3.14 Pre-FOA scenario review for full airport system scenario 3A&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 3A&2C.

Runway 24 features for:		**Runway 06 features for Westbound (STEPS)**	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 73 opposite and Figure 74 on page 142 show the route configuration for the scenario 3A&2C.

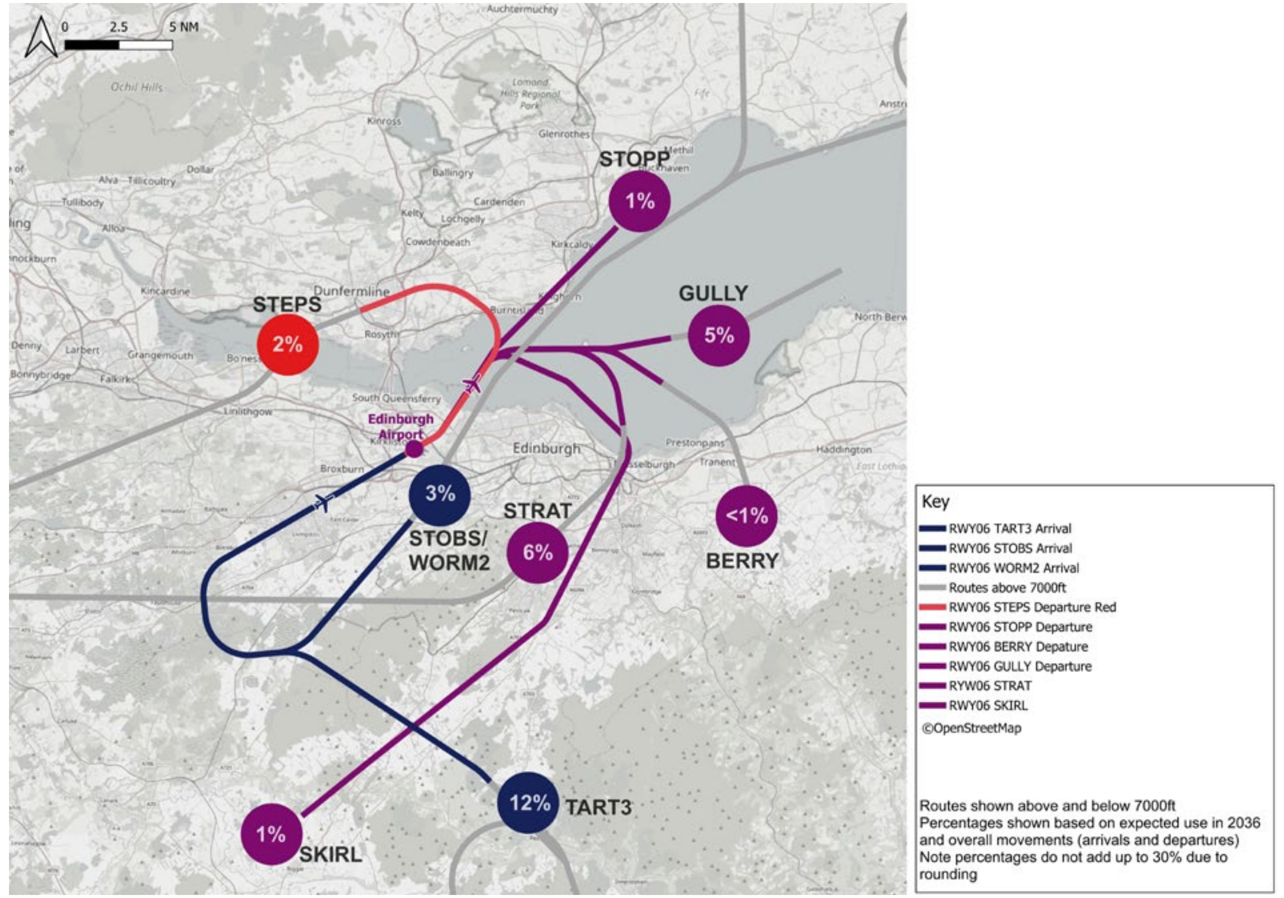


Figure 73: Design for scenario 3A&2C – runway 06.

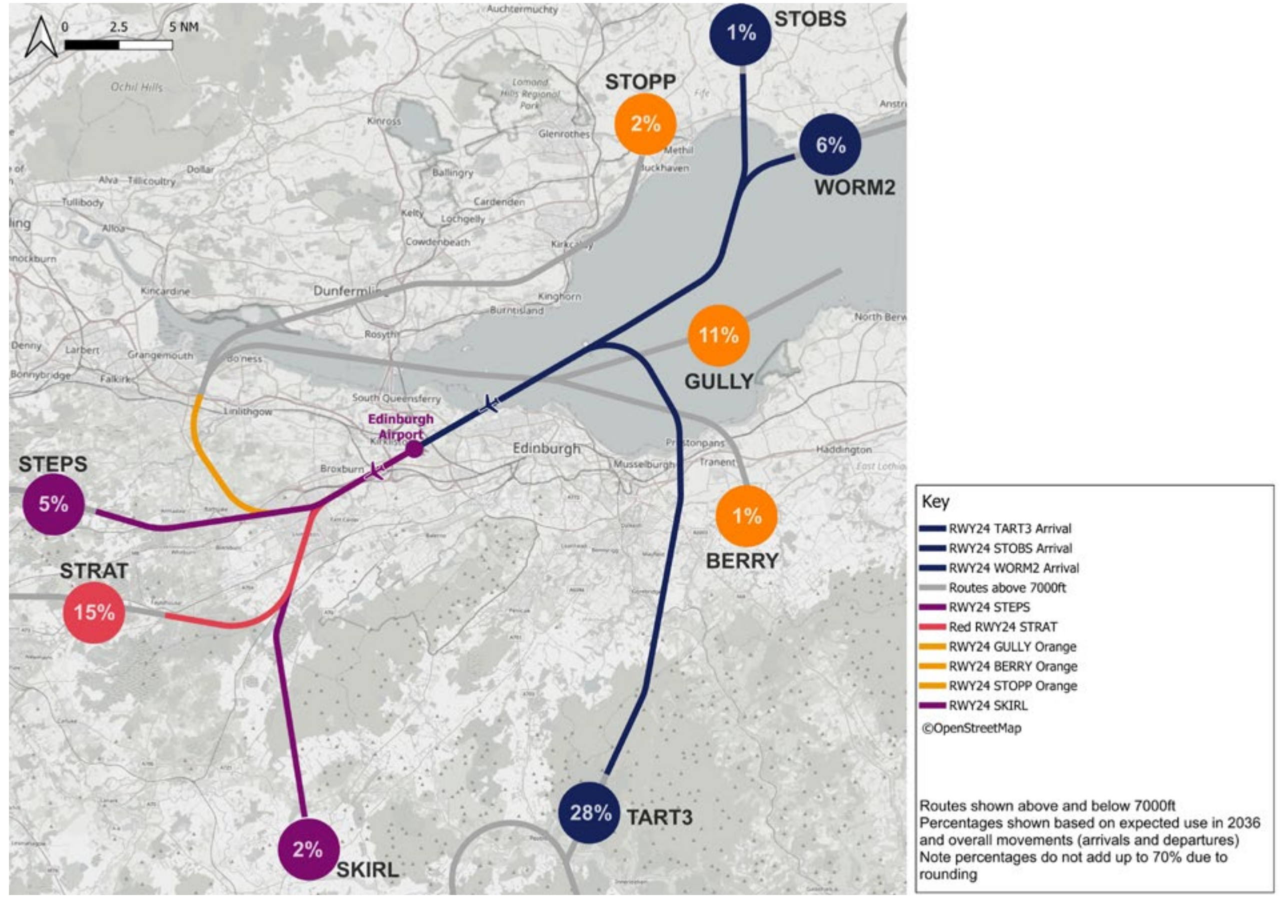


Figure 74: Design for scenario 3A&2C – runway 24.

2.3.14.1 Scenario 3A&2C indicators for potential adverse noise effects

Table 42: Qualitative assessment of potential adverse noise effects for scenario 3A&2C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
3A&2C	no evidence – neutral	no	yes – small

2.3.14.2 Scenario 3A&2C indicators for overflight footprints vs population density and GoldSET suitability surface

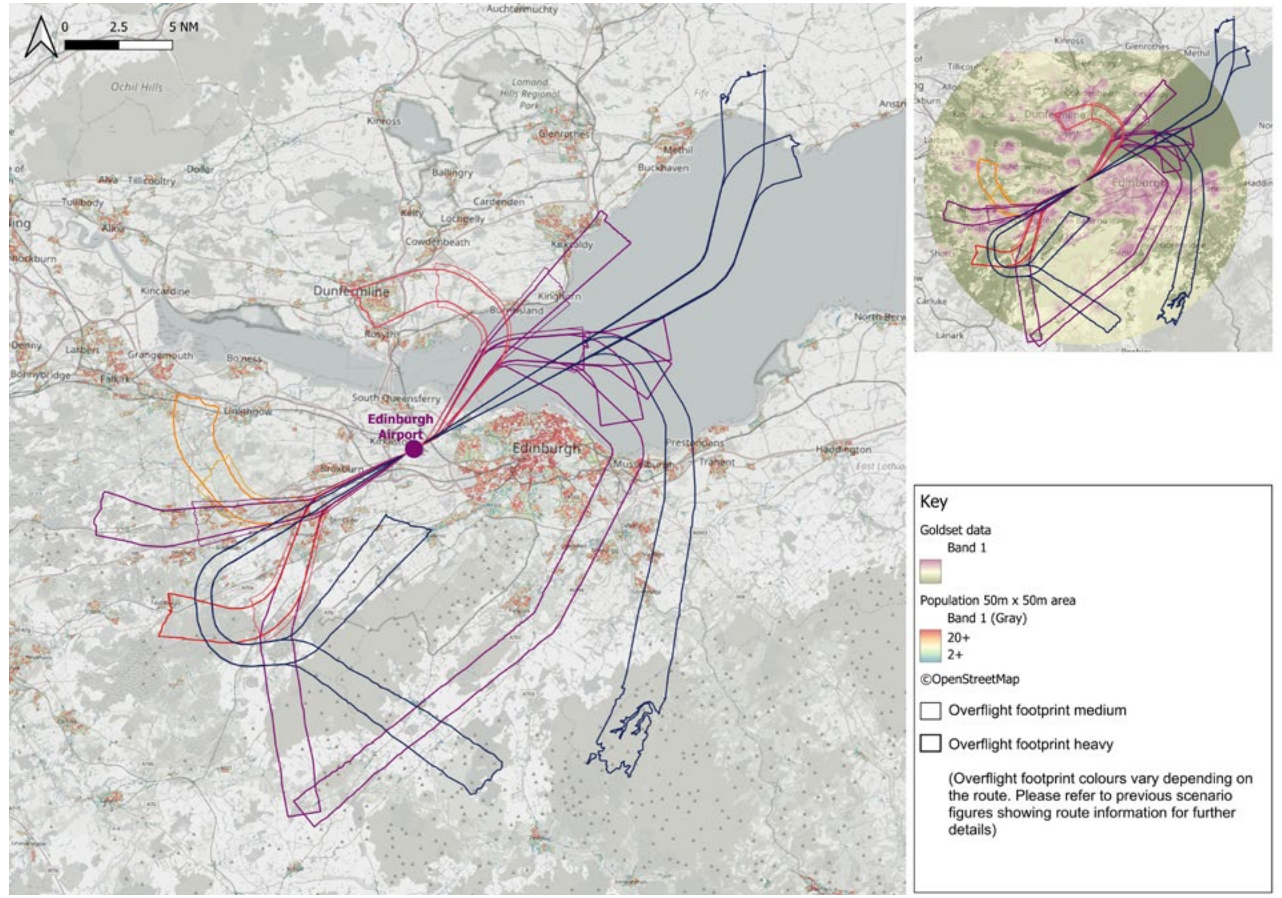


Figure 75: Scenario 3A&2C overflight footprints vs population density and GoldSET suitability surface.

Table 43: Scenario 3A&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
3A&2C	98,407,358	96.37

2.3.14.3 Scenario 3A&2C indicators for fuel burn and CO_2e efficiency review

Table 44: Scenario 3A&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Orange	39.2	3,006	117,817
24	To east (GULLY)	Orange	45.8	14,166	648,873
24	To east (BERRY)	Orange	42.8	899	38,467
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,348,456

2.3.15 Pre-FOA scenario review for full airport system scenario 3B&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 3B&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 76 opposite and Figure 77 on page 148 show the route configuration for the scenario 3B&2C.

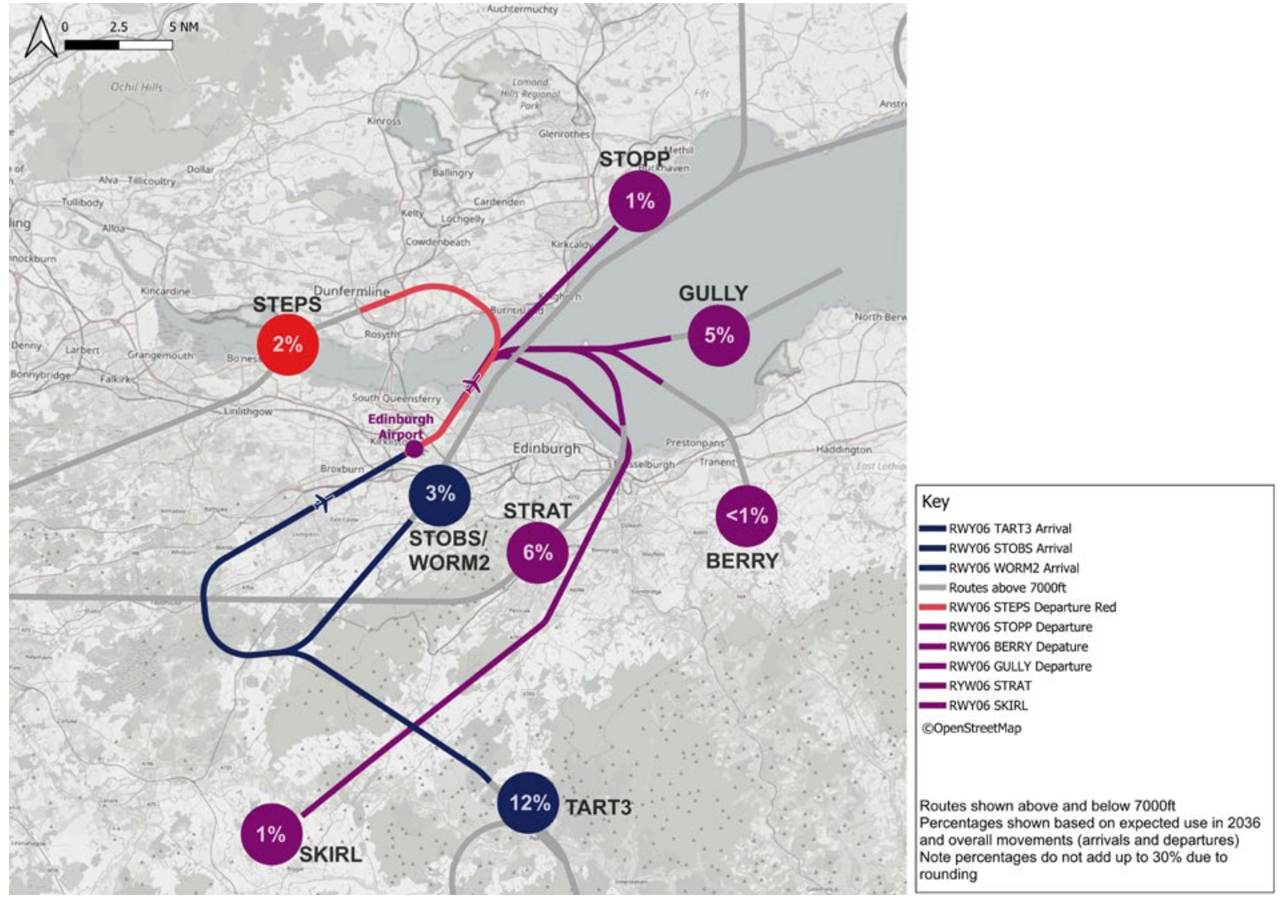


Figure 76: Design for scenario 3B&2C – runway 06.

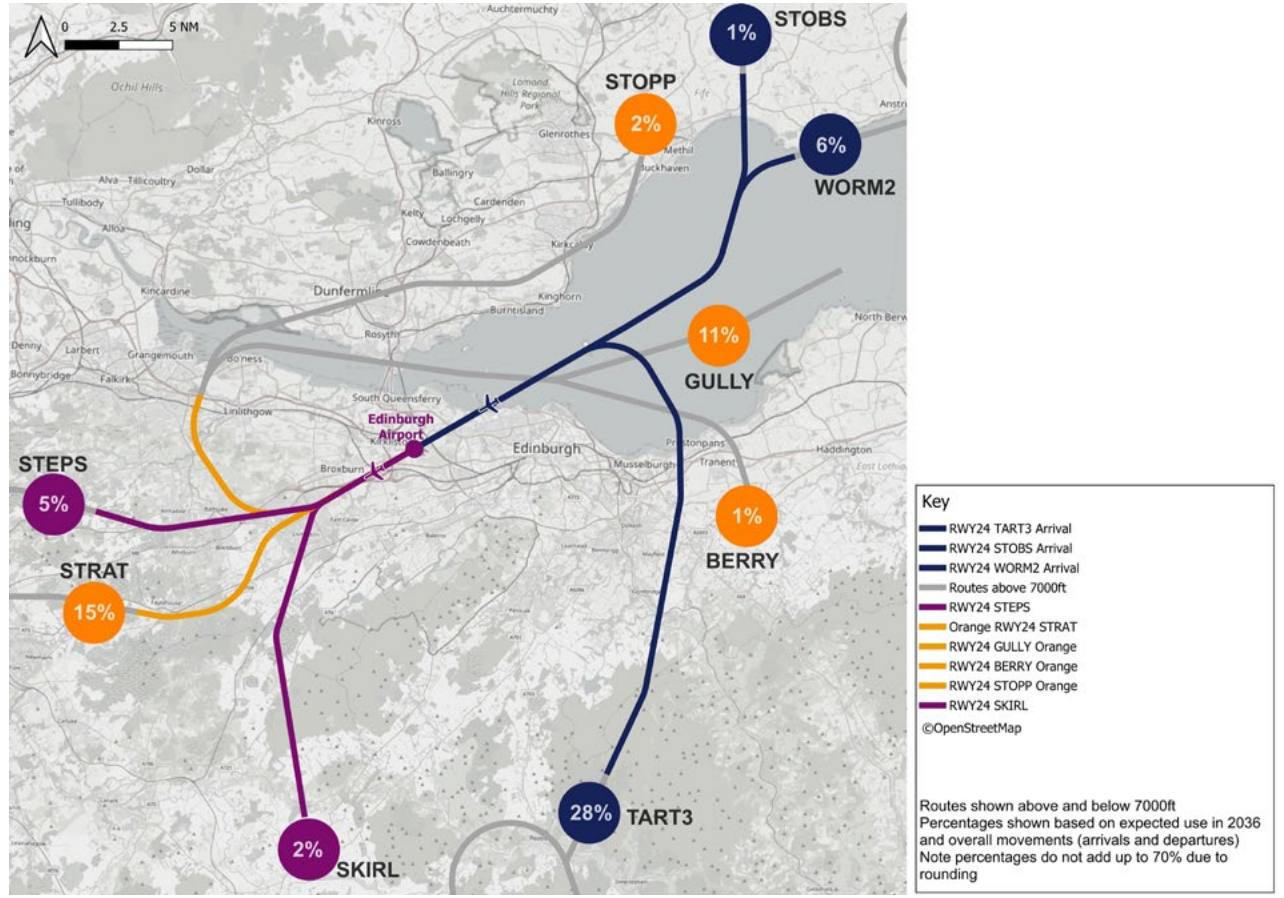


Figure 77: Design for scenario 3B&2C – runway 24.

2.3.15.1 Scenario 3B&2C indicators for potential adverse noise effects

Table 45: Qualitative assessment of potential adverse noise effects for scenario 3B&2C

Scenario	RWY24 North & Eastbound – Potential improvement to net adverse effects	RWY24 Southbound – Routes resemble to today's, so minimal change	RWY06 Westbound – Potential improvement to net adverse effects
3B&2C	no evidence – neutral	yes – neutral	yes – small

2.3.15.2 Scenario 3B&2C indicators for overflight footprints vs population density and GoldSET suitability surface

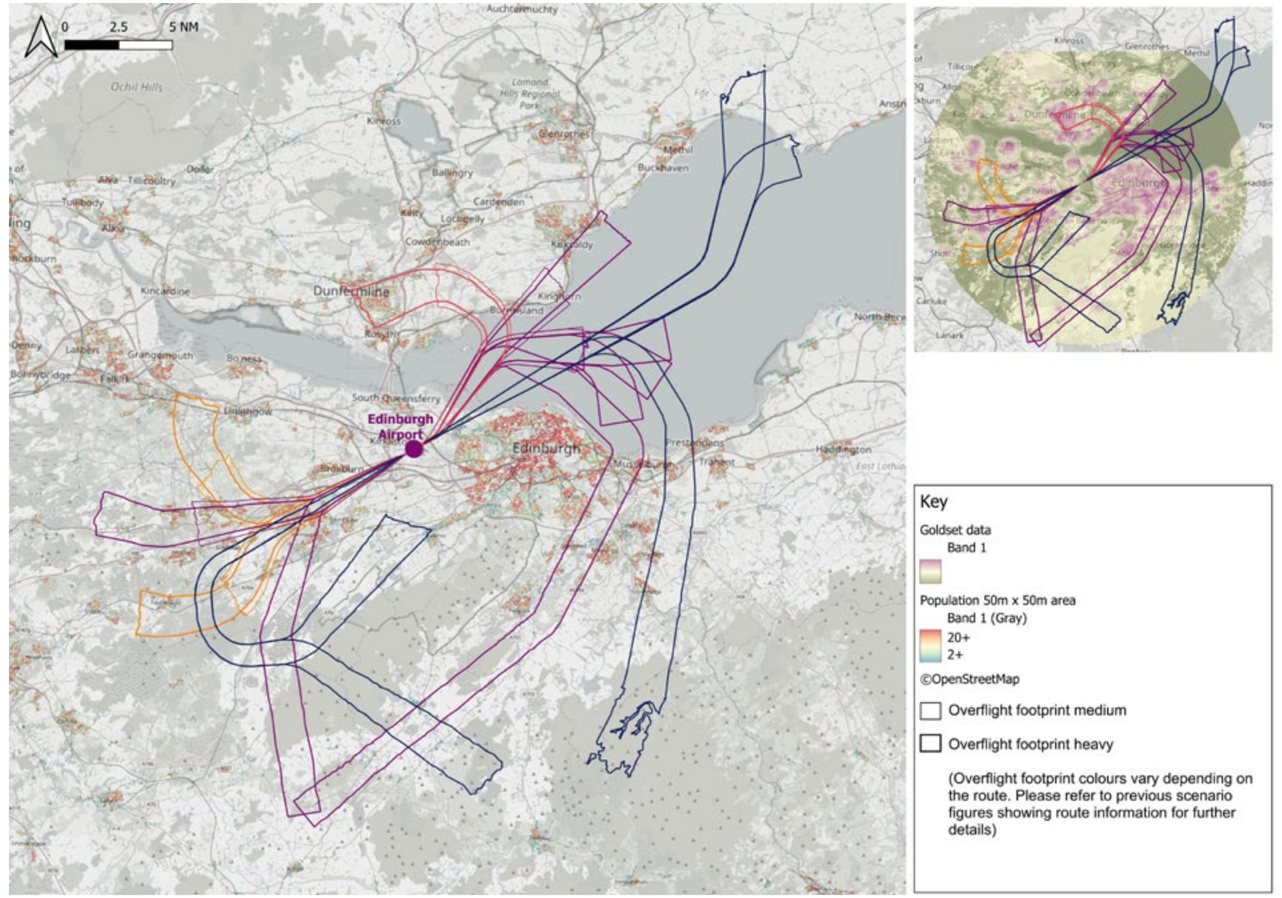


Figure 78: Scenario 3B&2C overflight footprints vs population density and GoldSET suitability surface.

Table 46: Scenario 3B&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
3B&2C	98,838,158	96.35

2.3.15.3 Scenario 3B&2C indicators for fuel burn and CO_2e efficiency review

Table 47: Scenario 3B&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Orange	39.2	3,006	117,817
24	To east (GULLY)	Orange	45.8	14,166	648,873
24	To east (BERRY)	Orange	42.8	899	38,467
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,320,453

2.3.16 Pre-FOA scenario review for full airport system scenario 4A&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 4A&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 79 opposite and Figure 80 on page 154 show the route configuration for the scenario 4A&2C.

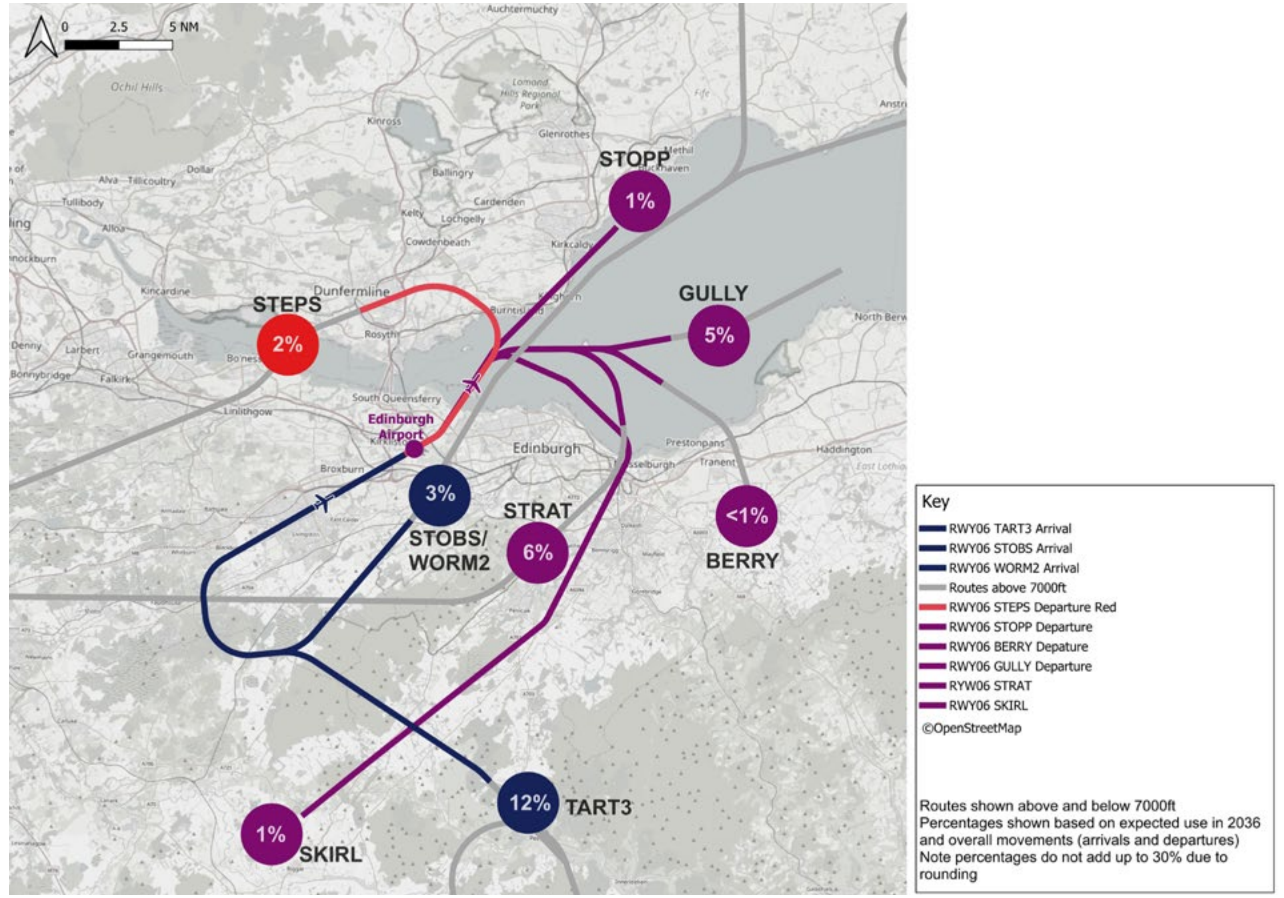


Figure 79: Design for scenario 4A&2C – runway 06.

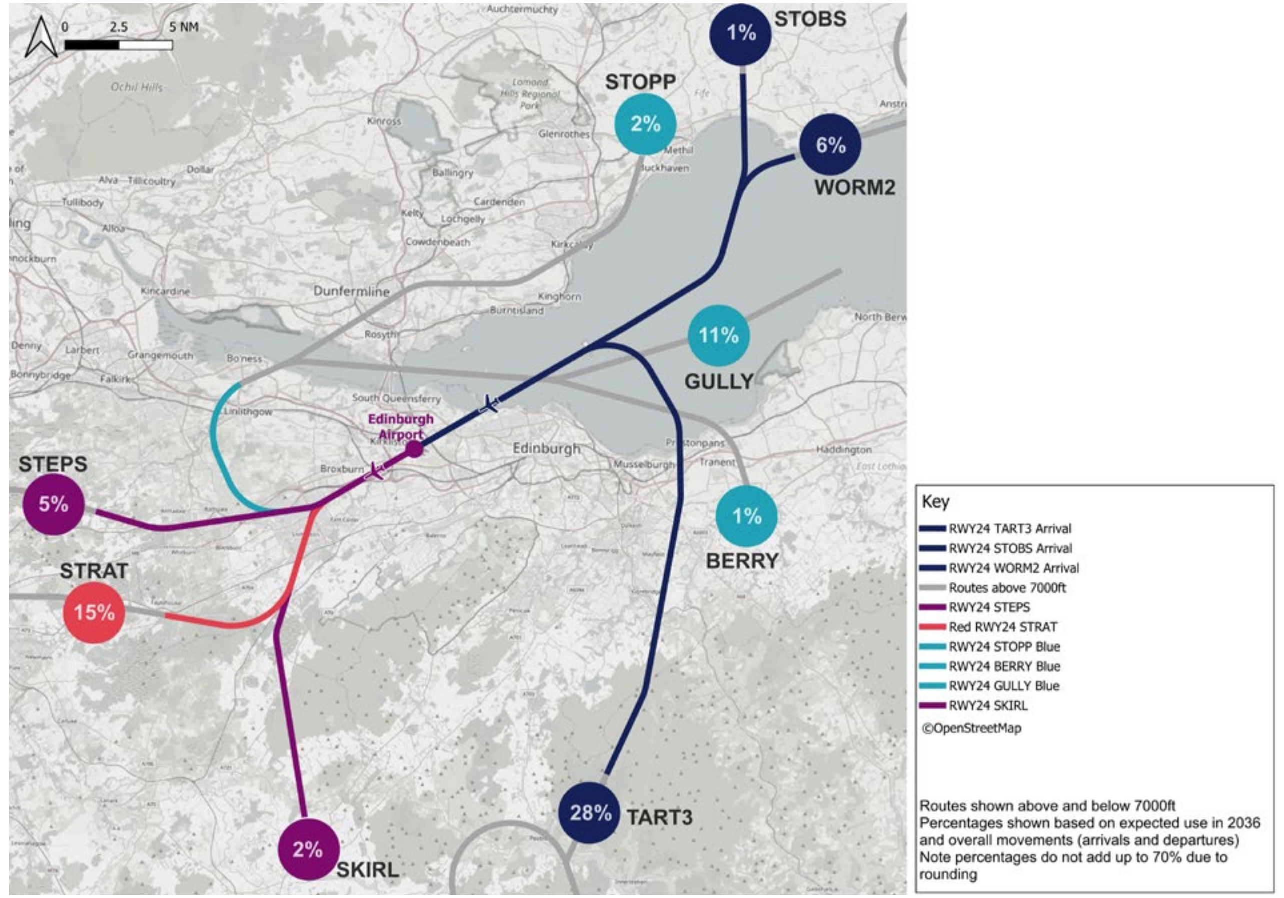


Figure 80: Design for scenario 4A&2C – runway 24.

2.3.16.1 Scenario 4A&2C indicators for potential adverse noise effects

Table 48: Qualitative assessment of potential adverse noise effects for scenario 4A&2C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
4A&2C	no evidence – neutral	no	yes – small

2.3.16.2 Scenario 4A&2C indicators for overflight footprints vs population density and GoldSET suitability surface

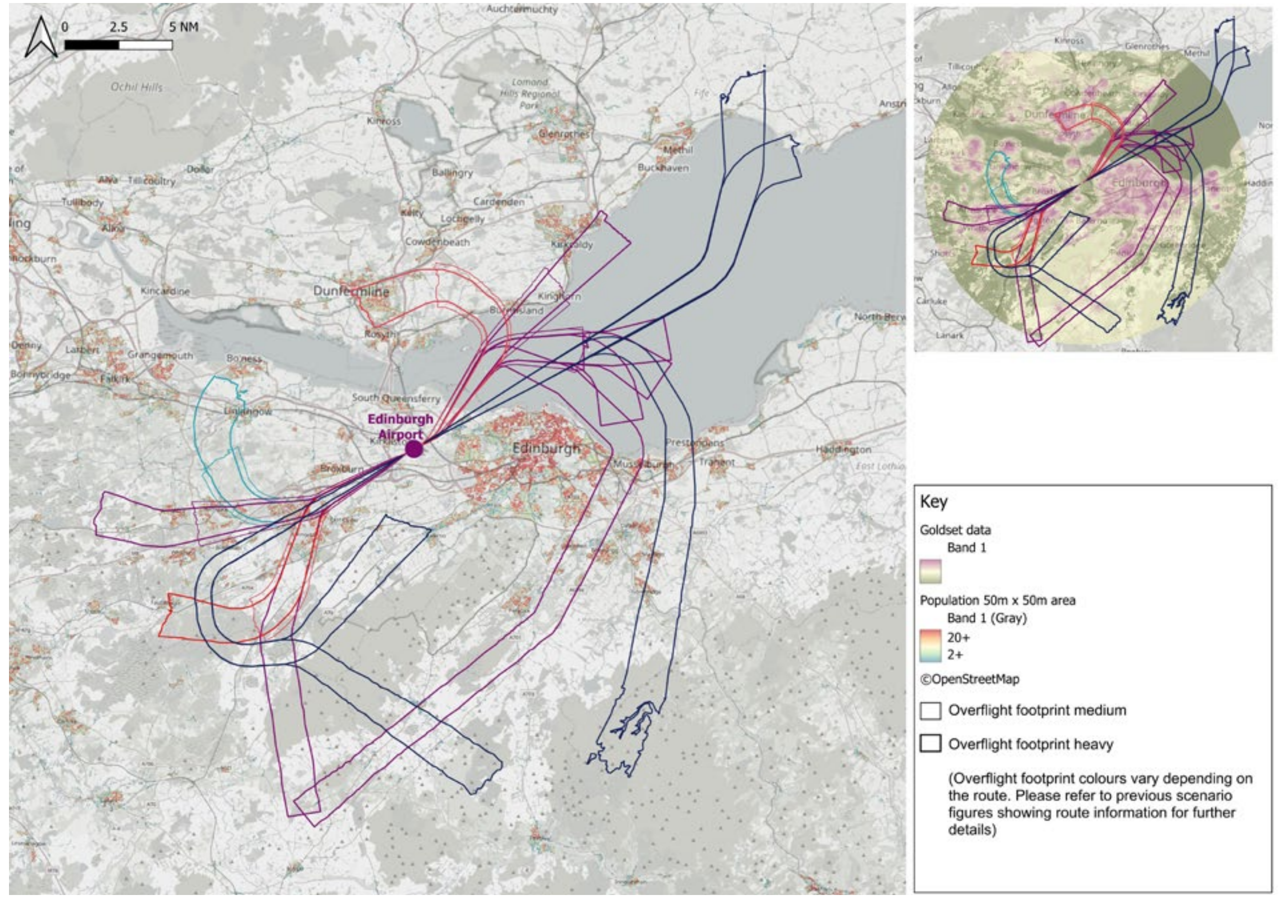


Figure 81: Scenario 4A&2C overflight footprints vs population density and GoldSET suitability surface.

Table 49: Scenario 4A&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
4A&2C	98,036,170	96.39

2.3.16.3 Scenario 4A&2C indicators for fuel burn and CO_2e efficiency review

Table 50: Scenario 4A&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Blue	36.9	3,006	110,905
24	To east (GULLY)	Blue	43.2	14,166	611,981
24	To east (BERRY)	Blue	40.2	899	36,131
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Red	29.3	23,336	683,740
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,302,375

2.3.17 Pre-FOA scenario review for full airport system scenario 4B&2C

This subsection describes the results of the pre-FOA scenario review for full airport system scenario 4B&2C.

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	Southbound (STRAT)	Orange (turns west of Aberdour)	Red (turns east of Aberdour)
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Figure 82 opposite and Figure 83 on page 160 show the route configuration for the scenario 4B&2C.

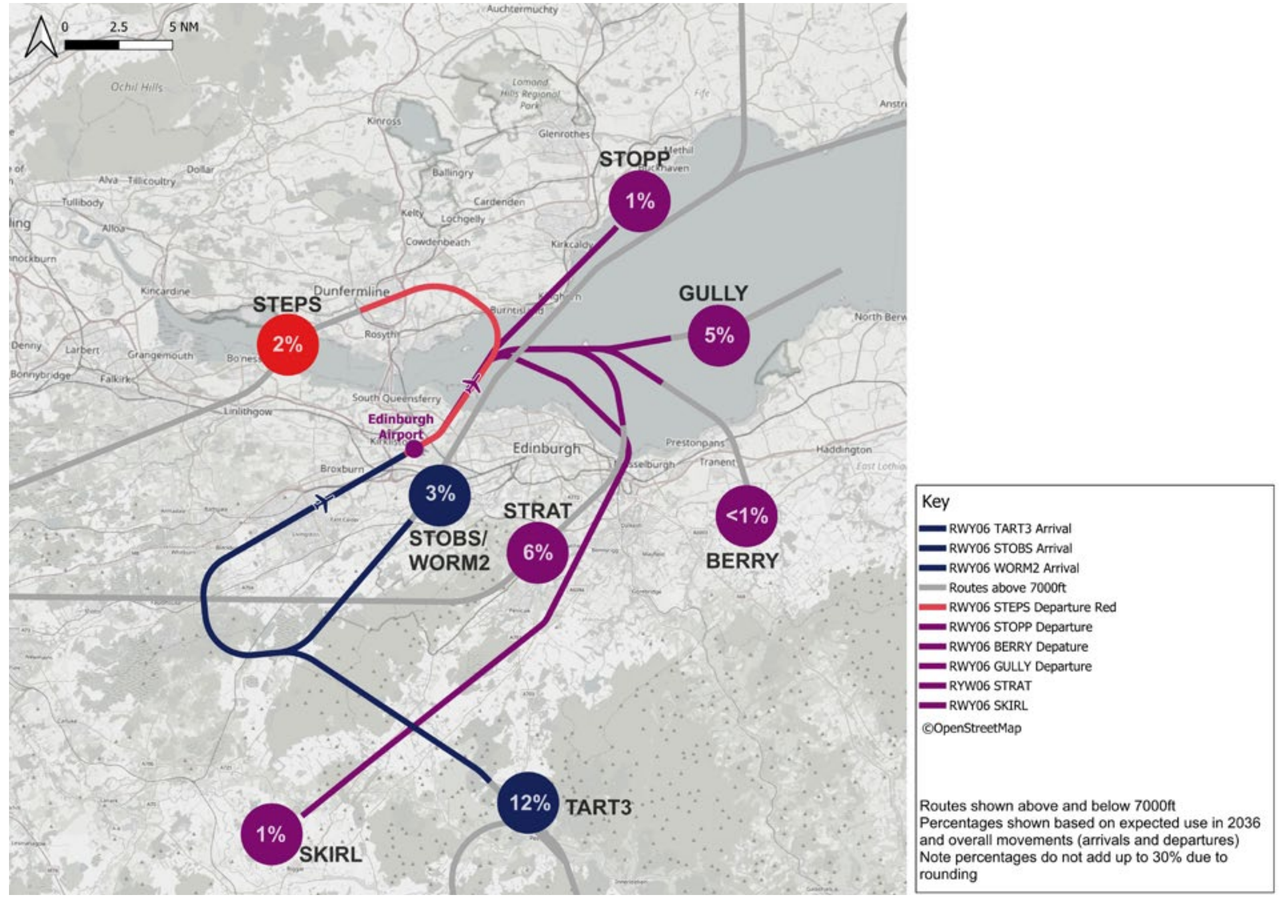


Figure 82: Design for scenario 4B&2C – runway 06.

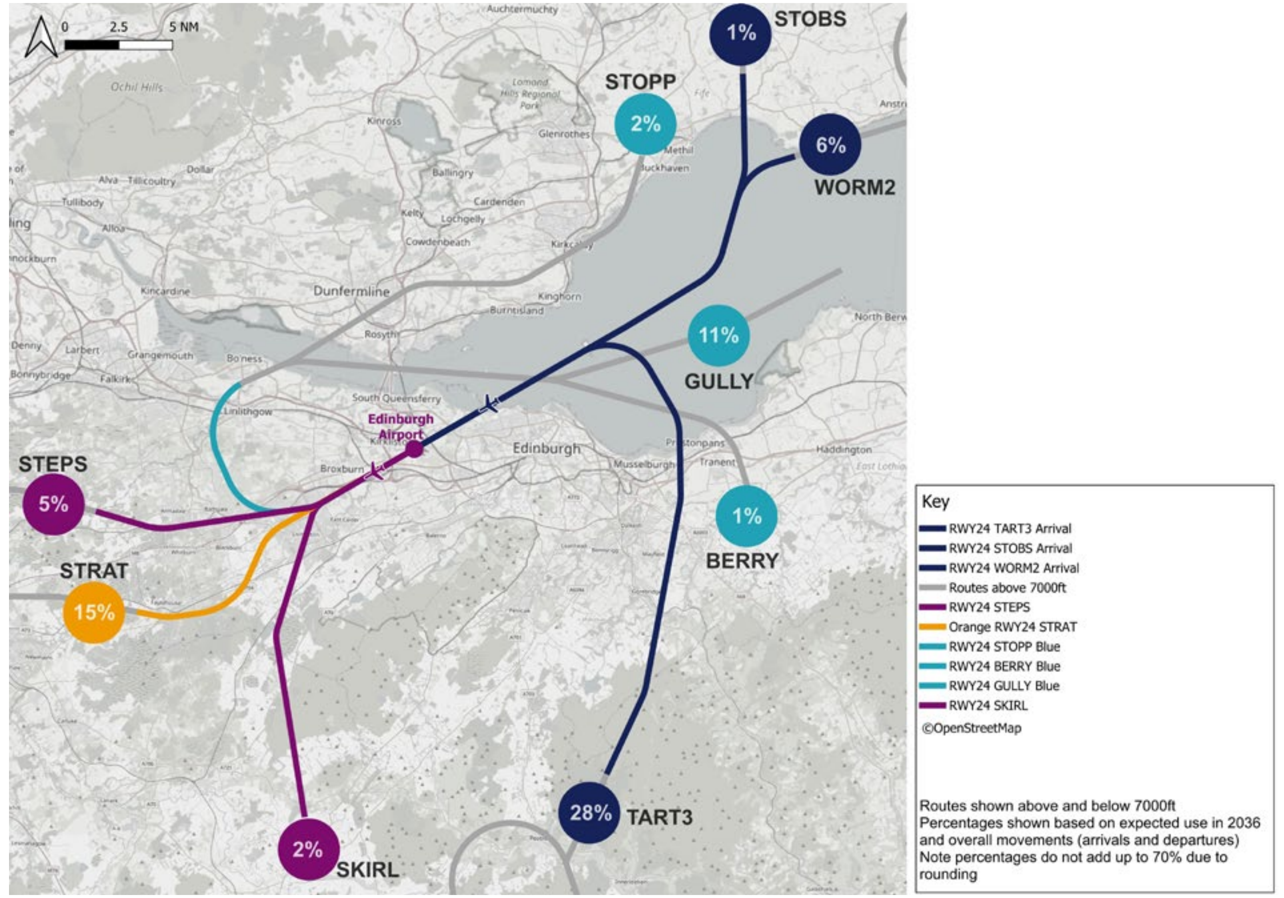


Figure 83: Design for scenario 4B&2C – runway 24.

2.3.17.1 Scenario 4B&2C indicators for potential adverse noise effects

Table 51: Qualitative assessment of potential adverse noise effects for scenario 4B&2C

Scenario	**RWY24 North & Eastbound –** Potential improvement to net adverse effects	**RWY24 Southbound –** Routes resemble to today's, so minimal change	**RWY06 Westbound –** Potential improvement to net adverse effects
4B&2C	no evidence – neutral	yes – neutral	yes – small

2.3.17.2 Scenario 4B&2C indicators for overflight footprints vs population density and GoldSET suitability surface

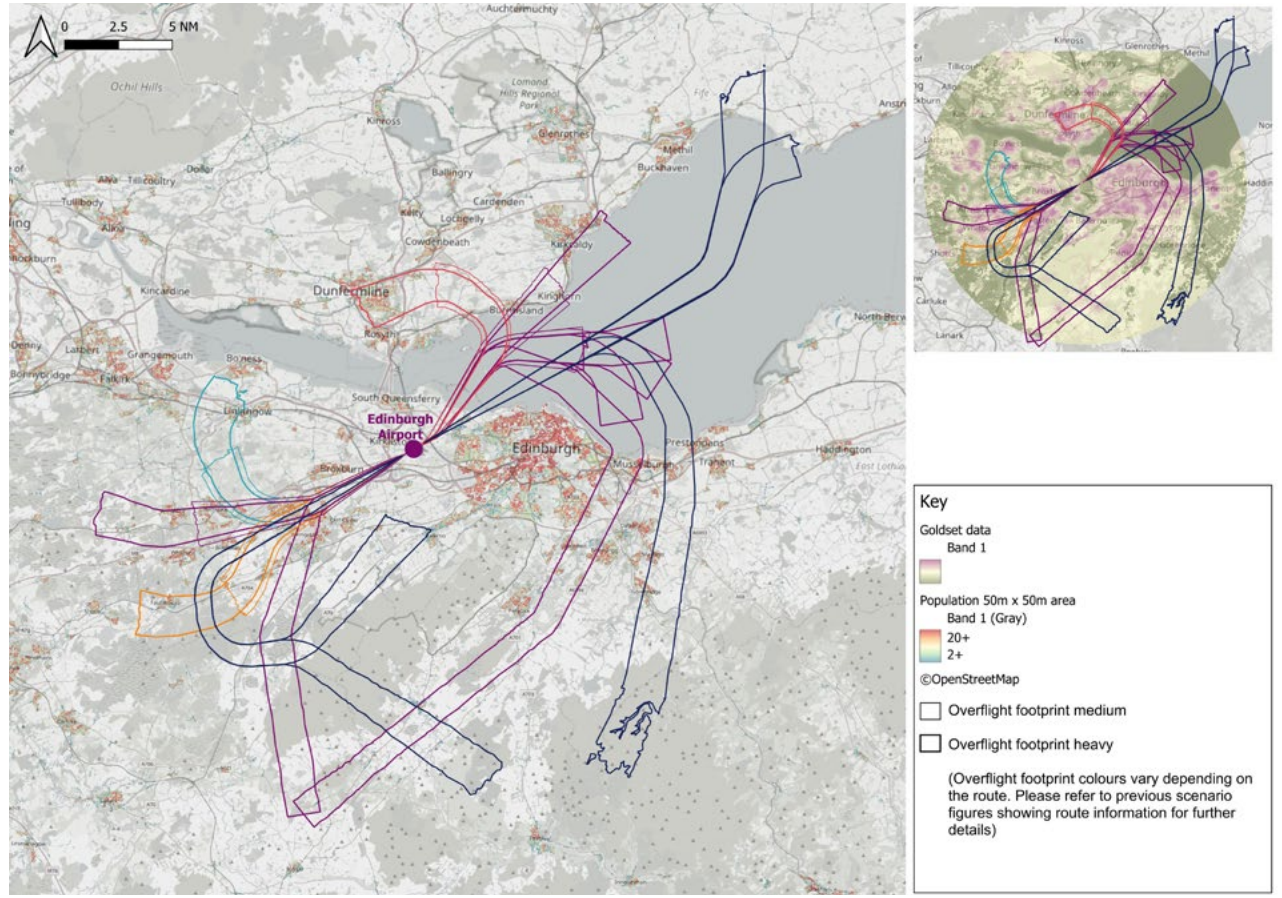


Figure 84: Scenario 4B&2C overflight footprints vs population density and GoldSET suitability surface.

Table 52: Scenario 4B&2C overflight footprint population and GoldSET metrics

Scenario	Weighted Overflight Event Index (weighted overflights per month)	GoldSET Suitable score (out of 100)
4B&2C	98,466,970	96.37

2.3.17.3 Scenario 4B&2C indicators for fuel burn and CO_2e efficiency review

Table 53: Scenario 4B&2C route length indicator

Runway	Route	Colour	Length	Annual Traffic Count (2027)	Actual Distance Flown (NM)
06	To north (STOPP)		16.8	1,288	21,640
06	To east (GULLY)		21.9	6,071	132,960
06	To east (BERRY)		20.1	385	7,742
06	To west and south turboprops only (SKIRL)		36.3	1,151	41,769
06	To south (STRAT)		53.2	10,001	532,057
06	To west (STEPS)	Red	43.6	3,235	141,029
06	From north (STOBS)		66.0	722	47,641
06	From east (WORM2)		60.5	3,213	194,393
06	From south (TART3)		33.7	18,196	613,202
24	To north (STOPP)	Blue	36.9	3,006	110,905
24	To east (GULLY)	Blue	43.2	14,166	611,981
24	To east (BERRY)	Blue	40.2	899	36,131
24	To west and south turboprops only (SKIRL)		19.2	2,685	51,549
24	To south (STRAT)	Orange	28.1	23,336	655,737
24	To west (STEPS)		30.4	7,547	229,441
24	From north (STOBS)		38.2	1,684	64,339
24	From east (WORM2)		32.1	7,497	240,662
24	From south (TART3)		36.3	42,457	1,541,193
Both	Weighted total for comparison				5,274,372

2.4 Step 4: Down-selection for FOA options

Table 54 provides a summary of the pre-FOA review outcomes.

Table 54: Summary table of pre-FOA review outcomes

Scenario	RWY24 north and eastbound (STOPP, GULLY, BERRY)	RWY24 southbound (STRAT)	Runway 06 westbound (STEPS)	Qualitative assessment visual comparison to LAeq 8hr: RWY24 north & eastbound Potential improvement to net adverse effects	RWY24 southbound Routes resemble to today's, so minimal change	RWY06 westbound Potential improvement to net adverse effects	Weighted Overflight Event Index (weighted overflights per month	GoldSET suitability score (out of 100)	Annual route mile differences compared to shortest (NM) – note shortest is best	Option
	colour coding relates to route variation			colour coding relates to relative performance						
1A&1C				yes	no	yes – small	93,143,006	96.42	-28,003	
1A&2C							92,965,821	96.44	-36,413	
1B&1C					yes – neutral		93,573,806	96.40	zero – shortest	1
1B&2C							93,396,621	96.41	-8,410	
2A&1C					no		93,865,106	96.39	-47,881	
2A&2C							93,687,921	96.40	-56,291	3
2B&1C					yes – neutral		94,295,906	96.37	-19,878	
2B&2C							94,118,721	96.38	-28,288	
3A&1C				no evidence – neutral	no		98,584,543	96.36	-190,341	
3A&2C							98,407,358	96.37	-198,751	
3B&1C					yes – neutral		99,015,343	96.34	-162,338	2
3B&2C							98,838,158	96.35	-170,748	
4A&1C					no		98,213,354	96.37	-144,259	
4A&2C							98,036,170	96.39	-152,669	
4B&1C					yes – neutral		98,644,155	96.35	-116,256	
4B&2C							98,466,970	96.37	-124,666	

The conclusions of the FOA review are laid out below.

The visual comparison of centrelines versus the baseline LAeq contours suggested scenarios with green or red route for runway 24 north and eastbound could improve adverse noise effect outcomes by reducing the extent to which the contours effect the Livingston area, at the expense of more impact over a less populated tract of land between Livingston and Uphall.

The weighted overflight event index is not a noise measure, but at this stage in the process this can serve as a proxy for potential noise impacts by presenting data on overflight that takes into account population likely to be overflown, and the height of the overflight.

This weighted overflight event analysis supported the conclusion that scenarios with green or red for the runway 24 north and eastbound route would be better for noise outcomes than those with the blue or orange route, with a scoring between 92.9m and 94.3m for the scenarios with the green or red variation of this route vs 98.0m to 99.1m for the scenarios with blue or orange.

The weighted overflight difference between scenarios where the only route difference is the green or red route for runway 24 north and eastbound departures is <1%, and so it is not a basis for favouring one over the other.

Conclusion 1: Scenarios with green or red designs for runway 24 north and eastbound are more likely to reduce adverse effects, in line with the government's primary noise objective for flights below 4,000ft, compared to those with the orange or blue versions of the route.

The visual comparison of centrelines versus the baseline LAeq contours provided no evidence to suggest that the overall adverse effects would be more or less affected by the choice of the runway 24 southbound route. The weighted overflight index is marginally in favour of red over orange, but the difference between scenarios that only differ with respect to this route is small, <1%, and so is not a basis for favouring one over the other.

However, the visual comparison of centrelines versus the baseline LAeq suggests the scenarios involving the red version of the route would be likely to result in more change to the contours than the green version (e.g. more new people effected above the LOAEL, albeit cancelled out by similar numbers of people currently affected who would no longer be).

Conclusion 2: Scenarios with orange designs for runway 24 southbound are more consistent with the existing published arrangements in terms of the location of adverse effects when compared to an equivalent design with the red version of this route. This means that orange version of the runway 24 southbound route is more favourable in terms of the government's secondary noise objective for flights below 4,000ft.

Given that other factors such as continuous climb rates are consistent across all options the annual difference in route miles is a proxy for relative CO_2e and fuel burn performance. The green route for runway 24 north and eastbound, orange for runway 24 southbound and orange for runway 06 westbound are the shortest version of each route and therefore have the lowest annual route miles and can therefore be assumed to be the most efficient combination for CO_2e and fuel.

Conclusion 3: Scenario 1B+1C would be the most efficient scenario with respect to CO_2e and fuel burn.

GoldSET suitability scores have all returned in a narrow range and does not provide any strong evidence for favouring any one group of scenarios over any other.

The above conclusions support the selection of Scenario 1B&1C as an option for the FOA as it was the only scenario that was in the favoured group with respect to Conclusions 1, 2 and 3. This provides evidence to suggest it would produce the best results in the FOA. Going forward into FOA this scenario was renamed Option 1 for simplicity.

Conclusion 1 identifies the likely benefit in terms of potential adverse effects of an early turn (green or red) on the runway 24 north and eastbound departures. However, feedback from Stage 2 and previous route trials in the area have highlighted the concern of communities who would be affected by such a route (see Annex I). Given that the pre-FAO scenario review is not a definitive study, we therefore chose to take forward Scenario 3B&1C, which is the same as Option 1 except it has latest turn for the runway 24 north and eastbound routes (orange) instead of the narrowest (green). Scenario 3B&1C was therefore taken forward to FOA and renamed as Option 2 for simplicity.

Our third scenario for FOA sought to capture a range of the other design alternatives not represented in Option 1 or 2 to ensure that they were also represented in the more detailed FOA, namely the red route for the runway 24 north and eastbound departures, the red route for the runway 24 southbound departures and the red route for the runway 06 westbound departures. This is Scenario 2A&2C which is taken forward and renamed as Option 3.

The only individual route option not represented in either Option 1, 2 or 3 was the blue runway 24 north and eastbound route. We believe that this later turn option was adequately represented by the orange version of the same route captured in Option 2 and that an additional FOA option to analyse it would not add value.

Table 55 shows how the options taken forward map to those considered in the pre-FOA review.

Table 55: Table of full airport system scenarios highlighting those being taken forward as options for the FOA

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C **OPTION 1**	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C **OPTION 3**
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C **OPTION 2**	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

Table 56 on page 167 and Figure 85 on page 168 shows how the individual route options, except for the blue route discussed above, are represented in the three options being taken forward.

Table 56: Table showing how the options selected for FOA relate to the alternative designs for each route

	Runway 24 North and Eastbound (STOPP/GULLY/BERRY)	**Runway 24** Southbound (STRAT)	**Runway 06** Westbound (STEPS)	**All other routes**
FOA Option 1	Green (turns east of Linlithgow)	Orange (turns after Linlithgow)	Orange (turns west of Aberdour)	**No difference**
FOA Option 2	Orange (turns west of Linlithgow)	Orange (turns after Linlithgow)	Orange (turns west of Aberdour)	**No difference**
FOA Option 3	Red (turns east of Linlithgow)	Red (turns overhead Livingston)	Red (turns east of Aberdour)	**No difference**

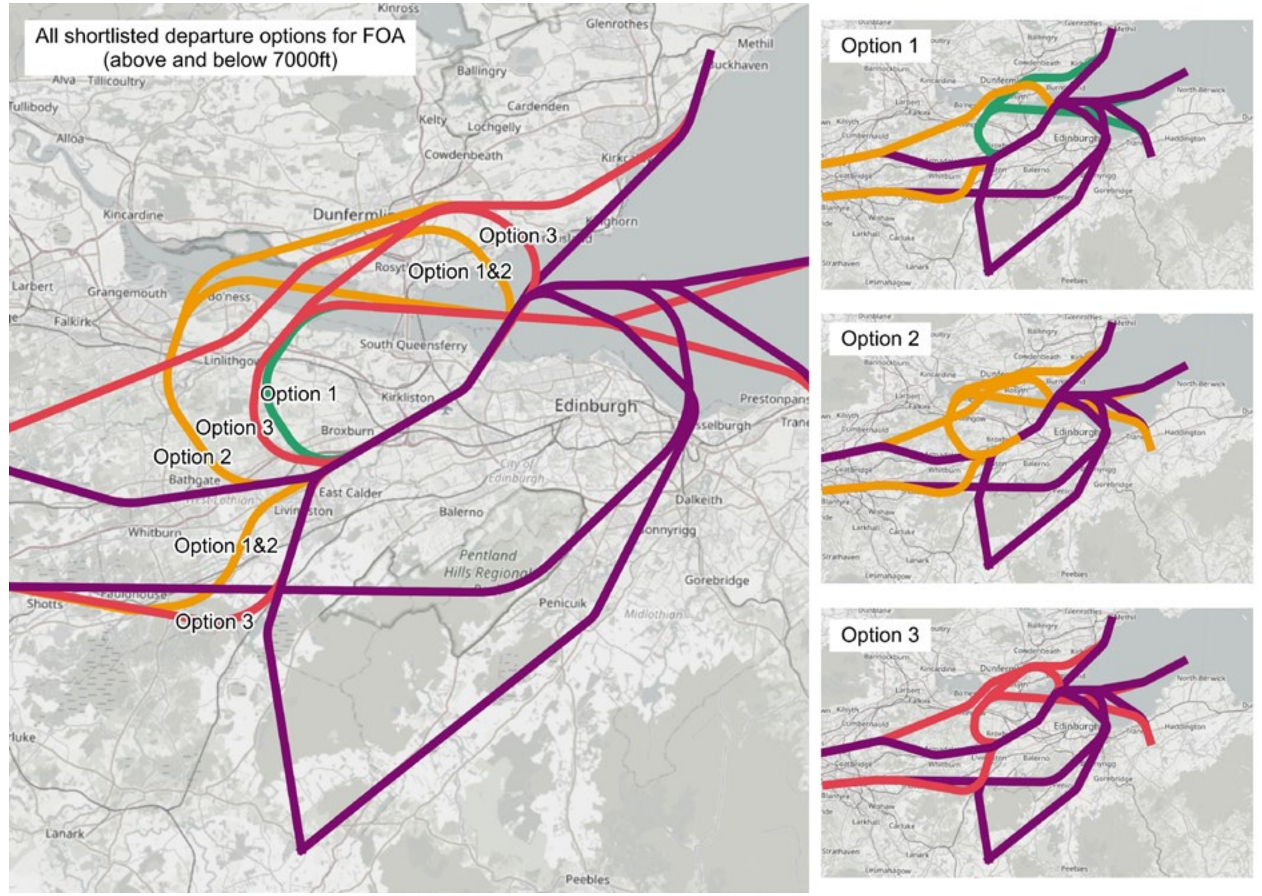


Figure 85: FOA Options 1, 2 and 3 side by side with alternative designs highlighted.

Full Options Appraisal Methodology

03

3. Full Options Appraisal Methodology

3.1 Baseline inputs

As part of this FOA, CAP1616 requires airspace change sponsors to set a baseline which is used for appraisal of the options. CAP1616 explains that this will be a 'without airspace change' scenario for a future period. This is then used in the FOA to appraise the difference between this 'without airspace change' scenario and the options, which represent the 'with airspace change' scenarios.

The 'without airspace change' baseline reflects current-day routes and operations, although it will also take due consideration of known or anticipated factors that affect performance such as forecast growth in air traffic and expected changes in airlines' fleet mix.

Likewise, the baseline dataset must take into account all planned housing developments close to an airport, alongside data on the established populations.

The following subsections provide information which has been used to generate the baseline scenario. The full baseline appraisal is shown in Section 4.1.

Note that as part of the ACOG Cumulative Analysis Framework Part 2 (CAF2), for some assessments shared assumptions were made across the three ACPs (Edinburgh Airport, Glasgow Airport and NERL) which form the ScTMA Cluster for airspace modernisation. For details of these shared assumptions, please see the ACOG CAF2 document[1].

3.1.1 Scenario years and traffic forecasts: Movement numbers and schedule

Airspace Change Sponsors must determine a 'current day' scenario which represents actual flight data and is typically based on the latest full year of data available [at the start of the analysis]. This current day scenario is then used as a starting point when developing scenarios for:

- year of implementation 'without airspace change' proposal (year 1)
- year of implementation 'with airspace change' proposal for each design option (year 1)
- 10 years after implementation 'without airspace change' proposal (year 10)
- 10 years after implementation 'with airspace change' proposal for each design option (year 10).

We have defined the current-day scenario as 2023 as this was the latest available data at the time of undertaking the noise and CO_2e modelling.

The Scottish Airspace Modernisation ACPs are expected to be implemented no earlier than Spring 2027 and therefore this FOA will 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 2027. Year 10 after a 2027 implementation date is 2036.

All the figures in this section relate to our annual forecast which are the numbers we represent in this document to describe the changes and are the basis of annual calculations. Specific summertime figures have been developed for the noise analysis as required by CAP1616. The noise analysis assumptions are found in Annex F.

3.1.2 Traffic forecast: Movement numbers and schedule

For the purposes of this FOA, we have taken flight data from 2023 and used our long-term business plan predictions to grow this data to the 2027 baseline. This 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.

We do not usually undertake this kind of detailed forecasting beyond five years because there is no reliable data available on how the aircraft types airlines plan to use on any given route will change in the long term. We do, however, have a view on how demand for flights will change. Therefore, we have longer term forecasts of growth by 'market sector'. Market sectors are the regions that our flights fly to and from. For example, in the long term we expect more growth on routes to/from eastern Europe than on domestic routes.

The forecasting was based upon the best and most up-to-date information available at the time of forecasting, which was prior to the FOA analysis starting early in 2024.

Airport operations are continuously evolving with airline decisions around the introduction of new destinations, withdrawal of existing destinations and changes to fleet mix outside of an airport's immediate control. Just as we have between

[1] Scottish Terminal Manoeuvring Area (ScTMA) Cluster – Cumulative Analysis Framework Part 2 (CAF2) Annex B.

Stage 2 and Stage 3, as we progress through the airspace change process, we will continue to review the forecasts and update. We will update the forecasts again ahead of the Stage 4 Final Options Appraisal.

3.1.2.1 Modal split

The annual modal split based on the long-term[2] average is runway 06 being used 30% of the year, and runway 24 being used 70% of the year.

3.1.2.2 Overall Air Traffic Movements

Table 1 opposite provides an overview of the forecast movement numbers for both 'without airspace change' and 'with airspace change' scenarios.

In Stage 2 we alluded to potential capacity improvement from this ACP that would increase our growth. This was to be achieved by reducing the timed separation between our departures. It has since been clarified that the reduction of departure separation is not part of this ACP as it does not require any changes to the airspace structure. Therefore, we are no longer claiming a capacity benefit from this ACP. Consequently, the options within the ACP do not enable any increase in forecast movements at Edinburgh Airport and therefore the traffic forecast applied 'without airspace change' is the same as 'with airspace change'.

Note that reduced departure separation is still progressing as a separate project but this has not yet been developed fully and would be subject to separate regulatory approval. It is not accounted for in our traffic forecasts.

Calculations for years between 2027 and 2036 are assumed to have a linear year on year change.

Table 1: Annual Forecast Movements for Edinburgh Airport across the ACP assessment period

Year	ATMs
2023	116,000
2027	148,000
2028	149,000
2029	149,000
2030	152,000
2031	155,000
2032	157,000
2033	160,000
2034	163,000
2035	167,000
2036	170,000

Note: Figures have been rounded to '000s.

In Table 1 above, the 'current day' scenario is based on 2023. This is because the FOA for the Stage 3 submission of this ACP was started in 2024 and we had to use a full years' worth of data to generate forecasts and undertake some of the assessments. Following completion of the assessments and drafting of this consultation material we submitted our Stage 3 documents to the CAA in August 2024 (alongside Glasgow Airport and NERL who submitted their own Stage 3 submissions at the same time).

We recognise that this means the 'current year' is now a number of years in the past 'however' this does not affect the main basis of the analysis which looks at the changes between the 'with airspace change' and 'without airspace change' scenarios in 2027 and 2036.

If you would like to see how movement numbers have changed since 2023, please see https://www.caa.co.uk/data-and-analysis/uk-aviation-market/airports/uk-airport-data/

As part of Stage 4 of the airspace change process, we will undertake a Final Options Appraisal on the proposal developed following this consultation. At the point of undertaking this appraisal we will use the most up-to-date sources of data for all of the assessments within the appraisal.

[2] 2004-2023

3.1.2.3 Market sector growth 2027 to 2036

Table 2 shows the different growth rates forecast between 2027 and 2036 for each market sector. The differing market sector growths rates have been accounted for in the FOA quantitative analyses.

Table 2: 2027-2036 market sector growth rates

Domestic	Western Europe	Eastern Europe	America	East
-2%	19%	51%	13%	31%

3.1.2.4 Fleet mix

Table 3 shows fleet mix percentages for actual flight data from 2023 alongside data from the samples grown to 2027 and 2036[3].

Table 3: Fleet mix forecast

Type	2023	Cumalative Percentage
BOEING 737-800	22%	22%
AIRBUS A320	18%	41%
BOEING 737 MAX 8	10%	51%
AIRBUS A319	8%	60%
AIRBUS A320neo	7%	66%
EMBRAER 190	5%	72%
ATR ATR-72-600	5%	77%
EMBRAER C-99	4%	81%
ATR ATR-42-500	3%	84%
BOEING 737-400	2%	86%
BOEING 757-200	2%	88%
AIRBUS A321neo	2%	89%
AIRBUS A321	1%	90%
BOEING 787-8	1%	91%
BOEING 767-300	1%	92%
Other Aircraft Types	8%	100%

Type	2027	Cumalative Percentage
BOEING 737-800	30%	30%
AIRBUS A320	23%	53%
AIRBUS A320neo	9%	62%
AIRBUS A319	6%	68%
ATR ATR-72-201	6%	73%
EMBRAER 190	5%	78%
EMBRAER C-99	5%	83%
ATR ATR-42-300	3%	86%
BOEING 757-200	3%	89%
AIRBUS A321	2%	91%
BOEING 737-400	2%	92%
BOEING 787-8	2%	94%
BOEING 767-300	2%	95%
BOEING 737-200	1%	97%
AIRBUS A321neo	1%	97%
CANADAIR Challenger 890	1%	98%
Other Aircraft Types	2%	100%

Type	2036	Cumalative Percentage
BOEING 737-800	32%	32%
AIRBUS A320	22%	55%
AIRBUS A320neo	9%	64%
AIRBUS A319	5%	69%
EMBRAER 190	5%	74%
ATR ATR-72-201	5%	79%
EMBRAER C-99	4%	84%
ATR ATR-42-300	2%	86%
AIRBUS A321	2%	89%
BOEING 757-200	2%	91%
BOEING 787-8	2%	93%
BOEING 737-400	2%	94%
BOEING 767-300	1%	96%
BOEING 737-200	1%	97%
CANADAIR Challenger 890	1%	97%
AIRBUS A321neo	1%	98%
Other Aircraft Types	2%	100%

[3] Earlier in this section we describe how detailed forecasting was only available for five years ahead, and that beyond this growth is only captured in terms of demand for the different market sectors. This means that detailed information on fleet mix changes as a result of airlines retiring some aircraft types and introducing others was available for 2027 but not 2036, and therefore the fleet mix assumptions for each market sector are constant between 2027 and 2036. However, different market sectors have different fleet mix profiles (e.g. typical domestic vs long haul types will differ) and therefore because different growth rates have been applied to each market sector, the overall fleet mix does change between 2027 and 2036 (e.g. domestic flights have a high proportion of turboprop aircraft and so the reduction in the proportion of domestic flights contributes to a reduction in the percentage of turboprops in the overall forecast fleet mix between 2027 and 2036, conversely the increase in flights to eastern Europe, where medium sized jets are more prevalent has contributed to an increase in the proportion of some medium sized jets).

3.1.3 Route usage

Table 4 shows the baseline and proposed annual 24 hour average route usage assumptions for 2027 and 2036.

Note that the apparent discrepancy in the total column is due to rounding. In all cases the unrounded runway 24 values sum to 35% each for arrivals and departures to represent the 70% average annual usage of that runway, whereas runway 06 arrivals and departures each sum to 15%.

Differences in usage rates between 2027 and 2036 are due to the differences in market sector growth rates as discussed above.

Table 4: Route usage assumptions for 2027 and 2036

2027 24 hour annual			2036 24 hour annual		
Baseline Departures	**% overall Runway 24**	**% overall Runway 06**	**Baseline Departures**	**% overall Runway 24**	**% overall Runway 06**
GOSAM	22%	10%	GOSAM	21%	9%
GRICE	2%	1%	GRICE	2%	1%
TALLA	10%	4%	TALLA	11%	5%
Total	35%	15%	Total	35%	15%
Proposed Departures	**% overall Runway 24**	**% overall Runway 06**	**Proposed Departures**	**% overall Runway 24**	**% overall Runway 06**
BERRY	1%	<0%	BERRY	1%	<0%
GULLY	10%	4%	GULLY	11%	5%
SKIRL	2%	1%	SKIRL	2%	1%
STEPS	5%	2%	STEPS	5%	2%
STOPP	2%	1%	STOPP	2%	1%
STRAT	16%	7%	STRAT	15%	6%
Total	35%	15%	Total	35%	15%
Baseline Arrivals	**% overall Runway 24**	**% overall Runway 06**	**Baseline Arrivals**	**% overall Runway 24**	**% overall Runway 06**
STIRA	2%	1%	STIRA	2%	1%
TARTN	33%	14%	TARTN	33%	14%
Total	35%	15%	Total	35%	15%
Proposed Arrivals	**% overall Runway 24**	**% overall Runway 06**	**Proposed Arrivals**	**% overall Runway 24**	**% overall Runway 06**
STOBS	1%	<0%	STOBS	1%	<0%
TART3	29%	12%	TART3	28%	12%
WORM2	5%	2%	WORM2	6%	3%
Total	35%	15%	Total	35%	15%

3.1.4 Missed approaches

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 occur if the runway is temporarily blocked, or if it is unsafe to land. In the event of a missed approach, aircraft fly a defined, published procedure.

At Edinburgh Airport there were 149 missed approaches in 2023 which is around 12 per month on average. As missed approaches are operated on an unplanned basis and owing to the low number of missed approaches per year, they do not form part of the noise and environmental analysis of our proposal. However, proposed missed approach procedures have been considered, safety and operability assessments have been undertaken and both the proposed missed approach procedures (one for each runway direction) are described in Annex K.

3.1.5 Helicopters

A small percentage of movements to and from Edinburgh Airport are helicopter traffic (approximately 0.04%). When arriving or departing from Edinburgh Airport, there are no specific helicopter routes, although some helicopters may use the final approach procedures but would not use the SIDs nor Approach Transitions. For helicopters following Visual Flight Rules (VFR), whenever possible, helicopter flights in the Edinburgh CTR/CTA will be cleared by ATC on direct routings under VFR (or, when requested at night in the Edinburgh Control Zone, on Special VFR clearance, in accordance with the procedures for Special VFR flights). As such, this ACP does not propose to make any changes to the way helicopters arrive or depart, and any assessments have therefore assumed that this continues.

3.1.6 Planned developments

The baseline was informed by a search of planning applications to identify future planned residential and school development in the local authorities surrounding Edinburgh Airport.
A search of the Planning Portals for East Lothian Council, City of Edinburgh Council, Falkirk Council, Clackmannanshire Council, Stirling Council, Fife Council, Midlothian Council, North Lanarkshire Council, Scottish Borders Council, South Lanarkshire Council, West Lothian Council, East Dunbartonshire Council, Glasgow City Council and Perth & Kinross Council was undertaken to identify approved, pending and allocated housing provision within the local development frameworks within areas potentially affected by our changes. A list of the developments is set out in Annex E.

The population density was calculated using the occupancy rate (people per household) from the Scottish Government dataset for household projections of average household size for 2027 for each council area. This was applied to each of the planned developments to estimate the number of individuals in each development.
All of the developments have been incorporated into the baseline.

3.2 Full Options Appraisal Categories and Criteria

Table 5: Full Options Appraisal Assessment Criteria (based on CAP1616f – page 36 – 40)

Group	Impact
All	Safety
Communities	Noise
	Air Quality
Wider Society	Greenhouse gas emissions
	Tranquillity
	Biodiversity
	Capacity/Resilience
General Aviation	Access
General Aviation/ Commercial airlines	Economic impact from increased effective capacity
	Fuel burn
Commercial airlines	Training costs
	Other costs
Airport/Air navigation service provider (ANSP)	Infrastructure costs
	Operational costs
	Deployment costs
	Other costs
All	**Airspace Modernisation Strategy (AMS)**

At Stage 3, CAP1616 requires sponsors to carry out a full assessment of the benefits and impacts of each option, tested against the 'do nothing' baseline scenario. The purpose of this Full Options Appraisal (FOA) is to highlight the change to sponsors, stakeholders, and the CAA, the relative differences between the impacts, both positive and negative, of each option.

Our assessment criteria shown in Section 3.3 below have been categorised based on the requirements outlined in CAP1616f and summarised in Table 5. We have added an additional category called 'Airspace Modernisation Strategy' to assess against the indicators that the CAA will use to assess whether this Stage 3 submission accords with the AMS including iteration 3 of the Masterplan.

The order of criteria shown in 3.3 below and in Table 5 is followed throughout the appraisal of baseline and the options presented in Section 4.

3.3 Full Options Appraisal: Methodology

This section describes the methodology that will be followed for each of the categories listed in Table 5. This includes whether the category has been quantitatively assessed and, if not, justification for the qualitative level of assessment.

This methodology will be used to compare the 'with airspace change' options against the 'without airspace change' baseline.

3.3.1 Safety

Any proposed change to airspace requires detailed safety analysis. The ongoing safety work across Stage 3 and eventually into Stage 4 is being co-ordinated by ACOG as part of The Masterplan Safety Strategy[4]. This aims to ensure that co-ordinated safety assurance is carried out by the ScTMA ACP sponsors and evidenced to the CAA when the proposals are submitted at the CAP1616 Stage 4 for approval at Stage 5 of the CAP1616 process. The strategy offers guidance to the ACP sponsors on how a coherent approach to safety can be taken to ensure the overarching safety arguments for the overall ScTMA proposal are developed and understood.

As part of Stage 3 and the wider Scottish Airspace Modernisation project, the Edinburgh Airport designs were tested within an ATC development simulation and the safety outcomes of this simulation were used to guide the development of the proposals and the subsequent safety assessments. This safety work included working with Air Navigation Solutions Limited (ANSL) to follow their safety management system (SMS) processes.

This ongoing safety work is relevant to all the options.

The safety appraisal in the FOA focuses on qualitatively highlighting key differences in safety between the baseline and the options.

Further safety assessments and justifications to meet all relevant safety requirements will be submitted in Stage 4 should this option be proposed to be implemented.

[4] contained within Appendix 4 of Iteration 3 of the ScTMA Masterplan.

3.3.2 Noise (and overflight)

The noise assessment has been undertaken using CAP1616 'primary', 'secondary' and 'additional' noise metrics. CAP1616i explains (at paragraph 5.16) "when considering noise impacts, the CAA will weigh the outcomes from 'primary' metrics over 'secondary' metrics. Primary metrics will be those that are used to quantify total adverse noise effects, such as the Department for Transport's TAG outputs. Secondary metrics will be those that are not being used to determine total adverse noise effects, but which are still able to convey noise effects, such as number above contours. While not a noise metric, overflight contours will be a secondary metric for the purposes of decision-making." The metrics in this quote are described below alongside a description of how we have approached them in this appraisal.

3.3.2.1 Primary noise metrics (LAeq and TAG)

CAP1616i explains (at paragraph 5.17): "adverse effects are considered to be those related to health and quality of life. These adverse effects must be assessed using a risk-based approach above the lowest observed adverse effect level (LOAEL), 51dB LAeq 16h daytime and 45dB LAeq 16h night-time. Adverse effects of noise are determined through TAG calculated on the basis of changes in LAeq noise exposure." The primary metrics are therefore daytime LAeq 16h, night-time LAeq 16h and the TAG assessment. These primary metrics have been calculated, and LAeq noise contour maps have been provided for each airspace design option, as well as the 'current' 2023 baseline and the 'without airspace change' future baseline scenarios.

LAeq contours are the equivalent continuous sound level of aircraft noise indBA. This is based on the daily average movements that take place in the 16-hour daytime period (07:00-23:00 local time) or 8-hour night-time period (23:00-07:00) during the 92-day summer period 16 June to 15 September inclusive. This metric is the measure of noise exposure adopted by the UK Government for the purpose of considering adverse effects from aircraft noise and it forms the basis of the UK government's policies in relation to aircraft noise. The assessment of noise using LAeq also relies on the concept of the LOAEL. The LOAEL is the noise level above which adverse effects on health and quality of life can be detected. The LOAEL aircraft noise during day and night periods are presented in Table 6. The LOAEL is defined in UK Government airspace policy.

Table 6: Aircraft noise LOAEL

Time Period	Threshold LevelsdB LAeq,T for 92-day summer average – LOAEL
Daytime (07:00 to 23:00)	51
Night-time (23:00 to 07:00)	45

The contours are generated based on all fixed-wing aircraft arrivals and departures to/from Edinburgh Airport. LAeq contours have been generated in 3dB intervals from 51dB LAeq 16h for daytime contours, and 45dB LAeq 16h for night-time contours.

Section 4 presents the quantitative results relating to the contours. Population and household figures are rounded to the nearest 100, this can mean that results close to zero may appear inconsistent, particularly in comparison tables. For example; 51 and 149 households are both rounded to 100 in the absolute results. In a comparison table, which compares these rounded figures, they cancel one another out, but the related (larger) population figures would not. Therefore, the household difference column shows zero but there may still be a small difference in population.

The contour pictures themselves are presented in Annex L, which is a large annex containing all the contours and supplementary data that were the basis of the FOA results in Section 4.

TAG assessments have been conducted for each option as part of the FOA and are presented as an overall net present value (NPV, £) along with NPVs for different health effects.

The May 2024 version of the TAG Noise Workbook – Aviation has been used to calculate monetised noise impacts. LAeq 16hr and LAeq 16hr 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 LAeq 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 LOAEL (see Table 6) 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 2024 prices.

3.3.2.2 Secondary noise metrics (N65, N60, overflights)

As described in the quote from CAP1616i paragraph 5.16 above, secondary metrics are those that are not used to determine total adverse noise effects, but which are still able to convey noise effects, such as 'number above contours'. CAP1616i also lists overflight contours as secondary metrics. The secondary noise metrics of N65, N60 and overflights have been calculated for each airspace design option, as well as the 'current' 2023 baseline and the 'without airspace change' future baseline scenarios. Secondary metric contour maps are presented in the Annex L.

Number above contours, and specifically those referred to as 'N65' and 'N60' contours, are noise metrics which respectively describe the number (N) of aircraft noise events above a noise level of 65dB LASmax[5] in the daytime period and 60dB LASmax for the night-time period. These are event-based metrics, which can be used to better understand the number of noise events and their location.

'Overflight' is a metric that portrays areas that are perceived to be overflown and can be useful for describing the pattern and dispersion of aircraft below 7,000ft. CAA provide a definition for overflight in CAP1498. Whilst they are useful as a means of communication of airspace change operations, it is important to note that they do not illustrate noise impacts.

This document presents the quantitative results relating to the contours. The contour pictures themselves are presented in Annex L.

3.3.2.3 Additional noise metrics – 100% mode LAeq contours

Whilst it is not a requirement, CAP1616i recommends that additional noise metrics can be provided if they would aid stakeholders' understanding of the impacts. We have therefore produced data relating to 100% mode contours. 100% mode LAeq noise contours portray averaged noise impacts based on single direction runway usage rather than the standard method of reflected actual or forecast runway usage. These are therefore able to aid stakeholders' understanding of noise impacts by depicting a full day or night period of runway operations being 100% on one runway.

We have produced data relating to 100% mode contours which can be found alongside the contour pictures themselves in Annex L.

3.3.2.4 Operational diagrams

Diagrams describing the operation are shown in Section 4 for the baseline and the options. These contain basic information to highlight the difference between the baseline and the options, and between the options themselves to support understanding of the detailed FOA.

A more detailed set of operational diagrams have been produced for baseline and option being presented at consultation. These aim to provide the wider stakeholder group with an understanding of how the consultation option may impact their locality. These are presented in the consultation material.

3.3.2.5 CAP2091 and noise modelling methodology

Noise modelling for this FOA has been conducted in accordance with the guidance outlined in CAP1616i and the standards for noise modelling mandated in CAP 2091[6]. Since Edinburgh Airport falls under 'noise Category C' as defined by CAP2091, the noise models include[7]:

- ICAO datasets for noise data (i.e. Noise-Power-Distance curves16).
- Flight profiles incorporating adjustments in altitudes, speeds, climb rates, and approach angles based on local track-keeping data for major aircraft types (those contributing 75% or more of the noise energy on departure and arrival).

[5] LASmax refers is a common measure in noise assessments which indicates the highest sound level reached during the observation period.

[6] Link to **CAP2091**.

[7] The planned improvements to Edinburgh Airport's noise monitoring infrastructure described in our Stage 2 documentation have not yet been implemented. Therefore, consistent with the definitions detailed in CAP2091, Edinburgh Airport remains a "Category C" airport and the analysis adheres to this category.

- Arrival and departure mean tracks, and lateral dispersion, determined from local track-keeping data.
- ICAO ANP (Air Navigation Plan) dataset flight profiles for all minor aircraft types.
- Dispersion around the track centrelines derived from local track-keeping data.

All noise modelling has been conducted using the latest version of the UK Civil Aviation Authority (CAA) Aircraft Noise Contour Model ANCON (V2.4). ANCON is identified in CAP 1616i as a "recognised and validated noise model". The methodologies for noise, aircraft flight profile, and flight path computation in ANCON (V2.4) adhere to the standards set by the European Civil Aviation Conference (ECAC) Doc 29 (4th Edition)17 and the International Civil Aviation Organization (ICAO) Doc 9911 (2nd Edition)18. ANCON is also compatible with Commission Directive (EU) 2020/367 as the Directive mirrors the calculation method set out in ECAC Doc 29.

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. These are documented in Annex F.

Mean flight tracks and associated lateral dispersions were calculated for each of the three departure routes in use today (GOSAM, GRICE and TALLA) from each runway direction using radar data covering the 2023 summer period. The TALLA runway 24 route was modelled by three separate sub-tracks to provide a better representation. Flight track patterns were also calculated for arrivals. These are shown in Figure 1 opposite and Figure 2 on page 181.

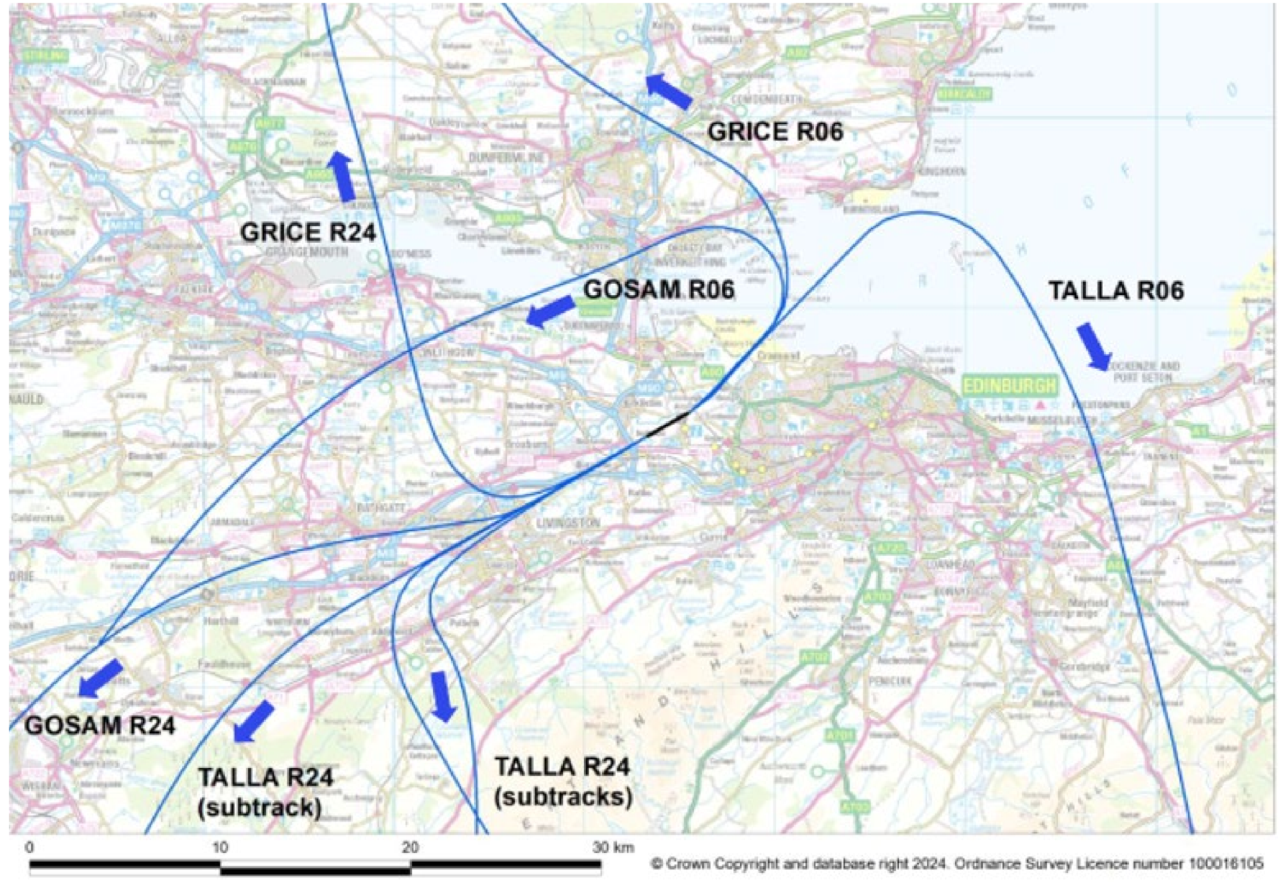


Figure 1: Edinburgh Airport 2023 departure mean tracks.

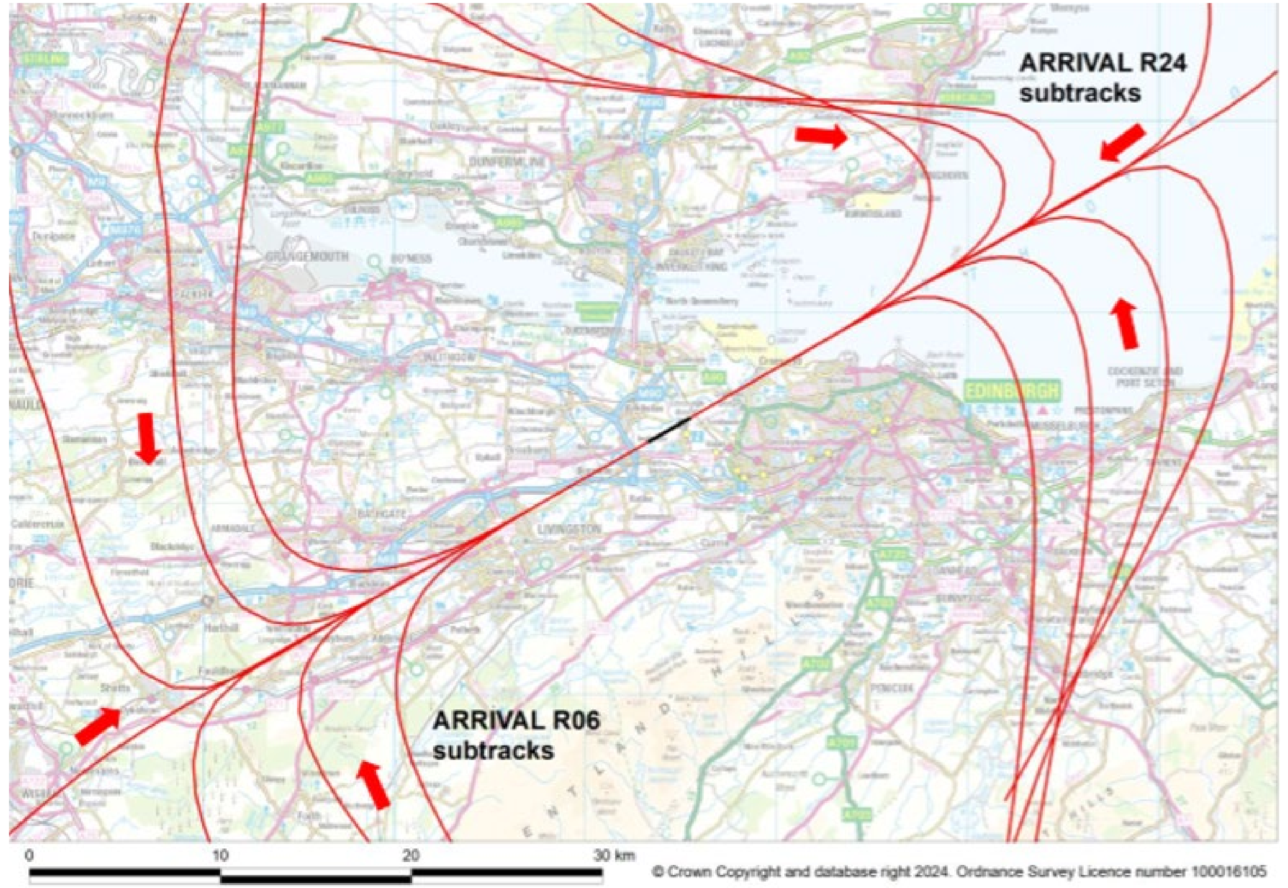


Figure 2: Edinburgh Airport 2023 arrival mean tracks.

The proposal is that aircraft will follow the PBN routes most of the time with vectoring only used in order to maintain safety, for example where speed control is not able to ensure separation on final approach, or to avoid thunderstorms and other bad weather. The ground tracks for the 'with airspace change' options are therefore the proposed route centrelines. These are the same tracks as used in the CO_2e and fuel analysis.

Further detail of the noise modelling methodology and assumptions can be found in Annex F.

3.3.2.6 CAP1498 Overflights

Overflights have been calculated for all aircraft operations below 7,000ft using the definition of overflight in CAA CAP1489 which described an overflight 'cone' illustrated in Figure 3 below. People falling within the cone as it moves with the aircraft are considered overflown. The angle of the cone used in the calculation of overflights is 48.5°, as stipulated in CAP 1616i.

The same CAP 2091 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. 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.

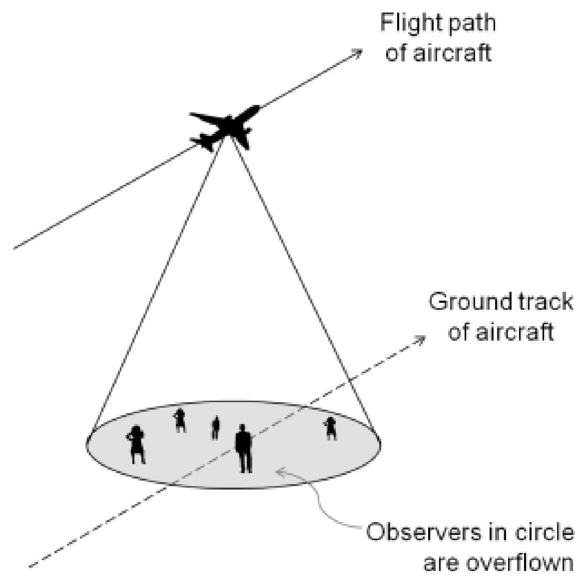


Figure 3: Overflight cone as described in CAP1489.

3.3.2.7 Population and noise sensitive building counts

Population counts within the calculated noise contours have been generated from 2023 population data set OS AddressBase Plus. This data has been supplemented with the planned residential developments described in Section 3. The population density has been calculated using the occupancy rate (people per household) from the Scottish Government dataset for household projections of average household size for 2027 for each council area. This 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 2024 OS AddressBase Plus dataset at the time of the analysis (summer 2024). The OS AddressBase Plus codes included in the assessment are shown in the table below and cover schools, hospitals, care homes, and places of worship.

Table 7: AddressBase source for noise sensitive buildings

OS AddressBase Plus Classification Code	Description	Noise sensitive building type
CE classification	Primary schools, high schools, academies, colleges and universities	School
CM classification	Medical hospitals	Hospital
RI01	Residential care and nursing homes	Care Home
ZW classification	Churches, mosques	Place of worship

3.3.2.8 Impacts on people with protected characteristics

We have committed to take account of potential adverse impact due to those overflown having protected characteristics as defined by the Equalities Act 2010. Development of Design Principle 9 was informed by input from a representative of the Royal National Institute of Blind People (RNIB). Background noise can affect the ability of visually impaired people to safely navigate their communities, as they are more reliant on hearing. This makes them particularly sensitive to changes in aircraft noise levels that may be associated with the ACP. Input was also received from community members with concerns about noise impacts on children attending special schools.

The Equality Act 2010 defines protected characteristics as:

- Age.
- Gender reassignment.
- Being married or in a civil partnership.
- Being pregnant or on maternity leave.
- Disability.
- Race including colour, nationality, ethnic or national origin.
- Religion or belief.
- Sex.
- Sexual orientation.

People with protected characteristics live and work throughout overflown communities and it is therefore not possible (nor proportionate) to assess the potential impact of this ACP option on individuals or on people with protected characteristics where they are not gathered together in defined locations.

Some people with certain protected characteristics (age, disability and religion or belief) are more likely to gather in groups at defined locations including educational facilities, medical facilities, care homes and places of worship. The impact of the ACP on these receptors has been assessed against all the noise and overflight metrics presented in Section 3 using the OS AddressBase Plus dataset as described in the previous section.

While many children with disabilities are educated at mainstream schools, some will attend special schools and so we have identified those in the potentially affected area, and in Section 4 we provide data to show how they would, or would not, be affected by overflight from the options. The sites considered are listed in Table 8 opposite.

It is not possible to assess the potential impact of the ACP on individuals with visual impairment living and working in the community. However, Sight Scotland Veterans' Linburn Centre in Wilkieston is a location where people with visual impairment will gather together. Other Sight Scotland facilities, including supported living accommodation and the Royal Blind School, are located in Edinburgh city. Section 4 presents tables listing these facilities and how they would, or would not, be affected by overflight from the options. The sites considered are listed in Table 8.

Table 8: Special Schools and Sight Scotland sites in the potentially affected area

Site
Pinewood School
Moore House Academy
Ogilvie School
Cedarbank School
Calaiswood School
Sight Scotland Veterans' Linburn Centre
Starley Hall School
Victoria Park School
Kaimes Special School
Rosslyn School
Sight Scotland Allermuir Home
Sight Scotland The Royal Blind School
Broughton Primary School
Hyndhead School
New Struan School
Ochil Tower School
Rowanfield Special School
Woodlands School

3.3.3 Local air quality

Paragraph 7.5 of the Civil Aviation Authority's (CAA) CAP1616i guidance states:

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

- there is likely to be a change in aviation emissions (by volume or location) below 1,000ft Above Aerodrome Level (AAL); and
- the location of the emissions is within or adjacent to a designated Air Quality Management Area (AQMA)."

As explained further above, this ACP does not change growth and so will not change the volume of aviation emissions below 1,000ft AAL.

The proposed future flight path options for arrivals on runway 06 and both departures and arrivals for runway 24 will all use the same lateral and vertical profiles below 1,000ft as those for the baseline option. This will result in no change in the location of aviation emissions below 1,000ft AAL for runway 24.

The proposed future flight path options for departures from runway 06 below 1,000ft will all differ slightly from the lateral profile of the baseline option, although there will be no vertical change (this is the initial left turn taking aircraft further from Cramond as described in Section 2.1.4).

Figure 4 on page 185 shows that there are two AQMAs in the vicinity of the airport. Neither are northeast of the airport beneath or near where the runway 06 departures are changing below 1,000ft.

Consequently, none of our options are likely to result in a possibility of pollutants breaching legal limits and target values (or worsening an existing breach of legal limits and target values), and therefore further assessment of air quality was not undertaken as it is not required.

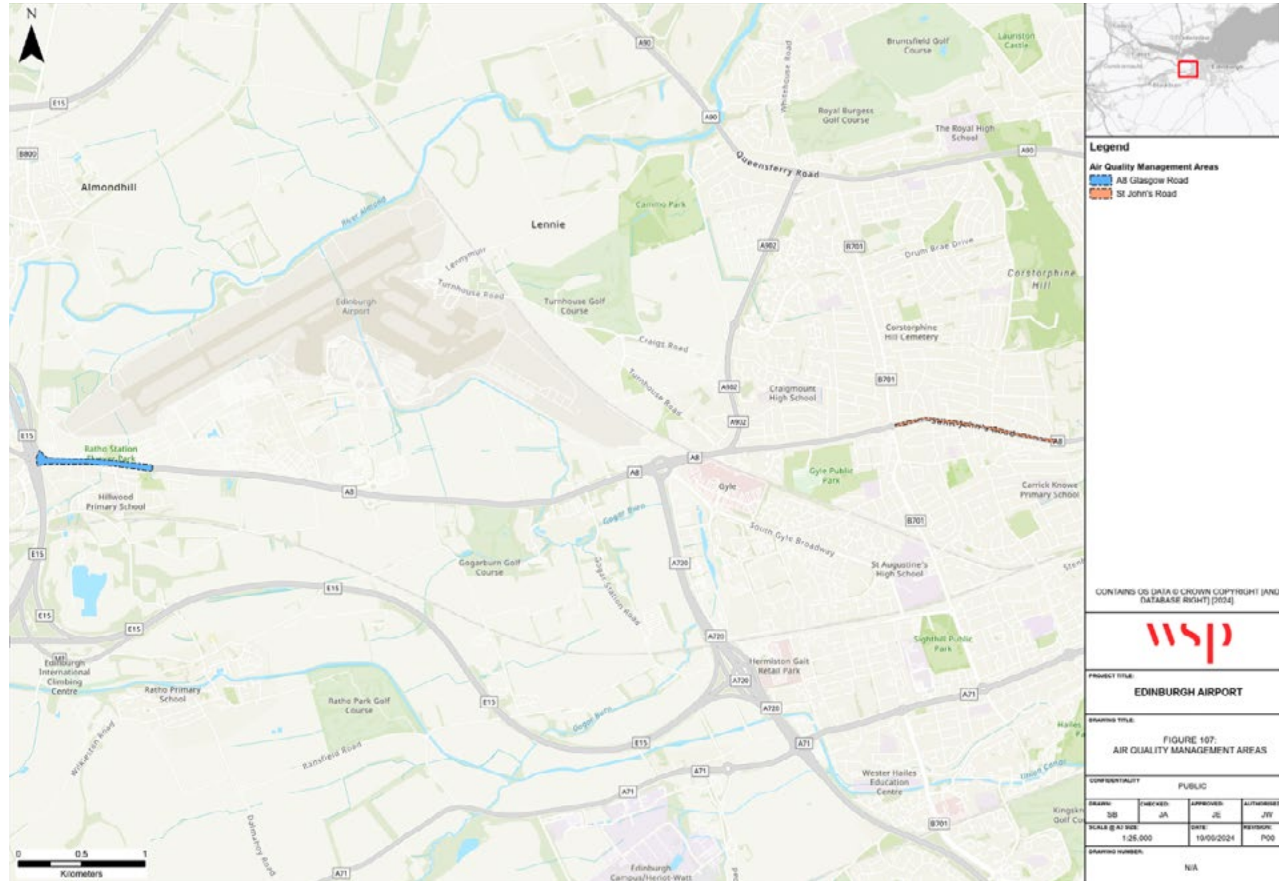


Figure 4: AQMAs in the vicinity of the airport.

3.3.4 Combined greenhouse gas emissions methodology

The approach to CO_2e analysis for AMS clusters is described in the CAF2 methodology[8]. Note that throughout this FOA the term carbon dioxide equivalent (CO_2e)[9] emissions is used to represent greenhouse gas emissions.

The methodology involves a two-step process:

- NERL's overall network analysis to show the difference between the baseline and a combined scenario made up of one of our scenarios, a Glasgow Airport option and the NERL option.
- Airport analysis of the difference between our options, to present a comparison between our options.

The proposal is that aircraft will follow the PBN routes most of the time with vectoring only used in order to maintain safety, for example where speed control is not able to ensure separation on final approach, or to avoid thunderstorms and other bad weather. The ground tracks for the 'with airspace change' options are therefore the proposed route centrelines. These are the same tracks as used in the noise analysis.

3.3.4.1 NERL methodology

The NERL network analysis utilises AirTOP®, an industry leading fast time modelling tool coupled with a combination of BADA 4.2 and 3.13. We used BADA 3.16.

The use of different models reflects the different focus of the analysis at each step as these models, with AirTOP® being appropriate for modelling the dynamic effect of the design on flows and holding, BADA are industry accepted tools for analysing individual trajectories (the results of which can then be aggregated).

Use of different BADA datasets is assumed to have a negligible effect on results and no bearing on the conclusions drawn. This is because up-issues of the BADA dataset generally involve adding data (e.g. more aircraft types and/or more performance parameters) rather than changing the data from previous versions. Note that Eurocontol did not grant access to airports for BADA 4 on the basis that BADA 3 variants remain valid and were sufficient for the type of analyses being undertaken.

While these models and parameters differ, they are all individually robust enough for use in individual sponsor CAP1616 analyses. The CAF2 methodology[10] recognises the validity of which states "It is assumed that the approach(es) agreed to meet CAP1616 will be sufficiently robust for use in the CAF." [ScTMA Masterplan Iteration 3 Appendix 2 Para 128].

It is important to note that the assessment of CO_2e and fuel burn is based on calculated 'enabled benefits'. An enabled benefit is one that relates to the fuel saving resulting from more efficient flight planned routes. This is not an exact representation of the actual change in fuel burn and CO_2e emissions. The actual impact can only be calculated following implementation of the change. This will allow a direct comparison between the pre-implementation trajectory data and actual trajectory data following the change. This will be provided within the Post Implementation Review of the Airspace Change.

3.3.4.2 Airport methodology

The CO_2e for the 2023 baseline and 2027 and 2036 'without airspace change' and a 'with airspace change' scenario was calculated by NERL following the methodology outlined above and described further in the NERL Stage 3 FOA. To determine the fuel burn and CO_2e for the FOA options, we calculated the differences between the scenario NERL modelled and our options. The NERL calculated values for modelled scenarios were adjusted according to the differences in local CO_2e (and fuel burn), to give an overall CO_2e (and fuel burn) estimate for each option.

Our calculation analysed fuel consumed over each flight path segment for fixed wing aircraft using BADA 3.16 to calculate the fuel flow.

Results for each aircraft were aggregated to generate a figure for annual CO_2e using the forecasts detailed earlier in Section 3.

The same PBN departure and arrival centrelines used in the noise modelling were used for the fuel analysis.

[8] contained in Appendix 2 of **Iteration 3 of the ScTMA Masterplan**.

[9] CO_2e, or carbon dioxide equivalent, is a standardized unit of measurement used to compare the global warming potential of different greenhouse gases. It allows us to express the impact of various gases, like methane and nitrous oxide, in terms of their equivalent impact on the climate compared to carbon dioxide.

[10] contained within Appendix 2 of the **UK Airspace Change Masterplan Iteration 3 – ScTMA**.

To ensure a like for like comparison between the different airspace change design options, the proposed track centrelines used in the greenhouse gas assessment were extended to common endpoints (considering both lateral and vertical position) in the network where necessary.

The mass of carbon dioxide equivalent in tonnes (tCO_2e) emitted for the 'with airspace change' options has been calculated by multiplying the mass (in tonnes) of aviation turbine fuel burned during flight by a factor of 3.18 (tonnes of CO_2e/ tonne of aviation turbine fuel) as set out in the Greenhouse Gas Reporting Conversion Factors[11] (rounded to 3 significant figures).

3.3.4.3 Supplementary methodology information for Scottish Airspace Modernisation CO_2e calculation

Background

The following information includes specifics on the technical methodology used by NERL to model future enabled CO_2e benefits brought by the proposals. An enabled CO_2e benefit correlates with the fuel saving resulting from more efficient routes within the new proposals.

To provide this analysis, modelling is used to simulate the design with the goal of understanding a proposal's performance verses the current airspace, referred to as the baseline. This is standard practice in all airspace change proposals, and an important step to ensure alignment is made to the CAA's Airspace Modernisation Strategy.

Providing background information to this analysis helps to highlight that aircraft profiles modelled many years ahead of implementation may differ from those flown in reality. There are always variables such as weather, world events, military activity and more, which cannot be predicted. To aid transparency, the description below has been produced to demonstrate that the methodology used provides a good indication of the enabled benefit of the proposed change. The actual impact can only be calculated following implementation of the change. This will allow a direct comparison between the baseline trajectory data and actual trajectory data following the change, as part of the Post-Implementation Review.

Modelling lateral profiles for CO_2e

For the lateral element of a flight in today's airspace, both arriving and departing aircraft are generally 'tactically'[12] routed by controllers to fly the optimum trajectory given the traffic scenario and airspace limitations at that time. Tactical intervention is most notable in low traffic conditions close to the departure point or destination and can reduce the track mileage a given aircraft will fly, thereby reducing its emissions.

Furthermore, the difference is not the same for every flight. In reality, no two flights are ever the same and the differences are impossible to predict. While it is recognised that modelling the planned tracks may vary from the actual tracks seen in reality, the industry standard modelling process used (i.e. planned tracks and **BADA Performance database**) provides a good assessment for the performance of a proposal.

In addition, tactical lateral shortcuts and, less often, lateral track extensions, are subject to a myriad of factors including interaction with other aircraft, ATC workload, military activity, and weather which by their nature cannot be foreseen with a degree of certainty. So, for large scale airspace changes it is not possible to model this accurately or forecast exactly how this will change.

However, when a whole flight is modelled, the difference between flight planned routes and actual routes flown tend to average out[13]. Therefore, for the lateral portion of a flight, the flight plan route is a good approximation. When the whole end-to-end flight plan route is modelled, with the addition of holding analysis, this provides a good indication of whether a proposed change will positively or negatively impact the CO_2e for a specific flight or flights.

Modelling vertical profiles for CO_2e

Similarly, for the vertical element of a flight, no two flights are the same, climb and descent rates are based on engine type, aircraft weight, airline company operating procedures, wind, temperature etc.

[11] Department for Energy Security and Net Zero (2024) Conversion factors 2024: full set (for advanced users) – updated 8 July 2024. Available at: **https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024**

[12] Tactical intervention is where air traffic control instruct aircraft to fly away from their planned route. Tactical intervention typically occurs to provide more efficient/direct routes, to resolve conflicts between aircraft or to generate an efficient landing sequence.

[13] This is described in the CAF2 methodology, found in Appendix 2 of the ScTMA Masterplan Iteration 3 (Airspace Masterplan – Airspace Change Organising Group (ACOG).

Arrival profiles are more consistent than departure profiles as an economic descent rate is similar between all aircraft and descent restrictions on STARs are consistently applied by ATC.

However, for departures, level off restrictions on SIDs exist which may, in reality, not be required due to the traffic scenario at the time. For example, an aircraft can be tactically climbed by ATC above the SID restrictions. How many aircraft will be climbed above the SID profile in the future or how many will level off due to conflicting aircraft elsewhere in the climb is not possible to predict with accuracy. The modelling therefore assumes that level off restrictions are present in all modelled scenarios.

It should be noted that there are some trends that are likely in a more systemised environment in future. With some SIDs climbing to higher levels it is expected that:

- it is more likely that aircraft will fly the vertical restrictions on a SID; and
- the modelled CO_2e difference between an aircraft levelling off on the SID and not levelling off will be less (when comparing the vertical elements in isolation).

This modelling can lead to overestimation of benefits for some profiles (and underestimation for others). The difference can vary on a route by route and type by type basis and so it is not possible to apply a single factor to the overall figures[14].

In all cases the actual outcome is likely to be somewhere between the results for a restricted model and an unrestricted model, however, as it's not possible to forecast this outcome precisely, the procedural SIDs are used as an approximation of benefit until real life track data can be used to corroborate findings through the post implementation review process. At this point the lateral tracks of aircraft trajectories will also be taken into account. It is important not to consider one factor in isolation.

Finally, it is important to note that because the proposed airspace change design enables a reduction in the per flight planned track mileage this would likely enable an overall CO_2e benefit for Edinburgh Airport regardless of the modelling methodology used.

3.3.4.4 Emissions trading

Since 2021, CO_2e from domestic flights, flights to and from Gibraltar, and certain flights departing from the UK such as those arriving in the European Economic Area (EEA, excluding the outermost regions) have been included in the UK Emissions Trading System (UK ETS). Therefore, CO_2e subject to inclusion within the UK ETS have been categorised into 'traded', and the remainder categorised as 'non-traded'. Non-traded emissions includes those associated with international flights that are not traded under the UK ETS. The classification of which airports are considered traded and non-traded depending on arrivals and departures is set out in the shared assumptions presented in the ScTMA Cluster CAF2 Report[15].

As agreed with the CAA, the traded and non-traded status for CO_2e considers only the UK ETS and does not take into account other emissions trading systems such as the EU ETS and CORSIA.

3.3.4.5 CO_2e TAG assessment

The change in emissions (from 'without airspace change' to 'with airspace change') for each option has been valued using the May 2024 TAG Greenhouse Gases Workbook. The TAG workbook is an Excel tool developed by the Department for Transport to calculate the monetised impacts of CO_2e assessments, among other environmental assessments, in appraisal schemes and utilises the carbon appraisal values derived from the TAG data book. The TAG assessment has taken into account the traded and non-traded status of the emissions in the UK ETS as described above. TAG outputs are calculated using a 2024 base year and are presented in market prices.

3.3.5 Tranquillity

Civil Aviation Authority (CAA) guidance CAP1616i (CAA, 2023) sets out the requirements for environmental assessment of airspace change. It states at paragraph 8.1:

"The consideration of impacts upon tranquillity for airspace change proposals is with specific reference to National Parks, Areas of Outstanding Natural Beauty (AONB), National Scenic Areas (NSA) (broadly equivalent to AONBs in Scotland), the Norfolk and Suffolk Broads, plus any local 'tranquil' areas that are identified through community engagement and are subsequently reflected within an airspace change proposal's design principles."

[14] Illustrative examples can be found in the methodology section of Annex B2 which is the CAF2 Technical Annex.

[15] See **Scottish Terminal Manoeuvring Area (ScTMA) Cluster – Cumulative Analysis Framework Part 2 (CAF2) Annex C**.

National Parks and NSA's have been identified using the Scottish government's catalogue of spatial data[16] – note that there are no National Parks within the study area and one NSA – the Upper Tweeddale NSA. A number of locally identified Candidate Quiet Areas (CQAs) are present within the study area including but not limited to Corstorphine Hill, the Firth of Forth, ancient woodland at Cammo House and ancient woodland at Balerno.

CAP 1616i goes on to recommend that proposals should seek to "avoid overflight of tranquillity receptors below 7,000ft" (paragraph 8.3).

We have therefore calculated metrics for the number and area of national scenic areas, national parks, candidate quiet areas, country parks, gardens and designated landscapes, and scheduled ancient monuments located within daytime LAeq 16hr and daytime overflight contours.

As tranquillity receptors are outdoors, they are more frequently occupied during the daytime. The frequency of overflight is also greater during the daytime. The consideration of the impact of noise and overflight on tranquillity therefore focuses on potential LAeq 16hr and daytime overflight contours. Data for night-time is, however, provided in Annex L for reference, along with N65 and N60 data.

The area values are rounded to the nearest 0.1km². Given the small size of some receptors, the results may indicate a reduction or increase in the number of receptors within a noise or overflight contour with no associated reduction or increase in the area affected.

A set of figures showing the locations of the areas (with the 2027 daytime noise contours for reference) are provided in the Annex L.

3.3.6 Biodiversity

Airspace change sponsors are required to undertake a Habitats Regulations Assessment (HRA) screening assessment of European Sites potentially affected by the Airspace Change Masterplan. This is outlined in CAP2527. The assessment involves looking at any sites which are where aircraft are below 3,000ft and assessing whether the change has the potential to impact these.

The receptors that must be considered in the HRA screening are Special Areas of Conservation (SAC) and possible SACs, Special Protection Areas (SPAs) and possible SPAs and Ramsar sites (wetlands of international importance) and proposed Ramsar sites. These receptors are collectively known as European Sites and are protected by the Habitats Regulations. These sites have been identified using the Scottish government's catalogue of spatial data. CAP1616i also requires that Compensatory Habitats (areas secured to compensate for damage to SACs, SPAs and Ramsar sites) are considered but notes that there is no publicly available database for these sites and therefore recommends contacting the Statutory Nature Conservation bodies to enquire about compensatory habitats.

In accordance with CAA guidance an 'early screening' assessment was undertaken to determine if a secondary HRA Screening Assessment was required. The aim of the early screening assessment is to quickly rule out any airspace change projects that are self-evidently unlikely to result in Likely Significant Effects (LSE) on any European Site. The screening report is available at Annex H.

The early screening assessment ascertained that the options had potential connectivity, based on CAA early screening criteria, to the following European Sites:

- Firth of Forth SPA.
- Firth of Forth Ramsar site.
- Forth Islands SPA.
- Outer Firth of Forth and St Andrews Bay Complex SPA.

However, on review it was concluded that of the potential effects of overflights by aircraft below 3,000ft in the options would not differ sufficiently from the existing baseline options to result in likely significant effects on the conservation objectives of any European Site.

See Annex H for the screening report.

While none of the options would have likely significant effects on any European Site, we have chosen to present additional information showing the number and area of biodiversity sites (including National Nature Reserves and Local Nature Reserves) that are within the contours for each primary and secondary noise metrics.

[16] **https://data.spatialhub.scot/**

3.3.7 Capacity/Resilience

This change is not expected to impact the overall airport capacity or future growth and so no capacity modelling has been undertaken (see 3.1.2.2).

This ACP does present some potential benefits with respect to reduced regulated (network) delay and improved resilience benefits. These will not change our capacity or expected growth but would mean that forecast growth can be accommodated with less risk of delay.

It has not been possible to quantify the potential benefits with respect to either regulated delay or resilience and so the FOA provides a quantitative assessment.

3.3.8 Access for other airspace users

Other airspace users include General Aviation (GA) and military operators.

Controlled airspace (CAS) is airspace of defined dimensions within which an air traffic control (ATC) service is provided in accordance with the airspace classification. Its purpose is to create a known air traffic environment to achieve the objectives of the ATC service to prevent collisions between aircraft and to expedite and maintain an orderly flow of air traffic.

There is no difference to the CAS requirements or access arrangements between the FOA options. One assessment is therefore presented in Annex G that is referred to for each of the FOA options.

In determining the appropriate volume and classification of airspace, all three sponsors (Edinburgh Airport, Glasgow Airport and NERL) worked collaboratively to meet sponsor and CAA policy requirements. As a result, the following types of changes are being proposed:

- Amendments to lateral dimensions of CAS.
- Amendments to vertical dimensions of CAS.
- Amendments to classifications of CAS.
- Amendments to assignment (TMA/CTR/CTA) of CAS.

Due to reassignment of airspace, it would present an inaccurate quantitative picture to consider the Edinburgh airspace changes in isolation. For example, it is proposed to re-assign some places currently assigned as ScTMA or other Control Areas (CTAs) below 6,000ft to Edinburgh Airport. Conversely, it is proposed to reassign some parts of the Edinburgh Control Zone (CTR) or some parts of the Edinburgh CTA to ScTMA.

The quantitative part of the FOA assessment of impacts on other airspace users with respect to access therefore considers the holistic change in airspace classification considering all three ACPs in the ScTMA Cluster. The results are presented in Annex G.

In Annex G we also present a qualitative assessment of airspace changes involving our CTA and CTR.

3.3.9 Economic impact from increased effective capacity

This change is not expected to impact the overall airport capacity or future growth and so there is no economic impact from increased effective capacity to report.

3.3.10 Fuel burn – general aviation/ commercial airlines

For details of the methodology used to assess fuel burn, please see the greenhouse gas emissions section above.

Once fuel burn has been calculated as described in the greenhouse gas emissions section, it is then monetised by assuming a cost per tonne of £685.99. The derivation of this monetary value is set out in the shared assumptions presented in the ScTMA Cluster CAF2 Report[17].

3.3.11 Training costs – commercial airlines

The FOA considers whether any training costs would be incurred by commercial airlines in order to implement the option.

3.3.12 Other costs – commercial airlines

The FOA qualitatively considers whether any other costs would be incurred by commercial airlines in order to implement the option.

3.3.13 Infrastructure costs – Airport/ANSP

The FOA qualitatively considers infrastructure costs or savings that would be incurred by the airport or ANSP. These have been monetised where possible.

[17] See Scottish Terminal Manoeuvring Area (ScTMA) Cluster – Cumulative Analysis Framework Part 2 (CAF2) Annex C.

3.3.14 Operational costs – Airport/ANSP

The FOA considers any operational costs that would be incurred by the airport or ANSP in order to implement the option. This includes the cost of maintaining the airport's Instrument Flight Procedures (IFPs) and our Noise Insulation Scheme.

3.3.15 Deployment costs – Airport/ANSP

The FOA qualitatively considers the deployment costs that would be incurred by the airport or ANSP in order to implement the option. As there are over two years before implementation, project and any other costs have not been quantified.

3.3.16 Other costs – Airport/ANSP

The FOA will describe any other costs that would be incurred by the airport or ANSP in order to implement the option.

3.3.17 Airspace Modernisation Strategy (AMS) CAP1711 – All

The FOA will qualitatively assess each option against the objectives of the AMS by summarising relevant outcomes from the detailed assessment categories of the FOA.

The AMS objectives are:

- Safety: 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.
- Integration of diverse users: 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).
- Simplification, reducing complexity and improving efficiency: 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.
- Environmental sustainability: 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.

3.4 Evidence gaps following Stage 2

The Stage 2 submission was qualitative on the basis that it was considering swathes of airspace. No specific references to evidence gaps were made in the submission, but general references to the provision of more detailed information, included quantified and monetised data where possible, were made. This is summarised in Rows 1.1.6 and 1.1.7 of the Initial Options Appraisal Assessment[18], which highlights a number of specific areas which are, in practice, evidence gaps. These are listed in Table 9 on page 192 along with details of where the information can be found.

In addition, a number of recommendations were highlighted in the CAAs' approval for the Stage 2 material. These are also listed in Table 9.

[18] See the Stage 2 Initial Options Appraisal submission at https://airspacechange.caa.co.uk/PublicProposalArea?pID=407.

Table 9: Evidence gaps identified as part of Stage 2A and where to find information within this FOA

Evidence gap identified at Stage 2B	Source	Where to find within this FOA
TAG assessment for Greenhouse Gas [CO_2e], noise and air quality.	Boxes 1.1.6 and 1.1.7 in CAA Initial Options Appraisal Assessment	The methodology applied for collecting noise and greenhouse gas data, including its monetisation using TAG is described earlier in this section. The TAG data for CO_2e and noise itself can be found in Section 4 for the baseline and options. The need for air quality assessment has been scoped out as described earlier in Section 3.3.3.
Impacts that need to be assessed for a 'typical airspace change' including fuel burn and capacity.	Box 1.1.7 in CAA Initial Options Appraisal Assessment	The methodology presented earlier in this section describes how data will be collected for each of the impact categories listed in CAP1616. This methodology highlights which categories it has been possible to develop quantified and monetised measurements, which include fuel burn. All the results of the assessment are presented in Section 4.
Consideration of respite (ref: box1.1.7 in CAA Initial Options Appraisal Assessment).	Box 1.1.7 in CAA Initial Options Appraisal Assessment	We have considered the application of respite and relief in our design – this is detailed in Section 2.1.4.
Overflight contours and operational diagrams (ref: box1.1.7 in CAA Initial Options Appraisal Assessment).	Box1.1.7 in CAA Initial Options Appraisal Assessment	Overflight contours are produced for the baseline and the options. Data relating to the contours is found in Section 4 and the contours themselves are in Annex L. Basic operational diagrams are provided for each option in Section 4 and more detailed ones are provided in the consultation material.
The sponsor is reminded that two sets of traffic forecasts will be required if the proposed airspace change is expected to have an effect on the number of types of aircraft utilising the airspace [CAP1616 para B32].	CAA Stage 2 approval 08/03/23	Since Stage 2 we have removed capacity increase from the scope of our change. This is discussed earlier in Section 3.1.2. The growth expected in our 'without airspace change' baseline growth and our 'with airspace change' options are now identical, with the proposal's benefits being limited to reducing delay and improving resilience rather than increasing capacity. Therefore only one set of forecast data is provided.

Table 9: Evidence gaps identified as part of Stage 2A and where to find information within this FOA

Evidence gap identified at Stage 2B	Source	Where to find within this FOA
The sponsor should include a glossary in their documentation to clarify the technical acronyms used throughout. (Ref CAA stage 2 approval 08/03/23).	CAA Stage 2 approval 08/03/23	A glossary is provided at Annex A.
In terms of traffic forecast provided in the Options Development document, the sponsor should bear in mind that for any quantitative analysis/forecast data, the methodology needs to be explained and data sources should be referenced for CAA's validation and most importantly for transparency purposes (CAP 1616 Appendix E11 & E55-56).	CAA Stage 2 approval 08/03/23	Details of the methodology for all quantitative analysis is provided in Section 3.3. Details of the forecast data can also be found in Section 2.
The sponsor should provide two sets of traffic forecast at Stage 3 according to the description given in CAP 1616 Appendix B31-B34.	CAA Stage 2 approval 08/03/23	As described above only one set of traffic forecasts is now required.

Full Options Appraisal Results

04

4. Full Options Appraisal Results

This section presents the FOA for the baseline (current day) operation and the FOA options. For each we provide a description of the baseline or option followed by the FOA results in the form of tables and figures quantifying the impact each has across the criteria specified in CAP1616. A subsection at the end presents the cost benefits results from the FOA.

In this document we present comparisons between our options and the baseline. In all cases where values are highlighted in red it denotes a negative effect compared to the baseline, whereas green denotes a positive effect.

4.1 Baseline 'without airspace change'

The options are appraised against a baseline which is the 'without airspace change' design that is in place today.

This Section (4.1) therefore describes how aircraft depart from and arrive at Edinburgh Airport today and then describes the impacts of today's operation with reference to the criteria laid out in Section 3.

Procedure charts for today's routes are published as part of the Aeronautical Information Publication (AIP) EGPH section 2.24: **eAIS Package United Kingdom**.

Figure 1 below and Figure 2 on page 196 show the published departure and arrivals routes for runway 06 and runway 24 respectively. These figures also show how flight paths vary as a result of vectoring. They also show the percentage of overall movements that use each route taking account of runway direction (so runway 06 percentages add up to 30% and runway 24 percentages 70%).

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore, for runway 06 these add up to 30% as that is the proportion that runway 06 is used.

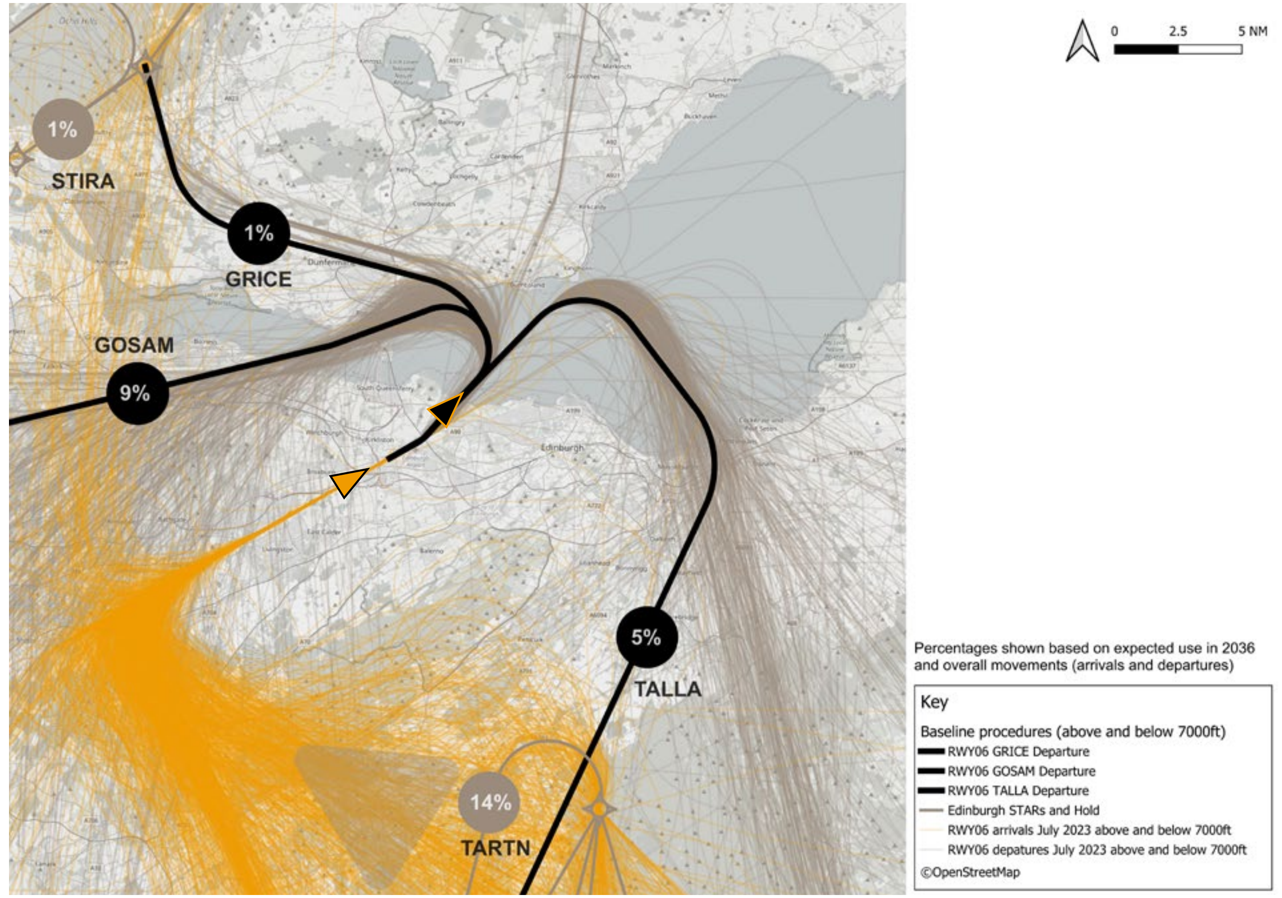


Figure 1: Today's arrival and departure routes, plus flight path showing typical vectoring for runway 06.

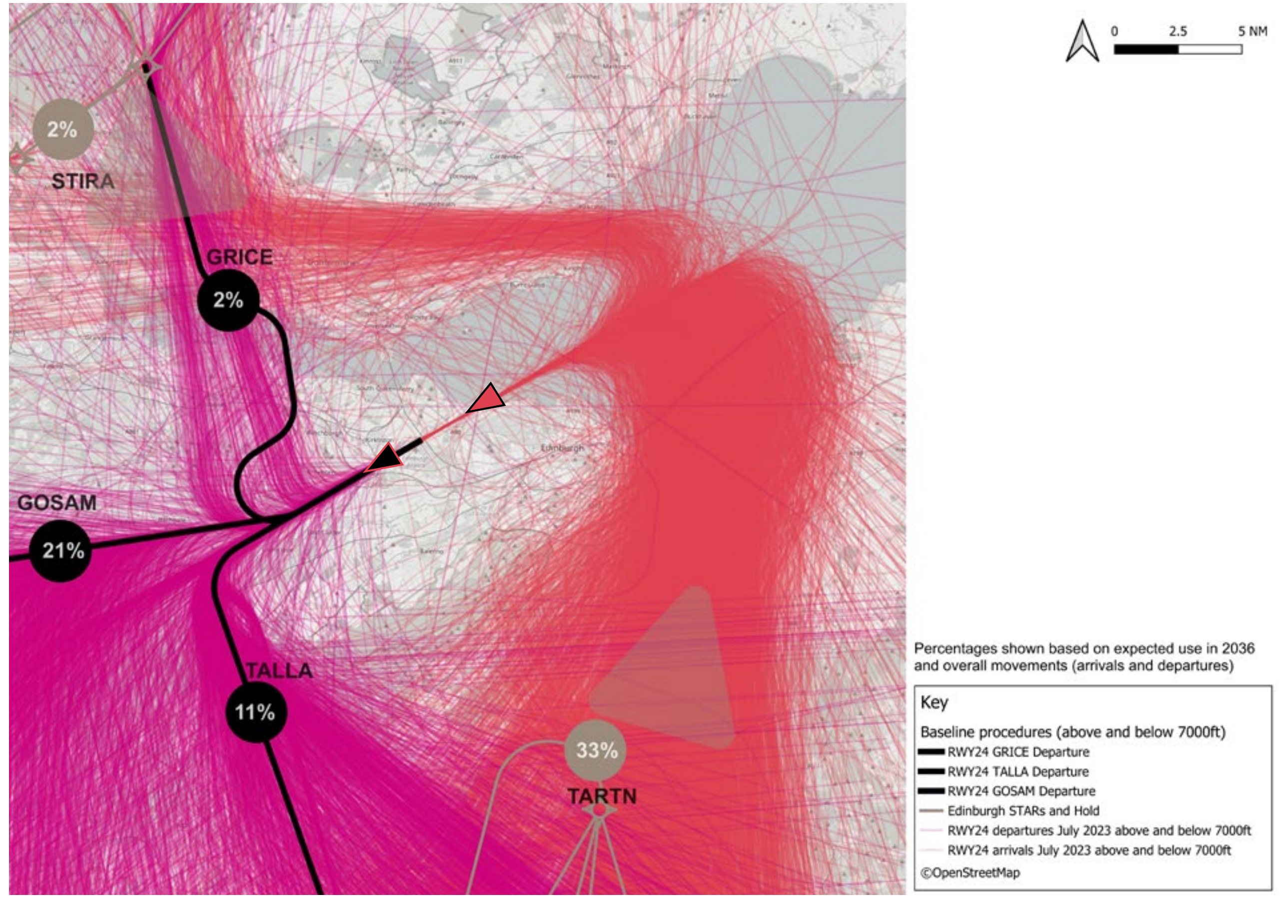


Figure 2: Today's arrival and departure routes, plus flight path showing typical vectoring for runway 24.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore, for runway 24 these add up to 70% as that is the proportion that runway 24 is used. Note that percentages shown on the figure add up to 69% due to rounding.

4.1.1 Today's departures

Figure 1 and Figure 2 show three departure routes off each runway end named GOSAM, TALLA and GRICE. These figures also display a month of actual flight paths from July 2023, from which it can be seen that, in reality, few aircraft stay on their planned route.

4.1.1.1 Runway 06 departures today

In order to limit the impact of aircraft noise on the Cramond area of Edinburgh, all three current departure routes from runway 06 turn left, once it is safe to do so and it meets the earlier of one of the following two conditions:

- The aircraft has reached 635ft above sea level, or,
- The aircraft has travelled 0.5 NM measured from the end of the runway.

The left turn is on to a 043° heading, passing further to the left of Cramond than they would if they routed straight ahead upon departure; we refer to this as the "Cramond Offset" (for more details see Section 2.1.4).

Depending upon many factors – wind speed and direction, air temperature, aircraft type, aircraft load (fuel and passengers) and more – the exact point at which each aircraft makes this early left turn varies for each departure.

Once over the Firth of Forth, flights on the GOSAM and GRICE departures turn left towards their respective SID end points. TALLA deps continue over the Firth of Forth before turning right towards Cockenzie and then further right to TALLA.

While all aircraft initially follow one of the routes, they are rarely flown to the end as a result of air traffic control interventions required to keep aircraft separated and/or to expedite the traffic flow. These are time consuming for both air traffic control and pilots, and they also lead to inconsistency in the position of flight paths. This is inefficient for our operation and leads to inefficiency in the wider network operated by NERL (as subject to a separate but related NERL ACP as described in Section 1).

The actual flight paths shown in Figure 1 on page 195 illustrate this dispersal of tracks inherent in today's airspace design predicated on old technology. In particular it can be seen that:

- a wide spread of GOSAM route aircraft making the left turn over the Firth of Forth;
- aircraft being vectored off the GOSAM route at many different points as they transit west. Air traffic control do this once any Edinburgh outbound aircraft has climbed above any Glasgow Airport inbound aircraft that may be arriving from the south;
- many aircraft are vectored off the TALLA route, heading directly to the southeast rather than tracking southwest along the published TALLA route;
- some aircraft departing on the GRICE route are vectored to the northeast prior to reaching the end of the published route.

4.1.1.2 Runway 24 departures today

Like runway 06, runway 24 has three routes GOSAM, TALLA and GRICE (see Figure 2 on page 196).

All follow an initial segment that continues on the extended centreline of the runway before splitting off in their respective direction at around six miles from the airport.

The actual flight paths shown in Figure 2 illustrate that, like those off runway 06, the runway 24 routes are rarely flown to the end as a result of air traffic control interventions which leads to a wide spread of flight paths and inefficiency in the operation.

In particular it can be seen that:

- aircraft are vectored off the published GOSAM route at many different points as they transit west. Air traffic control do this once the Edinburgh outbound aircraft has climbed above any Glasgow Airport inbound aircraft that may be arriving from the south;
- many aircraft are vectored off the TALLA route, heading directly towards their final destination rather than tracking southwest on the TALLA route;
- aircraft departing on the GRICE route are turned north at various points, and head straight towards the end of the route rather than following the turns in the planned route.

4.1.2 Arrivals today

All commercial aircraft have to file a flight plan detailing their route from their origin airport to their destination. The flight plan is used by air traffic control systems to inform air traffic controllers of an aircraft's arrival into their airspace sector and to manage the number of aircraft predicted to be in a given sector of airspace at any point in time. All aircraft destined for Edinburgh Airport will have their route to Edinburgh published in their flight plan, which will include an estimated time of arrival to a holding stack, whose location is defined around a point in space called a holding fix.

Edinburgh Airport currently has two holding fixes, TARTN to the southeast and STIRA to the northwest. These are shown in both Figure 1 on page 195 and Figure 2[1] on page 196.

Currently, there are no set routes between the holding stacks and the runway. ATC will therefore vector each aircraft by providing each aircraft tailored instructions towards final approach. These instructions manoeuvre aircraft from the hold towards the final approach, or in many cases, the instructions are given before the aircraft reach the holding point so they bypass this and head straight towards the final approach.

Like our current departures, this reliance on vectoring leads to further unpredictability in the flight paths and a spreading of flights across wide areas. This leads to the wide spread of traffic shown in the flight path data in Figure 1 and Figure 2.

[1] During busy arrival periods at the airport aircraft may be required to queue at the holding point until their turn to make an approach and landing. When this is required they queue in what is referred at as a holding stack, in which the queuing aircraft fly around in an oval, 'stacked' one above another with 1,000ft vertical separation between each oval. The holding stacks are above 7,000ft and designed and operated by NERL. NERL are seeking to redesign these holds alongside our redesign of lower-level routes. For more detail on the redesign of the holds see the **NERL ACP and consultation**.

The unpredictability of the flight path flown also makes it difficult for ATC and pilots to plan a continuous descent, because the track, and therefore the distance they have to fly, is rarely the same. Therefore, they may pause their descent and fly level for a period, which is inefficient with respect to fuel and CO_2e, and can create more noise if the level portion of flight is below 7,000ft.

For runway 06, aircraft are vectored to join the final approach along a line extending from the runway to the southwest. From here they follow a direct path to land on the runway as shown in Figure 1. Arrivals on runway 24 do the same except they join final approach on a line stretching northeast from runway 24 (see Figure 2).

4.1.2.1 Today's noise abatement procedures

Edinburgh has noise abatement procedures described in the Aeronautical Information Publication (AIP). These are reproduced in Annex J. In practice, these procedures do not prevent aircraft flight paths from being dispersed over a wide area.

4.1.2.2 Summary

In summary, both our arrivals and departures are managed through vectoring in today's operation. This method of managing our traffic means that no two aircraft will follow the exact same route and often have their climb or descent interrupted by periods of level flight. This can lead to both operational inefficiency in terms of ATC and pilot workload, and environmental inefficiency in terms of noise and CO_2e. Using PBN to enableaircraft to accurately follow routes which have been designed to improve operational and environmental efficiency is a key reason why we would like to change our airspace.

The remainder of this section provides the detailed results of the FOA for the baseline 'without airspace change' design that is in place today. The data in this section is the comparison point against which the performance of the options is assessed in Sections 4.2 to 4.4.

4.1.3 Baseline 'without Airspace Change': Safety

Group	Impact	Level of analysis
All	Safety	Qualitative

At current traffic levels, there are no safety concerns which require immediate resolution with the current arrangements at Edinburgh.

Future traffic growth could, however, result in increased complexity and workload for Air Traffic Controllers and pilots. It is best practice to minimise complexity in the design and operation of airspace where possible.

4.1.4 Baseline 'without Airspace Change': Noise

Group	Impact	Level of analysis
Communities	Noise	Quantitative

4.1.4.1 Contour maps

The contour maps for the 'without airspace change' scenarios are shown in Section 1 of Annex L.

4.1.4.2 Primary noise metrics – TAG assessment

Information about the changes in LAeq contours compared to the baseline LAeq contours will be used to generate TAG outcomes for the options. There is no TAG outcome for the baseline as it is the 'without airspace change' scenario.

4.1.4.3 LAeq Contours

The following tables shows LAeq noise contour data for the 'without airspace change' pre-implementation scenario for 2023, 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 number of listed buildings has been included to address community feedback relating to heritage sites. The contour figures and 100% mode tables can be found in Annex L.

Table 1: LAeq 16hr, Daytime 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2023	Without Airspace Change	LAeq 16hr	51	50.1	45,600	20,700	6	1	150	2	8
			54	29.0	9,500	4,400	1	0	103	0	4
			57	15.8	3,500	1,700	1	0	57	0	1
			60	8.2	1,700	800	1	0	21	0	1
			63	4.1	400	200	0	0	3	0	0
			66	2.1	100	100	0	0	0	0	0
			69	1.1	0	0	0	0	0	0	0

Table 2: LAeq 16hr, Daytime 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Without Airspace Change	LAeq 16hr	51	63.4	58,100	26,300	6	1	169	3	15
			54	36.9	16,000	7,400	5	0	127	1	5
			57	20.7	5,100	2,500	1	0	68	0	2
			60	11.0	2,700	1,300	1	0	40	0	1
			63	5.5	500	200	0	0	10	0	0
			66	2.9	200	100	0	0	1	0	0
			69	1.5	0	0	0	0	0	0	0

Table 3: LAeq 16hr, Daytime 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Without Airspace Change	LAeq 16hr	51	73.9	67,200	30,400	7	1	193	5	17
			54	43.3	23,800	10,900	5	1	141	2	7
			57	24.6	6,900	3,300	1	0	87	0	2
			60	13.3	3,000	1,500	1	0	45	0	1
			63	6.8	900	500	0	0	15	0	0
			66	3.5	300	200	0	0	1	0	0
			69	1.8	<100	<100	0	0	0	0	0

Table 4: LAeq 8hr, Night-Time 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2023	Without Airspace Change	LAeq 8hr	45	66.9	61,400	27,800	6	1	169	5	16
			48	39.3	19,300	8,900	5	0	127	1	5
			51	22.3	5,400	2,600	1	0	86	0	2
			54	11.8	3,000	1,500	1	0	52	0	1
			57	6.0	1,800	900	1	0	15	0	1
			60	3.0	200	100	0	0	2	0	0
			63	1.5	0	0	0	0	0	0	0
			66	0.8	0	0	0	0	0	0	0

Table 5: LAeq 8hr, Night-Time 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Without Airspace Change	LAeq 8hr	45	79.5	70,600	31,900	7	1	208	6	18
			48	46.5	40,900	18,600	6	1	139	2	7
			51	26.9	8,400	4,000	1	0	94	0	4
			54	14.4	3,200	1,600	1	0	58	0	1
			57	7.4	2,300	1,100	1	0	21	0	1
			60	3.6	300	200	0	0	3	0	0
			63	1.8	<100	<100	0	0	0	0	0
			66	0.9	0	0	0	0	0	0	0

Table 6: LAeq 8hr, Night-Time 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Without Airspace Change	LAeq 8hr	45	92.2	76,000	34,400	7	1	228	6	20
			48	54.0	47,900	21,700	6	1	156	2	9
			51	31.6	11,800	5,500	3	0	107	1	4
			54	17.2	4,200	2,000	1	0	64	0	1
			57	8.9	2,600	1,300	1	0	33	0	1
			60	4.4	500	200	0	0	7	0	0
			63	2.2	100	100	0	0	0	0	0
			66	1.1	0	0	0	0	0	0	0

4.1.4.4 N60 and N65 Contours

The following tables show N65 and N60 noise contour data for the 'without airspace change' pre-implementation scenario for 2023, 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 Annex L.

Table 7: N65 Daytime 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2023	Without Airspace Change	N65 (day)	5	113.3	87,500	39,600	7	1	243	7	23
			10	95.2	78,100	35,300	7	1	228	7	22
			20	75.0	68,600	31,000	6	1	177	5	18
			50	44.8	30,400	13,900	6	1	138	2	7
			100	27.2	13,000	6,000	3	0	103	1	4
			200	2.3	0	0	0	0	0	0	0

Table 8: N65 Daytime 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Without Airspace Change	N65 (day)	5	122.3	92,100	41,800	7	1	263	7	23
			10	102.2	80,100	36,300	7	1	235	7	22
			20	84.8	73,800	33,400	6	1	194	6	19
			50	58.2	52,000	23,500	6	1	153	3	11
			100	37.6	19,800	9,100	5	1	128	2	5
			200	3.3	100	<100	0	0	0	0	0

Table 9: N65 Daytime 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Without Airspace Change	N65 (day)	5	129.7	98,800	44,800	7	1	306	7	23
			10	107.4	85,000	38,500	7	1	236	7	22
			20	90.0	76,400	34,600	7	1	222	7	22
			50	64.3	58,100	26,300	6	1	164	4	16
			100	41.2	26,300	12,000	6	1	132	2	7
			200	19.2	8,300	3,900	2	0	77	1	3

Table 10: N60 Night-Time 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2023	Without Airspace Change	N60 (night)	5	133	112,300	50,700	11	1	283	11	26
			10	88	75,100	34,000	7	1	223	7	19
			20	52	31,700	14,400	6	1	126	2	8
			50	1	0	0	0	0	0	0	0

Table 11: N60 Night-Time 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Without Airspace Change	N60 (night)	5	150	123,100	55,600	11	1	296	14	27
			10	96	79,100	35,800	7	1	230	7	19
			20	67	56,300	25,500	7	1	182	3	12
			50	3	<100	<100	0	0	1	0	0

Table 12: N60 Night-Time 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Without Airspace Change	N60 (night)	5	170	140,700	63,600	12	2	315	14	31
			10	109	98,200	44,400	10	1	258	9	24
			20	76	66,300	30,000	7	1	206	6	18
			50	3	100	<100	0	0	6	0	0

4.1.4.5 Overflight Contours

The following tables show overflight day and night contour data for the 'without airspace change' pre-implementation scenario for 2023, 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 Annex L.

Table 13: Overflight, Daytime 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2023	Without Airspace Change	Overflights Day	5	909.4	399,400	181,300	43	6	2151	36	101
			10	511.5	313,300	141,400	35	5	1674	29	79
			20	243.6	180,100	81,400	25	3	920	20	50
			50	54.4	51,400	23,100	6	1	37	9	16
			100	18.3	12,700	5,700	3	1	5	1	3

Table 14: Overflight, Daytime 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Without Airspace Change	Overflights Day	5	1173.3	454,400	206,900	53	8	2554	43	114
			10	653.0	343,100	155,000	37	6	1814	31	86
			20	342.6	240,700	108,600	28	4	1345	25	61
			50	72.6	62,700	28,200	7	1	68	11	19
			100	29.2	25,300	11,400	6	1	15	2	5

Table 15: Overflight, Daytime 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Without Airspace Change	Overflights Day	5	1360.1	494,200	225,600	59	13	2958	44	119
			10	776.8	363,500	164,500	40	6	1959	34	92
			20	414.2	280,400	126,400	31	4	1538	27	70
			50	85.8	70,300	31,600	8	1	87	13	21
			100	42.2	37,800	17,000	6	1	25	6	14
			200	4.6	6,200	2,800	1	0	3	0	3

Table 16: Overflight, Night-Time 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2023	Without Airspace Change	Overflights Night	5	188	143,100	64,300	23	2	600	16	41
			10	44	35,100	15,800	6	1	28	6	11
			20	16	8,700	3,900	3	0	5	1	3

Table 17: Overflight, Night-Time 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Without Airspace Change	Overflights Night	5	235	178,000	79,900	26	3	960	21	52
			10	61	58,400	26,300	6	1	40	11	18
			20	25	20,700	9,300	6	1	10	2	4

Table 18: Overflight, Night-Time 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Without Airspace Change	Overflights Night	5	306	218,900	98,300	28	4	1199	24	60
			10	77	68,400	30,800	8	1	74	12	19
			20	33	27,400	12,300	6	1	19	2	6

4.1.4.6 People with Protected Characteristics

Table 19 opposite shows the current day overflight below 7,000ft for the Special Schools and Sight Scotland facilities we identified in the vicinity of the airport where there was potential for overflight. We have listed all the facilities we have looked at, including those not overflown; where this is the case the table states 'Null'.

Data on educational facilities, medical facilities, care homes and places of worship are covered in the earlier noise/overflight data tables in the preceding sub sections.

Table 19: 'Without Airspace Change' Baseline Overflight of Special Schools and Sight Scotland Facilities, 2027 & 2036

	2027 Day Overflight Contour (Flights per Day)	2036 Day Overflight Contour (Flights per Day)
Receptor Name	Without Airspace Change	Without Airspace Change
Pinewood School	50	50
Moore House Academy	100	100
Ogilvie School	100	100
Cedarbank School	Null	Null
Calaiswood School	Null	Null
Sight Scotland Veterans' Linburn Centre	Null	Null
Starley Hall School	Null	Null
Victoria Park School	Null	Null
Kaimes Special School	Null	Null
Rosslyn School	Null	Null
Sight Scotland Allermuir Home	Null	Null
Sight Scotland The Royal Blind School	Null	Null
Broughton Primary School	Null	Null
Hyndhead School	Null	Null
New Struan School	Null	Null
Ochil Tower School	Null	Null
Rowanfield Special School	Null	Null
Woodlands School	Null	Null

4.1.5 Baseline 'without Airspace Change': Local Air Quality

Group	Impact	Level of analysis
Communities	Local Air Quality	Qualitative

Section 3.3.4 describes how none of the options are likely to result in a possibility of pollutants breaching legal limits and target values (or worsening an existing breach of legal limits and target values). Therefore, no further assessment of air quality was undertaken for either the baseline or the options.

4.1.6 Baseline 'without Airspace Change': Greenhouse Gas Emissions

Group	Impact	Level of analysis
Wider Society	Greenhouse Gas Emissions	Quantitative

4.1.6.1 TAG Outcomes

Information about the changes in greenhouse gas emissions for each option compared to the baseline 'without airspace change' scenario have been used to generate TAG outcomes for the options. There is no TAG outcome for the baseline as it is the 'without airspace change' scenario.

4.1.6.2 Greenhouse Gas Emissions

Annual greenhouse gas emissions (CO_2e) data is presented in[2]. This covers CO_2e from our departures and arrivals at low level and also the flight paths through the ScTMA operated by NERL. We use this data as a comparison point for the options, which only vary in terms of the low-level design (see Section 3.3.4 methodology for details).

Table 20: CO_2e 'Without Airspace Change' Baseline, Current Day (2023) and 2027-2036

Year	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)
2023	716,505	6,208
2027	942,797	6,390
2028	960,002	6,406
2029	977,207	6,419
2030	994,412	6,431
2031	1,011,617	6,441
2032	1,028,823	6,449
2033	1,046,028	6,455
2034	1,063,233	6,459
2035	1,080,438	6,462
2036	1,097,643	6,463

[2] Please refer to the FOA methodology section for greenhouse gas emissions for contextual information on how the use of planned flight data in the NERL modelling may affect this result.

4.1.6.3 Changes to CO_2e/fuel burn for other airspace users

Changes in fuel burn from GA activity is unpredictable, not the responsibility of Edinburgh ATC and are not as a result of scheduled aircraft arriving or departing from Edinburgh Airport. It therefore does not form part of the quantified CO_2e or fuel burn modelling for the baseline or any of the options.

4.1.7 Baseline 'without Airspace Change': Tranquillity

Group	Impact	Level of analysis
Wider Society	Tranquillity	Quantitative

The following tables show the number and area of national scenic areas, national parks, candidate quiet areas (CQA), country parks, gardens & designated landscapes and scheduled ancient monuments within each LAeq 16hr noise contour for the 'without airspace change' pre-implementation scenario for 2023, 2027 and 2036. Scheduled ancient monuments have been included to address community feedback relating to heritage sites.

Equivalent data is also presented for daytime overflights.

Equivalent data for night-time (LAeq 8hr), N65, N60 and night-time overflight contours are presented in Annex L.

A commentary on how each option would change the overflight of these different designations is provided in the later sections.

Table 21: Tranquillity Sites in Relation to LAeq 16hr, Daytime 'Without Airspace Change' Baseline, Current Day

				Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
Year	Scenario	Metric	Contour (dB)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	LAeq 16hr	51	1	0.1	2	3.4	4	5.3	0	0.0	0	0.0	8	0.3
			54	0	0.0	2	0.9	4	3.8	0	0.0	0	0.0	6	0.2
			57	0	0.0	2	0.2	3	1.9	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	3	0.8	0	0.0	0	0.0	4	0.0
			63	0	0.0	0	0.0	2	0.4	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 22: Tranquillity Sites in Relation to LAeq 16hr, Daytime 'Without Airspace Change' Baseline, 2027

				Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
Year	Scenario	Metric	Contour (dB)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Without Airspace Change	LAeq 16hr	51	1	0.1	2	4.1	4	6.0	0	0.0	0	0.0	11	0.3
			54	1	0.0	2	2.0	4	4.5	0	0.0	0	0.0	8	0.2
			57	0	0.0	2	0.5	4	2.8	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	3	1.3	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	2	0.6	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0

Table 23: Tranquillity Sites in Relation to LAeq 16hr, Daytime 'Without Airspace Change' Baseline, 2036

				Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
Year	Scenario	Metric	Contour (dB)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	LAeq 16hr	51	1	0.2	2	4.4	4	6.4	0	0.0	0	0.0	12	0.3
			54	1	0.0	2	3.0	4	4.9	0	0.0	0	0.0	8	0.2
			57	0	0.0	2	0.7	4	3.3	0	0.0	0	0.0	6	0.2
			60	0	0.0	1	0.0	3	1.6	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	3	0.7	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	2	0.3	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0

Table 24: Tranquillity Sites in Relation to Overflight Daytime 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	Overflights Day	5	5	1.4	2	5.9	23	29.2	0	0.0	0	0.0	158	4.4
			10	1	1.0	2	5.5	16	24.9	0	0.0	0	0.0	101	3.4
			20	1	0.6	2	4.6	9	14.3	0	0.0	0	0.0	60	2.4
			50	0	0.0	1	0.6	2	0.6	0	0.0	0	0.0	7	0.4
			100	0	0.0	1	0.4	2	0.2	0	0.0	0	0.0	3	0.1

Table 25: Tranquillity Sites in Relation to Overflight Daytime 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Without Airspace Change	Overflights Day	5	5	1.6	2	6.0	24	31.7	0	0.0	0	0.0	180	4.7
			10	1	1.0	2	5.7	21	26.6	0	0.0	0	0.0	123	3.8
			20	1	1.0	2	5.2	15	22.5	0	0.0	0	0.0	77	3.0
			50	0	0.0	1	2.3	2	2.3	0	0.0	0	0.0	9	0.5
			100	0	0.0	1	0.5	2	0.4	0	0.0	0	0.0	5	0.3

Table 26: Tranquillity Sites in Relation to Overflight Daytime 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	Overflights Day	5	5	2.0	2	6.1	27	34.0	0	0.0	0	0.0	220	5.3
			10	1	1.0	2	5.7	21	28.4	0	0.0	0	0.0	147	4.2
			20	1	1.0	2	5.4	16	23.9	0	0.0	0	0.0	84	3.1
			50	0	0.0	1	2.6	2	2.6	0	0.0	0	0.0	10	0.5
			100	0	0.0	1	0.6	2	0.5	0	0.0	0	0.0	6	0.4
			200	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0

4.1.8 Baseline 'without Airspace Change': Biodiversity

Group	Impact	Level of analysis
Wider Society	Biodiversity	Quantitative & Qualitative

The potential impacts to biodiversity with respect to potential effects on European Sites from overflight below 3,000ft are considered in the HRA Screening Report available in Annex H. There is no outcome for the baseline as it is the 'without airspace change' scenario.

While the HRA focus is on sites overflown below 3,000ft, for information we have provided the tables below showing the number and area of European Sites overflown below 7,000ft. These are the basis for comparison with the options in the following sections.

Metrics for LAeq 16hr, LAeq 8hr, N65 and N60, plus metrics for other site designations are presented in Annex L.

Table 27: Biodiversity Sites in Relation to Overflight Daytime 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	Overflights Day	5	1	1.4	0	0.0	16	13.9	4	18.2	18	243.4	62	37.8
			10	1	1.4	0	0.0	13	8.0	0	0.0	15	186.8	35	9.9
			20	1	1.4	0	0.0	7	5.9	0	0.0	9	101.1	20	6.8
			50	1	1.2	0	0.0	1	0.6	0	0.0	3	17.1	3	0.9
			100	0	0.0	0	0.0	1	0.4	0	0.0	3	8.6	1	0.4

Table 28: Biodiversity Sites in Relation to Overflight Daytime 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Without Airspace Change	Overflights Day	5	3	1.5	0	0.0	16	16.5	4	27.3	19	277.1	73	51.4
			10	1	1.4	0	0.0	14	10.3	4	2.0	16	204.7	49	14.5
			20	1	1.4	0	0.0	11	6.9	0	0.0	13	121.2	27	8.5
			50	1	1.4	0	0.0	1	2.3	0	0.0	3	26.8	4	2.6
			100	1	0.2	0	0.0	1	0.5	0	0.0	3	12.2	2	0.5

Table 29: Biodiversity Sites in Relation to Overflight Daytime 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	Overflights Day	5	8	1.9	0	0.0	16	17.5	4	29.3	20	294.6	80	60.7
			10	1	1.4	0	0.0	16	12.0	4	13.0	18	220.4	56	29.2
			20	1	1.4	0	0.0	11	7.2	0	0.0	13	143.6	29	9.0
			50	1	1.4	0	0.0	1	2.6	0	0.0	3	36.0	6	3.0
			100	1	0.6	0	0.0	1	0.6	0	0.0	3	14.4	2	0.9
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 30: Biodiversity Sites in Relation to Overflight Night-Time 'Without Airspace Change' Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2023	Without Airspace Change	Overflights Night	5	1	1.4	0	0.0	4	3.7	0	0.0	6	75.9	10	4.3
			10	1	0.7	0	0.0	1	0.6	0	0.0	3	18.5	2	0.9
			20	0	0.0	0	0.0	1	0.4	0	0.0	3	10.0	1	0.4

Table 31: Biodiversity Sites in Relation to Overflight Night-Time 'Without Airspace Change' Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Without Airspace Change	Overflights Night	5	1	1.4	0	0.0	4	4.4	0	0.0	6	87.2	14	5.2
			10	1	1.4	0	0.0	1	0.7	0	0.0	3	20.5	3	1.0
			20	0	0.0	0	0.0	1	0.5	0	0.0	3	11.4	1	0.5

Table 32: Biodiversity Sites in Relation to Overflight Night-Time 'Without Airspace Change' Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Without Airspace Change	Overflights Night	5	1	1.4	0	0.0	6	5.3	0	0.0	8	107.8	20	6.7
			10	1	1.4	0	0.0	1	0.7	0	0.0	3	27.1	3	1.0
			20	1	0.5	0	0.0	1	0.5	0	0.0	3	13.6	2	0.6

4.1.9 Baseline 'without Airspace Change': Capacity/resilience

Group	Impact	Level of analysis
Wider Society	Capacity/ resilience	Qualitative

4.1.9.1 Overall Capacity and Growth

This change is not expected to impact the overall airport capacity or future growth.

4.1.9.2 Network Delay

Departure delays are currently experienced as a result of network congestion in downstream air traffic control sectors, particularly those in the network over the north of England which deal with traffic flows from the airports in the Manchester regions and overflights crossing to and from the Atlantic. A large proportion of our flights currently fly south through this airspace, and these can be delayed on the ground when these sectors reach capacity.

4.1.9.3 Medium Term ILS Resilience

Arrivals on final approach use an Instrument Landing System (ILS) to guide them into the airport. When the ILS is unavailable, aircraft rely on the Non Directional Beacons (NDBs) to guide them close enough to the airport to enable a visual approach. The Edinburgh Airport NDBs are at end of life and it is expected that they will no longer be able to be serviced beyond 2030. Replacement NDBs will therefore be needed in c.2030 to maintain resilience. The expected cost is c£300k.

4.1.9.4 Long Term Resilience

The published departure procedures today rely on a network of conventional ground-based navigation aids called Very high frequency Omnidirectional Range, or VORs for short. Much of this equipment is due to be decommissioned as part of a NERL UK wide programme under the Airspace Modernisation programme.

Other than an airspace change to introduce PBN, there is no long-term resilience for Edinburgh's published departure procedures as NERL decommissions the VORs that they rely on. The 'without airspace change' scenario would therefore mean that over time Edinburgh loses its published routes for departing aircraft, which would result in critical operational issues and significant loss of revenue[3].

4.1.10 Baseline 'without Airspace Change': Access for other airspace users

Group	Impact	Level of analysis
General Aviation	Access	Qualitative & Quantitative

Figure 3 on page 217 shows the controlled airspace designated as Edinburgh Airport's (shown in red) has varying lower and upper limits with the volume closest to the airport, the Control Zone (CTR) going down to ground level (shown in orange outline).

[3] EDI has an RNAV substitution airspace change lodged with the CAA in parallel to this ACP (ACP-2021-075). This is not included in the 'without airspace change' scenario as it has yet to be approved. Furthermore, it would be temporary solution and would not provide long term resilience.

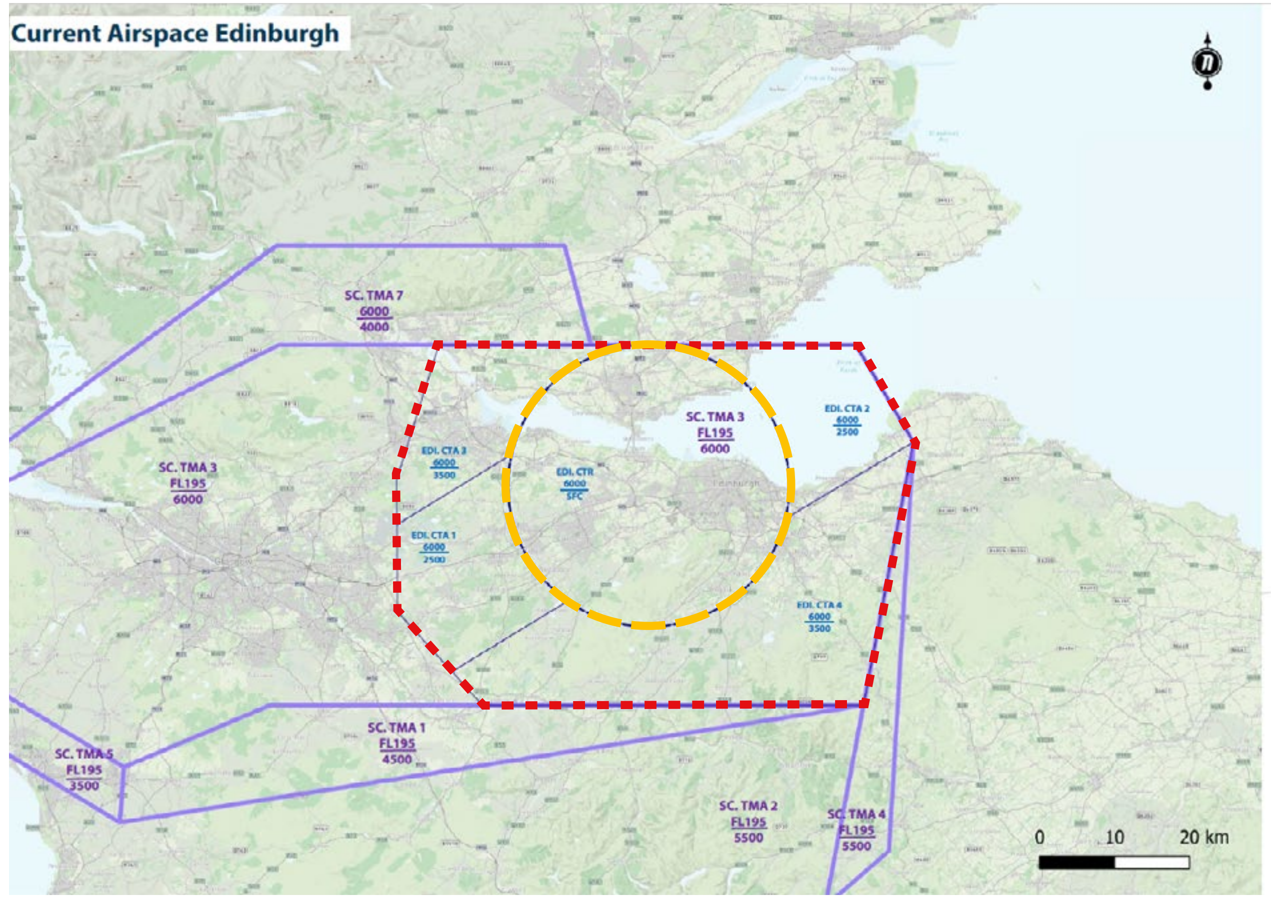


Figure 3: Simplified Chart showing today's Edinburgh Airport Control Zone (CTR) and Control Areas (CTAs) See Annex G for a more detailed picture).

Whilst the existing baseline scenario will not result in the requirement for more airspace, it offers no opportunity to reduce the size of CAS. The options will be quantitatively compared against this existing scenario.

For more detailed pictures of today's airspace and the appraisal of General Aviation (GA) access, please see Annex G.

4.1.11 Baseline 'without Airspace Change': Economic impact from increased effective capacity

Group	Impact	Level of analysis
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Qualitative

This change will not impact the effective airport capacity or future growth.

There is an economic cost to the network delays mentioned in the capacity/resilience section but it has not been possible to quantify them.

4.1.12 Baseline 'without Airspace Change': Fuel Burn

Group	Impact	Level of analysis
General aviation/ commercial airlines	Fuel Burn	Quantitative

Annual and per flight fuel burn data is presented below for the 'without airspace change' scenario. This covers fuel burn from our departures and arrivals at low level and also their flight paths through the ScTMA operated by NERL. We use this data as a comparison point for the options, which only vary in terms of the low-level design (see Section 3.3.4 methodology for details).

Table 33: Fuel Burn for 'Without Airspace Change' Baseline, Current Day (2023) and 2027-2036

Year	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)
2023	225,316	£154,564,656	1,952
2027	296,477	£203,380,252	2,009
2028	301,887	£207,091,751	2,014
2029	307,298	£210,803,249	2,019
2030	312,708	£214,514,747	2,022
2031	318,119	£218,226,245	2,025
2032	323,529	£221,937,743	2,028
2033	328,940	£225,649,241	2,030
2034	334,350	£229,360,739	2,031
2035	339,760	£233,072,237	2,032
2036	345,171	£236,783,735	2,032

4.1.12.1 Changes to CO_2e/fuel burn for other airspace users

See Section 4.1.6.3.

4.1.13 Baseline 'without Airspace Change': Training Costs for Commercial Airlines

Group	Impact	Level of analysis
Commercial airlines	Training Costs	Qualitative

Commercial airlines would see no change to training costs as the baseline involves no change to their operations.

4.1.14 Baseline 'without Airspace Change': Other Costs for Commercial Airlines

Group	Impact	Level of analysis
Commercial airlines	Other costs	Qualitative

As the baseline is already in operation, there are no other costs anticipated as there will be no change.

4.1.15 Baseline 'without Airspace Change': Infrastructure costs for airports/ANSP

Group	Impact	Level of analysis
Airport/ANSP	Infrastructure costs	Quantitative

There would be infrastructure costs of circa £300,000 (2024 prices) for 2xNDB replacement in 2030 without airspace change as the airport would need to invest for resilience in the absence of a PBN design.

4.1.16 Baseline 'without Airspace Change': Operational costs for airports/ANSP

Group	Impact	Level of analysis
Airport/ANSP	Operational costs	Qualitative

The operational costs for the Airport and ANSP would remain the same as the baseline involves no change to airport operations.

4.1.17 Baseline 'without Airspace Change': Deployment costs for Airport/ANSP

Group	Impact	Level of analysis
Airport/ANSP	Deployment costs	Qualitative

The operational costs will continue as business as usual for no change.

4.1.18 Baseline 'without Airspace Change': Other costs

Group	Impact	Level of analysis
Airport/ANSP	Other costs	Qualitative

There are no other costs for the baseline relevant to the scope of this ACP.

4.1.19 Baseline 'without Airspace Change': Airspace Modernisation Strategy (AMS) CAP1711

The following assessment against the four objectives of the AMS is based upon the detailed information in the sections above.

AMS Strategic Objectives CAP 1711	
Safety	The baseline would maintain safety at current traffic levels, however, future forecasts growth may be subject to increasing delay to maintain safety. There would be no opportunities for improvement
Integration of diverse users	The baseline would offer no improvements to the existing airspace arrangements at Edinburgh Airport. There would be no opportunity to release CAS.
Simplification, reducing complexity – improving efficiency	The baseline would not provide any opportunities to reduce complexity and improve efficiency.
Environmental sustainability	The baseline would not enable any environmental benefits.

4.2 FOA for Option 1

Section 2 describes the evolution of our design from CAP1616 Stage 2 to the three full system options (named Options 1, 2 and 3) taken through to this FOA. This section describes Option 1 in further detail and presents the associated FOA results.

4.2.1 Option 1 overview

Note that this textual overview is largely the same for all three options. This is because they are all based on the same PBN principles and would be expected to operate in the same way. The only differences are the positioning of some of the routes. These differences are highlighted in the pictures and tables below. For more detail of how the options differ see the earlier Section 2.4.2.

Figure 4 on page 221 shows the proposed arrival and departure routes for runway 06 and they are described in Table 34 on page 222 and Table 35 on page 223. Figure 5 on page 224, Table 36 on page 225 and Table 37 on page 226 shows the same information for runway 24.

Unlike today's flight paths which show a wide spread of flights, in Option 1 we would expect most aircraft to follow the designated routes with vectoring by air traffic control as the exception to maintain safety, for example where speed control is not able to ensure separation on final approach, or to avoid thunderstorms. This applies to both arrivals and departures. Figure 4 and Figure 5 have an insert which shows the proposed routes compared to today's spread of traffic. This is to show the comparison, it is important to note that in the proposed design flights would stay on the route centreline most of the time.

Each turn will be planned, therefore most arriving aircraft will be able to execute an efficient continuous descent arrival phase of flight, and their exact arrival time will be more easily predicted. Most departing aircraft will achieve a continuous climb to at least 7,000ft and continuous climb beyond that will be more common than it is today.

Our departure routes from either runway terminate at common points in the network, but they take different routes to get there because aircraft on runway 06 start their journey by flying in the opposite direction from those departing on runway 24.

Some routes are colour coded differently because they are a point of difference between the options:

- Figure 4 shows the runway 06 westbound departure route (STEPS) in orange because it is a point of difference between Option 1 and Option 3.
- Figure 5 shows the runway 24 northbound (STOPP), eastbound (GULLY and BERRY) in green because they are a point of difference between Option 1 and both Option 2 and Option 3.
- Figure 5 shows the southbound (STRAT) departure routes in orange because it is a point of difference between Option 1 and Option 3.

This colour coding matches that in Section 2 which describes how the options were developed.

All other routes are the same between the FOA Options 1, 2 and 3. These are shown in purple.

A detailed comparison of areas overflown by each option is provided later in Section 5.3.

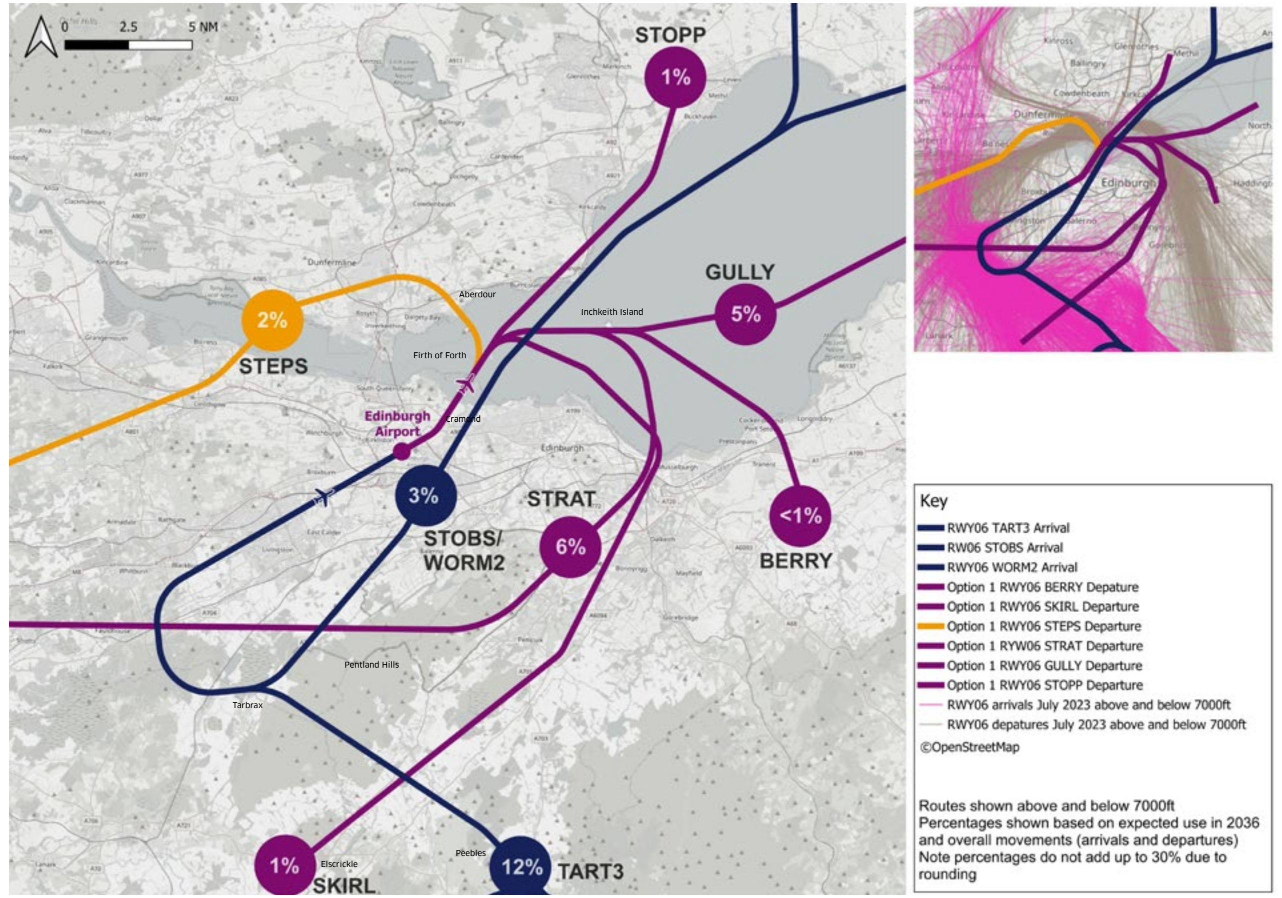


Figure 4: Option 1 proposed routes for runway 06.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore for runway 06 these add up to 30% as that is the proportion that runway 06 would be in use. The same has been done for arrivals. These numbers are consistent with those presented in the description of the baseline in Section 4.1.

The smaller picture shows the proposed routes overlaid today's tracks for reference – in the proposed designs aircraft would stay on the route centreline except for safety reasons, for example where speed control cannot assure separation, or for avoidance of thunderstorms.

Table 34: Option 1 description of runway 06 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	After flying the improved Cramond offset (see Section 2.1.4) these flights will fly northeast over Kinghorn, and skirting Burntisland and Kirkcaldy. The slowest climbing aircraft are expected to be at 7,000ft or higher just north of Kirkcaldy.	GRICE
GULLY	East (e.g. central Europe and the Middle East)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island. This route does not make landfall again.	TALLA
BERRY	East GULLY alternative when D514 in use	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island, and then southeast to cross the coast over Cockenzie. The slowest climbing aircraft are expected to be at 7,000ft before reaching Cockenzie.	N/A
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning northwest, flying over the coast between Aberdour and Dalgety Bay. They make a further turn to the west to cross over Dunfermline. The slowest climbing aircraft are expected to be at 7,000ft or higher as they pass over Dunfermline. THE DESIGN OF THE RUNWAY 06 STEPS ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 1 AND OPTION 3 (BUT NOTE THAT THE DESIGN FOR STEPS IN OPTION 1 and OPTION 2 ARE IDENTICAL).	TALLA
STRAT	South (e.g. southern UK, Spain, France)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island, and then south to cross the coast near Musselburgh by which time all aircraft are expected to be at 7,000ft or higher.	GOSAM
SKIRL	West – Turboprops only (e.g. Ireland)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning southeast to fly parallel to the coast north of Edinburgh. Aircraft will turn southwest to cross the coast west of Musselburgh. Abeam Penicuik, aircraft turn southwest towards the hamlet of Elsrickle. This route is for slow climbing turboprop aircraft only and has a restriction at 6,000ft until a point (named SKIRL) near the hamlet of Elsrickle. This restriction would only be applied if there are other aircraft in the vicinity to restrict the climb, a situation which we expect to be rare. Aircraft would be climbed to 7,000ft or higher before joining the wider route network at SKIRL except in these rare circumstances.	GOSAM

Table 35: Option 1 description of runway 06 arrivals

New arrival route name	Direction and example origins – this is not an exhaustive list	Description	Previous arrival route equivalent
STOBS transition	North and West (e.g. Scottish Islands, Iceland and transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at STOBS over Dundee, flights track south before turning southwest over the Firth of Forth to make landfall over Cramond. The aircraft with the shallowest descent profile pass through 7,000ft abeam the airport. From here they follow a track to the southwest, following the line of the A70 west of the Pentland Hills. They begin their turn to join final approach near the hamlet of Tarbrax, continuing their turn over the village of Breich and joining final approach south of Blackburn. From here they follow the final approach direct to the airport overhead Livingston.	N/A vectoring only
WORM2 transition	East (e.g. eastern Europe and the Middle East)	After passing/leaving the holding stack at WORM2 over the sea east of the Fife coast, flights track along the coast to join the approach transition from STOBS east of Kirkcaldy. Flights reach landfall over Cramond and continue along the transition as described above.	N/A vectoring only
TART3	South and West (e.g. western Europe, southern UK, Ireland and transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at TART3 flights track northwest, with the aircraft with the shallowest descent profiles passing below 7,000ft after passing Peebles. The route continues to join the routes from STOBS and WORM2 near the hamlet of Tarbrax. The route from here is as described above.	N/A vectoring only

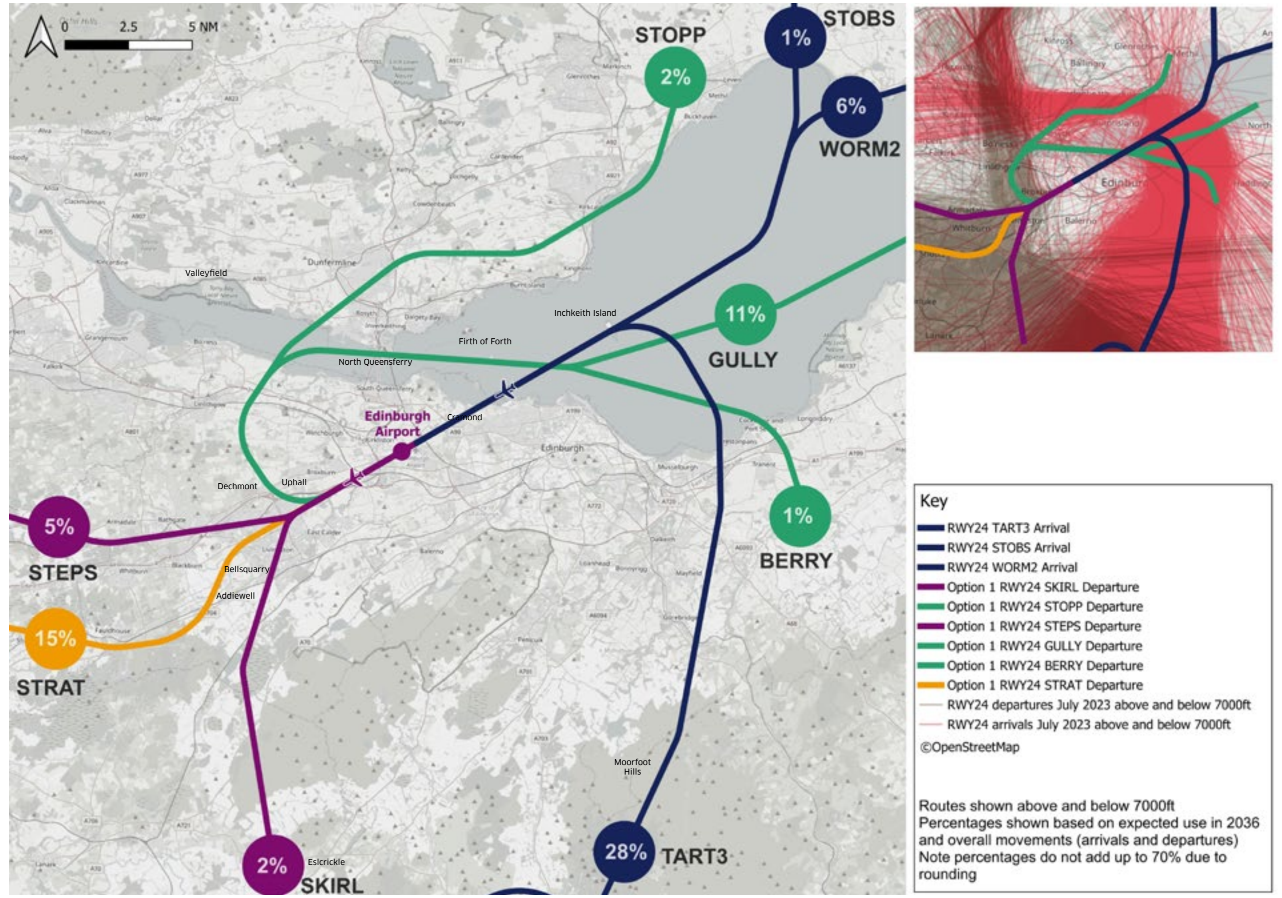


Figure 5: Option 1 proposed routes for runway 24.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore for runway 24 these add up to 70% as that is the proportion that runway 24 would be in use. The same has been done for arrivals. These numbers are consistent with those presented in the description of the baseline in Section 4.1.

The smaller picture shows the proposed routes overlaid today's tracks for reference – in the proposed designs aircraft would stay on the route centreline except for safety reasons, for example where speed control cannot assure separation, or for avoidance of thunderstorms.

Table 36: Option 1 description of runway 24 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	Aircraft initially fly straight out, staying south of Broxburn. A right turn is initiated just before passing Uphall Station so that the route northwest passes between Uphall and Dechmont. A further turn towards the northeast is then undertaken abeam the Beecraigs Country Park to staying east of Linlithgow. The south coast of the Firth of Forth is crossed at Blackness and landfall is made on the north coast of Fife at Limekilns. Aircraft are expected to be at 7,000ft or higher before making landfall over Limekilns. THE DESIGN OF THE RUNWAY 24 STOPP ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 1 AND BOTH OPTION 2 AND OPTION 3.	GRICE
GULLY	East (e.g. central Europe and the Middle East)	This route follows the same alignment as the STOPP route above, until just past Blackness, at which point this route peels off to follow the Firth of Forth with aircraft to be at 7,000ft or higher before going overhead North Queensferry. From here onwards the route remains over the water. THE DESIGN OF THE RUNWAY 24 GULLY ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 1 AND BOTH OPTION 2 AND OPTION 3.	TALLA
BERRY	East GULLY alternative when D514 in use	This route follows the same alignment as the GULLY route (described above) until it turns right, north of Leith, towards Cockenzie. Aircraft are expected to be at 7,000ft or higher before going overhead North Queensferry. THE DESIGN OF THE RUNWAY 24 BERRY ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 1 AND BOTH OPTION 2 AND OPTION 3.	N/A
STRAT	South (e.g. southern UK, Spain, France)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until past Livingston from where they turn south, passing over the prison and industrial area east of Addiewell. From here the route turns west, with aircraft expected to be at 7,000ft or higher before passing Fauldhouse. THE DESIGN OF THE RUNWAY 24 STRAT ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 1 AND OPTION 3 (BUT NOTE THAT THE DESIGN OF STRAT IN OPTION 1 and OPTION 2 ARE IDENTICAL).	TALLA
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn west to follow the track of today's GOSAM route, broadly tracking the M8 corridor. Aircraft are expected to be at 7,000ft or higher on passing Armadale.	GOSAM
SKIRL	West – Turboprops only (e.g. Ireland)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn south passing over Bellsquarry. The route then continues south. This route is for slow climbing turboprop aircraft only and has a restriction at 6,000ft until a point (named SKIRL) near the hamlet of Elsrickle. This restriction would only be applied if there are other aircraft in the vicinity to restrict the climb, a situation which we expect to be rare. Aircraft would be climbed to 7,000ft or higher before joining the wider route network at SKIRL except in these rare circumstances.	GOSAM

Table 37: Option 1 description of Runway 24 arrivals

New arrival route name	Direction and example origins – this is not an exhaustive list	Description	Previous arrvial route equivalent
STOBS transition	North and West (e.g. Scottish Islands, Iceland and transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at STOBS over Dundee, flights track south, with the aircraft with the shallowest descent profiles passing 7,000ft on passing east of Cupar. They continue south until over the Firth of Forth where they turn southwest to join the final approach passing overhead Inchkeith Island before making landfall over Cramond.	N/A vectoring only
WORM2 transition	East (e.g. eastern Europe and the Middle East)	After passing/leaving the holding stack at WORM2 over the sea east of the Fife coast, flights track along the coast, with the aircraft with the shallowest descent profiles passing 7,000ft abeam Anstruther. From here they join the transition from STOBS, turning southwest onto the final approach that makes landfall over Cramond.	N/A vectoring only
TART3 transition	South and West (e.g. western Europe, southern UK, Ireland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at TART3 east of Peebles, flights track to the northeast, with the aircraft with the shallowest descent profiles passing below 7,000ft over the Moorfoot Hills. The route continues to the north crossing the coast north of Wallyford. The route joins those from STOBS and WORM2 over Inchkeith Island. The route from here is as described above.	N/A vectoring only

4.2.2 Option 1: Noise abatement procedures:

The proposed noise abatement procedures for Option 1 are for departing jet aircraft and by all other departing aircraft of more than 5,700kg Maximum Take Off Weight to stay with 1.5km of the published route to 4,000ft or to end point shown in Figure 6 opposite, unless otherwise instructed by ATC in the interests of safety.

All other conditions of the noise abatement procedures would remain as today.

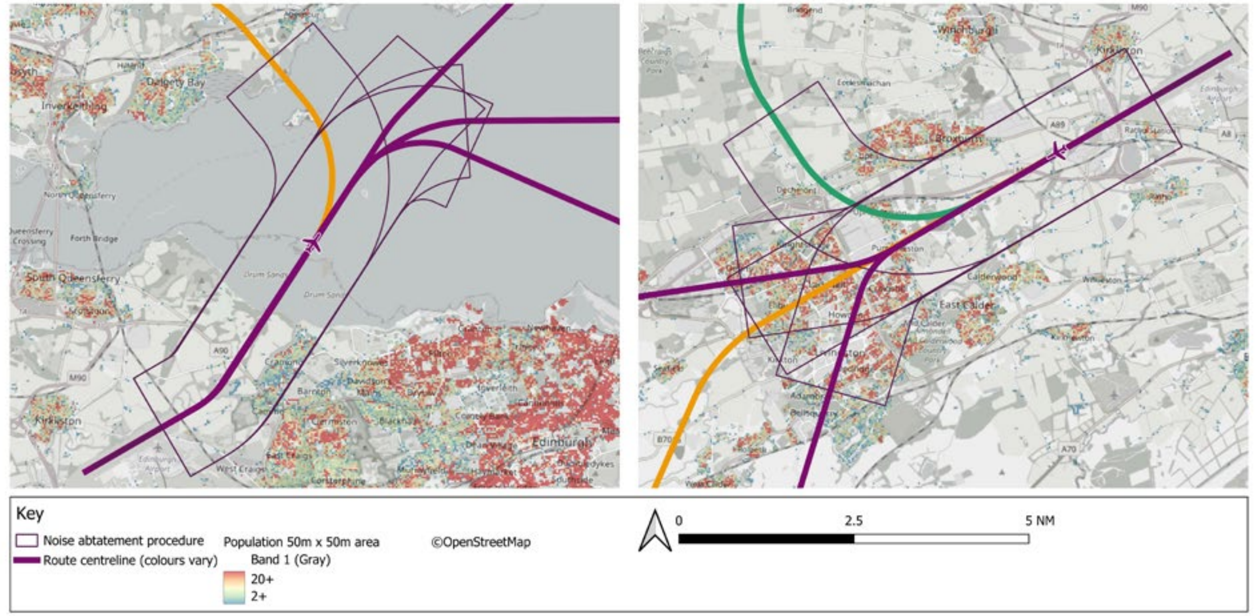


Figure 6: Option 1 noise abatement procedures for departures.

The remainder of this section provides the detailed results of the FOA for Option 1.

4.2.3 Option 1: Safety

Group	Impact	Level of analysis
All	Safety	Qualitative

The introduction of systemised routes where aircraft can fly their planned route with a degree of autonomy will reduce complexity and associated workload for both air traffic control and pilots. This is considered a safety enhancement as it is best practice to minimise complexity in the design and operation of airspace where possible.

Sending eastbound departures out over the Firth of Forth, and southbound departures west before turning south puts fewer flights through the congested and complex airspace south of Edinburgh.

The ongoing safety work applicable to all options is described in Section 3. Further safety assessments and justifications to meet all relevant safety requirements will be submitted in Stage 4 should this option be proposed.

4.2.4 Option 1: Noise (and overflight)

Group	Impact	Level of analysis
Communities	Noise (and overflight)	Quantitative

4.2.4.1 Contour maps

The contour maps for Option 1 are shown in Section 2 in Annex L.

4.2.4.2 Primary noise metrics: TAG assessment

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 £20.9m (2024 prices).

This reflects a net reduction in adverse noise impacts which includes some people who experience less noise (c.33,000/c.42,000 experience less daytime/night-time noise respectively) and some that experience more (c.4,000/c.9,000 experience more daytime/night-time noise respectively). Overall, there are more positively affected people than negative.

It is 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 CAP 1616. 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.

Table 38: Option 1 TAG Noise Assessment Results

NPV Total Noise (2024 prices)	NPV Sleep (2024 prices)	NPV Amenity (2024 prices)	NPV AMI (2024 prices)	NPV Stroke (2024 prices)	NPV Dementia (2024 prices)	Individuals experiencing increased daytime noise in forecast year	Individuals experiencing reduced daytime noise in forecast year	Individuals experiencing increased night time noise in forecast year	Individuals experiencing reduced night-time noise in forecast year
£20,889,404	£12,821,860	£5,673,267	£30,498	£942,086	£1,421,693	3,910	32,618	9,009	42,648

4.2.4.3 LAeq noise tables

The above TAG results are based on LAeq contour analysis. The difference between Option 1 and the baseline in terms of LAeq contour results is presented below[4]. The predominance of the positive effects reflects the benefits in the TAG noise assessment as they indicate the net reduction in adverse effects from both daytime and night-time noise. There is also an improvement in terms of the net number of listed buildings, places of worship and schools affected by noise above the Lowest Observable Adverse Effect Level (LOAEL). These positive effects are greater in 2036 than 2027 indicating the benefit of the change increases in the longer term.

All the associated contour diagrams are provided in Annex L. Within Annex L we have also presented the 51dB LAeq 16hr daytime and 45dB LAeq 16hr night-time (LOAEL) contours for the option on a map alongside the equivalent baseline 'without airspace change' contours for comparison. The 100% mode tables can also be found in Annex L.

[4] Population and household figures are rounded to the nearest 100, this can mean that results close to zero may appear inconsistent, particularly in comparison tables. For example; 51 and 149 households are both rounded to 100 in the absolute results. In a comparison table, which compares these rounded figures, they cancel one another out, but the related (larger) population figures would not. Therefore the household difference column shows zero but there is still a small difference in population.

Table 39: Comparison Table for LAeq 16hr, Daytime Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Comparison LAeq 16hr	51	0.0	-9,600	-4,300	0	0	-3	-1	-5
			54	-0.5	-2,300	-1,100	-2	0	1	0	-1
			57	-0.2	200	0	0	0	-1	0	0
			60	0.0	-200	-100	0	0	-3	0	0
			63	0.0	-100	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0
			69	0.0	0	0	0	0	0	0	0

Table 40: Comparison Table for LAeq 16hr, Daytime Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Comparison LAeq 16hr	51	1.0	-10,400	-4,600	0	0	3	-3	-5
			54	-0.5	-5,000	-2,300	0	0	-1	0	-2
			57	-0.4	-900	-500	0	0	-14	0	0
			60	0.0	0	-100	0	0	-1	0	0
			63	-0.1	-200	-100	0	0	-3	0	0
			66	0.0	0	0	0	0	0	0	0
			69	0.0	0	0	0	0	0	0	0

Table 41: Comparison Table for LAeq 8hr, Night-time Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Comparison LAeq 8hr	45	2.9	-10,500	-4,700	0	0	-2	-3	-5
			48	-0.5	-21,100	-9,500	-1	0	1	0	-2
			51	-0.6	-1,600	-800	0	0	-1	0	-2
			54	-0.1	100	0	0	0	-3	0	0
			57	-0.1	-100	0	0	0	-2	0	0
			60	0.0	0	0	0	0	1	0	0
			63	0.0	0	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0

Table 42: Comparison Table for LAeq 8hr, Night-time Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Comparison LAeq 8hr	45	5.1	-6,600	-2,900	1	0	11	-2	-5
			48	-0.2	-7,200	-3,200	0	0	-7	0	-3
			51	-0.6	-3,000	-1,300	-2	0	-5	-1	0
			54	-0.1	-400	-200	0	0	1	0	0
			57	0.0	0	0	0	0	0	0	0
			60	-0.1	0	0	0	0	0	0	0
			63	0.0	0	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0

As LAeq is the primary noise metric the absolute values are also provided for reference below.

Table 43: LAeq 16hr, Daytime Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	LAeq 16hr	51	63.4	48,500	22,000	6	1	166	2	10
			54	36.4	13,700	6,300	3	0	128	1	4
			57	20.5	5,300	2,500	1	0	67	0	2
			60	11.0	2,500	1,200	1	0	37	0	1
			63	5.5	400	200	0	0	10	0	0
			66	2.9	200	100	0	0	1	0	0
			69	1.5	0	0	0	0	0	0	0

Table 44: LAeq 16hr, Daytime Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	LAeq 16hr	51	74.9	56,800	25,800	7	1	196	2	12
			54	42.8	18,800	8,600	5	1	140	2	5
			57	24.2	6,000	2,800	1	0	73	0	2
			60	13.3	3,000	1,400	1	0	44	0	1
			63	6.7	700	400	0	0	12	0	0
			66	3.5	300	200	0	0	1	0	0
			69	1.8	<100	<100	0	0	0	0	0

Table 45: LAeq 8hr, Night-time Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	LAeq 8hr	45	82.4	60,100	27,200	7	1	206	3	13
			48	46.0	19,800	9,100	5	1	140	2	5
			51	26.3	6,800	3,200	1	0	93	0	2
			54	14.3	3,300	1,600	1	0	55	0	1
			57	7.3	2,200	1,100	1	0	19	0	1
			60	3.6	300	200	0	0	4	0	0
			63	1.8	<100	<100	0	0	0	0	0
			66	0.9	0	0	0	0	0	0	0

Table 46: LAeq 8hr, Night-time Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	LAeq 8hr	45	97.3	69,400	31,500	8	1	239	4	15
			48	53.8	40,700	18,500	6	1	149	2	6
			51	31.0	8,800	4,200	1	0	102	0	4
			54	17.1	3,800	1,800	1	0	65	0	1
			57	8.9	2,600	1,300	1	0	33	0	1
			60	4.3	500	200	0	0	7	0	0
			63	2.2	100	100	0	0	0	0	0
			66	1.1	0	0	0	0	0	0	0

4.2.4.4 N60 and N65 'number above' contours

Number above contours show the locations where the number of events (i.e. flights) exceeds a pre-determined noise level, expressed indB LASmax. For example, N65 contours show the number of events where the noise level from those flights exceeds 65dB LASmax. For further details see Section 3.3.3. Number above contours are described in CAP1616i as secondary metrics and are not monetised or used to determine 'adverse noise effects'.

The tables below show the difference in populations, households and sensitive buildings for each contour band compared to the baseline 'without airspace change' scenario. Absolute values and the contour diagrams are provided in Annex L.

The N65 daytime comparison shows a pattern of mostly negative effects for population changes within lower contour rates (5 and 10 flights per day) vs more positive effects at the higher rates (20-100 flights per day). However, note that overall population numbers positively affected (particularly in the higher flight per day contours where effects are greater) are in total larger than those negatively affected (which are generally in the lower flight per day contours).

N60 night-time data shows a decrease in population counts at all contour levels.

The effects across potentially sensitive buildings for both N60 and N65 is mixed, with some categories benefiting and others not. Like the population comparison, the negative effects tend to be at the lower contour levels, and positive effects at the higher contour levels.

Drawing a single conclusion from positive and negative effects across different N65 and N60 contours is difficult, but in general terms the 'number above' results are perceived to be more positive than negative, particularly at night.

Table 47: Comparison Table for N65, Daytime Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Comparison N65 (day)	5	10.3	2,300	900	1	0	7	1	1
			10	16.7	8,500	3,800	1	0	17	1	-2
			20	2.7	-5,800	-2,600	1	0	10	-4	-4
			50	0.6	-8,300	-3,700	0	0	1	-1	-2
			100	-1.2	-900	-400	0	0	-1	0	0
			200	0.0	0	0	0	0	0	0	0

Table 48: Comparison Table for N65, Daytime Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Comparison N65 (day)	5	12.2	-3,100	-1,500	1	0	-21	1	1
			10	15.1	6,200	2,700	1	0	19	1	1
			20	5.6	-5,000	-2,300	0	0	9	-3	-6
			50	0.6	-10,400	-4,700	0	0	-8	-2	-6
			100	-1.6	-4,200	-1,900	0	0	-3	0	-2
			200	-2.5	-4,100	-1,900	-2	0	-26	-1	-3

Table 49: Comparison Table for N60, Night-time Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Comparison N60 (night)	5	27.8	-13,100	-5,900	0	0	19	-3	-4
			10	5.7	-1,800	-800	1	0	3	-3	-2
			20	-4.9	-11,500	-5,200	-1	0	-21	-1	-4
			50	0.0	0	0	0	0	0	0	0

Table 50: Comparison Table for N60, Night-time Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Comparison N60 (night)	5	40.8	-22,900	-10,400	-1	-1	40	-2	-6
			10	9.7	-1,200	-600	0	0	-6	-3	-4
			20	-2.4	-10,900	-4,800	0	0	-3	-3	-8
			50	0.0	0	0	0	0	0	0	0

4.2.4.5 Overflight Contours

The measurement of 'overflight' is a secondary metric that can be useful for explaining the operational impacts of airspace change proposals. These are a means of defining and portraying the pattern and dispersion of aircraft below 7,000ft, and the frequency that they occur. They are based upon a perception of overflight, so we list them alongside our noise results even though they are not a noise metric. For further detail on the overflight metric see Section 3.3.3.

Overflight contours are not monetised or used to determine 'adverse noise effects'.

The tables below show the difference in populations, households and sensitive buildings for each contour band compared to the baseline 'without airspace change' scenario.

Absolute values and the contour diagrams are provided in Annex L.

The daytime overflights show significant reductions in population overflown at the lower counter levels (5, 10 and 20 flights per day) which can be attributed to the significant reduction in the areas overflown today as a consequence of the wide dispersal through vectoring.

At 50 and 100 flights per day there are negative effects across the two analysis years with more people being overflown which can also be assumed to be the consequence of concentration.

The 200 flights per day contour does not exist in 2027, but in 2036 it shows a reduction for Option 1. At this rate the contour is close to the airport. The most significant difference between the baseline and Option 1 this close in is the early right turn for north and eastbound departures of runway 24 (STOPP, GULLY and BERRY), and therefore this is likely to be the cause of the reduction.

Night-time contours also show a pattern of large population reductions at the lowest contour band and a mixture of positive and negative effects (albeit more negative than positive) at the higher contour bands.

Note that in all cases the numbers of people negatively affected by concentration at the higher contour bands are an order of magnitude less than those positively affected at the low contour levels.

In all cases the comparative area column is difficult to interpret because the areas may be over water or areas where there is little by way of population.

Table 51: Comparison Table for Overflight, Daytime Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Comparison Overflights Day	5	-394.2	-169,100	-76,500	-31	-4	-916	-20	-48
			10	-104.4	-192,300	-86,800	-22	-4	-625	-15	-44
			20	42.4	-138,400	-62,500	-16	-3	-1042	-14	-37
			50	120.4	14,300	6,500	3	0	128	-4	-6
			100	44.9	6,500	3,000	0	0	49	-1	0

Table 52: Comparison Table for Overflight, Daytime Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Comparison Overflights Day	5	-562.7	-201,200	-91,600	-36	-9	-1307	-21	-53
			10	-143.5	-189,200	-85,600	-22	-4	-626	-14	-43
			20	25.6	-145,900	-65,800	-17	-3	-883	-11	-36
			50	184.2	15,800	7,200	3	0	169	-5	-5
			100	65.0	2,400	1,200	3	0	79	-4	-7
			200	2.4	-5,200	-2,400	-1	0	3	0	-3

Table 53: Comparison Table for Overflight, Night-time Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Comparison Overflights Night	5	136.9	-77,600	-34,600	-13	-2	-333	-13	-31
			10	87.0	6,200	2,800	4	0	143	-8	-6
			20	-1.7	-10,600	-4,800	-3	-1	0	-1	-1

Table 54: Comparison Table for Overflight, Night-time Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Comparison Overflights Night	5	87.6	-113,900	-50,800	-15	-3	-373	-16	-36
			10	114.3	12,300	5,500	3	0	145	-4	-3
			20	66.3	10,900	5,000	1	0	84	-1	1

4.2.4.6 People with Protected Characteristics

Table 55 shows the Option 1 impact on overflight below 7,000ft for specific Special Schools and Sight Scotland facilities. We have listed all the facilities we have looked at, including those not overflown; where this is the case the table states 'Null'.

Data on educational facilities, medical facilities, care homes and places of worship are covered in the earlier noise/overflight data tables sections.

Red cells show the option results in more overflights than the baseline, green represents fewer. This shows that Moore House Academy and Ogilvie School would have fewer daytime overflights reducing from 100 to 20 and 50 per day respectively. Cedarbank, Calaiswood School and Linburn Centre would respectively be newly overflown by 10, 5 and 5 flights (below 7,000ft) per day in both 2027 and 2036.

Table 55: 'Without Airspace Change' Baseline and Option 1 Overflight of Special Schools and Sight Scotland Facilities, 2027 & 2036

	2027 Day Overflight Contour (Flights per Day)		2036 Day Overflight Contour (Flights per Day)	
Receptor Name	**Without Airspace Change**	**Option 1**	**Without Airspace Change**	**Option 1**
Pinewood School	50	50	50	50
Moore House Academy	100	20	100	20
Ogilvie School	100	50	100	50
Cedarbank School	Null	10	Null	10
Calaiswood School	Null	5	Null	5
Sight Scotland Veterans' Linburn Centre	Null	5	Null	5
Starley Hall School	Null	Null	Null	Null
Victoria Park School	Null	Null	Null	Null
Kaimes Special School	Null	Null	Null	Null
Rosslyn School	Null	Null	Null	Null
Sight Scotland Allermuir Home	Null	Null	Null	Null
Sight Scotland The Royal Blind School	Null	Null	Null	Null
Broughton Primary School	Null	Null	Null	Null
Hyndhead School	Null	Null	Null	Null
New Struan School	Null	Null	Null	Null
Ochil Tower School	Null	Null	Null	Null
Rowanfield Special School	Null	Null	Null	Null
Woodlands School	Null	Null	Null	Null

4.2.4.7 Changes to noise distribution as a result of other airspace users

The reclassification of airspace volumes as shown in Annex G may result in changes to traffic patterns of General Aviation aircraft. General Aviation are operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights, balloons, helicopters and private corporate jet flights. Any changes in noise from GA activity is unpredictable, it is not the responsibility of Edinburgh ATC and is not as a result of scheduled aircraft arriving or departing from Edinburgh Airport. It therefore does not form part of the quantified noise modelling shown here or in the following sections relating to tranquillity and biodiversity.

All our options have the same CAS design and so the qualitative assessment below applies equally to each.

Our design sees a lowering of CAS bases to the northeast, and lesser extent in the southwest. These are shown as the red shaded areas in Figure 7 on page 243. In either area this could result in GA flying lower, which in turn could mean some more noticeable overflight by light aircraft for the populations living in these areas. Note that much of the area in question to the northeast is over the sea.

Levels from the surface to 3,500ft are being changed from CAS to Class G to the northwest and southeast of the airport as shown by the green shaded area marked A and B in Figure 7. Our proposal would mean GA would, in the future, be able to fly in these areas which they are currently excluded from. This could mean more overflight by light aircraft for the populations living in these areas. If this does occur it would be expected to offset by some reduced overflight by light aircraft in the adjacent unshaded airspace marked CTA3 and CTA4 in Figure 7, as this is where light aircraft operate at low levels today.

Figure 7 also shows a green area further to the southeast. This shows where the CAS base is being raised. This would enable light aircraft to fly higher than they do today if they wish to do so.

See Annex G for further description of CAS changes.

The secondary metrics show a range of positive and negative effects, the relative benefit of which is likely be viewed subjectively depending on people's areas of interest.

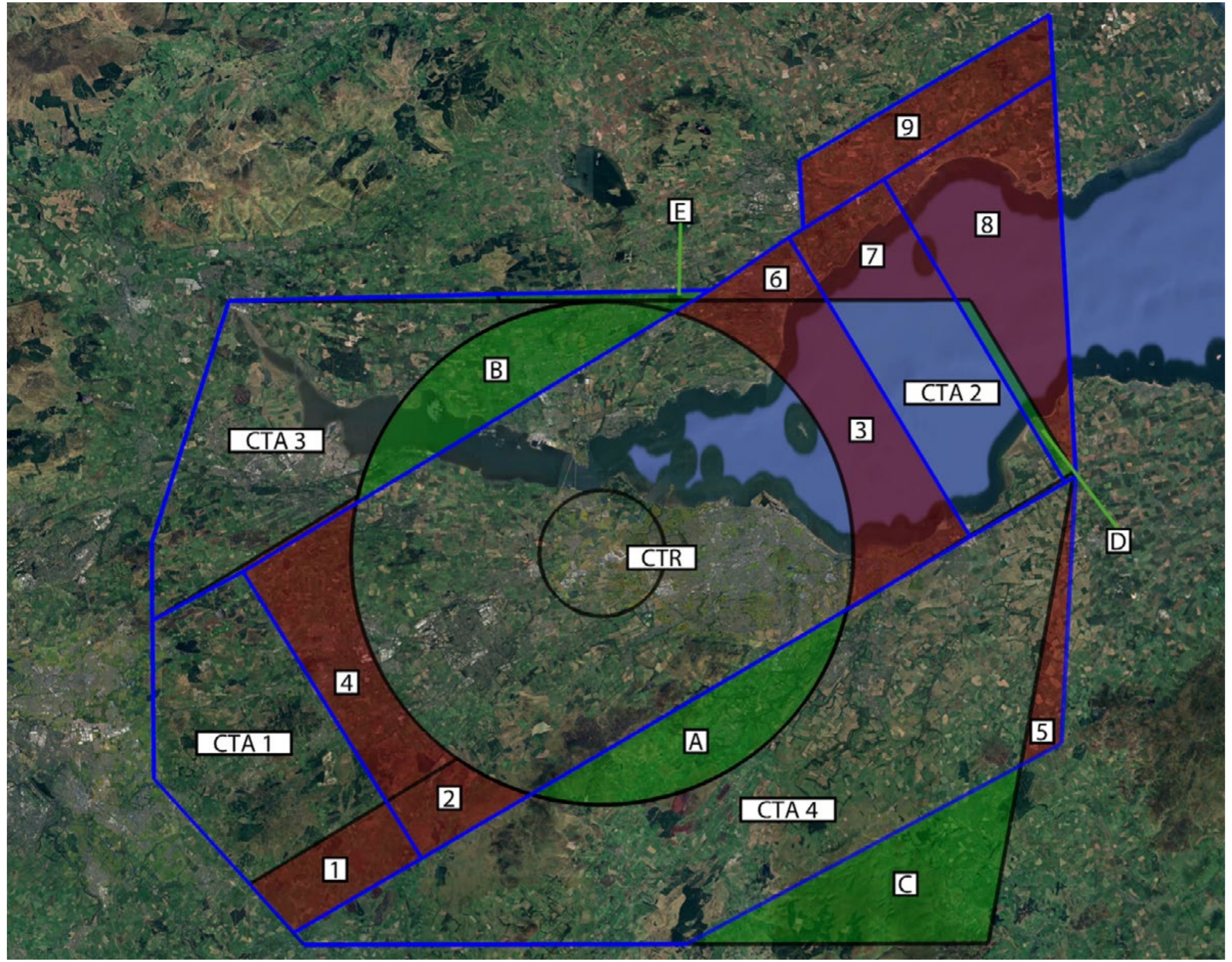


Figure 7: Areas of difference between the current and proposed airspace for Edinburgh operations.

4.2.4.8 Noise and overflight summary

TAG results show that for this option there is a significant net reduction in adverse effects as shown by the monetised benefit of £20.9m over 10 years.

This is supported by the LAeq comparison tables for both day and night which are predominantly green, indicating improvements. There are, however, some negative impacts as shown in the TAG results table and by the red shading on the comparisons tables so while we would expect a significant net benefit, there would be some areas where adverse effects are worsened.

Drawing a single conclusion from positive and negative effects across different N65 and N60 contours is difficult, but in general terms we perceive the results to be more positive than negative, particularly at night where populations affected would be reduced at all contour levels.

Likewise drawing a single conclusion from overflight data is difficult. The overflight data demonstrates large reductions of people overflown overall. This is attributable to large reductions in people overflown at lower contour levels due to aircraft following the prescribed track rather than being vectored. However, this is partially offset by increases to the number of people overflown at some higher contour levels, also likely to be attributable to increased flight path concentration.

Overall, it is concluded that this option is expected to result in a significant net positive beneficial impact to noise and overflight. This is on the basis that there is a significant reduction in the monetised adverse effects which is the primary noise objective.

4.2.5 Option 1: Local Air Quality

Group	Impact	Level of analysis
Communities	Local Air Quality	Qualitative

Section 3.3.4 describes how none of the options are likely to result in a possibility of pollutants breaching legal limits and target values (or worsening an existing breach of legal limits and target values) Therefore no further assessment of air quality was undertaken for either the baseline or the options.

4.2.6 Option 1: Greenhouse Gas Emissions

Group	Impact	Level of analysis
Wider Society	Greenhouse Gas Emissions	Quantitative

4.2.6.1 TAG Assessment

TAG has been used to assess the greenhouse gas impact over a 10-year appraisal period. The change in CO_2e emissions over the 10-year appraisal period is a reduction of 123.6kT of which 47.7kT is traded in the UK ETS. This results in a total monetised net present value (NPV) benefit of £32.4m for Option 1 (this is at 2024 prices discounted NPV including monetisation of both traded and non-traded).

4.2.6.2 Greenhouse Gas Emissions

Annual greenhouse gas emissions (CO_2e) are presented in Table 56 on page 245 for Option 1. This covers CO_2e from our departures and arrivals at low-level and also their flight paths through the ScTMA operated by NERL. This is because the interconnectivity of the design and operation of the airspace make it invalid to try to attribute CO_2e benefits to one proposal rather than the other[5].

Table 56 shows the change in total and the average per flight greenhouse gas emissions for Option 1 in 2027 and 2036 compared to the baseline which is the result of overall routes being shorter, less airborne holding and more continuous climb/descent profiles. These figures show that, in both 2027 and 2036, there would be a reduction in the annual total and per flight greenhouse gas emissions as a result of Option 1.

[5] Please refer to the greenhouse gas emissions methodology in section 3.3.4 for further details including contextual information on how the use of planned flight data in the NERL modelling may affect this result.

Table 56: Comparison Table for Greenhouse Gas Emissions Option 1 vs Baseline, 2027-2036

	Without Airspace Change		Option 1		Difference	
Year	**Annual total GHG emissions (tCO_2e)**	**Average GHG emissions per flight ($kgCO_2e$)**	**Annual total GHG emissions (tCO_2e)**	**Average GHG emissions per flight ($kgCO_2e$)**	**Annual total GHG emissions (tCO_2e)**	**Average GHG emissions per flight ($kgCO_2e$)**
2027	942,797	6,390	932,423	6,320	-10,374	-70
2028	960,002	6,406	949,187	6,334	-10,815	-72
2029	977,207	6,419	965,952	6,346	-11,255	-74
2030	994,412	6,431	982,717	6,356	-11,695	-76
2031	1,011,617	6,441	999,482	6,364	-12,136	-77
2032	1,028,823	6,449	1,016,246	6,370	-12,576	-79
2033	1,046,028	6,455	1,033,011	6,375	-13,017	-80
2034	1,063,233	6,459	1,049,776	6,378	-13,457	-82
2035	1,080,438	6,462	1,066,541	6,379	-13,898	-83
2036	1,097,643	6,463	1,083,305	6,379	-14,338	-84

4.2.6.3.Changes to Greenhouse Gas from other airspace users

The reclassification of airspace volumes as shown in Annex G may result in changes to traffic patterns of General Aviation (GA) aircraft. GA are operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights, balloons, helicopters and private corporate jet flights. Any changes in noise from GA activity is unpredictable, it is not the responsibility of Edinburgh ATC and is not as a result of scheduled aircraft arriving or departing from Edinburgh Airport. It therefore does not form part of the quantified CO_2e modelling shown here.

The option sees a lowering of CAS bases to the northeast, and lesser extent in the southwest. In either area this could result in GA flying lower or being displaced to other areas. Flying lower or being displaced could increase GA fuel burn and resultant CO_2e, however, any resultant increase in ether fuel burn or CO_2e would be expected to be negligible compared to those generated by commercial Air Traffic Movements into and out of the airport listed above.

Levels from the surface to 3,500ft are being changed from CAS to Class G to the northwest and southeast of the airport. Our proposal would mean GA would, in the future, be able to fly in these areas which they are currently excluded from. This may allow some GA flights to take more direct and efficient profiles in these areas, however, any resultant decrease in volumes would be expected to be negligible compared to those generated by commercial Air Traffic Movements into and out of the airport.

The controlled airspace changes for Option 2 and 3 are the same as for Option 1, and so the above description applies equally for those options.

For detail of changes to controlled airspace see Annex G.

4.2.7 Option 1: Tranquillity

Group	Impact	Level of Analysis
Wider Society	Tranquillity	Quantitative

The difference to impact on designated tranquil sites of Option 1 for each of the daytime noise and overflight metrics, and for both 2027 and 2036 are shown below[6]. The related contour diagrams are provided in Section 2 of Annex L alongside as the absolute daytime overflights data.

Absolute and comparative data for night-time (LAeq 8hr), N65, N60 and night-time overflight contours are also presented in Section 2 of Annex L.

The LAeq 16hr comparison tables below show that the differences with respect to tranquil sites is a mix of positive and negative effects, all of which are relatively minor. These relate to the changing of the contours as a result of the improved Cramond offset which moves the concentration of flight away from the designated landscapes at Craigiehall and Cammo near Cramond, at the expense of extending slightly further over Dalmeny Park and the Firth of Forth (Drum Sands) candidate quiet area. Note that while the concentration of flights would move as a result of this option all these sites are overflown today and would remain so in the future.

Overflights show an increase in the overflown area of the 'country parks' category as a result of the PBN approach transition for runway 06 from the north that catches the western edge of the Pentland Hills regional park, and also to a lesser extent from the runway 24 north and eastbound departure routes (STOPP, GULLY and BERRY) overflying the eastern end of the Beecraigs County Park. Overflights in Option 1 also extend slightly over the northern edge of the Upper Tweeddale NSA.

Vogrie Country Park is overflown in both the baseline and the option. In the baseline the overflight spread over all parts of the park as a result of the vectoring, whereas in the option the western edge of the park would be regularly overflown while the eastern edge would not.

CQA and Scheduled Monuments show a pattern of reduction at the lower contour levels offset by increases at higher contour levels. This is the result of the flight path concentration reducing the overall areas overflown, but increasing the area overflown at higher concentrations.

Overall we believe the overall impact on tranquillity is broadly neutral, although we recognise that individual's perception may differ depending on whether their areas of interest is over flown more or less.

[6] Note that the comparison tables may show zero on total column but a difference in the area column. This could indicate the same location is affected to a lesser or greater extent, or that the locations affected are different but cancel out, whereas the areas affected within those locations do not.

Table 57: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Comparison LAeq 16hr	51	0	0.0	0	0.9	0	0.3	0	0.0	0	0.0	0	0.0
			54	0	0.0	0	-0.1	0	0.4	0	0.0	0	0.0	-1	0.0
			57	0	0.0	0	0.0	-1	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 58: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Comparison LAeq 16hr	51	0	0.0	0	1.0	0	0.4	0	0.0	0	0.0	1	0.0
			54	0	0.0	0	0.1	0	0.4	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	-1	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 59: Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	LAeq 16hr	51	1	0.1	2	5.0	4	6.3	0	0.0	0	0.0	11	0.3
			54	1	0.0	2	1.9	4	4.9	0	0.0	0	0.0	7	0.2
			57	0	0.0	2	0.5	3	2.8	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	3	1.2	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0

Table 60: Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	LAeq 16hr	51	1	0.2	2	5.4	4	6.8	0	0.0	0	0.0	13	0.3
			54	1	0.0	2	3.1	4	5.3	0	0.0	0	0.0	8	0.2
			57	0	0.0	2	0.6	4	3.4	0	0.0	0	0.0	6	0.1
			60	0	0.0	1	0.0	3	1.6	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	3	0.7	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0

Table 61: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Comparison Overflights Day	5	0	8.3	5	-0.2	-9	-17.9	0	0.0	1	0.3	-73	-2.5
			10	2	7.0	4	-0.1	-11	-20.6	0	0.0	0	0.0	-48	-2.1
			20	1	-0.5	0	-0.5	-8	-17.1	0	0.0	0	0.0	-19	-1.6
			50	1	0.1	1	0.5	2	0.9	0	0.0	0	0.0	21	0.5
			100	1	0.0	1	0.1	1	0.9	0	0.0	0	0.0	17	0.4

Table 62: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Comparison Overflights Day	5	0	8.0	5	-0.3	-12	-20.0	0	0.0	1	0.4	-113	-3.1
			10	2	7.3	4	-0.1	-8	-17.6	0	0.0	0	0.0	-63	-2.2
			20	1	-0.5	0	-0.6	-9	-18.4	0	0.0	0	0.0	-19	-1.6
			50	2	0.2	1	1.8	3	1.8	0	0.0	0	0.0	27	0.7
			100	1	0.0	1	0.1	2	0.9	0	0.0	0	0.0	17	0.4
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3

4.2.8 Option 1: Biodiversity

Group	Impact	Level of analysis
Wider Society	Biodiversity	Quantitative

The potential impacts to biodiversity are considered in the HRA Screening Report available in Annex H. This concluded that the potential effects of overflights by aircraft below 3,000ft in the vicinity of any European Site would not differ sufficiently from the existing baseline to result in likely significant effects on the conservation objectives of those European Sites.

Though no impacts that meet the HRA criteria are predicted, the tables below provide information on how the number and area of European Sites overflown below 7,000ft differ between this option and the 'without airspace change' baseline.

Absolute values plus metrics for LAeq 16hr, LAeq 8hr, N65 and N60, plus metrics for other site designations are presented in Annex Lx.

Table 63: Comparison Table for Biodiversity Sites in Relation to Overflight Daytime Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Comparison Overflights Day	5	-1	0.2	0	0.0	-8	-7.2	-1	-12.3	-7	-41.5	-35	-15.2
			10	0	-0.2	0	0.0	-9	-4.0	-1	11.9	-7	-2.0	-26	15.5
			20	0	-0.8	0	0.0	-7	-1.6	3	10.6	-7	27.8	-11	14.0
			50	0	-1.0	0	0.0	2	0.5	2	6.9	2	33.0	4	10.7
			100	0	-0.1	0	0.0	1	0.1	0	0.0	1	20.9	0	0.1

Table 64: Comparison Table for Biodiversity Sites in Relation to Overflight Daytime Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison Overflights Day	5	-6	-0.1	0	0.0	-8	-8.0	-1	-14.1	-8	-53.2	-41	-24.0
			10	0	-0.1	0	0.0	-9	-5.3	-1	1.2	-7	-2.7	-22	2.5
			20	0	-0.5	0	0.0	-6	-1.7	3	11.1	-4	28.8	-7	16.4
			50	0	-1.0	0	0.0	3	2.4	3	8.9	3	57.6	7	16.4
			100	0	-0.5	0	0.0	2	0.1	1	0.0	2	22.7	2	-0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	1	3.9	0	0.0

Table 65: Comparison Table for Biodiversity Sites in Relation to Overflight Night-Time Option 1 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Comparison Overflights Night	5	0	-0.9	0	0.0	1	0.9	3	1.0	3	77.3	6	8.8
			10	0	-1.1	0	0.0	2	0.1	1	0.1	2	22.6	1	-0.1
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	2.5	0	0.0

Table 66: Comparison Table for Biodiversity Sites in Relation to Overflight Night-Time Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison Overflights Night	5	0	-0.9	0	0.0	-1	0.2	3	1.1	1	66.6	1	8.1
			10	0	-1.0	0	0.0	2	0.2	1	0.1	2	18.3	4	3.3
			20	0	-0.4	0	0.0	2	0.2	0	0.0	2	22.5	1	0.1

4.2.9 Option 1: Capacity/resilience

Group	Impact	Level of analysis
Wider Society	Capacity/ resilience	Qualitative

4.2.9.1 Overall Capacity and Growth

This change is not expected to impact the overall airport capacity or future growth.

4.2.9.2 Network Delay

Flights to the east and southeast currently fly south until over the north of England where they turn east and head out over the North Sea. However, the area of airspace over the north of England can become congested at times, and when it does our flights can be delayed on the ground until the congestion eases.

The introduction of new routes over the Firth of Forth for traffic will send our flights to the east and southeast directly over the North Sea, avoiding this bottle neck. We have not been able to quantify this benefit, but we are confident that the proposal will reduce the pre-departure delays currently experienced by these flows because of congestion in downstream air traffic control sectors in the network over the north of England.

4.2.9.3 Medium Term ILS Resilience

Arrivals on final approach use an Instrument Landing System (ILS) to guide them into the airport. When the ILS is unavailable aircraft currently rely on the Non-Direction Beacons (NDBs) to guide them close enough to the airport to enable a visual approach. The Edinburgh Airport NDBs are at end of life, and it is expected that they will need to be replaced in 2030 at a cost of c.£300k (2024 prices) – note this is listed under infrastructure costs in the cost benefit tables in Section 4.5. The PBN procedures will provide a contingency for when ILS is unavailable thereby avoiding this cost.

4.2.9.4 Long Term Resilience

The published procedures today rely on conventional ground-based navigation aids called VORs. This equipment is due to be decommissioned as part of a NERL UK wide programme under the Airspace Modernisation Programme. PBN routes would enable Edinburgh to continue operating as the VORs are decommissioned.

There is no difference between Option 1, Option 2 and Option 3 with respect to capacity and resilience. The above difference to baseline therefore applies equally to Options 2 and 3.

4.2.10 Option 1: Access for other airspace users

Group	Impact	Level of analysis
General Aviation	Access	Qualitative & Quantitative

The systemised airspace being proposed has different requirements for airspace than our existing airspace design. Annex G provides more detail on the overall airspace requirement and includes a qualitative review of our local airspace and explains where and why it is being extended or reduced.

There is no difference between our Option 1, Option 2 or Option 3 with respect to the design of controlled airspace and access. The difference to baseline described in Annex G applies equally to all our options.

Much of the airspace required is shared between flights controlled from Edinburgh Airport, Glasgow Airport and NERL and so at a quantitative assessment of overall controlled airspace requirements presented in Annex G is done collectively for the ScTMA Cluster of ACPs.

For a cluster wide picture of controlled airspace changes please see the CAF2 assessment in Annex B1.

4.2.11 Option 1: Economic impact from increased effective capacity

Group	Impact	Level of analysis
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Qualitative

This change will not impact the effective airport capacity or future growth.

Delays to flights have an associated cost to the airport, airlines and the travelling public. Therefore there would be an economic benefit from the reduced network delays and improved resilience mentioned in the capacity/resilience section, but these have not been quantified.

4.2.12 Option 1: Fuel Burn

Group	Impact	Level of analysis
General Aviation/ commercial airlines	Fuel Burn	Quantitative

Annual fuel estimates are presented in Table 67 on page 255 for Option 1. This covers fuel from our departures and arrivals at low level and also their flight paths through the ScTMA operated by NERL. This is because the interconnectivity of the design and operation of the airspace make it invalid to try to attribute fuel burn benefits to one proposal rather than the other[7].

Table 67 shows the change in total and the average per flight greenhouse gas emissions for Option 1 in 2027 and 2036 compared to the baseline which is the result of overall routes being shorter, less airborne holding and more continuous climb/descent profiles. These figures show that, in both 2027 and 2036, there would be a reduction in the annual total and per flight greenhouse gas emissions as a result of Option 1.

See Section 4.2.6.3 for discussion of how potential changes to GA operations have been considered with respect to fuel burn for this, and other, options.

[7] Please refer to the greenhouse gas emissions methodology section provided in Annex B for further details including contextual information on how the use of planned flight data in the NERL modelling may affect this result.

Table 67: Comparison Table for Greenhouse Gas emissions Option 1 vs Baseline, 2027-2036

	Without Airspace Change			Option 1			Difference		
Year	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)
2027	296,477	£203,380,252	2,009	293,215	£201,142,344	1,987	-3,262	-£2,237,908	-22
2028	301,887	£207,091,751	2,014	298,487	£204,758,833	1,992	-3,401	-£2,332,917	-23
2029	307,298	£210,803,249	2,019	303,759	£208,375,322	1,995	-3,539	-£2,427,926	-23
2030	312,708	£214,514,747	2,022	309,030	£211,991,811	1,999	-3,678	-£2,522,936	-24
2031	318,119	£218,226,245	2,025	314,302	£215,608,300	2,001	-3,816	-£2,617,945	-24
2032	323,529	£221,937,743	2,028	319,574	£219,224,789	2,003	-3,955	-£2,712,954	-25
2033	328,940	£225,649,241	2,030	324,846	£222,841,278	2,005	-4,093	-£2,807,963	-25
2034	334,350	£229,360,739	2,031	330,118	£226,457,767	2,006	-4,232	-£2,902,972	-26
2035	339,760	£233,072,237	2,032	335,390	£230,074,256	2,006	-4,370	-£2,997,981	-26
2036	345,171	£236,783,735	2,032	340,662	£233,690,745	2,006	-4,509	-£3,092,990	-27

4.2.13 Option 1: Training Costs for Commercial Airlines

Group	Impact	Level of analysis
Commercial airlines	Training Costs	Qualitative

Flight procedures worldwide are updated with each aeronautical information regulation and control (AIRAC) cycle and airlines update their procedures accordingly, training as required. This proposal is not anticipated to incur additional training costs for airlines.

4.2.14 Option 1: Other Costs for Commercial Airlines

Group	Impact	Level of analysis
Commercial airlines	Other costs	Qualitative

No other airline costs are foreseen.

4.2.15 Option 1: Infrastructure costs for airports/ANSP

Group	Impact	Level of analysis
Airport/ANSP	Infrastructure costs	Quantitative

This proposal is not expected to change Airport or ANSP infrastructure beyond the initial deployment phase which will require some ATC systems engineering amendments and some minor amendments to our noise track keeping software system, both of which can be captured in normal maintenance cycles and therefore incur no additional cost.

The implementation of Performance Based Navigation (PBN) procedures removes our dependencies on conventional ground based VORs which contributes to a reduction in NATS NERL's operating costs as it enables VOR rationalisation.

As discussed under the capacity and resilience heading above, the implementation of any of our options will remove a cost of c.£300k (2024 prices) in c.2030.

4.2.16 Option 1: Operational costs for airports/ANSP

Group	Impact	Level of analysis
Airport/ANSP	Operational costs	Quantitative

The operational costs will increase as a result of having more IFP procedures which are subject to 5 year review. This is expected to be a cost of c.£10,000 every 5 years (today's prices undiscounted).

Our noise insulation scheme is applied at the 63dBA LAeq 16hr contour and above. Our changes lead to a reduction in the 63dBA LAeq 16hr contour and therefore implementing this option is not expected to alter the cost to Edinburgh Airport to operate the noise insulation scheme compared to the 'without airspace 4.3.4.5 change' scenario.

4.2.17 Option 1: Deployment costs for airports/ANSP

Group	Impact	Level of analysis
Airport/ANSP	Deployment costs	Qualitative

All air traffic control staff operating in our control tower will require training prior to the implementation of the airspace change and this is likely to include self-reading, classroom training and simulator sessions. A training plan will be produced which will be approved by the regulator prior to the start of training. Each option is expected to result in a similar training demand as all of the options are system-wide and do not vary in terms of cost.

4.2.18 Option 1: Other costs

Group	Impact	Level of analysis
Airport/ANSP	Other costs	Qualitative

No other costs are foreseen.

4.2.19 Option 1: Airspace Modernisation Strategy (AMS) CAP1711

AMS Strategic Objectives CAP1711 Option 1	
Safety	The option is expected to enhance safety when compared to the 'Without Airspace Change' baseline.
Integration of diverse users	This proposed option will meet the requirements of our commercial airlines. Overall GA and other users of uncontrolled airspace are expected to benefit from a cluster wide reduction in CAS below 7,000ft. However, while there are some areas/levels of our CTA/CTR that will be reclassified as Class G there are some other areas where CAS will be increased, particularly over the Firth of Forth. In all cases we have sought to propose the minimum amount of CAS to safely contain our operations while achieving the noise and other benefits listed in this section. Along with the other ScTMA sponsors have sought to accommodate the requirements of local GA and other airspace users in the design.
Simplification, reducing complexity – improving efficiency	The reduction in complexity and enhanced systemisation will facilitate a more expeditious flow of traffic. More efficient routings will improve fuel efficiency and the reconfigured departure routes will help our traffic avoid some of the more congested parts of the wider UK network.
Environmental sustainability	The proposed option will offer environmental benefits such as reduction in noise and health effects through design. The cluster design as a whole, and the operation of Edinburgh air traffic will also offer improvement in reduced fuel consumption and therefore an improvement in greenhouse gas emissions.

4.3 FOA for Option 2

Section 2 describes the evolution of our design from CAP1616 Stage 2 to the three full system options taken through FOA (named Options 1, 2 and 3). This section describes Option 2 in further detail and presents the associated FOA results.

4.3.1 Option 2 overview

Note that this textual overview is largely the same for all three options. This is because they are all based on the same PBN principles and would be expected to operate in the same way. The only differences are the positioning of some of the routes. These differences are highlighted in the pictures and tables below. For more detail of how the options differ see the earlier Section 2.4.2.

Figure 8 on page 259 shows the proposed arrival and departure routes for runway 06 and they are described in Table 68 on page 260 and Table 69 on page 261. Figure 9 on page 262, Table 70 on page 263 and Table 71 on page 264 show the same information for runway 24.

Unlike today's flight paths which show a wide spread of flights, in Option 2 we would expect most aircraft to follow the designated routes with vectoring by air traffic control as the exception to maintain safety, for example where speed control is not able to ensure separation on final approach, or to avoid thunderstorms. This applies to both arrivals and departures. Figure 8 and Figure 9 have an insert which shows the proposed routes compared to today's spread of traffic. This is to show the comparison, it is important to note that in the proposed design flights would stay on the route centreline most of the time.

Each turn will be planned, therefore most arriving aircraft will be able to execute an efficient continuous descent arrival phase of flight, and their exact arrival time will be more easily predicted. Most departing aircraft will achieve a continuous climb to at least 7,000ft and continuous climb beyond that will be more common than it is today.

Our departure routes from either runway terminate at common points in the network, but they take different routes to get there because aircraft on runway 06 start their journey by flying in the opposite direction from those departing on runway 24.

Some routes are colour coded differently because they are a point of difference between the options:

- Figure 8 shows the runway 06 westbound departure route (STEPS) in orange because it is a point of difference between Option 2 and Option 3.
- Figure 9 shows the runway 24 northbound (STOPP), eastbound (GULLY and BERRY) in orange because they are a point of difference between Option 2 and both Option 1 and Option 3.
- Figure 9 shows the southbound (STRAT) departure routes in orange because it is a point of difference between Option 2 and Option 3

This colour coding matches that in section 2 which describes how the options were developed.

All other routes are the same between the FOA Options 1, 2 and 3. These are shown in purple.

A detailed comparison of areas overflown by each option is provided later in Section 5.3.

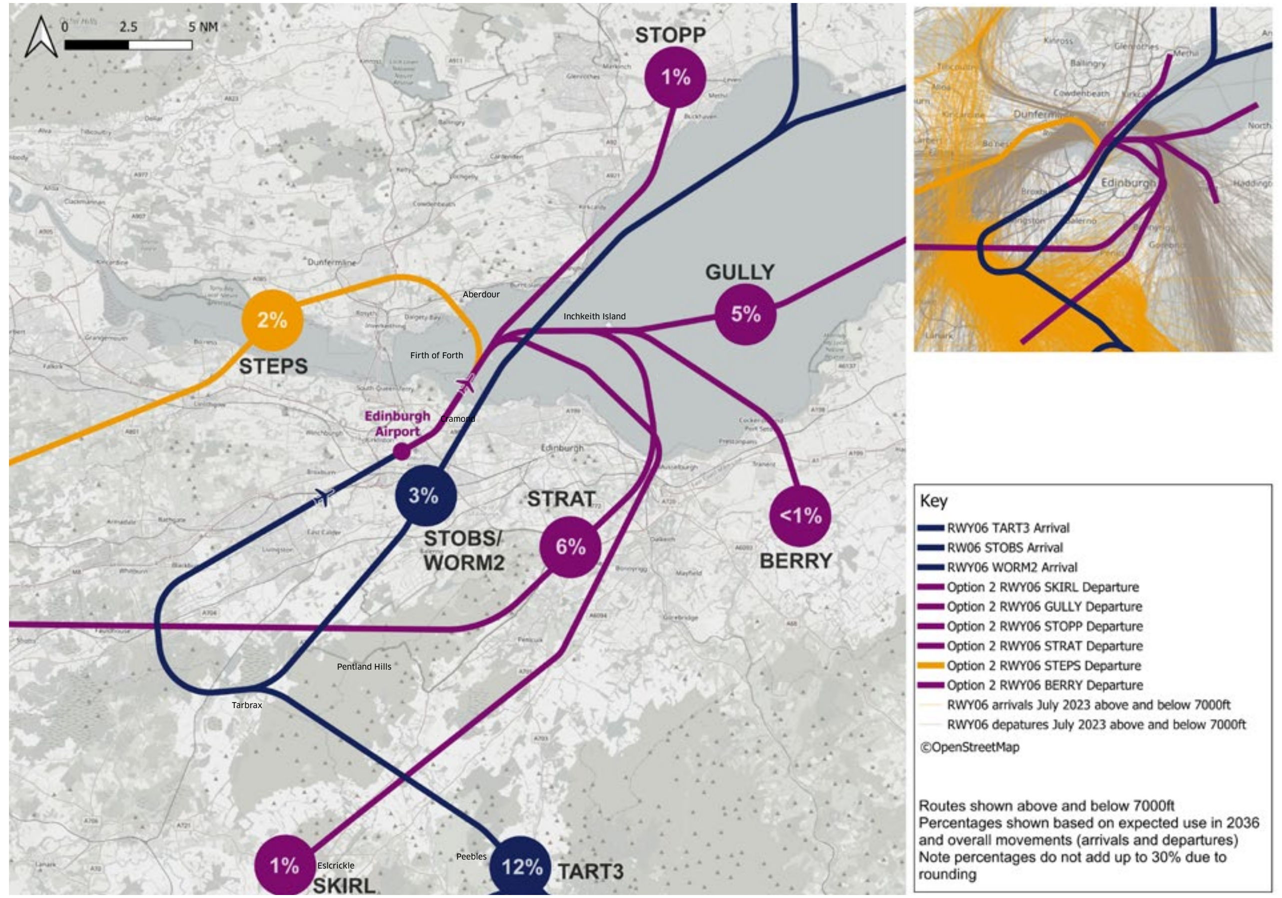


Figure 8: Option 2 proposed routes for runway 06.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore for runway 06 these add up to 30% as that is the proportion that runway 06 would be in use. The same has been done for arrivals. These numbers are consistent with those presented in the description of the baseline in Section 4.1.

The smaller picture shows the proposed routes overlaid today's tracks for reference – in the proposed designs aircraft would stay on the route centreline except for safety reasons, for example where speed control cannot assure separation, or for avoidance of thunderstorms.

Table 68: Option 2 description of runway 06 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	After flying the improved Cramond offset (see Section 2.1.4) these flights will fly northeast over Kinghorn and skirting Burntisland and Kirkcaldy. The slowest climbing aircraft are expected to be at 7,000ft or higher just north of Kirkcaldy.	GRICE
GULLY	East (e.g. central Europe and the Middle East)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island. This route does not make landfall again.	TALLA
BERRY	East GULLY alternative when D514 in use	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island, and then southeast to cross the coast over Cockenzie. The slowest climbing aircraft are expected to be at 7,000ft before reaching Cockenzie.	N/A
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning northwest, flying over the coast between Aberdour and Dalgety Bay. They make a further turn to the west to cross over Dunfermline. The slowest climbing aircraft are expected to be at 7,000ft or higher as they pass over Dunfermline. THE DESIGN OF THE RUNWAY 06 STEPS ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 2 AND OPTION 3 (BUT NOTE THAT THE DESIGN FOR STEPS IN OPTION 1 and OPTION 2 ARE IDENTICAL).	TALLA
STRAT	South (e.g. southern UK, Spain, France)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island, and then south to cross the coast near Musselburgh by which time all aircraft are expected to be at 7,000ft or higher.	GOSAM
SKIRL	West – Turboprops only (e.g. Ireland)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning southeast to fly parallel to the coast north of Edinburgh. Aircraft will turn southwest to cross the coast west of Musselburgh. Abeam Penicuik, aircraft turn right again towards the hamlet of Elsrickle. This route is for slow climbing turboprop aircraft only and has a restriction at 6,000ft until a point (named SKIRL) near the hamlet of Elsrickle. This restriction would only be applied if there are other aircraft in the vicinity to restrict the climb, a situation which we expect to be rare. Aircraft would be climbed to 7,000ft or higher before joining the wider route network at SKIRL except in these rare circumstances.	GOSAM

Table 69: Option 2 description of runway 06 arrivals

New arrival route name	Direction and example origins – this is not an exhaustive list	Description	Previous arrival route equivalent
STOBS transition	North and West (e.g. Scottish Islands, Iceland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at STOBS over Dundee, flights track south before turning southwest over the Firth of Forth to make landfall over Cramond. The aircraft with the shallowest descent profile pass through 7,000ft abeam the airport. From here they follow a track to the southwest, following the line of the A70 west of the Pentland Hills. They begin their turn to join final approach near the hamlet of Tarbrax, continuing their turn passing east of Fauldhouse and joining final approach south of Blackburn. From here they follow the final approach direct to the airport overhead Livingston.	N/A vectoring only
WORM2 transition	East (e.g. eastern Europe and the Middle East)	After passing/leaving the holding stack at WORM2 over the sea east of the Fife coast, flights track along the coast to join the approach transition from STOBS east of Kirkcaldy. Flights reach landfall over Cramond and continue along the transition as described above.	N/A vectoring only
TART3	South and West (e.g. western Europe, southern UK, Ireland and transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at TART3 flights track northwest, with the aircraft with the shallowest descent profiles passing below 7,000ft after passing Peebles. The route continues to join the routes from STOBS and WORM2 near the hamlet of Tarbrax. The route from here is as described above.	N/A vectoring only

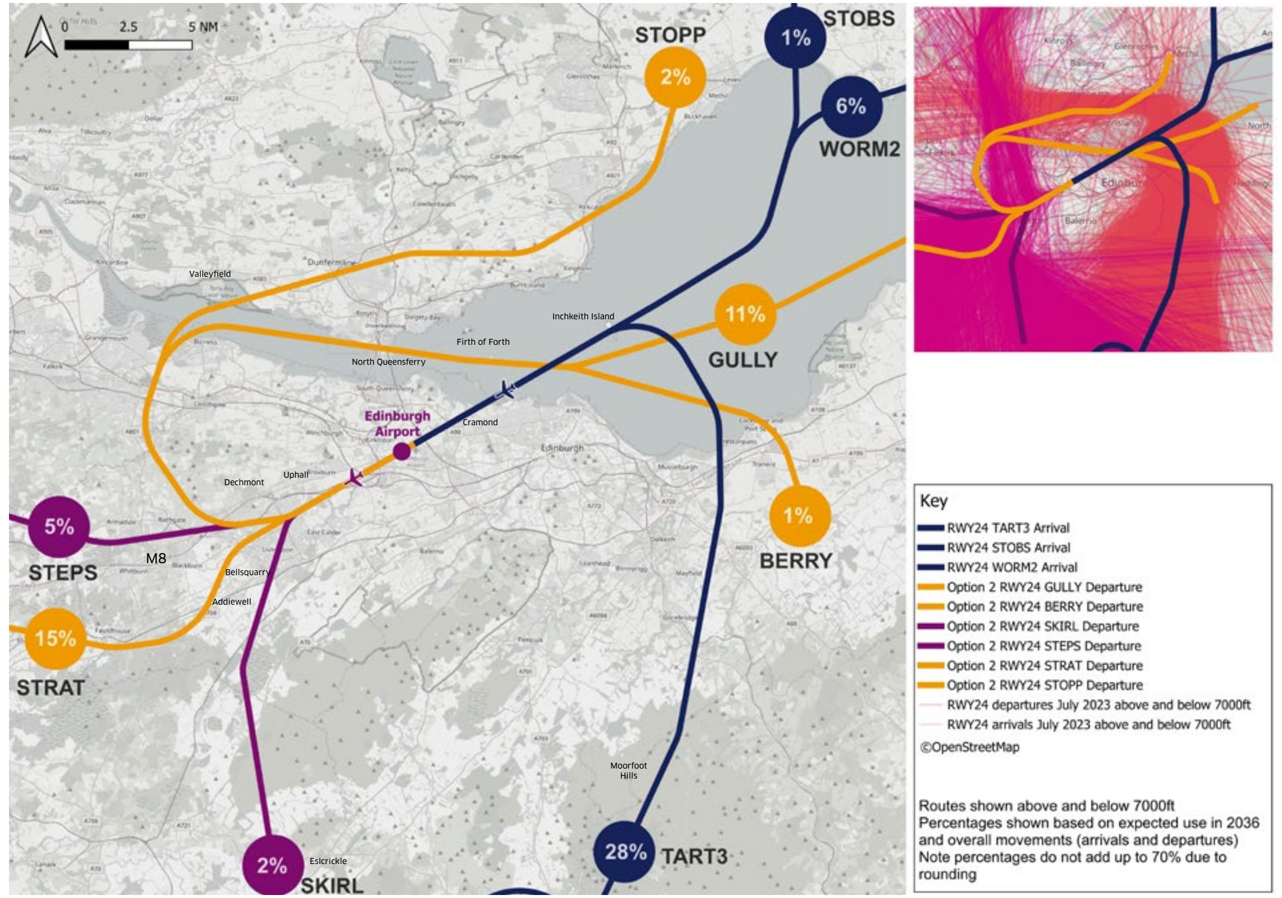


Figure 9: Option 2 proposed routes for Runway 24.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore for runway 24 these add up to 70% as that is the proportion that runway 24 would be in use. The same has been done for arrivals. These numbers are consistent with those presented in the description of the baseline in Section 4.1.

The smaller picture shows the proposed routes overlaid today's tracks for reference – in the proposed designs aircraft would stay on the route centreline except for safety reasons, for example where speed control cannot assure separation, or for avoidance of thunderstorms.

Table 70: Option 2 description of runway 24 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	Aircraft initially fly straight out, staying south of Broxburn. An initial right turn is initiated after passing Uphall Station after which the route heads west south of Dechmont. A further turn to the northwest is made east of Bathgate then followed by a turn northeast southwest of Linlithgow. The south coast of the Firth of Forth is crossed west of Bo'ness and landfall is made on the north coast south of Valleyfield. Aircraft are expected to be at 7,000ft or higher before making landfall over Valleyfield. THE DESIGN OF THE RUNWAY 24 STOPP ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 2 AND BOTH OPTION 1 AND OPTION 3.	GRICE
GULLY	East (e.g. central Europe and the Middle East)	This route initially follows the same alignment as the STOPP route above, until over the Firth of Forth, at which point this route peels off east with aircraft to be at 7,000ft or higher before going overhead North Queensferry. From here onwards the route remains over the water. THE DESIGN OF THE RUNWAY 24 GULLY ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 2 AND BOTH OPTION 1 AND OPTION 3.	TALLA
BERRY	East GULLY alternative when D514 in use	This route follows the same alignment as the GULLY route (described above) until north of Edinburgh where the routes separate. The GULLY route continues east until it turns to the southeast making landfall at Cockenzie. Aircraft to be at 7,000ft or higher before going overhead North Queensferry. THE DESIGN OF THE RUNWAY 24 BERRY ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 2 AND BOTH OPTION 1 AND OPTION 3.	N/A
STRAT	South (e.g. southern UK, Spain, France)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until past Livingston from where they turn south, passing over the prison and industrial area east of Addiewell. From here the route turns west, with aircraft expected to be at 7,000ft or higher before passing Fauldhouse. THE DESIGN OF THE RUNWAY 24 STRAT ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 2 AND OPTION 3 (BUT NOTE THAT THE DESIGN OF STRAT IN OPTION 1 and OPTION 2 ARE IDENTICAL).	TALLA
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn west to follow the track of today's GOSAM route, broadly tracking the M8 corridor. Aircraft are expected to be at 7,000ft or higher on passing Armadale.	GOSAM

Table 70: Option 2 description of runway 24 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
SKIRL	West – Turboprops only (e.g. Ireland)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn south passing over Bellsquarry. The route then continues south. This route is for slow climbing turboprop aircraft only and has a restriction at 6,000ft until a point (named SKIRL) near the hamlet of Elsrickle. This restriction would only be applied if there are other aircraft in the vicinity to restrict the climb, a situation which we expect to be rare. Aircraft would be climbed to 7,000ft or higher before joining the wider route network at SKIRL except in these rare circumstances.	GOSAM

Table 71: Option 2 description of runway 24 arrivals

New arrival route name	Direction and example origins – this is not an exhaustive list	Description	Previous arrival route equivalent
STOBS transition	North and West (e.g. Scottish Islands, Iceland and transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at STOBS over Dundee, flights track south, with the aircraft with the shallowest descent profiles passing 7,000ft on passing east of Cupar. They continue south until over the Firth of Forth where they turn southwest to join the final approach passing overhead Inchkeith Island before making landfall over Cramond.	N/A vectoring only
WORM2 transition	East (e.g. eastern Europe and the Middle East)	After passing/leaving the holding stack at WORM2 over the sea east of the Fife coast, flights track along the coast, with the aircraft with the shallowest descent profiles passing 7,000ft abeam Anstruther. From here they join the transition from STOBS, turning south west onto the final approach that makes landfall over Cramond.	N/A vectoring only
TART3 transition	South and West (e.g. western Europe, southern UK, Ireland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at TART3 at the southern end of the A703, flights track to the northeast, with the aircraft with the shallowest descent profiles passing below 7,000ft over the Moorfoot Hills. The route continues to the north crossing the coast west of Prestonpans. The route joins those from STOBS and WORM2 over Inchkeith Island. The route from here is as described above.	N/A vectoring only

4.3.2 Option 2: Noise abatement procedures:

The proposed noise abatement procedures for Option 2 are for departing jet aircraft and by all other departing aircraft of more than 5,700kg Maximum Take Off Weight to stay with 1.5km of the published route to 4,000ft or to end point shown in Figure 10 opposite, unless otherwise instructed by ATC in the interests of safety.

All other conditions of the noise abatement procedures would remain as today.

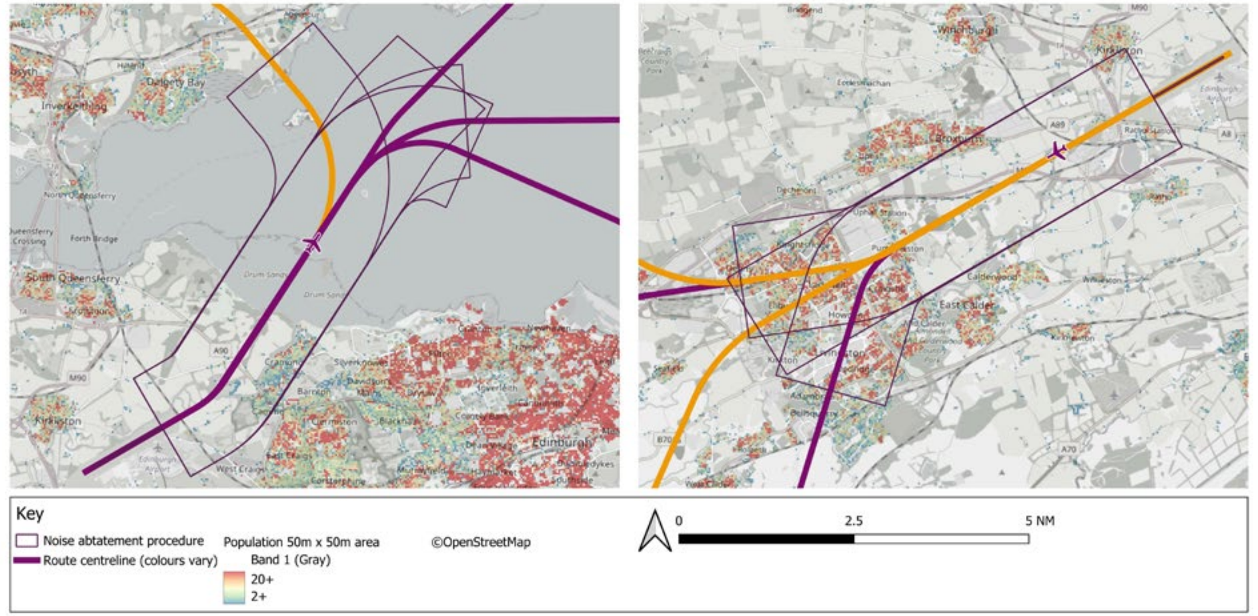


Figure 10: Option 2 noise abatement procedures for departures.

The remainder of this section provides the detailed results of the FOA for Option 2.

4.3.3 Option 2: Safety

Group	Impact	Level of analysis
All	Safety	Qualitative

The introduction of systemised routes where aircraft can fly their planned route with a degree of autonomy will reduce complexity and associated workload for both air traffic control and pilots. This is considered a safety enhancement as it is best practice to minimise complexity in the design and operation of airspace where possible.

Sending eastbound departures out over the Firth of Forth, and southbound departures west before turning south puts fewer flights through the congested and complex airspace south of Edinburgh.

The ongoing safety work applicable to all options is described in Section 3. Further safety assessments and justifications to meet all relevant safety requirements will be submitted in Stage 4 should this option be proposed.

4.3.4 Option 2: Noise (and overflight)

Group	Impact	Level of analysis
Communities	Noise (and overflight)	Quantitative

4.3.4.1 Contour maps

The contour maps for Option 2 are shown in Section 3 in Annex L.

4.3.4.2 Primary noise metrics: TAG assessment

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 minus £2.1m (2024 prices).

This reflects a net increase in adverse noise impacts which includes some people who experience less noise (c.5,000/c.7,000 experience less daytime/night-time noise respectively) and some that experience more (c.8,000/c.20,000 experience more daytime/night-time noise respectively). Overall, there are more negatively affected people than positive.

It is 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 CAP 1616. 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.

Table 72: Option 2 TAG Noise Assessment Results

NPV Total Noise (2024 prices)	NPV Sleep (2024 prices)	NPV Amenity (2024 prices)	NPV AMI (2024 prices)	NPV Stroke (2024 prices)	NPV Dementia (2024 prices)	Individuals experiencing increased daytime noise in forecast year	Individuals experiencing reduced daytime noise in forecast year	Individuals experiencing increased night time noise in forecast year	Individuals experiencing reduced night time noise in forecast year
-£2,059,045	-£1,565,222	-£355,203	£29,262	-£66,841	-£101,041	7,575	4,781	19,529	7,166

4.3.4.4 LAeq noise tables

The above TAG results are based on LAeq contour analysis. The difference between Option 2 and the baseline in terms of LAeq contour results is presented below. The diagrams show a mixture of positive and negative effects with a slight bias towards negative which reflects the disbenefits in the TAG noise assessment.

All the associated contour diagrams are provided in Annex L. Within Annex L we have also presented the 51dB LAeq 16hr daytime and 45dB LAeq 16hr night-time Lowest Observable Adverse Effect Level (LOAEL) contours for the option on a map alongside the equivalent baseline' without airspace change' contours for comparison. The 100% mode tables can also be found in Annex L.

Table 73: Comparison Table for LAeq 16hr, Daytime Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Comparison LAeq 16hr	51	1.4	700	300	1	0	2	0	-2
			54	0.4	800	300	0	0	2	1	0
			57	0.1	600	200	0	0	-1	0	0
			60	0.0	-200	-100	0	0	-3	0	0
			63	0.0	-100	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0
			69	0.0	0	0	0	0	0	0	0

Table 74: Comparison Table for LAeq 16hr, Daytime Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Comparison LAeq 16hr	51	2.2	-700	-300	0	0	15	1	0
			54	0.5	600	300	1	0	2	0	0
			57	0.2	300	100	0	0	-14	0	1
			60	0.0	0	-100	0	0	-1	0	0
			63	-0.1	-200	-100	0	0	-3	0	0
			66	0.0	0	0	0	0	0	0	0
			69	0.0	0	0	0	0	0	0	0

Table 75: Comparison Table for LAeq 8hr, Night-Time Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Comparison LAeq 8hr	45	3.4	-300	-100	0	0	6	0	0
			48	0.7	500	200	0	0	4	0	1
			51	0.2	0	0	0	0	-1	0	0
			54	-	100	0	0	0	-3	0	0
			57	-0.1	-100	0	0	0	-2	0	0
			60	0.0	0	0	0	0	1	0	0
			63	0.0	0	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0

Table 76: Comparison Table for LAeq 8hr, Night-Time Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Comparison LAeq 8hr	45	4.8	-700	-300	0	0	2	0	0
			48	1.2	500	200	0	0	-3	0	1
			51	0.3	500	200	0	0	-5	0	0
			54	0.1	200	100	0	0	1	0	0
			57	0.0	0	0	0	0	0	0	0
			60	-0.1	0	0	0	0	0	0	0
			63	0.0	0	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0

As LAeq is the primary noise metric the absolute values are also provided for reference below.

Table 77: LAeq 16hr, Daytime Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	LAeq 16hr	51	64.8	58,800	26,600	7	1	171	3	13
			54	37.3	16,800	7,700	5	0	129	2	5
			57	20.8	5,700	2,700	1	0	67	0	2
			60	11.0	2,500	1,200	1	0	37	0	1
			63	5.5	400	200	0	0	10	0	0
			66	2.9	200	100	0	0	1	0	0
			69	1.5	0	0	0	0	0	0	0

Table 78: LAeq 16hr, Daytime Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	LAeq 16hr	51	76.1	66,500	30,100	7	1	208	6	17
			54	43.8	24,400	11,200	6	1	143	2	7
			57	24.8	7,200	3,400	1	0	73	0	3
			60	13.3	3,000	1,400	1	0	44	0	1
			63	6.7	700	400	0	0	12	0	0
			66	3.5	300	200	0	0	1	0	0
			69	1.8	<100	<100	0	0	0	0	0

Table 79: LAeq 8hr, Night-Time Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	LAeq 8hr	45	82.9	70,300	31,800	7	1	214	6	18
			48	47.2	41,400	18,800	6	1	143	2	8
			51	27.1	8,400	4,000	1	0	93	0	4
			54	14.4	3,300	1,600	1	0	55	0	1
			57	7.3	2,200	1,100	1	0	19	0	1
			60	3.6	300	200	0	0	4	0	0
			63	1.8	<100	<100	0	0	0	0	0
			66	0.9	0	0	0	0	0	0	0

Table 80: LAeq 8hr, Night-Time Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	LAeq 8hr	45	97.0	75,300	34,100	7	1	230	6	20
			48	55.2	48,400	21,900	6	1	153	2	10
			51	31.9	12,300	5,700	3	0	102	1	4
			54	17.3	4,400	2,100	1	0	65	0	1
			57	8.9	2,600	1,300	1	0	33	0	1
			60	4.3	500	200	0	0	7	0	0
			63	2.2	100	100	0	0	0	0	0
			66	1.1	0	0	0	0	0	0	0

4.3.4.5 N60 and N65 'number above' contours

Number above contours show the locations where the number of events (i.e. flights) exceeds a pre-determined noise level, expressed in dB LASmax. For example, N65 contours show the number of events where the noise level from those flights exceeds 65dB LASmax. For further details see Section 3.3.3. Number above contours are described in CAP1616i as secondary metrics and are not monetised or used to determine 'adverse noise effects'.

The tables below show the difference in populations, households and sensitive buildings for each contour band compared to the baseline 'without airspace change' scenario. Absolute values and the contour diagrams are provided in Annex L.

Both the N65 and N60 contours show a predominancy of positive outcomes.

Drawing a single conclusion from positive and negative effects across different N65 and N60 contours is difficult, but in general terms these results are more positive than negative.

Table 81: Comparison Table for N65, Daytime Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Comparison N65 (day)	5	-2.0	-5,500	-2,600	0	0	-16	0	-1
			10	6.5	3,400	1,500	0	0	-3	0	0
			20	1.2	-1,300	-600	1	0	4	0	0
			50	1.1	-1,000	-400	0	0	3	-1	1
			100	-0.1	1,500	700	1	0	-1	0	0
			200	0.0	0	0	0	0	0	0	0

Table 82: Comparison Table for N65, Daytime Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Comparison N65 (day)	5	-0.5	-11,200	-5,100	0	0	-44	0	-1
			10	4.2	-500	-300	0	0	-4	0	0
			20	2.1	-200	-100	0	0	-1	0	-1
			50	0.9	-500	-300	0	0	-7	-1	-2
			100	-0.5	-200	-100	0	0	0	0	0
			200	-0.8	-800	-500	0	0	-26	0	-1

Table 83: Comparison Table for N60, Night-Time Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Comparison N60 (night)	5	23.7	-9,200	-4,100	0	0	2	-3	-1
			10	2.8	4,200	1,900	0	0	-3	-1	0
			20	1.0	2,300	1,000	0	0	3	0	0
			50	0.0	0	0	0	0	0	0	0

Table 84: Comparison Table for N60, Night-Time Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Comparison N60 (night)	5	34.2	-16,400	-7,400	-1	-1	8	0	-3
			10	8.0	2,900	1,300	0	0	-2	-1	-1
			20	1.0	100	100	0	0	-3	0	-1
			50	0.0	0	0	0	0	0	0	0

4.3.4.6 Overflight Contours

The measurement of 'overflight' is a secondary metric that can be useful for explaining the operational impacts of airspace change proposals. These are a means of defining and portraying the pattern and dispersion of aircraft below 7,000ft, and the frequency that they occur. They are based upon a perception of overflight so we list them alongside our noise results even though they are not a noise metric. For further detail on the overflight metric see Section 3.3.3.

Overflight contours are not monetised or used to determine 'adverse noise effects'.

The tables below show the difference in populations, households and sensitive buildings for each contour band compared to the baseline 'without airspace change' scenario.

Absolute values and the contour diagrams are provided in Annex L.

At 50, 100 and 200 flights per day there is a mixture of positive and negative effects across the two analysis years, but in general they show more people being overflown at the higher contour bands, which can also be assumed to be the consequence of concentration.

Note that the numbers of people negatively affected by concentration at the higher contour bands are an order of magnitude less than those positively affected at the low contour levels.

Night-time contours also show a similar pattern with population reductions being an order of magnitude higher at the lowest contour band.

In all cases the comparative area column is difficult to interpret because the areas may be over water or areas where there is little by way of population.

Table 85: Comparison Table for Overflight, Daytime Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Comparison Overflights Day	5	-417.5	-179,800	-81,300	-31	-5	-956	-20	-50
			10	-125.7	-197,500	-89,100	-22	-5	-667	-15	-45
			20	32.6	-128,900	-58,300	-16	-3	-1071	-9	-31
			50	118.7	28,200	12,700	3	0	114	0	3
			100	48.9	18,600	8,400	2	0	52	0	1

Table 86: Comparison Table for Overflight, Daytime Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Comparison Overflights Day	5	-587.3	-212,300	-96,600	-36	-10	-1348	-21	-55
			10	-165.6	-195,100	-88,300	-22	-5	-669	-14	-44
			20	6.7	-149,900	-67,600	-17	-3	-920	-11	-36
			50	178.2	28,100	12,700	3	0	150	1	4
			100	68.8	15,600	7,100	3	0	82	-3	-2
			200	5.2	2,400	1,100	0	1	4	1	0

Table 87: Comparison Table for Overflight, Night-Time Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Comparison Overflights Night	5	128.1	-65,500	-29,100	-13	-2	-368	-6	-23
			10	83.5	22,000	9,900	4	0	126	-4	4
			20	3.2	1,200	600	0	0	1	0	0

Table 88: Comparison Table for Overflight, Night-Time Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Comparison Overflights Night	5	78.2	-102,500	-45,700	-15	-3	-406	-8	-29
			10	108.1	27,100	12,200	3	0	122	0	6
			20	70.9	25,100	11,300	3	0	87	0	3

4.3.4.7 People with Protected Characteristics

Table 89 opposite shows the Option 2 impact on overflight below 7,000ft for specific Special Schools and Sight Scotland facilities. We have listed all the facilities we have looked at, including those not overflown; where this is the case the table states 'Null'.

Data on educational facilities, medical facilities, care homes and places of worship are covered in the earlier noise/overflight data tables sections.

Red cells show the option results in more overflights than the baseline, green represents fewer. This shows that Moore House would have fewer daytime overflights reducing from 100 to 50 per day. Cedarbank, Calaiswood School and Sight Scotland Veterans' Linburn Centre would respectively be newly overflown by 10, 5 and 5 flights below 7,000ft, per day in both 2027 and 2036.

Table 89: 'Without Airspace Change' Baseline and Option 2 Overflight of Special Schools and Sight Scotland Facilities, 2027 & 2036

	2027 Day Overflight Contour (Flights per Day)		2036 Day Overflight Contour (Flights per Day)	
Receptor Name	Without Airspace Change	Option 2	Without Airspace Change	Option 2
Pinewood School	50	50	50	50
Moore House Academy	100	50	100	50
Ogilvie School	100	100	100	100
Cedarbank School	Null	10	Null	10
Calaiswood School	Null	5	Null	5
Sight Scotland Veterans Linburn Centre	Null	5	Null	5
Starley Hall School	Null	Null	Null	Null
Victoria Park School	Null	Null	Null	Null
Kaimes Special School	Null	Null	Null	Null
Rosslyn School	Null	Null	Null	Null
Sight Scotland Allermuir Home	Null	Null	Null	Null
Sight Scotland The Royal Blind School	Null	Null	Null	Null
Broughton Primary School	Null	Null	Null	Null
Hyndhead School	Null	Null	Null	Null
New Struan School	Null	Null	Null	Null
Ochil Tower School	Null	Null	Null	Null
Rowanfield Special School	Null	Null	Null	Null
Woodlands School	Null	Null	Null	Null

4.3.4.8 Changes to noise distribution as a result of other airspace users

All our options have the same CAS design and so the qualitative assessment for Option 1 described in Section 4.2.4.9 applies equally to Option 2.

4.3.4.9 Noise and overflight summary

TAG results show that for this option there is an increase in adverse effects as shown by the monetised disbenefit of £2.0m over 10 years.

Drawing a single conclusion from positive and negative effects across different N65 and N60 contours is difficult, but in general terms results are more positive than negative for this secondary metric.

Likewise drawing a single conclusion from overflight data is difficult. The overflight data does, however, demonstrate large reductions of people overflown at lower contour levels due to track concentration.

Overall, it is concluded that this option is expected to result in a potential marginal worsening of adverse effects, which could be offset to a degree by more positive impacts in secondary metrics.

4.3.5 Option 2: Local Air Quality

Group	Impact	Level of analysis
Communities	Local Air Quality	Qualitative

Section 3.3.4 describes how none of the options are likely to result in a possibility of pollutants breaching legal limits and target values (or worsening an existing breach of legal limits and target values). Therefore no further assessment of air quality was undertaken for either the baseline or the options.

4.3.6 Option 2: Greenhouse Gas Emissions

Group	Impact	Level of analysis
Wider Society	Greenhouse Gas Emissions	Quantitative

4.3.6.1 TAG Assessment

TAG has been used to assess the greenhouse gas impact over a 10-year appraisal period. The change in CO_2e emissions over the 10-year appraisal period is a reduction of 88.5kT of which 17.6kT is traded in the UK ETS. This results in a total monetised NPV benefit of £24.8m for Option 2 (this is a 2024 prices discounted Net Present Value (NPV) including monetisation of both traded and non traded).

4.3.6.2 Greenhouse Gas Emissions

Annual greenhouse gas emissions (CO_2e) are presented in Table 90 on page 280 for Option 2. This covers CO_2e from our departures and arrivals at low-level and also their flight paths through the ScTMA operated by NERL. This is because the interconnectivity of the design and operation of the airspace make it invalid to try to attribute CO_2e benefits to one proposal rather than the other[8].

Table 90 shows the change in total and the average per flight greenhouse gas emissions for Option 2 in 2027 and 2036 compared to the baseline which is the result of overall routes being shorter, less airborne holding and more continuous climb/descent profiles. These figures show that, in both 2027 and 2036, there would be a reduction in the annual total and per flight greenhouse gas emissions as a result of Option 2.

See Section 4.2.6.3 for discussion of how potential changes to GA operations have been considered with respect to CO_2e emissions for this, and other, options.

[8] Please refer to the greenhouse gas emissions methodology in section 3.3.4 for further details including contextual information on how the use of planned flight data in the NERL modelling may affect this result.

Table 90: Comparison Table for Greenhouse Gas Emissions Option 2 vs Baseline, 2027-2036

	Without Airspace Change		Option 2		Difference	
Year	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)
2027	942,797	6,390	935,492	6,341	-7,305	-50
2028	960,002	6,406	952,353	6,355	-7,649	-51
2029	977,207	6,419	969,214	6,367	-7,994	-53
2030	994,412	6,431	986,074	6,377	-8,338	-54
2031	1,011,617	6,441	1,002,935	6,386	-8,682	-55
2032	1,028,823	6,449	1,019,796	6,392	-9,027	-57
2033	1,046,028	6,455	1,036,656	6,397	-9,371	-58
2034	1,063,233	6,459	1,053,517	6,400	-9,716	-59
2035	1,080,438	6,462	1,070,378	6,402	-10,060	-60
2036	1,097,643	6,463	1,087,238	6,402	-10,405	-61

4.3.7 Option 2: Tranquillity

Group	Impact	Level of analysis
Wider Society	Tranquillity	Quantitative

The difference to impact on designated tranquil sites of Option 2 for each of the daytime noise and overflight metrics, and for both 2027 and 2036 are shown below[9]. The related contour diagrams are provided in Section 3 of Annex L alongside as the absolute daytime overflights data.

Absolute and comparative data for night-time (LAeq 08hr), N65, N60 and night-time overflight contours are also presented in Section 3 of Annex L.

The LAeq 16hr comparison tables below show that the differences with respect to tranquil sites is a mix of positive and negative effects, all of which are relatively minor. These relate to the changing of the contours as a result of the improved Cramond offset which moves the concentration of flight away from the designated landscapes at Craigiehall and Cammo near Cramond, at the expense of extending slightly further over Dalmeny Park and the Firth of Forth (Drum Sands) candidate quiet area. Note that while the concentration of flights would move as a result of this option all these sites are overflown today and would remain so in the future.

Overflights show an increase in the overflown area of the 'country parks' category as a result of the PBN approach transition for runway 06 from the north that catches the western edge of the Pentland Hills regional park, and also to a lesser extent from the runway 24 north and eastbound departure routes (STOPP, GULLY and BERRY) overflying the Muiravonside County Park. Overflights in Option 1 also extend slightly over the northern edge of the Upper Tweeddale NSA.

Vogrie Country Park is overflown in both the baseline and this option. In the baseline the overflight spread over all parts of the park as a result of the vectoring, whereas in this option the western edge of the park would be regularly overflown while the eastern edge would not.

CQA and Scheduled Monuments show a pattern of reduction at the lower contour levels offset by increases at higher contour levels. This is the result of the flight path concentration reducing the overall areas overflown, but increasing the area overflown at higher concentrations.

[9] Note that the comparison tables may show zero on total column but a difference in the area column. This could indicate that:
- same location is affected to a lesser or greater extent, so the total difference count is zero, but the area affected is not, or
- that the locations affected are different but cancel each out to give a zero count in the total column, but not a zero difference for areas because the areas affected in each location would not necessarily also cancel out.

Table 91: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison LAeq 16hr	51	0	0.0	0	0.9	0	0.3	0	0.0	0	0.0	0	0.0
			54	0	0.0	0	-0.1	0	0.4	0	0.0	0	0.0	-1	0.0
			57	0	0.0	0	0.0	-1	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 92: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison LAeq 16hr	51	0	0.0	0	0.9	0	0.4	0	0.0	0	0.0	0	0.0
			54	0	0.0	0	0.0	0	0.4	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	-1	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 93: Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison LAeq 16hr	51	1	0.1	2	5.0	4	6.3	0	0.0	0	0.0	11	0.3
			54	1	0.0	2	1.9	4	4.9	0	0.0	0	0.0	7	0.2
			57	0	0.0	2	0.5	3	2.8	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	3	1.2	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0

Table 94: Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison LAeq 16hr	51	1	0.2	2	5.3	4	6.8	0	0.0	0	0.0	12	0.3
			54	1	0.0	2	3.0	4	5.3	0	0.0	0	0.0	8	0.2
			57	0	0.0	2	0.6	4	3.4	0	0.0	0	0.0	6	0.1
			60	0	0.0	1	0.0	3	1.6	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	3	0.7	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0

Table 95: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison Overflights Day	5	0	8.6	5	-0.2	-10	-18.8	0	0.0	1	0.3	-70	-2.5
			10	1	6.7	4	-0.1	-12	-21.3	0	0.0	0	0.0	-46	-2.1
			20	0	-0.7	0	-0.5	-9	-17.7	0	0.0	0	0.0	-14	-1.6
			50	1	0.1	1	0.5	2	0.9	0	0.0	0	0.0	21	0.5
			100	1	0.0	1	0.1	1	0.9	0	0.0	0	0.0	17	0.4

Table 96: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison Overflights Day	5	0	8.4	5	-0.3	-13	-20.8	0	0.0	1	0.4	-109	-3.1
			10	1	7.0	4	-0.1	-9	-18.4	0	0.0	0	0.0	-62	-2.3
			20	0	-0.7	0	-0.6	-10	-19.1	0	0.0	0	0.0	-15	-1.6
			50	1	0.2	1	1.8	3	1.8	0	0.0	0	0.0	31	0.6
			100	1	0.0	1	0.1	2	0.9	0	0.0	0	0.0	17	0.4
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3

4.3.8 Option 2: Biodiversity

Group	Impact	Level of analysis
Wider Society	Biodiversity	Quantitative

The potential impacts to biodiversity are considered in the HRA Screening Report available in Annex H. This concluded that the potential effects of overflights by aircraft below 3,000ft in the vicinity of any European Site would not differ sufficiently from the existing baseline to result in likely significant effects on the conservation objectives of those European Sites. Though no impacts that meet the HRA criteria are predicted, the tables below provide information on how the number and area of European Sites overflown below 7,000ft differ between this option and the 'without airspace change' baseline.

Absolute values plus metrics for LAeq 16hr, LAeq 8hr, N65 and N60, plus metrics for other site designations are presented in Annex L.

Table 97: Comparison Table for Biodiversity Sites in Relation to Overflight Daytime Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison Overflights Day	5	-1	0.2	0	0.0	-9	-9.3	-1	-12.3	-8	-43.6	-33	-17.1
			10	0	-0.2	0	0.0	-9	-4.0	-1	11.9	-7	-2.0	-23	15.6
			20	0	-0.7	0	0.0	-7	-1.6	3	10.6	-7	27.8	-7	14.3
			50	0	-1.0	0	0.0	2	0.5	2	6.9	2	33.0	7	11.0
			100	0	-0.1	0	0.0	1	0.1	0	0.0	1	20.9	0	0.1

Table 98: Comparison Table for Biodiversity Sites in Relation to Overflight Daytime Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison Overflights Day	5	-6	-0.1	0	0.0	-9	-10.2	-1	-14.1	-9	-55.4	-38	-26.0
			10	0	-0.1	0	0.0	-9	-5.3	-1	1.2	-7	-2.7	-20	2.6
			20	0	-0.5	0	0.0	-6	-1.7	3	11.1	-4	28.8	-4	16.5
			50	0	-0.9	0	0.0	3	2.4	3	8.9	3	57.6	12	16.9
			100	0	-0.4	0	0.0	2	0.1	1	0.0	2	22.7	3	-0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	1	3.9	0	0.0

Table 99: Comparison Table for Biodiversity Sites in Relation to Overflight Night-Time Option 2 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	Comparison Overflights Night	5	0	-0.9	0	0.0	1	0.9	3	1.0	3	77.3	11	9.3
			10	0	-1.1	0	0.0	2	0.1	1	0.1	2	22.6	6	0.4
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	2.5	0	0.0

Table 100: Comparison Table for Biodiversity Sites in Relation to Overflight Night-Time Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	Comparison Overflights Night	5	0	-0.9	0	0.0	-1	0.2	3	1.1	1	66.6	6	8.5
			10	0	-1.0	0	0.0	2	0.2	1	0.1	2	18.3	9	3.8
			20	0	-0.4	0	0.0	2	0.2	0	0.0	2	22.5	1	0.1

4.3.9 Option 2: Capacity/resilience

Group	Impact	Level of analysis
Wider Society	Capacity/ resilience	Qualitative

4.3.9.1 Overall Capacity and Growth

This change is not expected to impact the overall airport capacity or future growth.

4.3.9.2 Network Delay

Flights to the east and southeast currently fly south until over the north of England where they turn east and head out over the North Sea. However, the area of airspace over the north of England can become congested at times, and when it does our flights can be delayed on the ground until the congestion eases.

The introduction of new routes over the Firth of Forth for traffic will send our flights to the east and southeast directly over the North Sea, avoiding this bottle neck. We have not been able to quantify this benefit, but we are confident that the proposal will reduce the pre-departure delays currently experienced by these flows because of congestion in downstream air traffic control sectors in the network over the north of England.

4.3.9.3 Medium Term ILS Resilience

Arrivals on final approach use an Instrument Landing System (ILS) to guide them into the airport. When the ILS is unavailable aircraft currently rely on the Non Direction Beacons (NDBs) to guide them close enough to the airport to enable a visual approach. The Edinburgh Airport NDBs are at end of life and it is expected that they will need to be replaced in 2030 at a cost of c.£300k (2024 prices) – note this is listed under infrastructure costs in the cost benefit tables in Section 4.5). The PBN procedures will provide a contingency for when ILS is unavailable thereby avoiding this cost.

4.3.9.4 Long Term Resilience

The published procedures today rely on conventional ground-based navigation aids called VORs. This equipment is due to be decommissioned as part of a NERL UK wide programme under the Airspace Modernisation Programme. PBN routes would enable Edinburgh to continue operating as the VORs are decommissioned.

There is no difference between Option 1, Option 2 and Option 3 with respect to capacity and resilience. The same text is provided for all Options.

4.3.10 Option 2: Access for other airspace users

Group	Impact	Level of Analysis
General Aviation	Access	Qualitative & Quantitative

The systemised airspace being proposed has different requirements for airspace than our existing airspace design. Annex G provides more detail on the overall airspace requirement and includes a qualitative review of our local airspace and explains where and why it is being extended or reduced.

There is no difference between our Option 1, Option 2 or Option 3 with respect to the design of controlled airspace and access. The difference to baseline described in Annex G applies equally to all our options.

Much of the airspace required is shared between flights controlled from Edinburgh Airport, Glasgow Airport and NERL and so at a quantitative assessment of overall controlled airspace requirements presented in Annex G is done collectively for the ScTMA Cluster of ACPs.

For a cluster wide picture of controlled airspace changes please see the CAF2 assessment in Annex B1.

4.3.11 Option 2: Economic impact from increased effective capacity

Group	Impact	Level of Analysis
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Qualitative

This change will not impact the effective airport capacity or future growth.

Delays to flights have an associated cost to the airport, airlines and the travelling public. Therefore there would be an economic benefit from the reduced network delays and improved resilience mentioned in the capacity/resilience section, but these have not been quantified.

4.3.12 Option 2: Fuel Burn

Group	Impact	Level of Analysis
General Aviation/ commercial airlines	Fuel Burn	Quantitative

Annual fuel estimates are presented in Table 101 on page 290 for Option 2. This covers fuel from our departures and arrivals at low level and also their flight paths through the ScTMA operated by NERL. This is because the interconnectivity of the design and operation of the airspace make it invalid to try to attribute fuel burn benefits to one proposal rather than the other[10].

Table 101 shows the change in total and per flight fuel burn for Option 2 in 2027 and 2036 compared to the baseline which is the result of overall routes being shorter, less airborne holding and more continuous climb/descent profiles. These figures show that, in both 2027 and 2036, there would be a reduction in the annual total and per flight fuel burn as a result of Option 2.

See Section 4.2.6.3 for discussion of how potential changes to GA operations have been considered with respect to fuel burn for this, and other options.

[10] Please refer to the greenhouse gas emissions methodology section provided in Annex B for further details including contextual information on how the use of planned flight data in the NERL modelling may affect this result.

Table 101: Comparison Table for Greenhouse Gas Emissions Option 2 vs Baseline, 2027-2036

	Without Airspace Change			Option 2			Difference		
Year	**Annual Fuel Burn (t)**	**Annual Fuel Burn Cost (£) 2024 prices**	**Average Fuel Burn per Flight (kg)**	**Annual Fuel Burn (t)**	**Annual Fuel Burn Cost (£) 2024 prices**	**Average Fuel Burn per Flight (kg)**	**Annual Fuel Burn (t)**	**Annual Fuel Burn Cost (£) 2024 prices**	**Average Fuel Burn per Flight (kg)**
2027	296,477	£203,380,252	2,009	294,180	£201,804,509	1,994	-2,297	-£1,575,744	-15.6
2028	301,887	£207,091,751	2,014	299,482	£205,441,696	1,998	-2,405	-£1,650,054	-16.1
2029	307,298	£210,803,249	2,019	304,784	£209,078,883	2,002	-2,514	-£1,724,365	-16.5
2030	312,708	£214,514,747	2,022	310,086	£212,716,071	2,005	-2,622	-£1,798,676	-17.0
2031	318,119	£218,226,245	2,025	315,388	£216,353,258	2,008	-2,730	-£1,872,987	-17.4
2032	323,529	£221,937,743	2,028	320,690	£219,990,445	2,010	-2,839	-£1,947,297	-17.8
2033	328,940	£225,649,241	2,030	325,993	£223,627,633	2,012	-2,947	-£2,021,608	-18.2
2034	334,350	£229,360,739	2,031	331,295	£227,264,820	2,013	-3,055	-£2,095,919	-18.6
2035	339,760	£233,072,237	2,032	336,597	£230,902,007	2,013	-3,164	-£2,170,230	-18.9
2036	345,171	£236,783,735	2,032	341,899	£234,539,194	2,013	-3,272	-£2,244,540	-19.3

4.3.13 Option 2: Training Costs for Commercial Airlines

Group	Impact	Level of Analysis
Commercial airlines	Training Costs	Qualitative

Flight procedures worldwide are updated with each aeronautical information regulation and control (AIRAC) cycle and airlines update their procedures accordingly, training as required. This proposal is not anticipated to incur additional training costs for airlines.

4.3.14 Option 2: Other Costs for Commercial Airlines

Group	Impact	Level of Analysis
Commercial airlines	Other costs	Qualitative

No other airline costs are foreseen.

4.3.15 Option 2: Infrastructure costs for airports/ANSP

Group	Impact	Level of Analysis
Airport/ANSP	Infrastructure costs	Quantitative

This proposal is not expected to change Airport or ANSP infrastructure beyond the initial deployment phase which will require some ATC systems engineering amendments and some minor amendments to our noise track keeping software system, both of which can be captured in normal maintenance cycles and therefore incur no additional cost.

The implementation of Performance Based Navigation (PBN) procedures removes our dependencies on conventional ground based VORs which contributes to a reduction in NATS NERL's operating costs as it enables VOR rationalisation.

As discussed under the capacity and resilience heading above, the implementation of any of our options will remove a cost of c.£300k (2024 prices) in c.2030.

4.3.16 Option 2: Operational costs for airports/ANSP

Group	Impact	Level of Analysis
Airport/ANSP	Operational costs	Quantitative

The operational costs will increase as a result of having more IFP procedures which are subject to 5 year review. This is expected to be a cost of c.£10,000 every 5 years (today's prices undiscounted).

Our noise insulation scheme is applied at the 63dBA LAeq 16hr contour and above. Implementing this option is not expected to alter the cost to Edinburgh Airport to operate the noise insulation scheme compared to the 'without airspace change' scenario.

4.3.17 Option 2: Deployment costs for airports/ANSP

Group	Impact	Level of Analysis
Airport/ANSP	Deployment costs	Qualitative

All air traffic control staff operating in our control tower will require training prior to the implementation of the airspace change and this is likely to include self reading, classroom training and simulator sessions. A training plan will be produced which will be approved by the regulator prior to the start of training. Each option is expected to result in a similar training demand as all of the options are system-wide and do not vary in terms of cost.

4.3.18 Option 2: Other costs

Group	Impact	Level of Analysis
Airport/ANSP	Other costs	Qualitative

No other costs are foreseen.

4.3.19 Option 2: Airspace Modernisation Strategy (AMS) CAP1711

AMS Strategic Objectives CAP1711 Option 2	
Safety	The option is expected to maintain/enhance safety when compared to the 'Without Airspace Change' baseline.
Integration of diverse users	This proposed option will meet the requirements of our commercial airlines. Overall GA and other users of uncontrolled airspace are expected to benefit from a cluster wide reduction in CAS below 7,000ft. However, while there are some areas/levels of our CTA/CTR that will be reclassified as Class G there are some other areas where CAS will be increased, particularly over the Firth of Forth. In all cases we have sought to propose the minimum amount of CAS to safely contain our operations while achieving benefits listed in this section. Along with the other ScTMA sponsors we have sought to accommodate the requirements of local GA and other airspace users in the design.
Simplification, reducing complexity – improving efficiency	The reduction in complexity and enhanced systemisation will facilitate a more expeditious flow of traffic. More efficient routings will improve fuel efficiency and the reconfigured departure routes will help our traffic avoid some of the more congested parts of the wider UK network.
Environmental sustainability	Option 2 would have an overall negative impact on noise with respect to health and quality of life metrics. The cluster design as a whole, and the operation of Edinburgh air traffic would, offer improvement from reduced fuel consumption and therefore an improvement in greenhouse gas emissions.

4.4 FOA for Option 3

Section 2 describes the evolution of our design from CAP1616 Stage 2 to the three full system options taken through FOA (named Options 1, 2 and 3). This section describes Option 3 in further detail and presents the associated FOA results.

4.4.1 Option 3 overview

Note that this textual overview is largely the same for all three options. This is because they are all based on the same PBN principles and would be expected to operate in the same way. The only differences are the positioning of some of the routes. These differences are highlighted in the pictures and tables below. For more detail of how the options differ see the earlier Section 2.4.2.

Figure 11 on page 294 shows the proposed arrival and departure routes for runway 06 and they are described in Table 102 on page 295 and Table 103 on page 296. Figure 12, Table 104 on page 297 and Table 105 on page 299 show the same information for runway 24.

Unlike today's flight paths which show a wide spread of flights, in Option 3 we would expect most aircraft to follow the designated routes with vectoring by air traffic control as the exception to maintain safety, for example where speed control is not able to ensure separation on final approach, or to avoid thunderstorms. This applies to both arrivals and departures. Figure 11 and Figure 12 have an insert which shows the proposed routes compared to today's spread of traffic. This is to show the comparison, it is important to note that in the proposed design flights would stay on the route centreline most of the time.

Each turn will be planned, therefore most arriving aircraft will be able to execute an efficient continuous descent arrival phase of flight, and their exact arrival time will be more easily predicted. Most departing aircraft will achieve a continuous climb to at least 7,000ft and continuous climb beyond that will be more common than it is today.

Our departure routes from either runway terminate at common points in the network, but they take different routes to get there because aircraft on runway 06 start their journey by flying in the opposite direction from those departing on runway 24.

Some routes are colour coded differently because they are a point of difference between the options:

- Figure 11 shows the runway 06 westbound departure route (STEPS) in red because it is a point of difference between Option 3 and both Option 1 and Option 2.
- Figure 12 shows the runway 24 northbound (STOPS), eastbound (GULLY and BERRY) in red because they are a point of difference between Option 3 and both Option 1 and Option 2.
- Figure 12 shows the southbound (STRAT) departure routes in red because it is a point of difference between Option 3 and both Option 1 and Option 2.

This colour coding matches that in section 2 which describes how the options were developed.

All other routes are the same between the FOA Options 1, 2 and 3. These are shown in purple.

A detailed comparison of areas overflown by each option is provided later in Section 5.3.

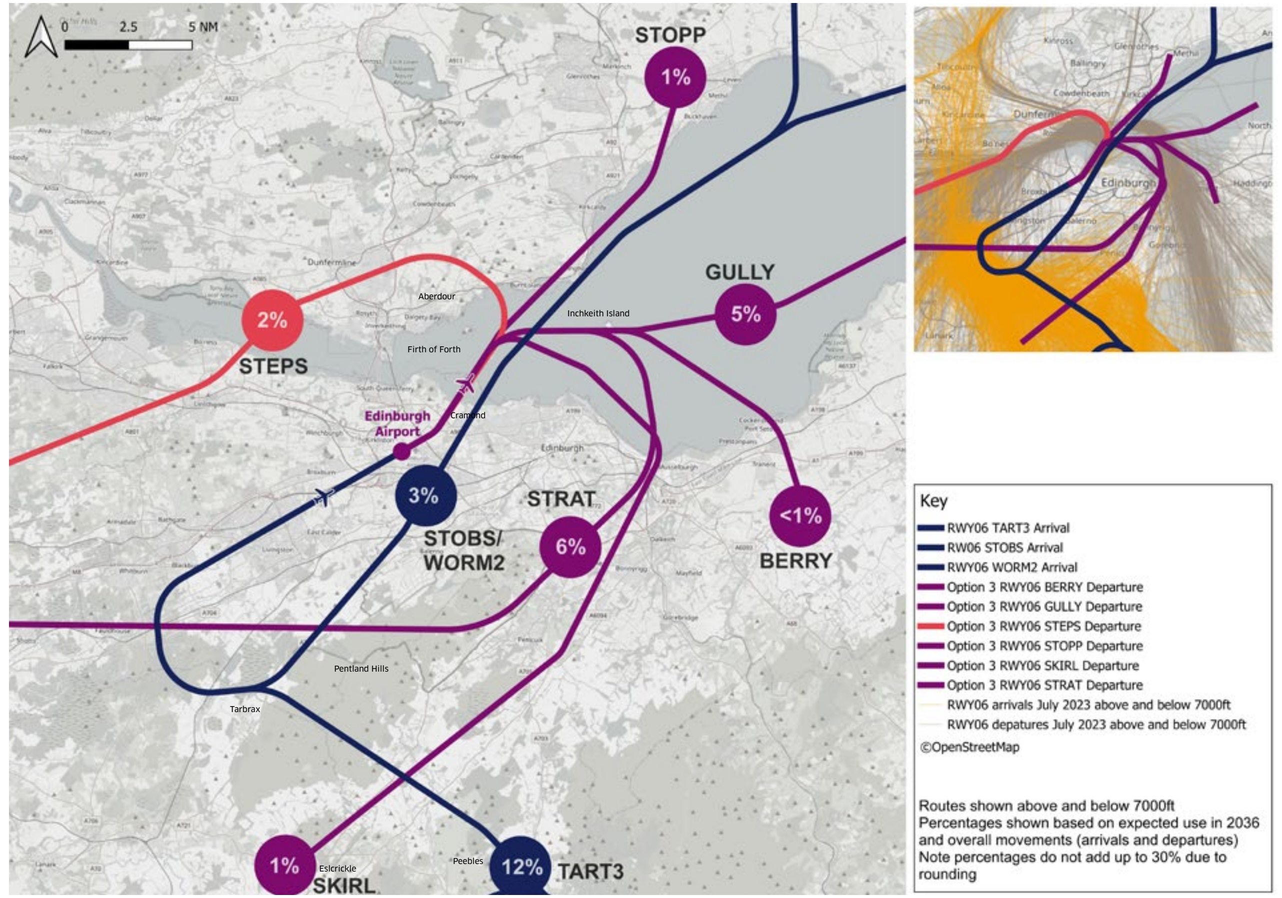


Figure 11: Option 3 proposed routes for runway 06.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore for runway 06 these add up to 30% as that is the proportion that runway 06 would be in use. The same has been done for arrivals. These numbers are consistent with those presented in the description of the baseline in Section 4.1.

The smaller picture shows the proposed routes overlaid today's tracks for reference – in the proposed designs aircraft would stay on the route centreline except for safety reasons, for example where speed control cannot assure separation, or for avoidance of thunderstorms.

Table 102: Option 3 description of runway 06 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	After flying the improved Cramond offset (see Section 2.1.4) these flights will fly northeast over Kinghorn and skirting Burntisland and Kirkcaldy. The slowest climbing aircraft are expected to be at 7,000ft or higher just north of Kirkcaldy.	GRICE
GULLY	East (e.g. central Europe and the Middle East)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island. This route does not make landfall again.	TALLA
BERRY	East GULLY alternative when D514 in use	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island, and then southeast to cross the coast over Cockenzie. The slowest climbing aircraft are expected to be at 7,000ft before reaching Cockenzie.	N/A
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning northwest, flying over the coast between Aberdour and Burntisland. They make a further turn to the west to pass over Dunfermline by which time slowest climbing aircraft are expected to be at 7,000ft or higher. THE DESIGN OF THE RUNWAY 06 STEPS ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 3 AND BOTH OPTIONS 1 AND OPTION 2 (BUT NOTE THAT THE DESIGN FOR STEPS IN OPTION 1 and OPTION 2 ARE IDENTICAL).	TALLA
STRAT	South (e.g. southern UK, Spain, France)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning east to fly directly over Inchkeith Island, and then south to cross the coast near Musselburgh by which time all aircraft are expected to be at 7,000ft or higher.	GOSAM
SKIRL	West – Turboprops only (e.g. Ireland)	After flying the improved Cramond offset these flights will fly northeast until over the Firth of Forth estuary, before turning southeast to fly parallel to the coast north of Edinburgh. Aircraft will turn southwest to cross the coast west of Musselburgh. Abeam Penicuik, aircraft turn right again towards the hamlet of Elsrickle. This route is for slow climbing turboprop aircraft only and has a restriction at 6,000ft until a point (named SKIRL) near the hamlet of Elsrickle. This restriction would only be applied if there are other aircraft in the vicinity to restrict the climb, a situation which we expect to be rare. Aircraft would be climbed to 7,000ft or higher before joining the wider route network at SKIRL except in these rare circumstances.	GOSAM

Table 103: Option 3 description of runway 06 arrivals

New arrival route name	Direction and example origins – this is not an exhaustive list	Description	Previous arrival route equivalent
STOBS transition	North and West (e.g. Scottish Islands, Iceland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at STOBS over Dundee, flights track south before turning southwest over the Firth of Forth to make landfall over Cramond. The aircraft with the shallowest descent profile pass through 7,000ft abeam the airport. From here they follow a track to the southwest, following the line of the A70 west of the Pentland Hills. They begin their turn to join final approach near the Hamlet of Tarbrax, continuing their turn over the village of Breich and joining final approach south of Blackburn. From here they follow the final approach direct to the airport overhead Livingston.	N/A vectoring only
WORM2 transition	East (e.g. eastern Europe and the Middle East)	After passing/leaving the holding stack at WORM2 over the sea east of the Fife coast, flights track along the coast to join the approach transition from STOBS east of Kirkcaldy. Flights reach landfall over Cramond and continue along the transition as described above.	N/A vectoring only
TART3	South and West (e.g. Western Europe, southern UK, Ireland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at TART3 flights track northwest, with the aircraft with the shallowest descent profiles passing below 7,000ft after passing Peebles. The route continues to join the routes from STOBS and WORM2 near the Hamlet of Tarbrax. The route from here is as described above.	N/A vectoring only

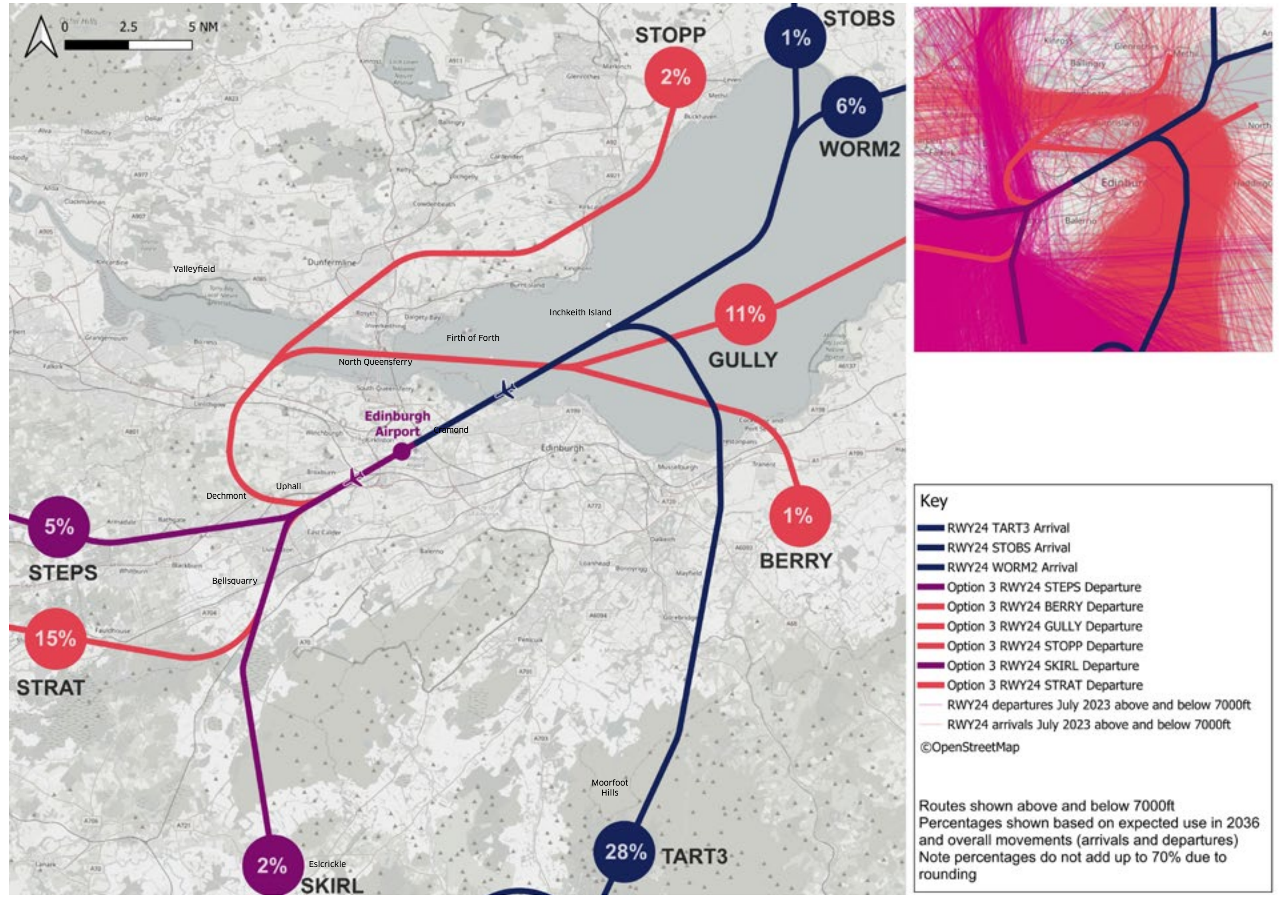


Figure 12: Option 3 proposed routes for runway 24.

Note that the percentages shown for departures are the proportion of overall movements expected on each route – considering both arrivals and departures taking into account runway direction. Therefore for runway 24 these add up to 70% as that is the proportion that runway 24 would be in use. The same has been done for arrivals. These numbers are consistent with those presented in the description of the baseline in Section 4.1.

The smaller picture shows the proposed routes overlaid today's tracks for reference – in the proposed designs aircraft would stay on the route centreline except for safety reasons, for example where speed control cannot assure separation, or for avoidance of thunderstorms.

Table 104: Option 3 description of runway 24 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
STOPP	North (e.g. Highlands and Islands Airports, plus Iceland)	Aircraft initially fly straight out, staying south of Broxburn. A right turn is initiated just before passing Uphall Station so that the route northwest passes between Uphall and Dechmont. A further turn towards the northeast is then undertaken abeam the Beecraigs Country Park, staying east of Linlithgow. The south coast of the Firth of Forth is crossed at Blackness and landfall is made on the north coast at Limekilns. Aircraft are expected to be at 7,000ft or higher before making landfall over Limekilns. THE DESIGN OF THE RUNWAY 24 STOPP ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 3 AND BOTH OPTION 1 AND OPTION 2.	GRICE
GULLY	East (e.g. central Europe and the Middle East)	This route follows the same alignment as the STOPP route above, until just past Blackness, at which point this route peels off to follow the Firth of Forth with aircraft to be at 7,000ft or higher before going overhead North Queensferry. From here onwards the route remains over the water. THE DESIGN OF THE RUNWAY 24 GULLY ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 3 AND BOTH OPTION 1 AND OPTION 2.	TALLA
BERRY	East GULLY alternative when D514 in use	This route follows the same alignment as the GULLY route (described above) until it turns right, north of Leith, towards Cockenzie. Aircraft are expected to be at 7,000ft or higher before going overhead North Queensferry. THE DESIGN OF THE RUNWAY 24 BERRY ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 3 AND BOTH OPTION 1 AND OPTION 2.	N/A
STRAT	South (e.g. southern UK, Spain, France)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn south over Bellsquarry. The route then continues south. The route turns west overhead the Cobbinshaw Reservoir, with aircraft expected to be at 7,000ft or higher before passing Fauldhouse. THE DESIGN OF THE RUNWAY 24 STRAT ROUTE IS A POINT OF DIFFERENCE BETWEEN OPTION 3 AND BOTH OPTIONS 1 AND OPTION 2 (BUT NOTE THAT THE DESIGN FOR STRAT IN OPTION 1 AND OPTION 2 ARE IDENTICAL).	TALLA
STEPS	West (e.g. Ireland (Jets), Portugal, Canaries, Transatlantic)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn west to follow the track of today's GOSAM route, broadly tracking the M8 corridor. Aircraft are expected to be at 7,000ft or higher on passing Armadale.	GOSAM

Table 104: Option 3 description of runway 24 departures

New departure route name	Direction and example destinations – this is not an exhaustive list	Description	Previous departure route equivalent (serving flights in that direction)
SKIRL	West – Turboprops only (e.g. Ireland)	Aircraft initially fly straight out, staying south of Broxburn. They continue on a straight path until overhead Livingston from where they turn south passing over Bellsquarry. The route then continues south. This route is for slow climbing turboprop aircraft only and has a restriction at 6,000ft until a point (named SKIRL) near the hamlet of Elsrickle. This restriction would only be applied if there are other aircraft in the vicinity to restrict the climb, a situation which we expect to be rare. Aircraft would be climbed to 7,000ft or higher before joining the wider route network at SKIRL except in these rare circumstances.	GOSAM

Table 105: Option 3 description of runway 24 arrivals

New arrival route name	Direction and example origins – this is not an exhaustive list	Description	Previous arrival route equivalent
STOBS transition	North and West (e.g. Scottish Islands, Iceland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at STOBS over Dundee, flights track south, with the aircraft with the shallowest descent profiles passing 7,000ft on passing east of Cupar. They continue south until over the Firth of Forth where they turn southwest to join the final approach passing overhead Inchkeith Island before making landfall over Cramond.	N/A vectoring only
WORM2 transition	East (e.g. eastern Europe and the Middle East)	After passing/leaving the holding stack at WORM2 over the sea east of the Fife coast, flights track along the coast, with the aircraft with the shallowest descent profiles passing 7,000ft abeam Anstruther. From here they join the transition from STOBS, turning southwest onto the final approach that makes landfall over Cramond.	N/A vectoring only
TART3	South and West (e.g. western Europe, southern UK, Ireland and Transatlantic flights – depending on the weather patterns)	After passing/leaving the holding stack at TART3 east of Peebles, flights track to the northeast, with the aircraft with the shallowest descent profiles passing below 7,000ft over the Moorfoot Hills. The route continues to the north crossing the coast north of Wallyford. The route joins those from STOBS and WORM2 over Inchkeith Island. The route from here is as described above.	N/A vectoring only

4.4.2 Option 3: Noise abatement procedures:

The proposed noise abatement procedures for Option 3 are for departing jet aircraft and by all other departing aircraft of more than 5,700kg Maximum Take Off Weight to stay with 1.5km of the published route to 4,000ft or to end point shown in Figure 13 opposite, unless otherwise instructed by ATC in the interests of safety.

All other conditions of the noise abatement procedures would remain as today.

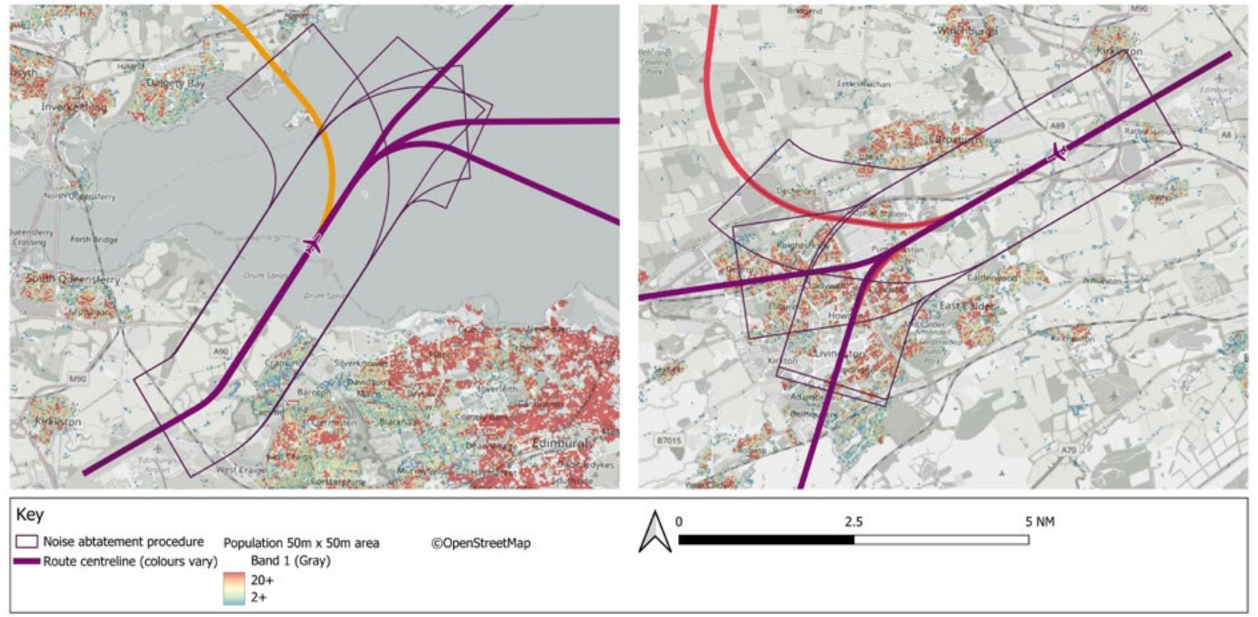


Figure 13: Option 3 noise abatement procedures for departures.

The remainder of this section provides the detailed results of the FOA for Option 3.

4.4.3 Option 3: Safety

Group	Impact	Level of Analysis
All	Safety	Qualitative

The introduction of systemised routes where aircraft can fly their planned route with a degree of autonomy will reduce complexity and associated workload for both air traffic control and pilots. This is considered a safety enhancement as it is best practice to minimise complexity in the design and operation of airspace where possible.

Sending eastbound departures out over the Firth of Forth, and southbound departures west before turning south puts fewer flights through the congested and complex airspace south of Edinburgh.

The ongoing safety work applicable to all options is described in Section 3. Further safety assessments and justifications to meet all relevant safety requirements will be submitted in Stage 4 should this option be proposed.

4.4.4 Option 3: Noise (and overflight)

Group	Impact	Level of Analysis
Communities	Noise (and overflight)	Quantitative

4.4.4.1 Contour maps

The contour maps for Option 3 are shown in Section 4 in Annex L.

4.4.4.2 Primary noise metrics: TAG assessment

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 £21.6m (2024 prices).

This reflects a net reduction in adverse noise impacts which includes some people who experience less noise (c.31,000/c.34,000 experience less daytime/night-time noise respectively) and some that experience more (c.6,000/c.14,000 experience more daytime/night-time noise respectively), but overall there are more positive effects than negative).

It is 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 CAP 1616. 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.

Table 106: Option 3 TAG Noise Assessment Results

NPV Total Noise (2024 prices)	NPV Sleep (2024 prices)	NPV Amenity (2024 prices)	NPV AMI (2024 prices)	NPV Stroke (2024 prices)	NPV Dementia (2024 prices)	Individuals experiencing increased daytime noise in forecast year	Individuals experiencing reduced daytime noise in forecast year	Individuals experiencing increased night-time noise in forecast year	Individuals experiencing reduced night-time noise in forecast year
£21,580,782	£12,338,184	£6,498,449	£29,955	£1,081,722	£1,632,472	6,418	30,955	14,040	34,390

4.4.4.4 LAeq noise tables

The above TAG results are based on LAeq contour analysis. The difference between Option 3 and the baseline in terms of LAeq contour results is presented below.

The predominance of the positive effects (coloured green) is the basis of the benefits in the TAG noise assessment as they indicate the net reduction in adverse effects from both daytime and night-time noise. There is also an improvement in terms of the net number of listed buildings, places of worship and schools affected by noise above the Lowest Observable Adverse Effect Level (LOAEL). These positive effects are greater in 2036 than 2027 indicating the benefit of the change increases in the longer term.

All the associated contour diagrams are provided in Annex L. Within Annex L we have also presented the 51dB LAeq 16hr daytime and 45dB LAeq 16hr night-time (LOAEL) contours for the option on a map alongside the equivalent baseline' without airspace change' contours for comparison. The 100% mode tables can also be found in Annex L.

Table 107: Comparison Table for LAeq 16hr, Daytime Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Comparison LAeq 16hr	51	-1.3	-11,500	-5,200	0	0	-1	-1	-4
			54	-0.7	-3,200	-1,500	-2	0	1	0	-1
			57	-0.1	400	100	0	0	-1	0	0
			60	0.0	-200	-100	0	0	-3	0	0
			63	0.0	-100	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0
			69	0.0	0	0	0	0	0	0	0

Table 108: Comparison Table for LAeq 16hr, Daytime Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Comparison LAeq 16hr	51	-0.6	-11,000	-4,900	-1	0	-1	-3	-5
			54	-1.0	-6,000	-2,700	-2	-1	-2	-1	-3
			57	-0.3	-800	-400	0	0	-14	0	0
			60	0.0	0	-100	0	0	-1	0	0
			63	-0.1	-200	-100	0	0	-3	0	0
			66	0.0	0	0	0	0	0	0	0
			69	0.0	0	0	0	0	0	0	0

Table 109: Comparison Table for LAeq 8hr, Night-Time Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Comparison LAeq 8hr	45	0.5	-11,100	-4,900	0	0	-11	-4	-5
			48	-1.1	-8,100	-3,700	-3	-1	0	-1	-3
			51	-0.5	-1,500	-700	0	0	-1	0	-2
			54	0.0	100	0	0	0	-3	0	0
			57	-0.1	-100	0	0	0	-2	0	0
			60	0.0	0	0	0	0	1	0	0
			63	0.0	0	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0

Table 110: Comparison Table for LAeq 8hr, Night-Time Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Comparison LAeq 8hr	45	2.4	-5,200	-2,300	1	0	-6	-4	-4
			48	-1.2	-8,900	-4,000	-1	0	-5	0	-1
			51	-0.6	-3,100	-1,400	0	0	-5	-1	-1
			54	0.0	-100	0	0	0	1	0	0
			57	0.0	0	0	0	0	0	0	0
			60	-0.1	0	0	0	0	0	0	0
			63	0.0	0	0	0	0	0	0	0
			66	0.0	0	0	0	0	0	0	0

As LAeq is the primary noise metric the absolute values are also provided for reference below.

Table 111: LAeq 16hr, Daytime Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	LAeq 16hr	51	62.1	46,600	21,100	6	1	168	2	11
			54	36.2	12,800	5,900	3	0	128	1	4
			57	20.6	5,500	2,600	1	0	67	0	2
			60	11.0	2,500	1,200	1	0	37	0	1
			63	5.5	400	200	0	0	10	0	0
			66	2.9	200	100	0	0	1	0	0
			69	1.5	0	0	0	0	0	0	0

Table 112: LAeq 16hr, Daytime Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	LAeq 16hr	51	73.3	56,200	25,500	6	1	192	2	12
			54	42.3	17,800	8,200	3	0	139	1	4
			57	24.3	6,100	2,900	1	0	73	0	2
			60	13.3	3,000	1,400	1	0	44	0	1
			63	6.7	700	400	0	0	12	0	0
			66	3.5	300	200	0	0	1	0	0
			69	1.8	<100	<100	0	0	0	0	0

Table 113: LAeq 8hr, Night-Time Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	LAeq 8hr	45	80.0	59,500	27,000	7	1	197	2	13
			48	45.4	32,800	14,900	3	0	139	1	4
			51	26.4	6,900	3,300	1	0	93	0	2
			54	14.4	3,300	1,600	1	0	55	0	1
			57	7.3	2,200	1,100	1	0	19	0	1
			60	3.6	300	200	0	0	4	0	0
			63	1.8	<100	<100	0	0	0	0	0
			66	0.9	0	0	0	0	0	0	0

Table 114: LAeq 8hr, Night-Time Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	LAeq 8hr	45	94.6	70,800	32,100	8	1	222	2	16
			48	52.8	39,000	17,700	5	1	151	2	8
			51	31.0	8,700	4,100	3	0	102	0	3
			54	17.2	4,100	2,000	1	0	65	0	1
			57	8.9	2,600	1,300	1	0	33	0	1
			60	4.3	500	200	0	0	7	0	0
			63	2.2	100	100	0	0	0	0	0
			66	1.1	0	0	0	0	0	0	0

4.4.4.5 N60 and N65 'number above' contours

Number above contours show the locations where the number of events (i.e. flights) exceeds a pre-determined noise level, expressed indB LASmax. For example, N65 contours show the number of events where the noise level from those flights exceeds 65dB LASmax. For further details see Section 3.3.3. Number above contours are described in CAP1616i as secondary metrics and are not monetised or used to determine 'adverse noise effects'.

The tables below show the difference in populations, households and sensitive buildings for each contour band compared to the baseline 'without airspace change' scenario. Absolute values and the contour diagrams are provided in Annex L.

The N65 daytime comparison shows a pattern of negative effects (red) for population changes within lower contour rates (5 and 10 flights per day) vs more positive effects at the higher rates (20-100 flights per day). However, the population numbers negatively affected in the lower contours are generally larger than those positively affected at the higher end.

N60 night-time data shows a greater proportion of green positive impacts.

The effects across potentially sensitive buildings for both N60 and N65 is mixed, with some categories benefiting and others not.

Drawing a single conclusion from positive and negative effects across different N65 and N60 contours is difficult, but in general terms results are perceived to be more positive than negative, albeit marginally so.

Table 115: Comparison Table for N65, Daytime Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Comparison N65 (day)	5	15.6	12,000	5,300	4	0	12	1	6
			10	23.8	18,200	8,100	3	0	21	0	4
			20	3.0	-3,200	-1,500	2	0	20	-2	-2
			50	-0.2	-7,500	-3,300	0	0	3	-1	0
			100	-2.5	-7,700	-3,500	-2	-1	-2	-1	-1
			200	0.0	0	0	0	0	0	0	0

Table 116: Comparison Table for N65, Daytime Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Comparison N65 (day)	5	15.7	6,700	2,900	4	0	-26	1	6
			10	22.3	15,700	7,000	3	0	27	1	6
			20	7.0	-1,800	-800	1	0	2	-3	-3
			50	1.8	-8,000	-3,600	1	0	-5	-2	-4
			100	-2.9	-8,300	-3,700	-3	-1	-4	-1	-3
			200	-2.2	-3,900	-1,800	-2	0	-26	-1	-3

Table 117: Comparison Table for N60, Night-Time Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Comparison N60 (night)	5	36.8	-1,700	-700	3	0	26	-5	1
			10	-1.3	-7,700	-3,400	1	0	12	-3	-4
			20	-6.6	-16,800	-7,500	-4	-1	-17	-2	-5
			50	0.0	0	0	0	0	0	0	0

Table 118: Comparison Table for N60, Night-Time Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Comparison N60 (night)	5	49.8	-10,200	-4,700	2	0	63	-2	-2
			10	14.1	5,200	2,300	2	0	8	-2	2
			20	-8.0	-18,000	-8,100	-2	0	-24	-4	-7
			50	0.0	0	0	0	0	0	0	0

4.4.4.6 Overflight Contours

The measurement of 'overflight' is a secondary metric that can be useful for explaining the operational impacts of airspace change proposals. These are a means of defining and portraying the pattern and dispersion of aircraft below 7,000ft, and the frequency that they occur. They are based upon a perception of overflight so we list them alongside our noise results even though they are not a noise metric. For further detail on the overflight metric see Section 3.3.3.

Overflight contours are not monetised or used to determine 'adverse noise effects'.

The tables below show the difference in populations, households and sensitive buildings for each contour band compared to the baseline 'without airspace change' scenario.

Absolute values and the contour diagrams are provided in Section 3 of Annex L.

The daytime overflights show significant reductions in population overflown at the lower counter levels (5, 20 and 20 flights per day which can be attributed to the significant reduction in the areas overflown today as a consequence of the wide dispersal through vectoring.

At 50 flights per day there is a negative effect across both analysis years which can also be assumed to be the consequence of concentration.

At 100 and 200 flights per day the population count is reduced. At these rates the contours are relatively close to the airport. The most significant differences between the baseline and Option 3 this close in is the early right turn for north and eastbound departures off runway24 (STOPP, GULLY and BERRY), and the early left turn for the westbound departures (STRAT) off runway 24. These are likely to be the cause of the reductions.

Note that the numbers of people negatively affected by concentration at 50 flights per day is an order of magnitude less than those positively affected at the low contour levels.

Night-time contours also show a pattern of large population reductions at the lowest contour band and a mixture of positive and negative effects (albeit more negative than positive) at the higher contour bands.

Note that the numbers of people negatively affected by concentration at the higher contour bands are an order of magnitude less than those positively affected at the low contour levels.

In all cases the comparative area column is difficult to interpret because the areas may be over water or areas where there is little by way of population.

Table 119: Comparison Table for Overflight, Daytime Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Comparison Overflights Day	5	-402.1	-194,800	-88,800	-31	-4	-856	-19	-48
			10	-63.6	-166,100	-75,000	-18	-4	-550	-11	-35
			20	47.7	-138,700	-62,600	-15	-2	-1025	-17	-34
			50	128.4	15,300	6,900	5	0	122	-6	-1
			100	39.6	-1,100	-400	-3	-1	44	-2	-2

Table 120: Comparison Table for Overflight, Daytime Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Comparison Overflights Day	5	-573.7	-230,800	-105,700	-36	-9	-1239	-20	-53
			10	-145.9	-180,100	-81,500	-21	-4	-585	-13	-40
			20	34.2	-139,100	-62,700	-16	-2	-855	-12	-32
			50	188.3	14,700	6,700	4	1	160	-8	-1
			100	58.3	-5,100	-2,200	0	-1	73	-5	-9
			200	2.7	-4,800	-2,200	-1	0	3	0	-3

Table 121: Comparison Table for Overflight, Night-Time Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Comparison Overflights Night	5	140.6	-77,400	-34,500	-12	-1	-311	-15	-28
			10	77.4	100	100	2	1	134	-9	-5
			20	-3.2	-16,300	-7,300	-5	-1	-1	-2	-4

Table 122: Comparison Table for Overflight, Night-Time Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Comparison Overflights Night	5	91.9	-114,700	-51,200	-14	-2	-339	-16	-30
			10	116.0	15,600	7,000	3	1	159	-7	0
			20	61.0	2,700	1,300	-2	-1	81	-2	-1

4.4.4.7 People with Protected Characteristics

Table 123 opposite shows the Option 3 impact on overflight below 7.000ft for specific Special Schools and Sight Scotland facilities. We have listed all the facilities we have looked at, including those not overflown; where this is the case the table states 'Null'.

Data on educational facilities, medical facilities, care homes and places of worship are covered in the earlier noise/overflight data tables sections.

Red cells show the option results in more overflights than the baseline, green represents fewer. This shows that Moore House Academy and Ogilvie School would have fewer daytime overflights reducing from 100 to 20 per day in 2036. Cedarbank, Sight Scotland Veterans' Linburn Centre and Starley Hall would be respectively newly overflown by 50, 5 and 10 flights (below 7,000ft) per day in 2036.

Table 123: 'Without Airspace Change' Baseline and Option 3 Overflight of Special Schools and Sight Scotland Facilities, 2027 & 2036

	2027 Day Overflight Contour (Flights per Day)		2036 Day Overflight Contour (Flights per Day)	
Receptor Name	Without Airspace Change	Option 3	Without Airspace Change	Option 3
Pinewood School	50	50	50	50
Moore House Academy	100	10	100	20
Ogilvie School	100	20	100	20
Cedarbank School	Null	50	Null	50
Calaiswood School	Null	Null	Null	Null
Sight Scotland Veterans' Linburn Centre	Null	5	Null	5
Starley Hall School	Null	5	Null	10
Victoria Park School	Null	Null	Null	Null
Kaimes Special School	Null	Null	Null	Null
Rosslyn School	Null	Null	Null	Null
Sight Scotland Allermuir Home	Null	Null	Null	Null
Sight Scotland The Royal Blind School	Null	Null	Null	Null
Broughton Primary School	Null	Null	Null	Null
Hyndhead School	Null	Null	Null	Null
New Struan School	Null	Null	Null	Null
Ochil Tower School	Null	Null	Null	Null
Rowanfield Special School	Null	Null	Null	Null
Woodlands School	Null	Null	Null	Null

4.4.4.8 Changes to noise distribution as a result of other airspace users

All our options have the same CAS design and so the qualitative assessment for Option 1 described in Section 4.2.4.9 applies equally to Option 3.

4.4.4.9 Noise and overflight summary

TAG results show that for this option there is a significant net reduction in adverse effects as shown by the monetised benefit of £21.6m over 10 years.

This is supported by the LAeq comparison tables for both day and night which are predominantly green, indicating improvements. There are, however, some negative impacts as shown in the TAG results table and by the red shading on the comparisons tables so while we would expect a significant net benefit, there would be some areas where adverse effects are worsened.

Drawing a single conclusion from positive and negative effects across different N65 and N60 contours is difficult, but in general terms we perceive the results to be more positive than negative, particularly at night where populations affected would be reduced at all contour levels.

Likewise drawing a single conclusion from overflight data is difficult. The overflight data demonstrates large reductions of people overflown overall. This is attributable to large reductions in people overflown at lower contour levels due to aircraft following the prescribed track rather than being vectored. However, this is partially offset by increases to the number of people overflown at some higher contour levels, also likely to be attributable to increased flight path concentration.

Overall, it is concluded that this option is expected to result in a significant net positive beneficial impact to noise and overflight. This is on the basis that there is a significant reduction in the monetised adverse effects which is the primary noise objective.

The secondary metrics show a range of positive and negative effects, the relative benefit of which is likely be viewed subjectively depending on people's areas of interest.

4.4.5 Option 3: Local Air Quality

Group	Impact	Level of Analysis
Communities	Local Air Quality	Qualitative

Section 3.3.4 describes how none of the options are likely to result in a possibility of pollutants breaching legal limits and target values (or worsening an existing breach of legal limits and target values). Therefore no further assessment of air quality was undertaken for either the baseline or the options.

4.4.6 Option 3: Greenhouse Gas Emissions

Group	Impact	Level of Analysis
Wider Society	Greenhouse Gas Emissions	Quantitative

4.4.6.1 TAG Assessment

TAG has been used to assess the greenhouse gas impact over a 10-year appraisal period. The change in CO_2e emissions over the 10-year appraisal period is a reduction of 113.5kT of which 47.6kT is traded in the UK ETS. This results in a total monetised net present value (NPV) benefit of £30.2m for Option 3 (this is at 2024 prices discounted (NPV) including monetisation of both traded and non-traded).

4.4.6.2 Greenhouse Gas Emissions

Annual greenhouse gas emissions (CO_2e) are presented in the table below for Option 3. This covers CO_2e from our departures and arrivals at low-level and also their flight paths through the ScTMA operated by NERL. This is because he interconnectivity of the design and operation of the airspace make it invalid to try to attribute CO_2e benefits to one proposal rather than the other[11].

Table 124 on page 316 below shows the change in total and the average per flight greenhouse gas emissions for Option 3 in 2027 and 2036 compared to the baseline which is the result of overall routes being shorter, less airborne holding and more continuous climb/descent profiles. These figures show that, in both 2027 and 2036, there would be a reduction in the annual total and per flight greenhouse gas emissions as a result of Option 3.

See Section 4.2.6.3 for discussion of how potential changes to GA operations have been considered with respect to CO_2e emissions for this, and other, options.

Table 124: Comparison Table for Greenhouse Gas Emissions Option 3 vs Baseline, 2027-2036

	Without Airspace Change		Option 3		Difference	
Year	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)	Annual total GHG emissions (tCO_2e)	Average GHG emissions per flight ($kgCO_2e$)
2027	942,797	6,390	933,354	6,326	-9,443	-64
2028	960,002	6,406	950,135	6,340	-9,866	-66
2029	977,207	6,419	966,917	6,352	-10,290	-68
2030	994,412	6,431	983,699	6,362	-10,714	-69
2031	1,011,617	6,441	1,000,480	6,370	-11,137	-71
2032	1,028,823	6,449	1,017,262	6,376	-11,561	-72
2033	1,046,028	6,455	1,034,043	6,381	-11,984	-74
2034	1,063,233	6,459	1,050,825	6,384	-12,408	-75
2035	1,080,438	6,462	1,067,606	6,385	-12,832	-77
2036	1,097,643	6,463	1,084,388	6,385	-13,255	-78

[11] Please refer to the greenhouse gas emissions methodology in section 3.3.4 for further details including contextual information on how the use of planned flight data in the NERL modelling may affect this result.

4.4.7 Option 3: Tranquillity

Group	Impact	Level of Analysis
Wider Society	Tranquillity	Quantitative

The difference to impact on designated tranquil sites of Option 3 for each of the daytime noise and overflight metrics, and for both 2027 and 2036 are shown below[12]. The related contour diagrams are provided in Section 4 of Annex L alongside as the absolute daytime overflights data.

Absolute and comparative data for night-time (LAeq 8hr), N65, N60 and night-time overflight contours are also presented in Section 4 of Annex L.

The LAeq 16hr comparison tables below show that the differences with respect to tranquil sites is a mix of positive and negative effects, all of which are relatively minor. These relate to the changing of the contours as a result of the improved Cramond offset which moves the concentration of flight slightly away from the designated landscapes at Craigiehall and Cammo near Cramond, at the expense of extending slightly further over Dalmeny Park and the Firth of Forth (Drum Sands) candidate quiet area. Note that while the concentration of flights would move as a result of this option all these sites are overflown today and would remain so in the future.

Overflights show an increase in the overflown area of the 'country parks' category as a result of the PBN approach transition for runway 06 from the north that catches the western edge of the Pentland Hills regional park, and also to a lesser extent from the runway 24 north and eastbound departure routes (STOPP, GULLY and BERRY) overflying the eastern end of the Beecraigs County Park. Overflights in Option 1 also extend slightly over the northern edge of the Upper Tweeddale NSA.

Vogrie Country Park is overflown in both the baseline and this option. In the baseline the overflight spread over all parts of the park as a result of the vectoring, whereas in this option the western edge of the park would be regularly overflown while the eastern edge would not.

CQA and Scheduled Monuments show a pattern of reduction at the lower contour levels offset by increases at higher contour levels. This is the result of the flight path concentration reducing the overall areas overflown, but increasing the area overflown at higher concentrations.

Table 125: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	Comparison LAeq 16hr	51	0	0.0	0	0.9	0	0.3	0	0.0	0	0.0	0	0.0
			54	0	0.0	0	-0.1	0	0.4	0	0.0	0	0.0	-1	0.0
			57	0	0.0	0	0.0	-1	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 126: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	Comparison LAeq 16hr	51	0	0.0	0	0.9	0	0.4	0	0.0	0	0.0	1	0.0
			54	0	0.0	0	0.1	0	0.4	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	-1	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

[12] Note that the comparison tables may show zero on total column but a difference in the area column. This could indicate that:
- same location is affected to a lesser or greater extent, so the total difference count is zero, but the area affected is not, or
- that the locations affected are different but cancel each out to give a zero count in the total column, but not a zero difference for areas because the areas affected in each location would not necessarily also cancel out.

Table 127: Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	LAeq 16hr	51	1	0.1	2	5.0	4	6.3	0	0.0	0	0.0	11	0.3
			54	1	0.0	2	1.9	4	4.9	0	0.0	0	0.0	7	0.2
			57	0	0.0	2	0.5	3	2.8	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	3	1.2	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0

Table 128: Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison LAeq 16hr	51	1	0.2	2	5.3	4	6.8	0	0.0	0	0.0	13	0.3
			54	1	0.0	2	3.1	4	5.3	0	0.0	0	0.0	8	0.2
			57	0	0.0	2	0.6	4	3.4	0	0.0	0	0.0	6	0.1
			60	0	0.0	1	0.0	3	1.6	0	0.0	0	0.0	5	0.1
			63	0	0.0	0	0.0	3	0.7	0	0.0	0	0.0	3	0.0
			66	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	3	0.0
			69	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0

Table 129: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison Overflights Day	5	0	9.7	5	-0.2	-9	-23.3	0	0.0	1	0.3	-78	-2.4
			10	2	8.3	4	-0.1	-11	-20.4	0	0.0	0	0.0	-48	-19
			20	1	0.7	0	-0.5	-8	-16.8	0	0.0	0	0.0	-18	-17
			50	2	0.7	1	0.5	3	1.7	0	0.0	0	0.0	22	0.3
			100	1	0.0	1	0.1	1	0.9	0	0.0	0	0.0	17	0.4

Table 130: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison Overflights Day	5	0	9.4	5	-0.3	-12	-25.4	0	0.0	1	0.4	-117	-3.0
			10	2	8.6	4	-0.1	-10	-22.0	0	0.0	0	4.6	-69	-2.3
			20	1	0.8	0	-0.6	-9	-18.1	0	0.0	0	1.3	-19	-17
			50	2	11	1	1.8	4	2.7	0	0.0	0	2.3	28	0.5
			100	1	0.0	1	0.1	2	0.9	0	0.0	0	-0.4	17	0.4
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3

4.4.8 Option 3: Biodiversity

Group	Impact	Level of Analysis
Wider Society	Biodiversity	Quantitative

The potential impacts to biodiversity are considered in the HRA Screening Report available in Annex H. This concluded that the potential effects of overflights by aircraft below 3,000ft in the vicinity of any European Site would not differ sufficiently from the existing baseline to result in likely significant effects on the conservation objectives of those European Sites. Though no impacts that meet the HRA criteria are predicted, the tables below provide information on how the number and area of European Sites overflown below 7,000ft differ between this option and the 'without airspace change' baseline.

Absolute values plus metrics for LAeq 16hr, LAeq 8hr, N65 and N60, plus metrics for other site designations are presented in Annex L.

Table 131: Comparison Table for Biodiversity Sites in Relation to Overflight Daytime Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	Comparison Overflights Day	5	0	0.5	0	0.0	-9	-8.0	-1	-12.3	-8	-43.0	-39	-16.0
			10	0	-0.3	0	0.0	-9	-4.0	-1	11.9	-7	-1.2	-24	16.1
			20	0	-1.1	0	0.0	-7	-1.6	3	10.6	-7	27.8	-12	14.0
			50	0	-1.4	0	0.0	2	0.5	2	6.9	2	35.6	5	10.8
			100	-1	-0.2	0	0.0	1	0.1	0	0.0	1	20.9	0	0.1

Table 132: Comparison Table for Biodiversity Sites in Relation to Overflight Daytime Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	Comparison Overflights Day	5	-5	0.1	0	0.0	-9	-8.8	-1	-14.1	-9	-54.9	-45	-24.8
			10	1	-0.2	0	0.0	-11	-5.6	-1	1.2	-9	-2.7	-28	2.2
			20	0	-0.8	0	0.0	-6	-1.7	3	11.1	-4	28.7	-7	16.6
			50	0	-1.3	0	0.0	3	2.3	3	8.9	3	57.8	6	16.5
			100	-1	-0.6	0	0.0	2	0.1	1	0.0	2	22.7	2	-0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	1	3.9	0	0.0

Table 133: Comparison Table for Biodiversity Sites in Relation to Overflight Night-Time Option 3 vs Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison Overflights Night	5	0	-1.2	0	0.0	1	0.9	3	1.0	3	77.4	6	9.0
			10	-1	-1.4	0	0.0	2	0.1	1	0.1	2	22.6	1	-0.1
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	2.5	0	0.0

Table 134: Comparison Table for Biodiversity Sites in Relation to Overflight Night-Time Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison Overflights Night	5	0	-1.2	0	0.0	-1	0.2	3	1.1	1	66.6	1	8.2
			10	0	-1.4	0	0.0	2	0.2	1	0.1	2	18.3	4	3.5
			20	-1	-0.5	0	0.0	2	0.2	0	0.0	2	22.5	1	0.1

4.4.9 Option 3: Capacity/resilience

Group	Impact	Level of Analysis
Wider Society	Capacity/ resilience	Qualitative

4.4.9.1 Overall Capacity and Growth

This change is not expected to impact the overall airport capacity or future growth.

4.4.9.2 Network Delay

Flights to the east and southeast currently fly south until over the north of England where they turn east and head out over the North Sea. However, the area of airspace over the north of England can become congested at times, and when it does our flights can be delayed on the ground until the congestion eases.

The introduction of new routes over the Firth of Forth for traffic will send our flights to the east and southeast directly over the North Sea, avoiding this bottle neck. We have not been able to quantify this benefit, but we are confident that the proposal will reduce the pre-departure delays currently experienced by these flows because of congestion in downstream air traffic control sectors in the network over the north of England.

4.4.9.3 Medium Term ILS Resilience

Arrivals on final approach use an Instrument Landing System (ILS) to guide them into the airport. When the ILS is unavailable aircraft currently rely on the Non Direction Beacons (NDBs) to guide them close enough to the airport to enable a visual approach. The Edinburgh Airport NDBs are at end of life and it is expected that they will need to be replaced in 2030 at a cost of c.£300k (2024 prices) – note this is listed under infrastructure costs in the cost benefit tables in Section 4.5). The PBN procedures will provide a contingency for when ILS is unavailable thereby avoiding this cost.

4.4.9.4 Long Term Resilience

The published procedures today rely on conventional ground-based navigation aids called VORs. This equipment is due to be decommissioned as part of a NERL UK wide programme under the Airspace Modernisation programme. PBN routes would enable Edinburgh to continue operating as the VORs are decommissioned.

There is no difference between Option 1, Option 2 and Option 3 with respect to capacity and resilience. The same text is provided for all Options.

4.4.10 Option 3: Access for other airspace users

Group	Impact	Level of Analysis
General Aviation	Access	Qualitative & Quantitative

The systemised airspace being proposed has different requirements for airspace than our existing airspace design. Annex G provides more detail on the overall airspace requirement and includes a qualitative review of our local airspace and explains where and why it is being extended or reduced.

There is no difference between our Option 1, Option 2 or Option 3 with respect to the design of controlled airspace and access. The difference to baseline described in Annex G applies equally to all our options.

Much of the airspace required is shared between flights controlled from Edinburgh Airport, Glasgow Airport and NERL and so at a quantitative assessment of overall controlled airspace requirements presented in Annex G is done collectively for the ScTMA Cluster of ACPs.

For a cluster wide picture of controlled airspace changes please see the CAF2 assessment in Annex B1.

4.4.11 Option 3: Economic impact from increased effective capacity

Group	Impact	Level of Analysis
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Qualitative

This change will not impact the effective airport capacity or future growth.

Delays to flights have an associated cost to the airport, airlines and the travelling public. Therefore there would be an economic benefit from the reduced network delays and improved resilience mentioned in the capacity/resilience section, but these have not been quantified.

4.4.12 Option 3: Fuel Burn

Group	Impact	Level of Analysis
General aviation/ commercial airlines	Fuel Burn	Quantitative

Annual fuel estimates are presented in Table 135 on page 326 for Option 3. This covers CO_2e from our departures and arrivals at low level and also their flight paths through the ScTMA operated by NERL. This is because the interconnectivity of the design and operation of the airspace make it invalid to try to attribute fuel burn benefits to one proposal rather than the other[13].

Table 135 shows the change in total and per flight fuel burn for Option 1 in 2027 and 2036 compared to the baseline which is the result of overall routes being shorter, less airborne holding and more continuous climb/descent profiles. These figures show that, in both 2027 and 2036, there would be a reduction in the annual total and per flight fuel burn as a result of Option 3.

See Section 4.2.6.3 for discussion of how potential changes to GA operations have been considered with respect to fuel burn for this, and other, options.

[13] Please refer to the greenhouse gas emissions methodology section provided in Annex B for further details including contextual information on how the use of planned flight data in the NERL modelling may affect this result.

Table 135: Comparison Table for Greenhouse Gas Emissions Option 3 vs Baseline, 2027-2036

	Without Airspace Change			Option 3			Difference		
Year	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)	Annual Fuel Burn (t)	Annual Fuel Burn Cost (£) 2024 prices	Average Fuel Burn per Flight (kg)
2027	296,477	£203,380,252	2,009	293,508	£201,343,227	1,989	-2,969	-£2,037,025	-20.1
2028	301,887	£207,091,751	2,014	298,785	£204,963,349	1,994	-3,103	-£2,128,402	-20.7
2029	307,298	£210,803,249	2,019	304,062	£208,583,470	1,997	-3,236	-£2,219,778	-21.3
2030	312,708	£214,514,747	2,022	309,339	£212,203,592	2,001	-3,369	-£2,311,154	-21.8
2031	318,119	£218,226,245	2,025	314,616	£215,823,714	2,003	-3,502	-£2,402,531	-22.3
2032	323,529	£221,937,743	2,028	319,894	£219,443,836	2,005	-3,635	-£2,493,907	-22.8
2033	328,940	£225,649,241	2,030	325,171	£223,063,957	2,007	-3,769	-£2,585,283	-23.3
2034	334,350	£229,360,739	2,031	330,448	£226,684,079	2,008	-3,902	-£2,676,660	-23.7
2035	339,760	£233,072,237	2,032	335,725	£230,304,201	2,008	-4,035	-£2,768,036	-24.1
2036	345,171	£236,783,735	2,032	341,003	£233,924,322	2,008	-4,168	-£2,859,412	-24.5

4.4.13 Option 3: Training Costs for Commercial Airlines

Group	Impact	Level of Analysis
Commercial airlines	Training Costs	Qualitative

Flight procedures worldwide are updated with each aeronautical information regulation and control (AIRAC) cycle and airlines update their procedures accordingly, training as required. This proposal is not anticipated to incur additional training costs for airlines.

4.4.14 Option 3: Other Costs for Commercial Airlines

Group	Impact	Level of Analysis
Commercial airlines	Other costs	Qualitative

No other airline costs are foreseen.

4.4.15 Option 3: Infrastructure costs for airports/ANSP

Group	Impact	Level of Analysis
Airport/ANSP	Infrastructure costs	Quantitative

This proposal is not expected to change Airport or ANSP infrastructure beyond the initial deployment phase which will require some ATC systems engineering amendments and some minor amendments to our noise track keeping software system, both of which can be captured in normal maintenance cycles and therefore incur no additional cost.

The implementation of Performance Based Navigation (PBN) procedures removes our dependencies on conventional ground based VORs which contributes to a reduction in NATS NERL's operating costs as it enables VOR rationalisation.

As discussed under the capacity and resilience heading above, the implementation of any of our options will remove a cost of c.£300k (2024 prices) in c.2030.

4.4.16 Option 3: Operational costs for airports/ANSP

Group	Impact	Level of Analysis
Airport/ANSP	Operational costs	Quantitative

The operational costs will increase as a result of having more IFP procedures which are subject to 5 year review. This is expected to be a cost of c.£10,000 every 5 years (today's prices undiscounted).

Our noise insulation scheme is applied at the 63dBA LAeq 16hr contour and above. Implementing this option is not expected to alter the cost to Edinburgh Airport to operate the noise insulation scheme compared to the without airspace change scenario.

4.4.17 Option 3: Deployment costs for airports/ANSP

Group	Impact	Level of Analysis
Airport/ANSP	Deployment costs	Qualitative

All air traffic control staff operating in our control tower will require training prior to the implementation of the airspace change and this is likely to include self reading, classroom training and simulator sessions. A training plan will be produced which will be approved by the regulator prior to the start of training. Each option is expected to result in a similar training demand as all of the options are system-wide and do not vary in terms of cost.

4.4.18 Option 3: Other costs

Group	Impact	Level of Analysis
Airport/ANSP	Other costs	Qualitative

No other costs are foreseen.

4.4.19 Option 3: Airspace Modernisation Strategy (AMS) CAP1711

AMS Strategic Objectives CAP1711 Option 3	
Safety	The option is expected to maintain/enhance safety when compared to the 'Without Airspace Change' baseline.
Integration of diverse users	This proposed option will meet the requirements of our commercial airlines. Overall GA and other users of uncontrolled airspace are expected to benefit from a cluster wide reduction in CAS below 7,000ft. However, while there are some areas/levels of our CTA/CTR that will be reclassified as Class G there are some other areas where CAS will be increased, particularly over the Firth of Forth. In all cases we have sought to propose the minimum amount of CAS to safely contain our operations while achieving the noise and other benefits listed in this section. Along with the other ScTMA sponsors have sought to accommodate the requirements of local GA and other airspace users in the design.
Simplification, reducing complexity – improving efficiency	The reduction in complexity and enhanced systemisation will facilitate a more expeditious flow of traffic. More efficient routings will improve fuel efficiency and the reconfigured departure routes will help our traffic avoid some of the more congested parts of the wider UK network.
Environmental sustainability	The proposed option will offer environmental benefits such as reduction in noise and health effects through design. The cluster design as a whole, and the operation of Edinburgh air traffic will also offer improvement in reduced fuel consumption and therefore an improvement in greenhouse gas emissions.

4.5 Cost benefit analysis

As part of the FOA, Airspace Change Sponsors are required to produce a Cost Benefit Analysis (CBA) which looks at the monetised costs associated with the ACP and produces a Net Present Value (NPV) for each option.

The NPV tables on the following pages contain an analysis of all relevant monetised cost and monetised benefits associated with each option. NPVs are based on the following assumptions:

- All 'nominal' costs and benefits have been adjusted into 2024 'real' costs and benefits (using published Web TAG Databook GDP deflators) and converted into GBP when necessary, using spot rates as at 22nd March 2024.
- All 'real' figures have been discounted using the Social Time Preference Rate (STPR) set by the UK Government and contained in the TAG Databooks. The standard STPR of 3.5% has been used for all costs and benefits discounting, apart from 'Noise' costs and benefits, which have been discounted using the Health STPR figure of 1.5%.
- 2024 is used as the base year for NPV discounting.
- Noise and CO_2e costs and benefits are calculated directly using the government's TAG workbooks. Please refer to the methodology section for greenhouse gas emissions for contextual information on how the use of planned flight data in the NERL modelling may affect the CO_2e costs result.
- For fuel burn, the jet fuel price used in the NPV calculations is based on the Average Cost per Tonne of USD $861.39 (sourced from: IATA Fuel Monitor for week ending 22nd March 2024). To convert into GBP, the USD to GBP spot exchange rate from March 2024 of £0.79637298 was used, which converts the price to GBP £685.99. Fuel prices and exchange rates are volatile, and will have changed since the analysis was undertaken. However, it is important to note that there is a forecast fuel reduction per flight for all options and so there would always be an NPV benefit, regardless of the price and conversion rates applied. This Full Options Appraisal was undertaken on the most up-to-date sources of data at the time, and as part of the Final Options Appraisal in CAP1616 Stage 4, the fuel prices and exchange rates will be updated.
- Infrastructure costs are presented as a benefit as they are incurred in the baseline, but would not be incurred in any of the proposed options.

See Section 5 for discussion of how the Cost Benefit figures compare with one another.

Table 136: Cost Benefit Table for Option 1

Year	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10 year total benefit
Net Community Benefit (Noise)	£2,176,016	£2,156,380	£2,136,850	£2,117,426	£2,098,109	£2,078,900	£2,059,802	£2,040,813	£2,021,936	£2,003,172	£20,889,404
Net Wider Society Benefit (Untraded CO_2e)	£1,507,772	£1,678,103	£1,846,687	£2,013,427	£2,178,231	£2,341,016	£2,501,703	£2,660,219	£2,816,496	£2,970,471	£22,514,127
Net Airspace Users Benefit (Traded CO_2e)	£1,283,206	£1,222,550	£1,214,939	£1,161,975	£1,062,695	£966,593	£873,695	£798,296	£700,725	£617,053	£9,901,727
Net Airspace Users Benefit (Airborne Fuel Costs)	£2,018,369	£2,032,904	£2,044,071	£2,052,408	£2,057,443	£2,060,217	£2,060,202	£2,057,917	£2,053,317	£2,046,632	£20,483,480
Infrastructure Costs	£-	£-	£-	£244,050	£-	£-	£-	£-	£-	£-	£244,050
Operational Costs	£-	£-	£-	£-	-£6,875	£-	£-	£-	£-	-£5,166	-£12,041
Total Net Present Value	£6,985,364	£7,089,938	£7,242,547	£7,589,285	£7,389,602	£7,446,727	£7,495,402	£7,557,245	£7,592,475	£7,632,162	£74,020,747

Table 137: Cost Benefit Table for Option 2

Year	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10 year total benefit
Net Community Benefit (Noise)	-£22,491	-£66,608	-£109,415	-£150,943	-£191,219	-£230,272	-£268,129	-£304,817	-£340,362	-£374,789	-£2,059,045
Net Wider Society Benefit (Untraded CO_2e)	£1,367,946	£1,536,372	£1,703,219	£1,868,384	£2,031,769	£2,193,285	£2,352,846	£2,510,374	£2,665,795	£2,819,041	£21,049,031
Net Airspace Users Benefit (Traded CO_2e)	£695,965	£627,349	£583,612	£515,088	£426,131	£340,492	£258,155	£182,349	£103,713	£30,699	£3,763,554
Net Airspace Users Benefit (Airborne Fuel Costs)	£1,421,163	£1,437,857	£1,451,743	£1,463,223	£1,471,980	£1,478,778	£1,483,254	£1,485,797	£1,486,390	£1,485,212	£14,665,398
Infrastructure Costs	£-	£-	£-	£244,050	£-	£-	£-	£-	£-	£-	£244,050
Operational Costs	£-	£-	£-	£-	-£6,875	£-	£-	£-	£-	-£5,166	-£12,041
Total Net Present Value	£3,462,584	£3,534,971	£3,629,158	£3,939,802	£3,731,786	£3,782,283	£3,826,126	£3,873,704	£3,915,537	£3,954,997	£37,650,948

Note that the net community benefit (noise) results above are all negative – indicating a cost/increase in adverse effects.

Table 138: Cost Benefit Table for Option 3

Year	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10 year total benefit
Net Community Benefit (Noise)	£2,109,681	£2,122,581	£2,134,639	£2,145,877	£2,156,316	£2,165,979	£2,174,884	£2,183,054	£2,190,507	£2,197,263	£21,580,782
Net Wider Society Benefit (Untraded CO_2e)	£1,465,353	£1,635,716	£1,804,345	£1,971,143	£2,136,018	£2,298,886	£2,459,667	£2,618,288	£2,774,681	£2,928,782	£22,092,879
Net Airspace Users Benefit (Traded CO_2e)	£1,105,053	£1,044,248	£1,028,088	£972,726	£878,527	£787,379	£699,308	£625,514	£534,847	£455,630	£8,131,320
Net Airspace Users Benefit (Airborne Fuel Costs)	£1,837,193	£1,854,689	£1,868,831	£1,880,124	£1,888,149	£1,893,873	£1,896,822	£1,897,484	£1,895,828	£1,892,073	£18,805,067
Infrastructure Costs	£-	£-	£-	£244,050	£-	£-	£-	£-	£-	£-	£244,050
Operational Costs	£-	£-	£-	£-	-£6,875	£-	£-	£-	£-	-£5,166	-£12,041
Total Net Present Value	£6,517,281	£6,657,234	£6,835,903	£7,213,919	£7,052,135	£7,146,117	£7,230,682	£7,324,341	£7,395,863	£7,468,583	£70,842,057

Selection of the Consultation Option

05

5. Selection of the Consultation Option

At the end of the FOA, we look to the outcome of the assessments to determine a preferred option to focus our consultation on. A key part of the CAP1616 process is to have a transparent approach when establishing which option to take forward.

Selection of the preferred option for consultation is based on the data presented in the previous sections that show how each option performs relative to the baseline, as required by CAP1616. However, in coming to our decision, we have also taken an extra step of comparing our options against one another geographically with respect to noise and overflight impacts. This is to ensure that the geographical differences between each option are understood by us and are transparent to stakeholders, as this is not always clear from the consideration of data tables and from separate comparisons against the baseline.

This section on selection of the consultation option is presented in four parts:

- 5.1 outlines the decision-making criteria.
- 5.2 details how we have identified the best option with respect to the performance of each against the 'without airspace change' baseline and comparing the results for each option against each other.
- 5.3 provides a qualitative geographical comparison of options against one another with respect to noise and overflight contours.
- 5.4 concludes with our selection of a preferred option for consultation.

5.1 Decision-making criteria

When determining which option to focus our consultation on, we have considered outcomes of the cost benefit analysis and the detailed assessments undertaken against each FOA category to understand the positive benefits and negative impacts of each option.

Quantitative assessments are important, especially those which government policy are based around, but it's important to note that the threshold for discontinuing an option is not based on quantitative assessments alone. They must also consider relevant qualitative factors, as there are many factors and FOA categories to balance. There is no single formula that can be applied.

When considering which options to progress with we have to consider the legal and guidance framework provided by the government, and in particular the AMS and the **government's Air Navigation Guidance (ANG) 2017**. An overview of these sources is provided in the CAAs **CAP3042: Airspace Change: Masterplan Trade-off Procedure**.

A primary source is the AMS which has an overall vision to 'Deliver quicker, quieter and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace' and four objectives:

- Safety: 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.
- Integration of diverse users: 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).
- Simplification, reducing complexity and improving efficiency: 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.
- Environmental sustainability: 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.

The CAP1616 FOA captures data on the performance of the options across a range of categories which can be related to these objectives. Section 5.2 provides a comparison of how the options perform for each of the CAP1616 FOA categories.

Through the FOA we have found that the differences in performance between our options are primarily in the environmental category and so our selection process has a particular focus on the ANG.

The ANG is guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management.

The ANG outlines the government's altitude- based priorities for consideration of the environmental impacts arising from airspace change proposals. Table 1 outlines the altitude-based priorities most relevant to our selection process and describes how they have applied to the environmental assessments within the FOA.

Table 1: Altitude-based priorities and how they have been assessed

Altitude-Based Priority (ANG 2017)	How it's assessed within the FOA
a) In the airspace from the ground to below 4,000ft, the government's environmental priority is to limit and, where possible, reduce the total adverse noise effects on people	Total adverse noise effects for each option are assessed and reported using LAeq noise exposure. Total *adverse* noise effects are quantified by calculating the number of people exposed above the Lowest Observable Adverse Effect Level (LOAEL), and the magnitude of that exposure. Differences in total adverse effects compared to the 'without airspace change' scenario are assessed and monetised using TAG. We have used the TAG outputs to compare the performance of options with respect to the total adverse effects.
b) Where options for route design from the ground to below 4,000ft are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements	Where the adverse impacts are similar we have considered which options are most consistent with published arrangements. We have assumed that the basis of this objective for consistency is not because keeping routes where they are is good *per se*, but because keeping routes where they are is good because it is less likely to move adverse effects to new areas that have not had them before. In our application of this objective we have therefore looked for consistency in terms of where noise affects occur, i.e. an option is considered more consistent with the existing published arrangements if the adverse noise effects have remained in similar areas as seen with the published arrangements.
c) In the airspace at or above 4,000ft to below 7,0 0ft, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the government's overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO_2 emissions	The LOAEL contours that determine total adverse noise effects do not cover all the areas affected by flight paths above 4,000ft and below 7,000ft. For insight into potential noise effects beyond the LOAEL but below 7,000ft we have considered how the secondary metrics – N65, N60 and overflight – change when compared to the 'without airspace change' baseline, and how the relative performance of the options compare to one another. See below for consideration of CO_2e emissions.
d) In the airspace at or above 7,000ft, the CAA should prioritise the reduction of aircraft CO_2 emissions and the minimising of noise is no longer the priority	The CO_2e consequences of route design in a particular area/at a particular altitude are often realised elsewhere in the system, either upstream or downstream of where the design has changed. In particular, the CO_2e benefits of design changes below 7,000ft are often realised in the airspace above. This means it is not possible to make a clear distinction between CO_2e generated as a consequence of the design of the network above 7,000ft, and the CO_2e generated as a consequence of the design of the same routes below 7,000ft (from an aircraft's perspective they are just on one continuous flight path that happens to pass through 7,000ft). Therefore, while our design of options focused on the design of routes below 7,000ft, it still contributes to overall reductions in CO_2e for our flights at levels above 7,000ft. We therefore use the overall CO_2e reduction achieved with each of our design options as a comparator of their performance against this ANG performance category[1].

[1] For more details on why CO_2e assessment methodologies can't be split above and below 7,000ft see the CO_2e section of the CAF2 methodology in Appendix 2 of the **UK Airspace Change Masterplan Iteration 3 – ScTMA**.

5.2 Identifying the preferred option considering performance against the 'without airspace change' baseline

This section considers each of the FOA categories listed in CAP1616 in turn comparing the relative performance of each option and describes how this influenced our choice of the preferred option to focus our consultation on.

This section presents a selection of key results that have informed our choice of the preferred option, for a full set of results for each option see Section 4. The detailed methodology for appraising each category is provided in Section 3.

5.2.1 Safety

Safety is the overriding priority. All our options have been designed to meet the same safety standards, all are equally safe and so safety is not considered further.

5.2.2 Overall cost benefit results

Cost-benefit analysis is a process where disparate categories of future benefit and impact are each attributed a monetary value (referred to as the Net Present Value or NPV) so they can be compared alongside one another. The monetary values attributed are based on government guidance.

Table 2 opposite shows the monetised benefits and impacts over a 10-year period (2027 to 2036) for each of our FOA options compared to the 'without airspace change' baseline.

Table 2: Cost benefit table for all Options

Benefit Metric	Option 1	Option 2	Option 3
Net Community Benefit (Noise)	£20,889,404	-£2,059,045	£21,580,782
Net Wider Society Benefit (Untraded CO_2e)	£22,514,127	£21,049,031	£22,092,879
Net Airspace Users Benefit (Traded CO_2e)	£9,901,727	£3,763,554	£8,131,320
Net Airspace Users Benefit (Airborne Fuel Costs)	£20,483,480	£14,665,398	£18,805,067
Infrastructure Costs	£244,050	£244,050	£244,050
Operational Costs	-£12,041	-£12,041	-£12,041
Total Net Present Value	£74,020,747	£37,650,948	£70,842,057

Option 1 provides the highest monetised benefit at £74m, followed by Option 3, which also shows a significant net benefit. Option 2 has both a negative evaluation for noise and smaller benefits for CO_2e and also fuel, resulting in an overall total that is significantly lower than that of Options 1 and 3.

As mentioned above, there is no single formula to be applied, and some categories may be given more weight than others in particular circumstances. This is especially true for environmental priorities, for example Table 1 on page 336 highlights how noise from aircraft below 7,000ft is prioritised over CO_2e impacts.

5.2.3 Adverse Noise Effects

For Edinburgh Airport the adverse effects occur under parts of routes for which the minimum expected height of aircraft is below 4,000ft. ANG indicates that mitigating noise impacts from flights below 4,000ft should be prioritised and so the benefit (or negative impact in the case of Option 2) should be given additional weight in the decision-making process.

Analysis of our options indicates a net reduction in adverse noise effects for Option 1 and Option 3, amounting to c.£20.9 million and c.£21.6 million respectively for the 10 year appraisal period when compared to the baseline 'without airspace change'. This headline figure is expressed in monetary terms, but represents an evaluation –using the government's methodology – of expected improvements to health and well-being from reduced noise exposure.

The negative NPV for health and well-being evaluation for Option 2 represents a worsening to adverse health and well-being effects. This result alone provides a strong basis for discounting Option 2.

Table 3: Summary of key outcomes from primary noise metrics

Option	NPV Amenity (2024 prices)	Individuals experiencing increased daytime noise in forecast year	Individuals experiencing reduced daytime noise in forecast year	Individuals experiencing increased night-time noise in forecast year	Individuals experiencing reduced night-time noise in forecast year
Option 1	£20,889,404	3,910	32,618	9,009	42,648
Option 2	-£2,059,045	7,575	4,781	19,529	7,166
Option 3	£21,580,782	6,418	30,955	14,040	34,390

The performance of Option 1 and Option 3 are very similar, less than 3% difference in NPV. As noise modelling is a predictive exercise based on many assumptions care should be taken before assuming small differences in outcomes (such as this) indicate a difference in actual performance. We therefore do not consider this difference to be sufficient to conclude that Option 3 is clearly better than Option 1, concluding instead that the results suggest the outcomes are similar in scale.

The ANG 2027 states:

"Where options for route design from the ground to below 4,000ft are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements".

For both Option 1 and Option 3 the key differences to today's configuration with respect to noise outcomes are:

- they are both based on PBN designs, so both arrivals and departures will closely follow published routes most of the time, whereas today they are largely vectored
- they both involve the introduction of new routes to the east that redistributes flights across more departure routes and reduces flights overland.

These differences dictate the differences in performance between today's configuration and either Option 1 or Option 3 much more than any differences between the options themselves. Therefore a visual comparison to determine which option is most consistent with today's arrangements does not result in any significant differentiating factors between Options 1 and 3.

However, if it is assumed that the objective for consistency is to avoid moving adverse impacts around, and in particular to avoid causing people to experience an increase in adverse impacts unless there is an overall net gain to be had, then Table 3 on page 334 suggests that Option 1 would be better performing than Option 3. This is because it involves fewer people experiencing an increase in daytime noise than Option 3 (c.4,000 vs c.6,000) and similarly fewer people experiencing increased night-time noise (c.9,000 vs c.14,000).

5.2.4 Secondary Noise and Overflight Metrics

Given that primary metrics do not provide a clear distinction between Options 1 and 3 we have also considered the secondary metrics: referred to as Number Above (or Nx for short) and Overflight.

Table 4 to Table 7 on pages 340 and 341 show the N65, N60, overflight day, and overflight night figures for each option in 2036 compared to the baseline. In these tables green shading represents an improvement against the baseline, whereas red is a deterioration.

Table 4: 2036 N65 daytime contour population counts for all FOA Options, plus a direct comparison of Options 1 and 3

N65 Contour (Flights per Day)	Population Change			Option that Performs Best out of Option 1 or Option 3
	Option 1	Option 2	Option 3	
5	-3,100	-11,200	6,700	Option 1
10	6,200	-500	15,700	Option 1
20	-5,000	-200	-1,800	Option 1
50	-10,400	-500	-8,000	Option 1
100	-4,200	-200	-8,300	Option 3
200	-4,100	-800	-3,900	Option 1

Table 5: 2036 N60 night-time contour population counts for all FOA Options, plus a direct comparison of Options 1 and 3

N60 Contour (Flights per Day)	Population Change			Option that Performs Best out of Option 1 or Option 3
	Option 1	Option 2	Option 3	
5	-22,900	-16,400	-10,200	Option 1
10	-1,200	2,900	5,200	Option 1
20	-10,900	100	-18,000	Option 3

Table 6: 2036 daytime overflight contour population counts for all FOA Options, plus a direct comparison of Options 1 and 3

Overflights Day Contour (Flights per Day)	Population Change			Option that Performs Best out of Option 1 or Option 3
	Option 1 WEST1B+EAST1C	Option 2 WEST3B+EAST1C	Option 3 WEST2A+EAST2C	
5	-201,200	-212,300	-230,800	Option 3
10	-189,200	-195,100	-180,100	Option 1
20	-145,900	-149,900	-139,100	Option 1
50	15,800	28,100	14,700	Option 3
100	2,400	15,600	-5,100	Option 3
200	-5,200	2,400	-4,800	Option 1

Table 7: 2036 night-time overflight contour population counts for all FOA Options, plus a direct comparison of Options 1 and 3

Overflights Night Contour (Flights per Day)	Population Change			Option that Performs Best out of Option 1 or Option 3
	Option 1 WEST1B+EAST1C	Option 2 WEST3B+EAST1C	Option 3 WEST2A+EAST2C	
5	-113,900	-102,500	-114,700	Option 3
10	12,300	27,100	15,600	Option 1
20	10,900	25,100	2,700	Option 3

These tables are difficult to compare as a whole because there is no accepted weighting for comparing population counts at different 'flights per day' levels. However, we have shown a basic comparison line by line to help show which Option 1 or 3 performs better at each contour level (Option 2 is shown for information but has already been discounted on the basis of the primary noise metrics).

This comparison shows Option 1 has better performance across 7 out of the 9 categories and one is for the Nx metrics, whereas there is more of an even spread across the overflight categories between Option 1 and Option 3. Note that a qualitative comparison of areas positively and negatively affected by the contours is provided in Section 5.3.

5.2.5 Protected Characteristics

This section looks at relative overflight of the options for the specific special schools and Sight Scotland facilities identified in Section 4.

In all cases the majority of identified sites are not affected. For those that are red cells show the option in question results in more overflights than the baseline, green represents fewer. Table 8 opposite shows that all the options largely overfly the same facilities but with varying effects.

Differences between Option 1 and 3 in 2036 are:

- Ogilvie School which Option 1 overflies at 50 per day compared to 20 per day for Option 3
- Cedarbank which Option 1 overflies at 10 per day compared to 50 per day for Option 3
- Calaiswood School which Option 1 would overfly at 5 flights per day whereas Option 3 would not, and
- Starley Hall which Option 3 would overfly at 10 flights per day but Option 1 would not.

Table 8: 2027 & 2036 Day Overflight Contours & Aircraft Altitude for Facilities for People with Protected Characteristics[2]

Receptor Name	2027 Day Overflight Contour (Flights per Day)				2036 Day Overflight Contour (Flights per Day)			
	Without Airspace Change	Option 1	Option 2	Option 3	Without Airspace Change	Option 1	Option 2	Option 3
Pinewood School	50	50	50	50	50	50	50	50
Moore House Academy	100	20	50	10	100	20	50	20
Ogilvie School	100	50	100	20	100	50	100	20
Cedarbank School	Null	10	10	50	Null	10	10	50
Calaiswood School	Null	5	5	Null	Null	5	5	Null
Sight Scotland Veterans' Linburn Centre	Null	5	5	5	Null	5	5	5
Starley Hall School	Null	Null	Null	5	Null	Null	Null	10
Victoria Park School	Null	Null	Null	Null	Null	Null	Null	Null
Kaimes Special School	Null	Null	Null	Null	Null	Null	Null	Null
Rosslyn School	Null	Null	Null	Null	Null	Null	Null	Null
Sight Scotland Allermuir Home	Null	Null	Null	Null	Null	Null	Null	Null
Sight Scotland The Royal Blind School	Null	Null	Null	Null	Null	Null	Null	Null
Broughton Primary School	Null	Null	Null	Null	Null	Null	Null	Null
Hyndhead School	Null	Null	Null	Null	Null	Null	Null	Null
New Struan School	Null	Null	Null	Null	Null	Null	Null	Null
Ochil Tower School	Null	Null	Null	Null	Null	Null	Null	Null
Rowanfield Special School	Null	Null	Null	Null	Null	Null	Null	Null
Woodlands School	Null	Null	Null	Null	Null	Null	Null	Null

[2] Note that the aircraft height shown is based on a typical, medium aircraft. The overflight contours capture flights below 7,000ft. These include all the other aircraft types, some of which have worse climb performance which is why a site may be shows to have overflights when the typical aircraft height is greater than 7,000ft.

5.2.6 Local Air Quality

None of the options have air quality impacts, so air quality is not a factor in the selection of the preferred option.

5.2.7 Greenhouse Gas Emissions

Table 9 below shows the performance of each option with respect to CO_2e for the 10-year period 2027- 2036. This covers CO_2e from our departures and arrivals at low level and also their flight paths through the wider ScTMA network operated by NERL. This is because the interconnectivity of the design and operation of the airspace make it invalid to try to attribute fuel burn benefits to one proposal rather than the other.

All options provide benefit in terms of CO_2 reduction from a combination of shorter routes, more continuous climb and descent and reduced holding that our redesign enables in the network. However, Option 3 is ~9% worse than Option 1, and Option 2 is ~25% worse than Option 1.

Table 9: CO_2e for the 10-year period 2027-2036

Option	CO_2e difference to baseline (tonnes)	Monetised Benefit (NPV)
Option 1	123,561	£32,415,853
Option 2	88,547	£24,812,585
Option 3	113,491	£30,224,199

The relative performance with respect to greenhouse gas emissions is related to the length of our departure routes, because our arrivals are the same for each option and because other factors, such as continuous climb and descent opportunities apply equally to all options.

Section 2 describes how five of our departure routes differ between the options. These are:

- Runway 24 southbound route (STRAT).
- Runway 24 north and eastbound routes (STOPP GULLY and BERRY which all share the same first turn and can effectively be considered as one for the purposes of this comparison).
- Runway 06 westbound route (STEPS).

Option 1 has the shortest version of all of these routes which is why we can be confident in the results that shows it performs best for CO_2e.

Option 2 is worse performing overall as the result of the routing of the runway 24 STOPP, GULLY and BERRY departures. This is a runway 24 routing which means it is in operation c.70% of the time and it serves destinations to the north, east and southeast which captures a significant proportion of our departures (c.38% by 2036). All options for this routing initially head west before turning back towards the east, however, Option 2 travels significantly further west before turning east. This extra segment of track, designed to go around the Linlithgow area, heads in the opposite direction to its ultimate destination which negatively effects the fuel burn and therefore the CO_2e performance, which has a significant effect on the overall figures because of the number of flights that will use this route.

Option 3 also turns runway 24 STOPP, GULLY and BERRY departures later than Option 1. This a key factor in its poorer performance in respect of CO_2e. The Option 3 turn is, however, relatively close to the turn for Option 1 so the difference is less marked but still significant, contributing to the 9% difference between Option 1 and Option 3.

5.2.8 Tranquillity

All options have a selection of positive and negative effects on designated tranquil areas, as shown in the tables in Section 4. It is difficult to determine a definitive and absolute assessment of tranquility for each option against today because the value of where our proposal would provide benefit versus where the effects would be negative is likely to be very subjective, with different stakeholders placing different values on

- differing designations of tranquil areas, or
- similar designations in differing geographical locations

However, we have lined up the tranquillity tables next to one another to help identify any patterns when comparing between the options. The tables are shown in Table 10 to Table 12 for LAeq 16hr and Table 13 to Table 15 for daytime overflights.

Table 10: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 1 vs Baseline, 2036[3]

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison LAeq 16hr	51	0	0.0	0	1.0	0	0.4	0	0.0	0	0.0	1	0.0
			54	0	0.0	0	0.1	0	0.4	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	-1	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 11: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison LAeq 16hr	51	0	0.0	0	0.4	0	0.4	0	0.0	0	0.0	0	0.0
			54	0	0.0	0	0.0	0	0.4	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	-1	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

[3] Note that these are comparison tables between the options and the baseline so they show a net difference. E.g. if the same CQA area is affected by both the total column would be zero, but if they overfly a different area then this would show as a difference in the area column.

Table 12: Comparison Table for Tranquillity Sites in Relation to LAeq 16hr, Daytime, Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison LAeq 16hr	51	0	0.0	0	0.9	0	0.4	0	0.0	0	0.0	1	0.0
			54	0	0.0	0	0.1	0	0.4	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	-1	-0.1	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

This selection of tables is reproduced from Section 4. They demonstrate how the pattern of positive and negative LAeq 16hr, Daytime effects on areas with a tranquillity related designation is broadly very similar for Option 1 and 2. Overall, Option 3 has more negative impacts (red cells) but the extra positive impacts take place at higher contour levels and are therefore arguably more impactful.

In general, the scale of difference between the LAeq 16hr, Daytime effects on tranquillity sites is relatively small, so this metric does not provide any strong evidence for or against a particular option.

Table 13: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 1 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison Overflights Day	5	0	8.0	5	-0.3	-12	-20.0	0	0.0	1	0.4	-113	-3.1
			10	2	7.3	4	-0.1	-8	-17.4	0	0.0	0	0.0	-63	-2.2
			20	1	-0.5	0	-0.6	-9	-18.4	0	0.0	0	0.0	-19	-1.6
			50	2	0.2	1	1.8	3	1.8	0	0.0	0	0.0	27	0.7
			100	1	0.0	1	0.1	2	0.9	0	0.0	0	0.0	17	0.4
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3

Table 14: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 2 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison Overflights Day	5	0	8.4	5	-0.3	-13	-20.8	0	0.0	1	0.4	-109	-3.1
			10	1	7.0	4	-0.1	-9	-18.4	0	0.0	0	0.0	-62	-2.3
			20	0	-0.7	0	-0.6	-10	-19.1	0	0.0	0	0.0	-15	-1.6
			50	1	0.2	1	1.8	3	1.8	0	0.0	0	0.0	31	0.6
			100	1	0.0	1	0.1	2	0.9	0	0.0	0	0.0	17	0.4
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3

Table 15: Comparison Table for Tranquillity Sites in Relation to Overflight Daytime Option 3 vs Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison Overflights Day	5	0	9.4	5	-0.3	-12	-25.4	0	0.0	1	0.4	-117	-3.0
			10	2	8.6	4	-0.1	-10	-22.0	0	0.0	0	0.0	-69	-2.3
			20	1	0.8	0	-0.6	-9	-18.1	0	0.0	0	0.0	-19	-1.7
			50	2	1.1	1	1.8	4	2.7	0	0.0	0	0.0	28	0.5
			100	1	0.0	1	0.1	2	0.9	0	0.0	0	0.0	17	0.4
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3

his selection of tables is reproduced from Section 4. They demonstrate how the pattern and scale of positive and negative daytime overflight effects on areas with a tranquillity related designation is broadly similar across the three options, so this metric does not provide any strong evidence for or against a particular option.

5.2.9 Biodiversity

The HRA screening report concluded that, with respect to HRA criteria, that none of the ACP Options would result in any likely significant effects on any European site with respect to their conservation objectives. Biodiversity therefore does not provide any differentiating factor to inform the choice of preferred option.

5.2.10 Capacity/Resilience

Section 4 provides a qualitative description of how our options would improve capacity and resilience resulting in reduced delays compared to the baseline. This benefit is down to the modernisation and reconfiguration of the route structure, and in particular the introduction of new departure routes over the Firth of Forth. This is common to all our options and so capacity/resilience does not provide a differentiating factor between our options.

5.2.11 General Aviation/access

Annex G describes the benefits and impact of the controlled airspace structures required to accommodate our options compared to today. There is, however, no difference between the controlled airspace structure required for each of the options and so it is not a differentiating factor.

5.2.12 Economic impact from increased effective capacity

This is related to our capacity/resilience category above. The benefits from reduced delays as a consequence of capacity and resilience improvement would have an economic value to airlines but as the assessment was qualitative this cannot be monetised. In any case the benefit would be of equal measure across all three options and so it is not a differentiating factor.

5.2.13 Fuel burn

The CO_2e consequences described above are the direct consequence of reduced fuel burn because each tonne of aviation fuel burnt generates 3.18 tonnes of CO_2e.

Table 16 below shows the performance of each option with respect to fuel for 2027-2036, alongside the monetised benefits to airlines and ultimately their passengers. As with CO_2e the shorter routes in Option 1 generate the highest benefit scores.

Table 16: Fuel burn for the 10-year period 2027-2036

Option	Fuel difference to baseline (tonnes)	Monetised Benefit (NPV)
Option 1	38,856	£20,483,480
Option 2	27,845	£14,665,398
Option 3	35,689	£18,805,067

5.2.14 Other costs

The data in Section 4 shows that the identified costs for air traffic control, the airport or airlines are an order of magnitude smaller than noise, environmental and fuel impacts and so are not significant. Furthermore, any costs are the same across each option so do not provide a differentiating factor.

5.2.15 Design principles

To consider the performance of the FOA options against the Design Principles it is useful to split them into two groups.

The first group is those Design Principles broadly relating to noise, overflight, CO_2e and the government policy that tells us how they should be balanced (these are listed as DP7 to DP12). The FOA has involved collection of detailed noise, overflight and CO_2e data which show how the performance of Option 1, 2 and 3 differ – this is described in the earlier part of this section. The policy implications of these differences, and how that has influenced our choice of preferred design, is discussed in detail in the following section 5.2.16.

In terms of the rest of the Design Principles, which cover a range of subjects from operational/technical requirements, though to Local Air Quality, there is no difference between the options, with each having been developed to meet this group of Design Principles to an equal degree.

5.2.16 Summary and conclusion considering performance against the 'without airspace change' baseline

Table 17 on page 349 provides a summary of the conclusions of our comparison against each of the ANG altitude-based priorities listed at the start of this section and Table 18 on page 350 does the same for the AMS objectives.

We believe that when taken as a whole this indicates Option1 to be the best overall performing across these ANG and AMS criteria.

No other CAP1616 FOA category listed above provided differentiating evidence of significance between the options, with the exception of fuel burn costs, for which the conclusions mirror those for CO_2e presented in Table 17.

The overall benefits of Option 1 compared to the baseline and the other options is demonstrated in the cost benefit comparison, which shows Option 1 produced the best overall NPV when compared to the 'without airspace change' baseline. This was £74m over 10 years compared to £71m for Option 3 and £38m for Option 2. The NPV calculations therefore also supports the selection of Option 1 as the preferred option for consultation.

Table 17: Altitude-based priorities and a summary of how they have been assessed

Altitude-based Priority (ANG 2017)	Summary of Comparison
a) In the airspace from the ground to below 4,000ft, the government's environmental priority is to limit and, where possible, reduce the total adverse noise effects on people	In terms of the monetised reduction in adverse effects between Option 1 and Option 3 are similar, both providing a significant benefit. When compared to today Option 2 would increase total adverse effects, and as this objective to minimise adverse effects from noise has primacy, this alone is a reason to discard Option 2.
b) Where options for route design from the ground to below 4,000ft are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements	Neither Option 1 or 3 is, of itself, consistent with existing arrangements because both involve fundamental redesign to PBN. However, the distribution of adverse impact from Option 1 is more consistent with that of the existing published airspace arrangements than those of Option 3. Option 2 was not similar in terms of adverse noise effects and so was not assessed for consistency with published arrangements.
c) In the airspace at or above 4,000ft to below 7,000ft, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the government's overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO_2 emissions	This comparison shows Option 1 has better performance than Option 3 across more of the categories for the Nx metrics, whereas there is more of an even spread across the overflight categories in Option 1 and Option 3. Option 2 results were not directly compared to either because it has already been discounted on the basis of the primary noise metrics. None of the options increased CO_2e.
d) In the airspace at or above 7,000ft, the CAA should prioritise the reduction of aircraft CO_2 emissions and the minimising of noise is no longer the priority;	Option 1 includes the shortest version of all the routes and so contributes to the biggest reduction in CO_2e. Option 3 is a relatively close second, and while Option 2 still provides a sizable benefit, it is significantly the worse than both the other Options.

Table 18: Assessment against AMS objectives

AMS objective	Summary of Comparison
Safety: 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	All the options were based on PBN operating principles that would reduce complexity, which in turn would be expected to enhance future safety compared to the 'without airspace change' baseline.
Integration of diverse users: 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)	All the options were based around the same design for controlled airspace. In all cases the needs of other airspace users have been balanced with the need to ensure that commercial traffic on PBN routes has the required protection of controlled airspace, and sufficient airspace for air traffic control to ensure safety in unusual circumstances or bad weather. This has meant more airspace in some areas and less in other.
Simplification, reducing complexity and improving efficiency: 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	All the options were based on PBN operating principles that will reduce complexity. Although no specific capacity gains would be achieved by any of the designs they all incorporated new routes that would help flights avoid congested parts of UK airspace and so avoid delay. The options all offered operational efficiency benefits in terms of reduced fuel burn with Option 1 performing best.
Environmental sustainability: 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 ANG and, in doing so, will take account of the interests of all stakeholders affected by the use of airspace	As discussed in Table 17 Option 1 comes out on top with respect to ANG criteria.

5.3 Geographical comparison of options with respect to noise and overflight contours

We believe the case for Option 1 presented above is robust, however, we recognise that communities will tend to have focus on their own locality, and so we have taken an extra step of comparing our options against one another geographically with respect to noise and overflight impacts. This is to help show how different options would affect different communities, as this is not always clear from consideration of data tables and from separate comparisons against the baseline.

In this section, we qualitatively compare the various noise and overflight contours for Option 1 vs 2, and Option 1 vs 3. We are using Option 1 as the comparator as the previous section concluded it is best overall compared to the baseline. The comparison is qualitative, identifying communities that are affected differently by each design, either positively or negatively.

This area-by-area comparison is not quantitative because the population count data is produced for the whole contour, and so it is not feasible to break down the overall population counts to compare different contours on an area-by-area basis.

For quantitative analysis of the contours as a whole see Section 4. This also has data to compare the options against the 'without airspace change' baseline.

There are too many individual contours to compare them all, and so for each noise category of contour, we have selected the lowest level analysed to show the contour's largest extent, and also a midpoint contour. For the overflight contour we have focused on its furthest extent, so we only show the five per day contour.

We have also focused on 2036 contours as these relate to larger traffic samples than 2027, and so the contours are larger and the comparison of features is clearer. The differences discussed would also be apparent in the 2027 samples, albeit less so. For the full set of contours for each option see Annex L.

In each of the Figures we show an inset picture of the overall area but as these figures are provided for comparison between the options, we focus in on the areas where the design, and therefore effects, of the options differ from one another.

The following sections refer to day and night periods, with the night period defined by the CAA as 11:00pm to 7:00am, with daytime 7:00am to 11:00pm.

5.3.1 Option 1 vs Option 2

5.3.1.1 LAeq contour comparison – Option 1 vs Option 2

Figure 1 on page 325 shows the 2036 51 and 57dBA LAeq 16Hr daytime contours Option 1 (green) and Option 2 (orange). The 51dBA contour is the larger outline of each colour. Figure 2 on page 353 shows the same for the 2036 45 and 51dBA LAeq 8Hr night-time contour.

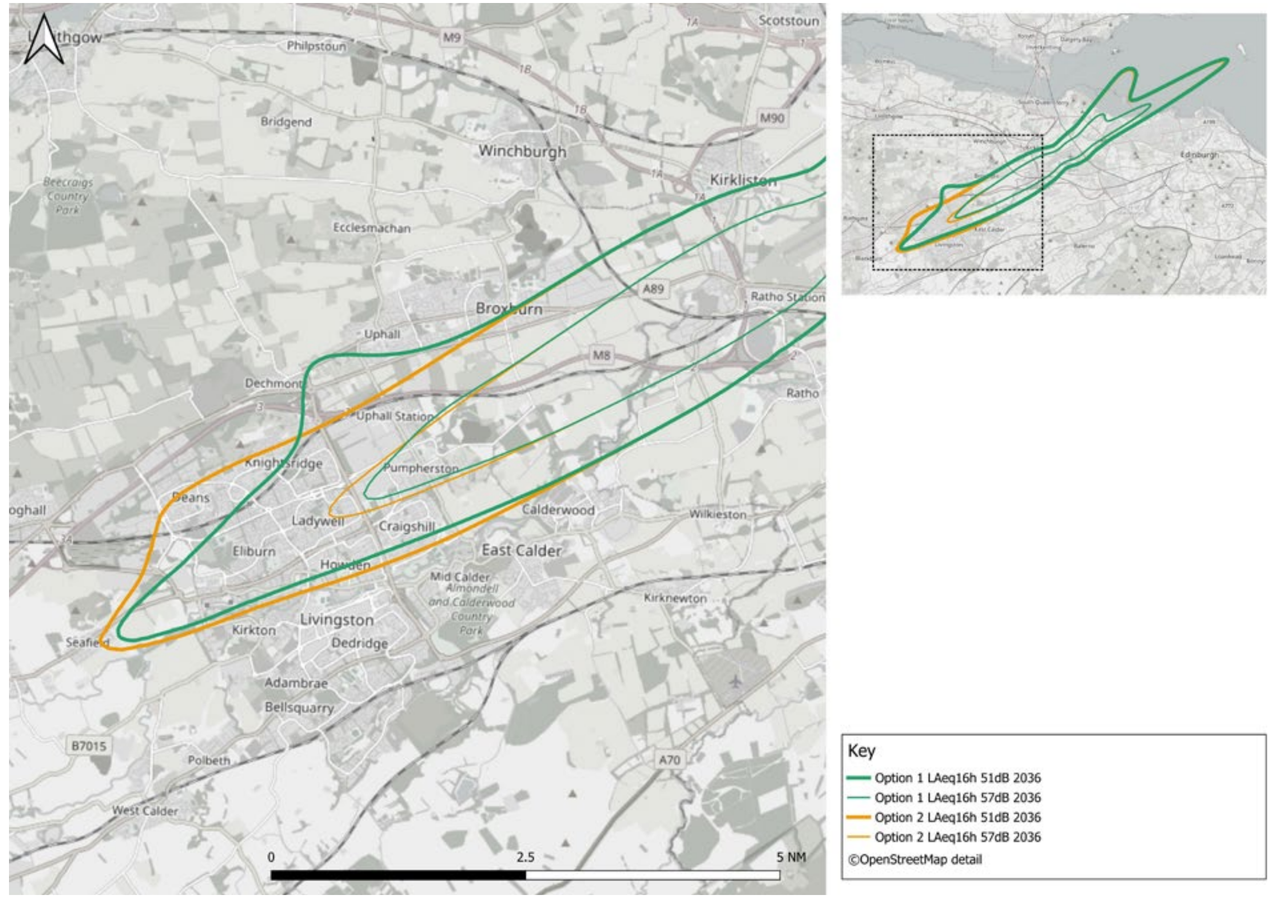


Figure 1: Option 1 vs Option 2 LAeq 16Hr daytime, 51 and 57dB.

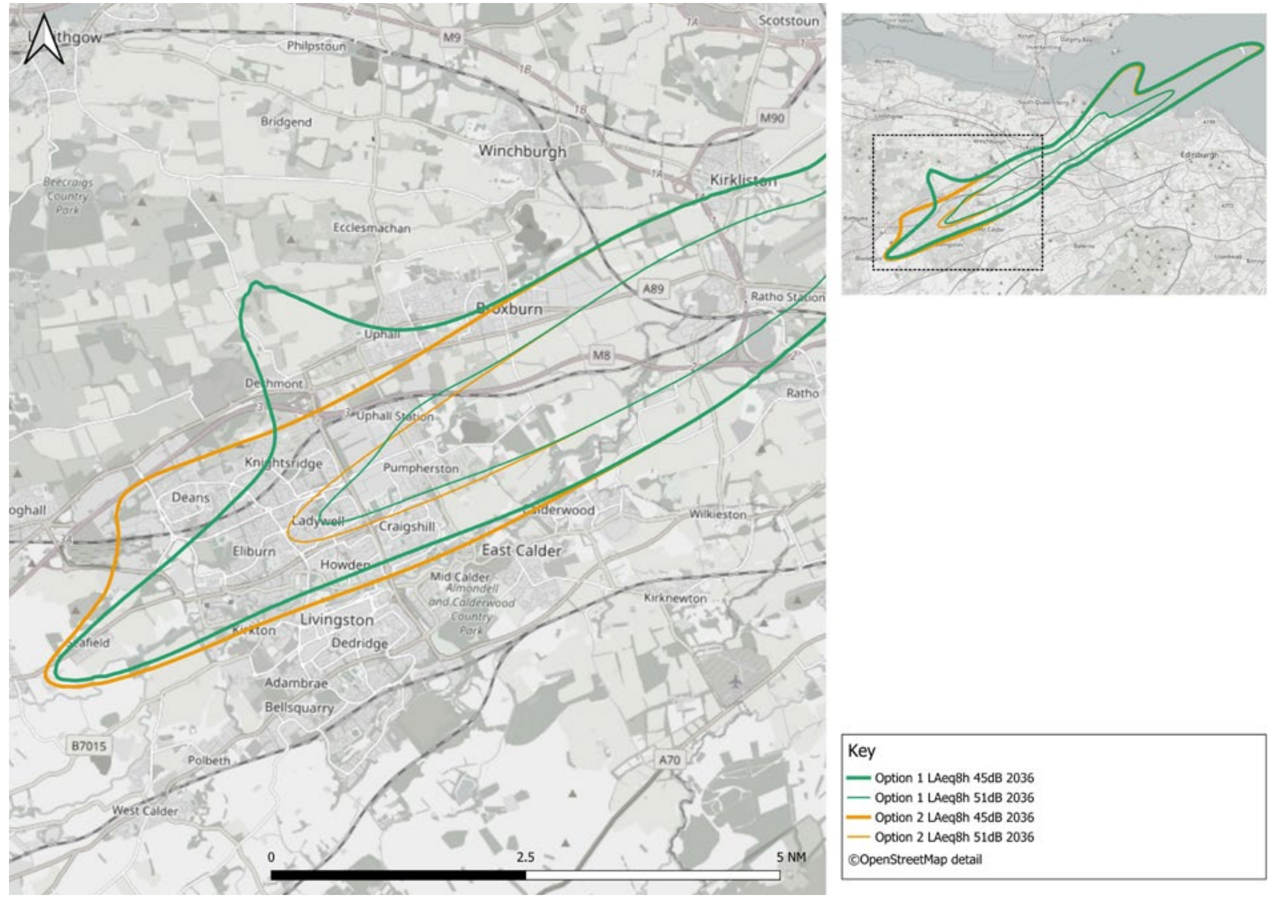


Figure 2: Option 1 vs Option 2 LAeq 8Hr night-time, 45 and 51dB.

Both Figure 1 and Figure 2 highlight how the early right turn in Option 1 off runway 24 departures creates a ‘node’ in the widest green contours (51dBA for daytime and 45dBA for night-time). This node is over Uphall and Dechmont and the relatively unpopulated countryside to the northwest of them.

In contrast, the orange contour of Option 2 has a less pronounced node further along the track that encompasses the more populated area of Deans. This is because the Option 2 route heads further westward before turning. The orange contours also extend further than the equivalent green contours around the southwestern end around to Howden and Craigshill. While these extensions are not as marked, they cover relatively heavily populated areas of Livingston.

The figures above do not show all the other contours to avoid complexity, but the 57dBA contours and 51dBA contours are also respectively shown on Figure 1 and Figure 2 to illustrate that similar differences, albeit less distinct, occur at other contour levels. For example, the Option 2 orange contours can be seen extending further over the populated Livingston area on both figures, whereas the small bulge to the north in the green contour is over a less populated area.

The overall difference in adverse effects between Option 1 and 2 shown in Table 3 on page 334 in Section 5.2.3 can be attributed to these LAeq differences (and similar in other contours not shown). In short when comparing the two options, the nodes unique to Option 1 more often tend to extend over less populated areas than those of Option 2.

5.3.1.2 Nx Contour Comparison – Option 1 vs Option 2

Figure 3 and Figure 4 present Nx contours at the N65 and N60 levels respectively. Nx is a secondary noise measure defined by the CAA and DfT. The DfT requires Nx to be considered at the 65dBA level for daytime and 60dBA level for night-time.

As can be seen from Figure 3 opposite and Figure 4 on page 351 the widest Nx contours tend to extend further out than the LAeq contours with more pronounced nodes.

Not all contours are shown here. For daytime N65 contours, Figure 3 illustrates the 5 flights per day and 50 flights per day contours. For night-time N60, Figure 4 shows 5 and 20 flights per night contours. These selections illustrate the lowest threshold (5 flights per day) and a midpoint. For the full set of contours see Annex L.

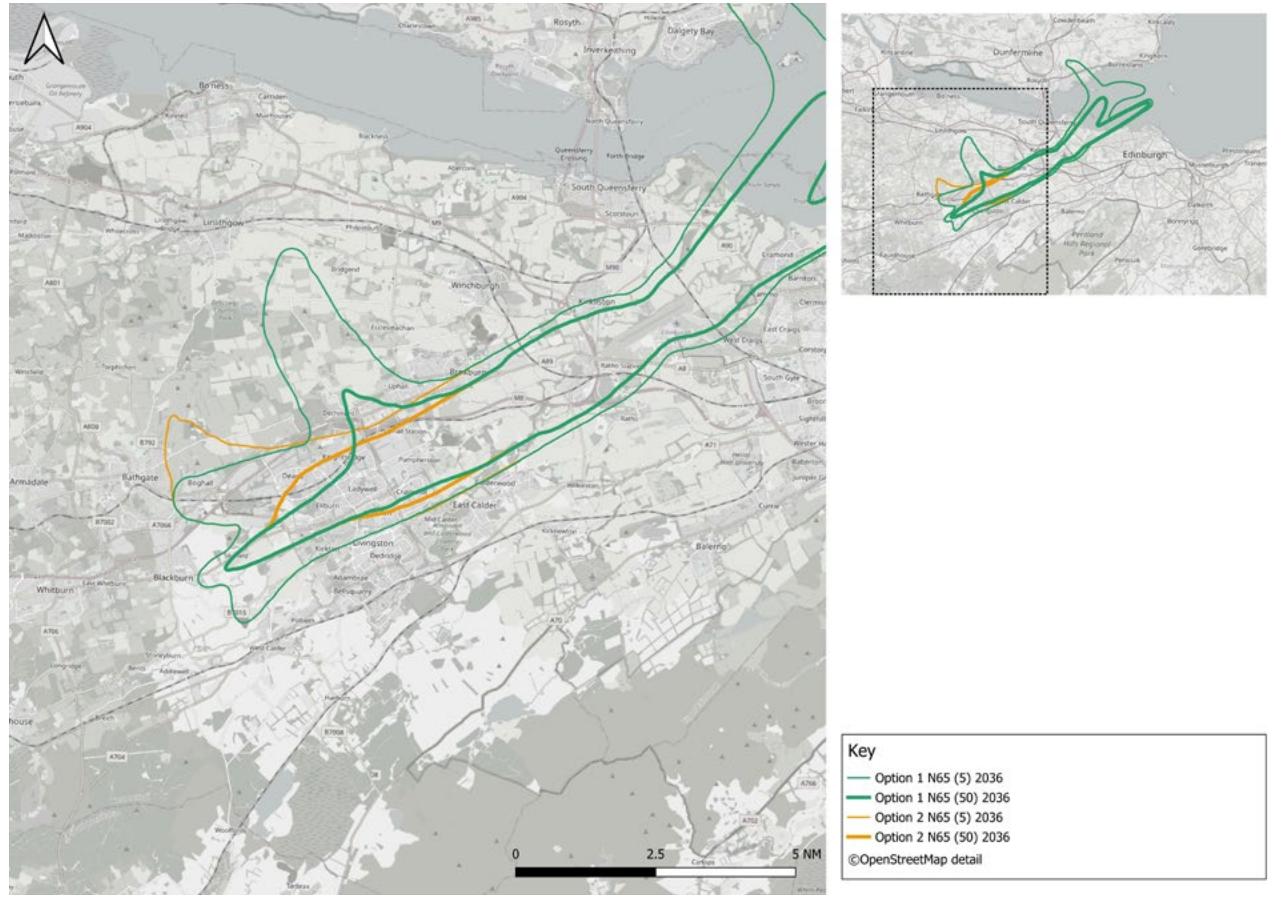


Figure 3: Option 1 vs Option 2 N65 daytime: 5 and 50 flights per day.

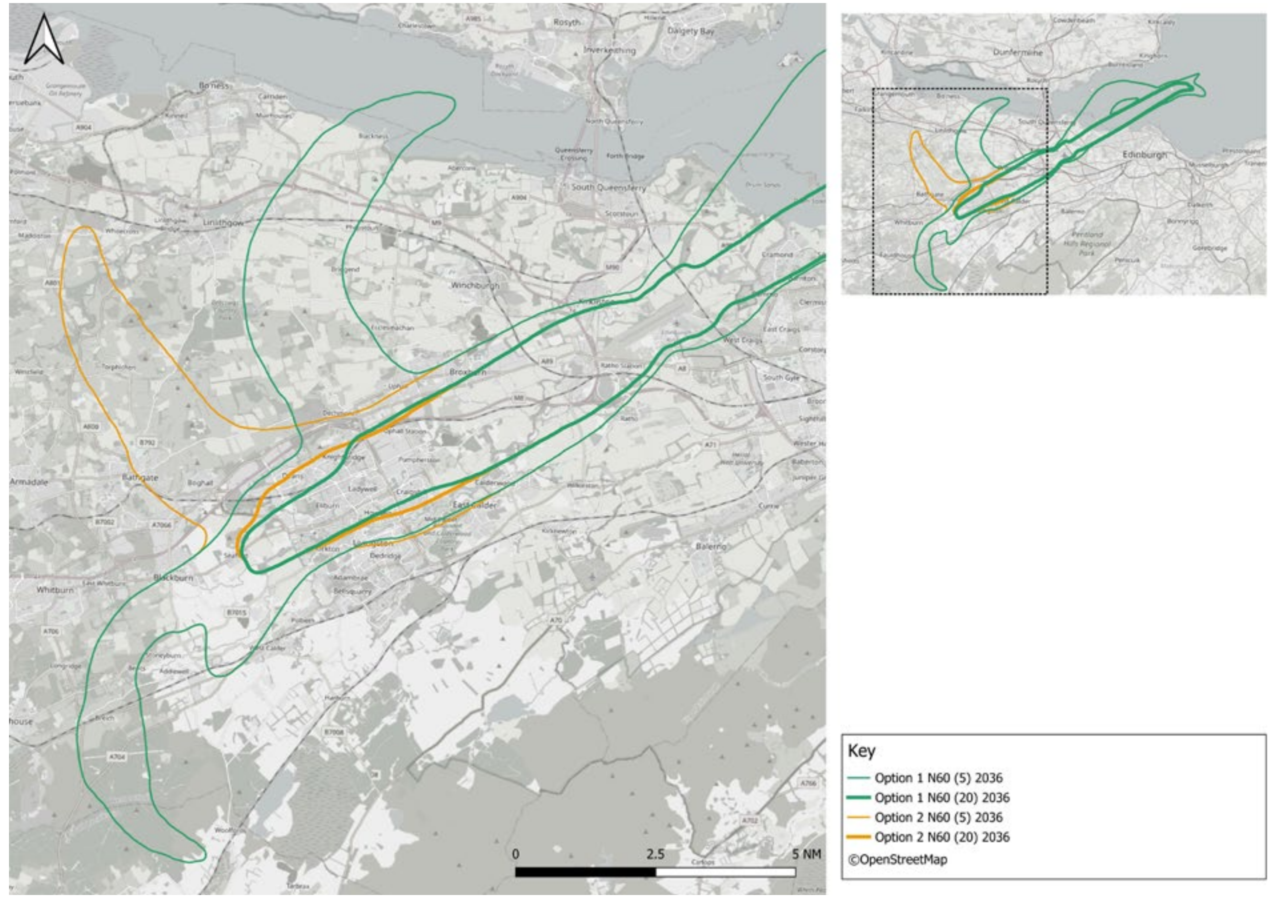


Figure 4: Option 1 vs Option 2 N60 night-time, 5 and 20 flights per day.

The N65 contour in Figure 3 also has nodes where the right turn is made. The node for Option 1 (green) largely covers relatively unpopulated areas, though parts of Uphall and Dechmont are inside the green but outside the orange, meaning they would be affected by Option 1 but not Option 2. The later node for Option 2 is less pronounced and the only additional populated area it captures is the northern edge of Boghall.

At the N65 50 flights per day level, the nodes are less distinct. However, there are still differences to note; the Option 1 (green) node extends over the relatively unpopulated M8 corridor north of Uphall Station, whereas Option 2 (orange) node extends the 50 flights per day area over parts of the more populated areas of Deans and Knightsridge.

Figure 4 shows the N60 contour for night-time. At 5 flights per night, the nodes for both early and late turns are more prominent than the N65 contour. This means that for N60, Option 1 (green) would affect more parts of Uphall and Dechmont than in the daytime, and further along the track it also overlays the eastern edge of Linlithgow and nearby villages such as Bridgend and Blackness (shown) and Champany and Kingscavil (not marked on map). By contrast, the later turn in Option 2 would capture the populated areas of Boghall and the eastern half of Bathgate, while further along its track it would capture the village of Torphichen.

At the 20 flights per night level, the N60 contours differ slightly where the earlier and later turns begin. The late turn for Option 2 (orange) creates a more pronounced bulge over the populated part of Livingston, resulting in more residents being within the 20 flights per night contour for Option 2 compared to Option 1.

5.3.1.3 Overflight contour comparison – Option 1 vs Option 2

The overflight contours for Option 1 and Option 2 exactly overlay one another except in the areas of the right turn off Runway 24. This area of difference is shown in Figure 5 opposite for the 5 overflights per day category. The night-time overflight contour is similar, but the nodes are less prominent.

The differences between Options 1 (green) and 2 (orange) for overflights bear similar characteristics to the N60 nodes described above.

For the full set of overflight contours, refer to Annex L.

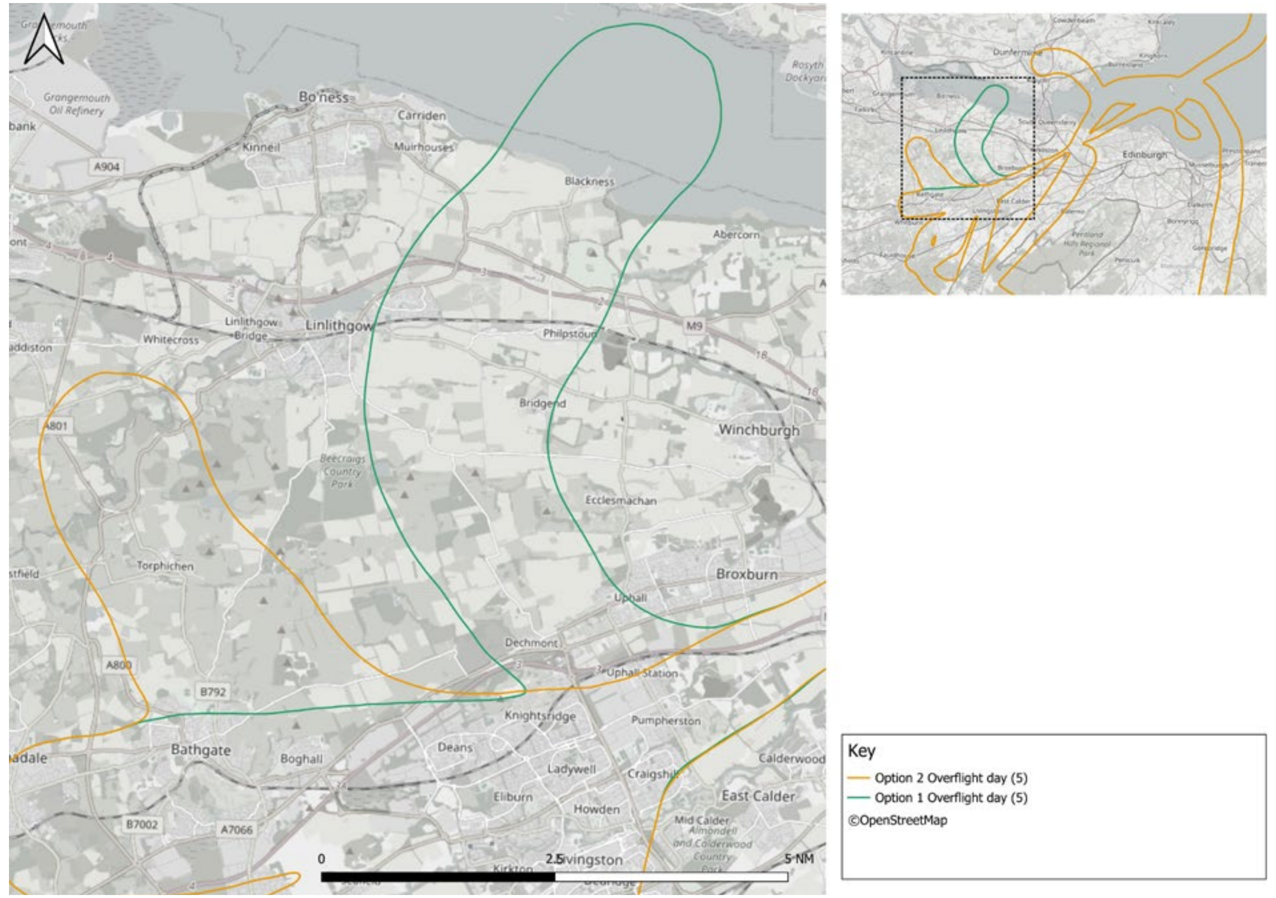


Figure 5: Option 1 vs Option 2 daytime overflights at 5 flights per day.

5.3.2 Option 1 vs Option 3

5.3.2.1 LAeq contour comparison – Option 1 vs Option 3

Table 3 in 5.2.3 showed that Option 1 and Option 3 would both provide a significant overall benefit with respect to adverse effects.

Figure 6 opposite shows the 51dBA LAeq 16Hr contour for 2036, showing the difference between Option 1 (green) and Option 3 (red). Figure 7 on page 358 shows the same for the 45dBA LAeq 8Hr contour.

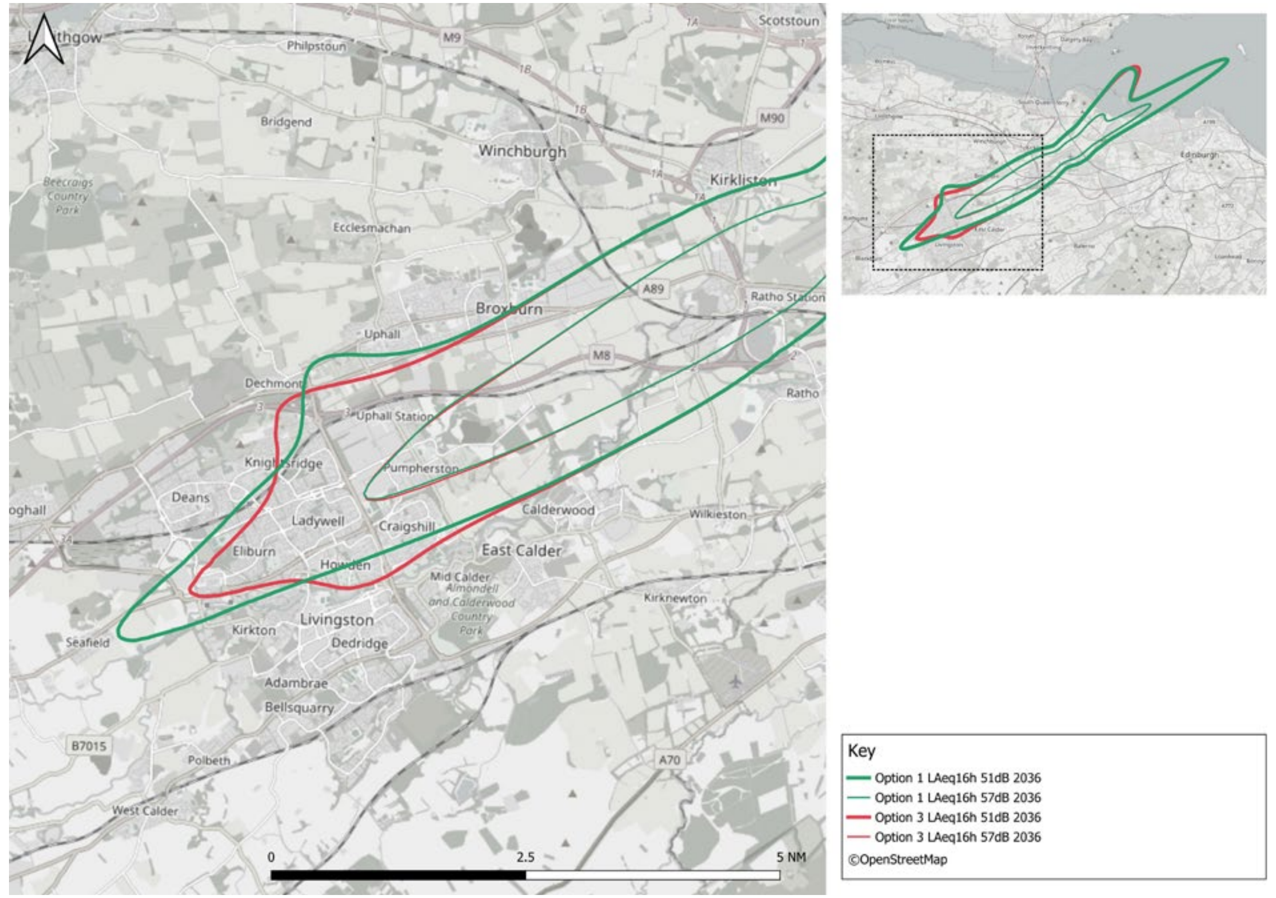


Figure 6: Option 1 vs Option 3 LAeq 16Hr daytime, 51 and 57dBA.

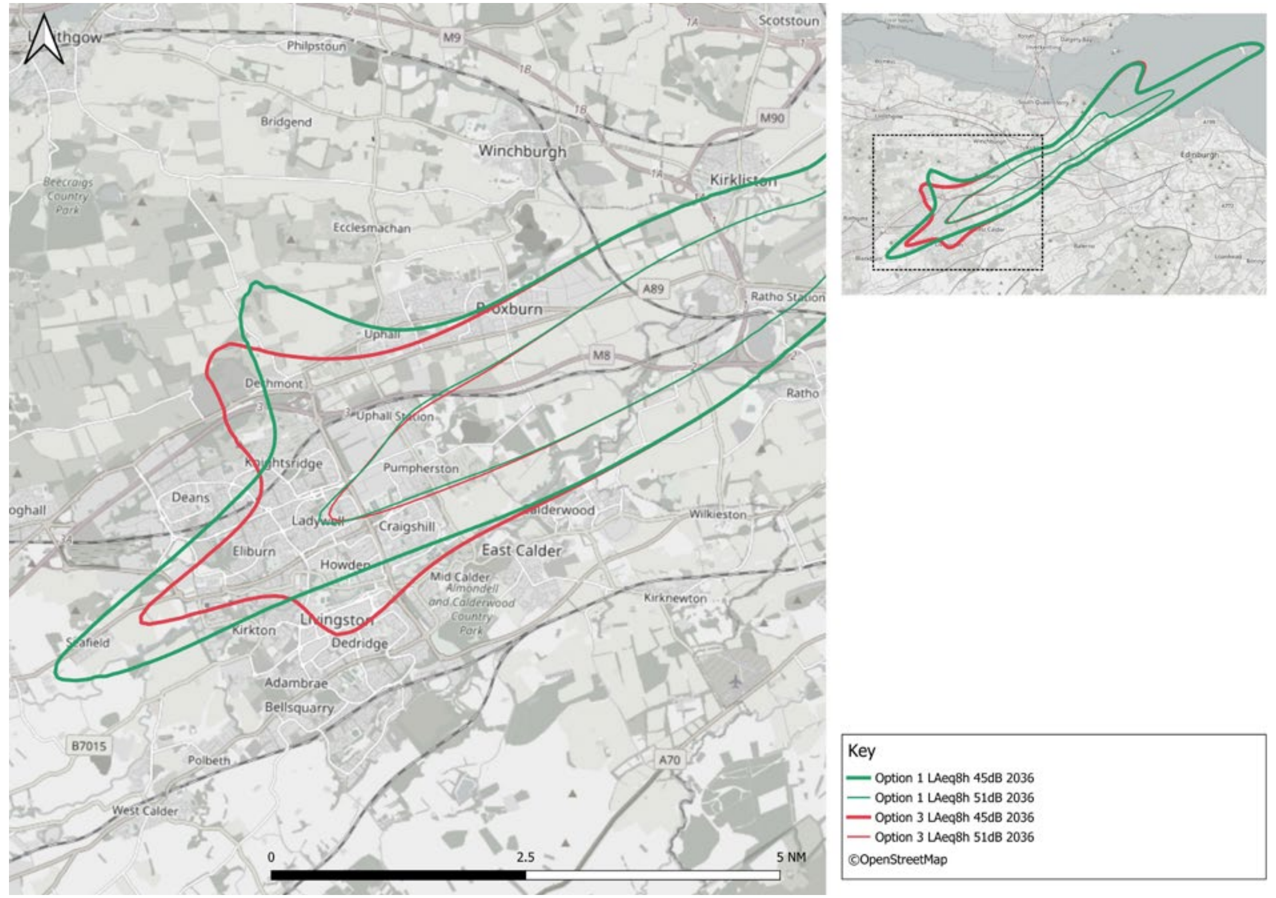


Figure 7: Option 1 vs Option 3 LAeq 8Hr night-time, 45 and 51dBA.

Figure 6 and Figure 7 highlight how the early right turn in both of runway 24 departures for Option 1 (green) and Option 3 (red) creates a node in the 51dBA daytime and 45dBA for night-time). For Option 1 (green) this node is over Uphall and Dechmont and the relatively unpopulated countryside to the northwest of them, whereas for Option 3 there is less impact on Uphall but there is a shift in the night-time contour towards Dechmont and the Knightsridge area of Livingston. The Figure 7 45dBA contour for Option 3 (red) also captures the area west of Dechmont where the Bangour Village development (not marked on map) is under construction.

To the southwest and south, the green contours extend further along the extended centreline of the runway because the southbound departures in Option 1 do not turn until the western edge of the Livingston conurbation. By contrast the Option 3 red contours are shorter and wider capturing more of Craigshill, Howden and Dedridge.

The diagram does not show all the other contours to avoid complexity, but the 57dBA contour is shown. This shows that at that level, the contours are practically indistinguishable, from which it can be inferred that contour levels above that would likewise be indistinguishable.

Section 5.2.3 has described how the net adverse effects in Option 1 and Option 3 are similar. Therefore, while these contours do affect some different areas, the net effect is broadly neutral.

5.3.2.2 Nx Contour Comparison – Option 1 vs Option 3

As can be seen from Figure 8 opposite and Figure 9 on page 360 the Nx contours tend to extend further out than the LAeq contours with more pronounced nodes.

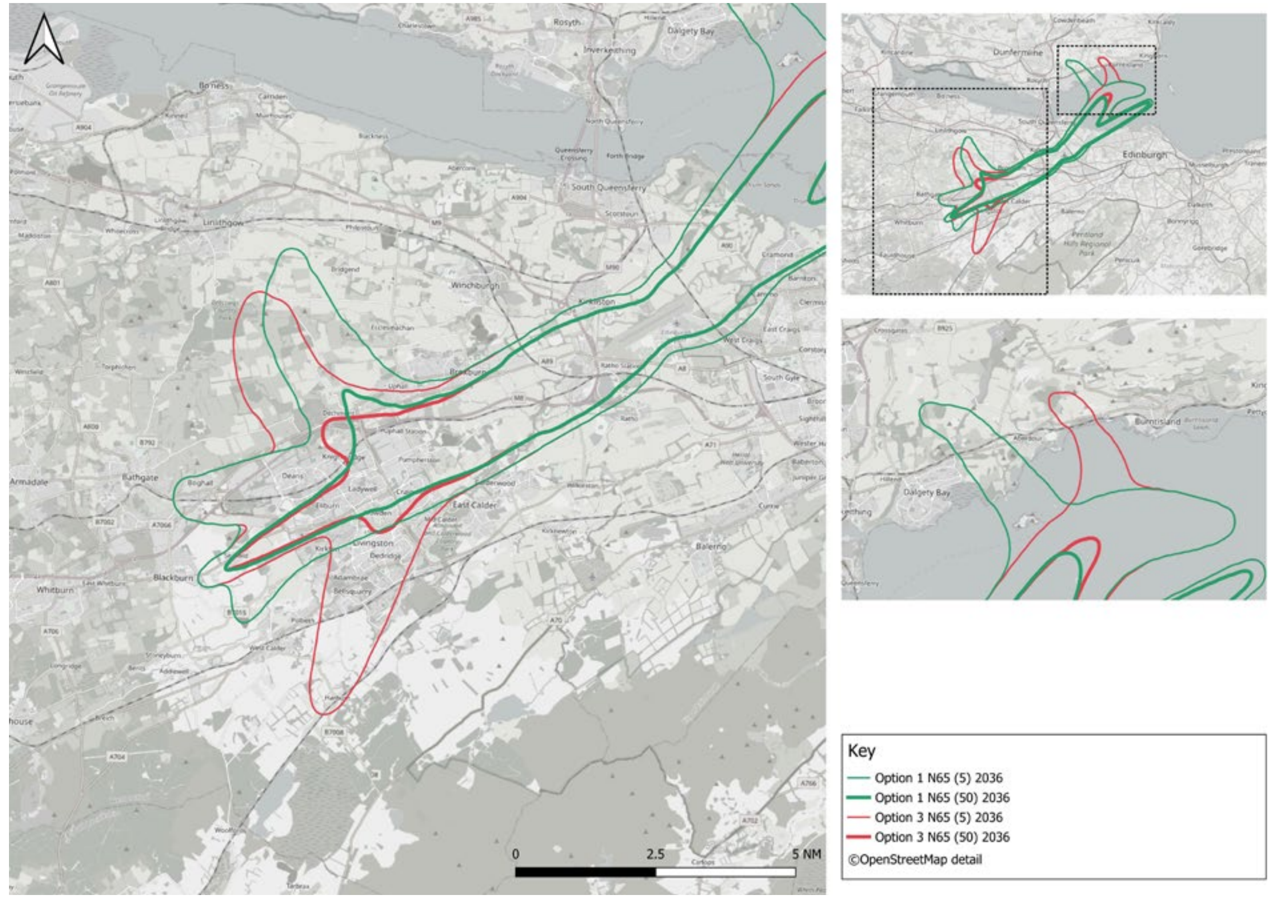


Figure 8: Option 1 vs Option 3 N65 daytime, 5 and 50 flights per day.

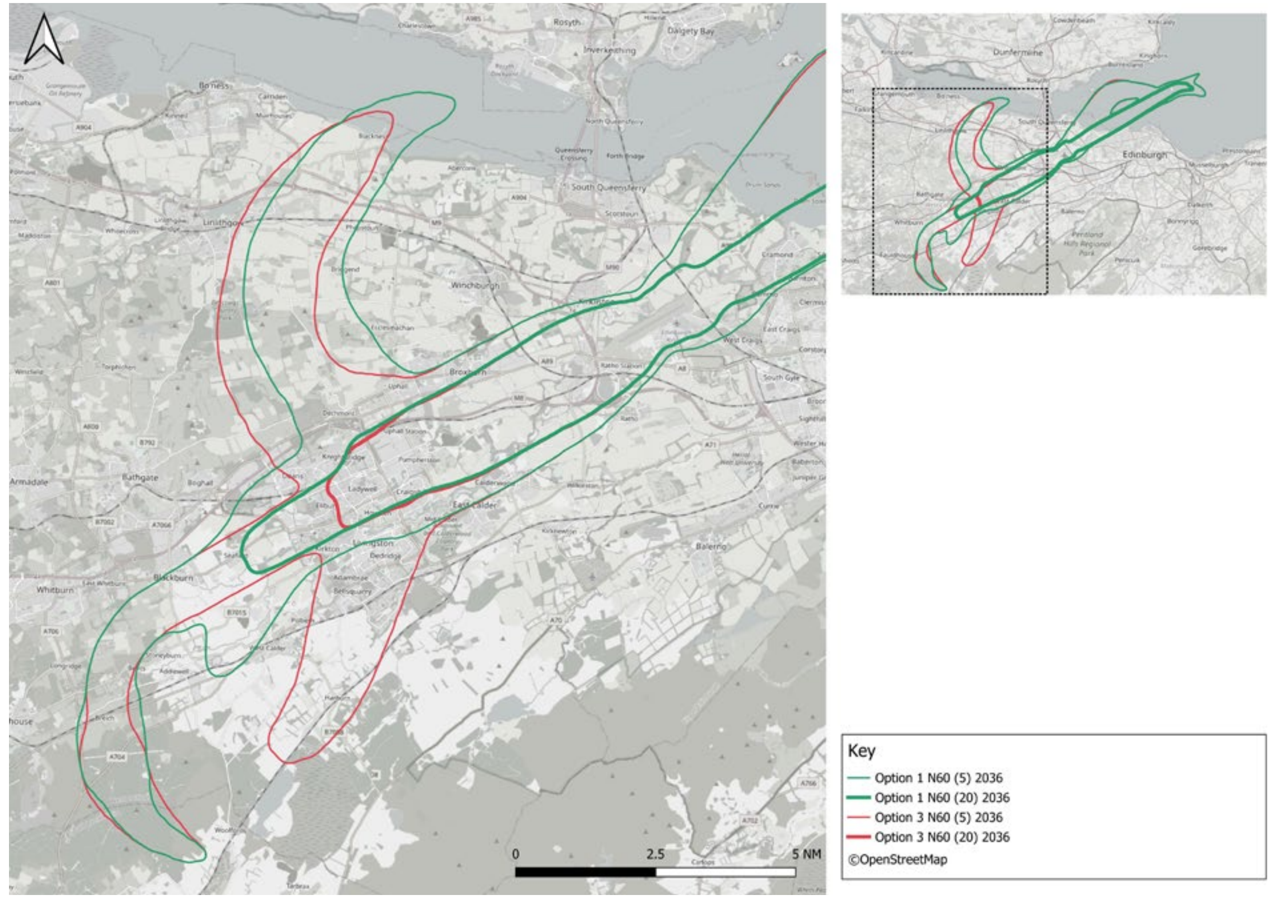


Figure 9: Option 1 vs Option 3 N60 night-time, 5 and 20 flights per day.

The N65 and N60 5 per day/night contours (Figures 8 and 9) show extended nodes where the right turn is made for both Option 1 (green) and Option 3 (red). These largely overlap – both capturing Dechmont – but for Option 3 the node is slightly further west. This means at their base, the additional area covered by Option 1 (green) affects the western end of Uphall, while the additional areas covered by Option 3 (red) instead cover areas west of Dechmont where the Bangour village development is under construction (not marked on map).

The N60 5 per night contour Figure 9 for both options extend over the eastern edge of Linlithgow, with the Option 1 (green) contour covering less of Linlithgow at the expense of extending further east over Bridgend and towards Philipstoun.

The Option 3 (red) contour also capture the Beecraigs Country Park.

To the south, nodes are apparent on both the N65 and N60 5 per day/night where departures on the STRAT and SKIRL departure routes turn southwest. This node for Option 3 (red) captures a significant part of the populated areas of Dedridge, Adambrae and Bellsquarry, whereas Option 1 (green) better avoids population by skirting West Calder. This benefit of Option 1 is, however, offset by the extension of the N60 20 per night contour which additionally captures Livingston Village.

Note that the long, curved node over Breich extended towards Woolfords is the path of the arrivals that is common to both Option 1 and 3.

To the northeast of the airport towards Fife, the N65 5 per day contour Figure 8 shows how Options 1 and 2 (both covered by the green on this map as this turn is identical in both Option 1 and Option 2) turns inside Aberdour, while Option 3 (red) turns outside it. Both nodes avoid being over populated areas. The N60 contours in Figure 9 do not make landfall for either option.

5.3.2.3 Overflight contour comparison – Option 1 vs Option 3

The daytime overflight contours at 5 flights per day for Option 1 and Option 3 (Figure 10 opposite) are comparable except for the nodes for the right turn off runway 24, the left turn off runway 06, and a small node in the southwest where the runway 24 turns to the southwest differ.

The right turn off runway 24 exhibits a similar characteristic to those discussed above for the N60 contours.

To the southwest the notable difference is that the Option 1 (green) 5 per day overflight contour captures most of West Calder where Option 3 (red) has a gap in its equivalent contour, and by contrast Option 3 (red) captures Polbeth where Option 1 (green) has a narrow gap.

To the north, the nodes for the left hand turn off runway 06 follow the turn of the routes to the west with the Option 3 (red) 5 per day overflight contour capturing the eastern side of Aberdour and part of Burntisland, whereas Option 1 (green) captures the western side of Aberdour, the eastern side of Dalgety Bay and encroaches over the southeast of Dunfermline.

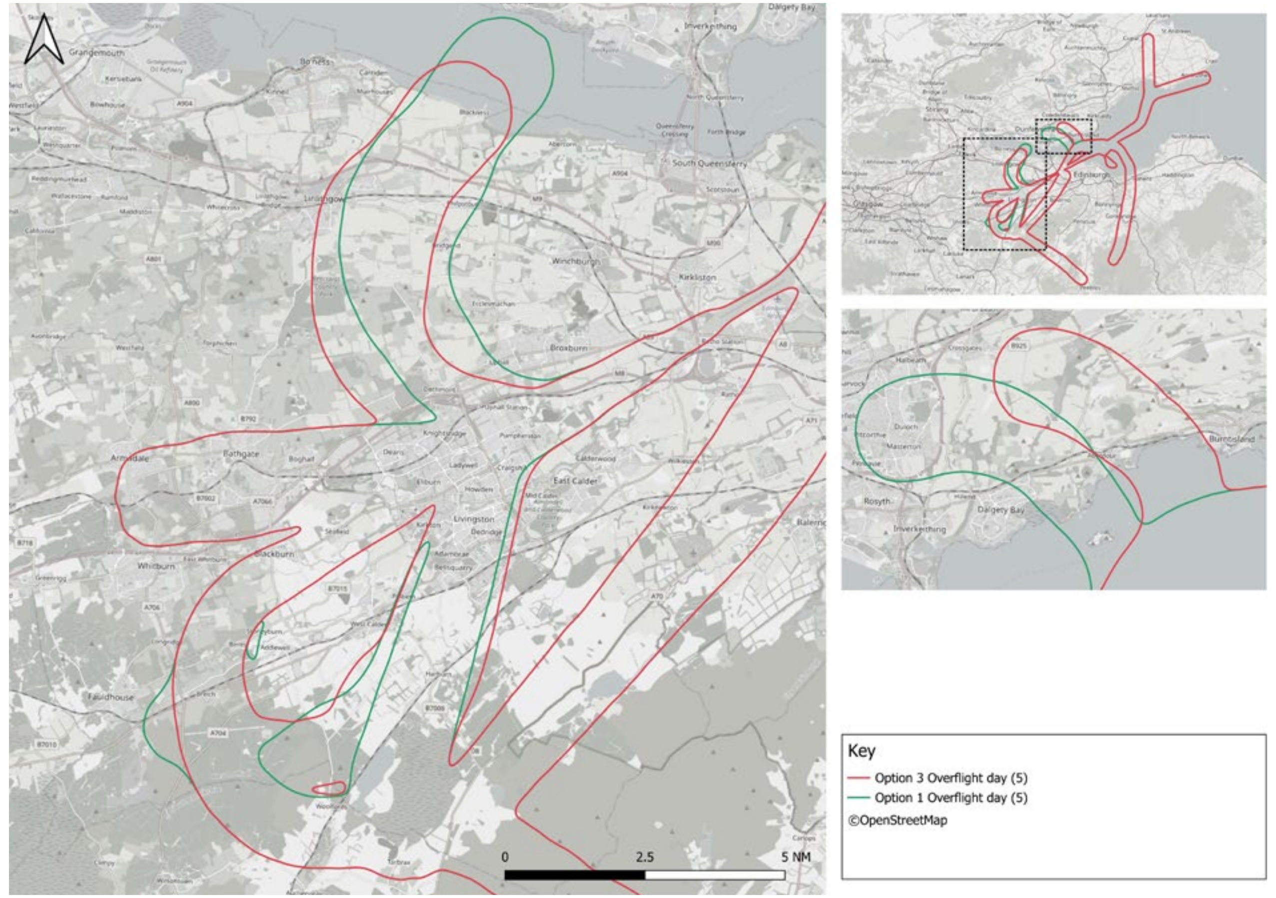


Figure 10: Option 1 vs Option 3, daytime overflights at 5 flights per day.

5.4 Conclusion – selection of preferred option for consultation

Section 5.2 concludes that the quantitative comparison of the Options with respect to their FOA performance indicates that Option 1 best meets the ANG objectives that the government places on airspace change sponsors. The data shows that when compared to the baseline 'without airspace change,' Option 1 provides a significant benefit across the 10-year analysis period. This is evaluated at £74.0m. The scale of this monetised figure represents the economic value of improved health and well-being, reduced CO_2e, and reduced fuel costs for airlines (which would be expected to filter down into reduced costs for the travelling public)[4].

The geographical comparison of options in Section 5.3 showed that there are large areas where the effects of each option would be the same or similar. However, there are some differences where the routes in the options deviate from one another. This comparison did not identify any extenuating local circumstances that would justify deviating from the option shown to best meet government guidance. However, geographical comparison does show how the choice of options would affect some communities differently.

On the basis of this information we are focusing our consultation on Option 1. While we discounted Option 2 and 3, all the information in the FOA will be available alongside the consultation document, for stakeholders wishing to see the detail of the other options considered.

We believe that the rationale for the choice of the preferred option presented here is sound, and that our choice represents the best overall solution in terms of the government's objectives and presents a tangible net benefit to our all our stakeholders including local communities as a whole.

Note that preferred option has been fed into the **Description of the proposed system-wide design for the Scottish (ScTMA) Cluster of the Airspace Change Masterplan** produced by ACOG. Please see this document for details of the overall system benefits and impacts include our change alongside those of Glasgow Airport and NERL

Please see our consultation website at **https://www.edinburghairport.com/whats-your-view** for the full set of consultation information, including less technical descriptions of Option 1 and an overview of the design journey that got us to it.

[4] The overall figure also captures some other costs but these are orders of magnitude smaller and not relevant to the decision.

Annex A: Glossary of Terms

Edinburgh Airport is consulting on changes to arrival and departure routes to and from the airport and on changes to the airspace surrounding the airport. These proposals are part of an industry-wide drive led by the Civil Aviation Authority (CAA, who regulate the UK's airspace) to modernise the UK airspace infrastructure. This document forms part of our consultation document set for our Edinburgh Airport airspace change proposals.

This document is intended to be read alongside our main consultation document and provides consultees with a glossary of terms used within that document.

Acronym	Term	Description
ACOG	Airspace Change Organising Group	A separate and impartial body set up on the direction of the Department for Transport and the Civil Aviation Authority to coordinate the Airspace Change Proposals required to deliver airspace modernisation.
ACP	Airspace Change Proposal	A proposal (usually from an airport or air navigation service provider) to change the design of UK airspace in line with the CAA's CAP1616 guidance.
	ACP Sponsor	An ACP Sponsor is the organisation (usually an airport or an air navigation service provider) that owns and develops an ACP to make a change to the notified airspace design in accordance with the CAA's airspace change process (CAP1616).
ADS-B	Automatic Dependent Surveillance Broadcast	A means by which aircraft can automatically transmit and/or receive data as appropriate in a broadcast mode via a data link.
	Adverse local air quality impacts	Changes resulting in a negative effect on the measure of pollutants in the air in the areas closest to the airport.
	Airway	An airway has no physical existence but can be thought of as a motorway in the sky. Each airway starts and finishes at a waypoint.
AIP	Aeronautical Publication	A publication which contains details of regulations, procedures and other information pertinent to the operation of aircraft in the particular country in which it relates.
	Airspace users	Any person or body that accesses airspace infrastructure, for example, commercial airlines, cargo operators, passengers, the military and general aviation.
AMS	Airspace Modernisation Strategy	A document published by the CAA that outlines actions to be undertaken to meet UK Government's targets for the aviation industry. This includes providing more choice and value for consumers, through the capacity for airlines to add new flights, reduce flight delays and enhance global connections that can help boost the UK economy, while continuing to improve safety standards. You can find this at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8960
AMSL	Above Mean Sea Level	
ANSP	Air Navigation Service Provider	An organisation that provides navigation services to aircraft in its airspace.

Acronym	Term	Description
ATC	Air Traffic Control	The ground-based personnel and equipment concerned with controlling and monitoring air traffic within a particular area.
ATS Routes	Air Traffic Service Routes	A generic term to describe a specified route designed to channel the flow of traffic as necessary for the provision of air traffic services. This includes airways and arrival and departure routes amongst others.
ATZ	Aerodrome Traffic Zone	A volume of airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.
CAA	Civil Aviation Authority	The UK's specialist aviation regulator responsible for the regulation of aviation safety in the UK, determining policy for the use of airspace, the economic regulation of designated airports and ANSPs, the licencing and financial fitness of airlines and the management of the ATOL financial protection scheme for holidaymakers. The CAA co-sponsors airspace modernisation. The CAA is a public corporation of the Department for Transport.
CAF	Cumulative Analysis Framework	Considers where cumulative impacts from the interdependent design options from conflicting ACPs below 7,000ft may affect stakeholders on the ground and the collective impacts of all the ACPs in a cluster when they are added together. The CAF incorporates the outputs that are available from the Initial Options Appraisal conducted by ACP sponsors on their design options in Stage 2 of the CAP1616 process, the Full Options Appraisals conducted in Stage 3 and the Final Options Appraisal conducted in Stage 4.
CAP, e.g. CAP1616	Civil Aviation Publication	A document published by the CAA on a particular subject in relation to matters that they regulate. These may include, for example, guidance, advice, consultation, decisions and others.
CAP1616	Civil Aviation Publication 1616	Also known as "Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements" – a document published by the CAA, which contains a set of requirements and guidance that airports need to follow when applying to make changes in the way their controlled airspace is operated. You can find this at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8127
	Community	People who live in a particular area or place.
CAS	Controlled Airspace	A block of airspace in which air traffic control services are provided. The specific air traffic control provider will decide the safest and most efficient routing for every aircraft (taking into account the surrounding conditions including the weather and other aviation traffic).
	Centreline	The nominal track for a published route.
	Collective Impact	Collates all the impacts (both positive and negative) of the ACPs contributing to the overall design when they are added together consistently, regardless of their impacts on specific stakeholders or locations.

Acronym	Term	Description
	Concentration or Concentrated	Refers to a density of aircraft flight paths over a given location; this generally refers to high density where tracks are not spread out. This is the opposite of dispersal.
	Conflict	Described as two or more ACPs that cannot both proceed in their proposed form because their design options are not compatible.
CCO	Continuous Climb Operations	An aircraft operating technique facilitated by the airspace and procedure design and assisted by appropriate ATC procedures, allowing the execution of a flight profile optimised to the performance of the aircraft leading to significant fuel economy and environmental benefits in terms of the reduction of both noise and emissions.
CDO	Continuous Descent Operations	An aircraft operating technique facilitated by the airspace and procedure design and assisted by appropriate ATC procedures, allowing arriving aircraft to descend from the optimal cruise position with minimal thrust and avoids level flight to the extent permitted by the safe operation of the aircraft and compliance with published procedures and ATC instructions.
	Conventional Navigation	The historic navigation standard where aircraft fly with reference to ground based navigational aids.
	Conventional Route	Routes defined to the conventional navigation standard ie using ground-based navigation beacons to determine their position.
CQA	Candidate Quiet Area	Defined as a location that meets specific criteria for low noise levels, providing a quiet environment.
CTA	Control Area	Controlled airspace extending upwards from a specified limit above the earth. CTAs are situated above the Aerodrome Traffic Zone (ATZ) and afford protection over a larger area to a specified upper limit.
CTR	Control Zone or Controlled Traffic Region	Controlled airspace extending upwards from the surface of the earth to a specified upper limit. Aerodrome CTRs afford protection to aircraft within the immediate vicinity of an aerodrome.
	Cumulative Impact	Where two or more routes from different ACPs are positioned in the same portion of the airspace below 7,000ft, creating culminative adverse effects for people on the ground in a specific location.
dB	Decibels	A unit used to measure the intensity of a sound (or the power level) of an electrical signal by comparing it with a given level on a logarithmic scale.
DfT	Department for Transport	Along with the CAA, co-sponsor airspace modernisation and oversee ACOG's work. The DfT works with agencies and partners to support the transport network that helps the UK's businesses and gets people and good travelling around the country. The DfT is a ministerial department supported by 24 agencies and public bodies.
DP	Design Principle	Encompass the objectives that the airport seeks to achieve through an airspace change, including safety, policy, environmental and operational factors. Design Principles are set through engagement with stakeholders at Stage 1 of the process and they guide the airspace designers to create suitable flight path options at Stage 2.

Acronym	Term	Description
DPE	**Design Principle Evaluation**	An evaluation of each design option against each design principle which forms part of Stage 2A of the CAP1616 process.
	Dispersal or Dispersion	Refers to the density of aircraft flights paths over a given location, this generally refers to lower density – flights that are spread out. This is the opposite of concentration.
	Disproportional	Where there is a clear disparity between one aspect over another without a particular reason or justification. In relation to the airspace design, this is when one feature of a flightpath design is favoured over another, for example, noise versus track miles.
EAL	**Edinburgh Airport Limited**	
	Easterlies	When a runway is operating such that aircraft are taking off and landing in an easterly direction.
	Final Approach	The final part of an arrival flight path that is directly aligned with the runway.
FASI North or FASI (N)	**Future Airspace Strategy Implementation North**	A combination of airspace redesign modules that comply with the UK's Future Airspace Strategy through the provision of Performance Based Navigation (PBN) routes which include, Standard Instrument Departures (SIDs) and Standard Arrival Routes (STARs) which facilitate continuous climb and continuous descent operations, user preferred routes, flexible use of airspace and simplified boundaries between controlled and uncontrolled airspace. The redesign and modification will include the Manchester Terminal Control Area, Scottish Terminal Control Area, Belfast Terminal Control Area and Irish Sea sector operations. Source: https://www.caa.co.uk/our-work/publications/documents/content/acp20177116/
FL	**Flight Level**	The altitude above sea level in 100 feet units measured according to a standard atmosphere. A flight level is an indication of pressure, not of altitude. Only above the transition level (which depends upon the local QNH but is typically 4,000ft above sea level) are flight levels used to indicate altitude; below the transition level 100s of feet are used.
FLARM	**Flight Alarm**	FLARM (an acronym based on FLight AlaRM) is the proprietary name for an electronic device which is in use as a means of alerting pilots of small aircraft, particularly gliders, to potential collisions with other similarly equipped aircraft.
	Flight Path	The track flown by an aircraft when following a published route or following directions from air traffic control.
	Flight path predictability	Flight paths are designed to accommodate modern air navigation systems which have an accuracy of 95% of aircraft flying within 1 nautical mile of the designed track. This makes the flight path predictable. It increases systemisation and therefore airspace capacity aiding both the pilot and the air traffic controller.

Acronym	Term	Description
ft	**Feet**	The standard measure for vertical distance used by air traffic control.
	Flyable	Suitable for flying or being flown. The climbs, descents and turns on the newly designed flight paths will be such that RNAV-equipped aircraft will be able to fly them safely during normal aircraft operations.
FOA	**Full Options Appraisal**	The second appraisal required by the CAP1616 process that builds on the work carried out as part of the Initial Options Appraisal (IOA).
GA	**General Aviation**	All civil aviation flying, other than commercial airline operations, which encompass a wide range of activity, such as gliding, ballooning, sport and recreational flying and corporate business jets, and others.
	Hold or Holding Stack	A published airborne hold, sometimes referred to as a holding stack, is a structure for arriving aircraft to fly in a racetrack pattern at assigned altitudes and speeds whilst awaiting instructions from air traffic control to commence their approach for landing.
HRA	**Habitats Regulation Assessment**	A process that determines whether or not development plans could negatively impact local plans on a recognised protected European site beyond reasonable scientific doubt. This is required by all competent authorities.
ICAO	**International Civil Aviation Organisation**	A specialised agency of the United Nations that coordinates the principles and techniques of international air navigation, fostering the planning and development of international air transport for safe and orderly growth.
IFP	**Instrument Flight Procedures**	A published procedure used by aircraft flying in accordance with instrument flight rules, which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route or a standard instrument arrival.
IFR	**Instrument Flight Rules**	A set of regulations under which a pilot must fly if the weather conditions are beyond the limits where it is safe to fly by visual references.
ILS	**Instrument Landing System**	A ground-based instrument approach system that provides precise vertical and lateral guidance to aircraft approaching and landing on a runway, using a combination of radio signals to enable a safe approach and landing even during poor weather and low visibility.
	Interdependency	In this context, two or more ACPs that are linked in some way. For example, there is a potential conflict in their design options or there is a potential cumulative impact on stakeholders on the ground.
IOA	**Initial Options Appraisal**	A qualitative appraisal of an airspace design option against a baseline, "do nothing" scenario, as required at Stage 2B of CAP1616.

Acronym	Term	Description
LAeq		The most common international measure of noise, meaning "equivalent continuous sound level". This is a measurement of sound energy over a period of time.
LAeq 16h		The A-weighted Leq measured over the 16 busiest daytime hours (07:00 – 23:00) is the normal time period used to develop the airport noise contours for daytime operations.
LAeq 8h		The A-weighted Leq measured over the 8 busiest nighttime hours (23:00 – 07:00) is the normal time period used to develop the airport noise contours for nighttime operations.
	Lower Airspace	Airspace in the general vicinity of the airport containing arrival and departure routes below 7,000ft. Airports have the primary accountability for the design of this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency.
	Masterplan	Developed by ACOG, this is the single coordinated implementation plan for the ACPs required to modernise the airspace through to 2040.
MSL	Mean Sea Level	
NAP	Noise Abatement Procedures	Designed to minimise exposure of residential areas to aircraft noise whilst ensuring safety of flight operations.
NATS	National Air Traffic Services	The main air navigation service provider in the United Kingdom. It provides en-route air traffic control services to flights within the UK flight information regions and Shanwick Oceanic Control Area. It also provides air traffic control services to 14 UK airports.
NERL	NATS En-Route PLC	The regulated subsidiary of NATS that provides the en-route air traffic control services to flights within the UK flight information regions and Shanwick Oceanic Control Area.
	Network Airspace or Upper Network	En-route airspace above 7,000ft in which NATS (NERL) has accountability for the safe and efficient air traffic services for aircraft travelling between UK airports and the airspace of neighbouring states.
nm	Nautical Mile	Aviation measures lateral distance in nautical miles. one nautical mile is 1,852 metres whilst one statute (road) mile is 1,609 metres making a nautical mile 15% longer than a statute mile.
NSRs	Noise-sensitive receptors	Buildings or sites, which may be particularly sensitive to noise due to the specific nature of their operations or users, these include – schools, nurseries, hospitals, retirement homes etc.
NTK	Noise Track Keeping	A system that monitors and records radar data to monitor aircraft operations and report statistics focussed on aircraft noise.

Acronym	Term	Description
	Overflying	An aircraft in flight passing an observer at an altitude of less than 7,000ft can be said to be overflying. A technical definition of overflight to be used for design purposes is contained within CAP 1498 which includes lateral, vertical and noise parameters. You can find out more at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7749
PANS OPS	Procedures for Air Navigation Services Aircraft Operations	Contained in ICAO document 8168 which sets out the design criteria and rules for instrument flight procedures which include approach and departure procedures.
PBN	Performance Based Navigation	An aircraft navigation system that utilises global navigation satellite systems instead of land-based infrastructure. Suitably equipped aircraft use PBN to fly along predetermined routes or to specific points in order to use airspace more efficiently and reduce air traffic controller and pilot workload.
	Procedurally deconflicted	Arriving and departing aircraft flight paths are designed so that aircraft using them are safely separated at all times. This means that aircraft flying these procedures are separated from each other (deconflicted) by design (published procedure of flight path).
	Protected characteristics	Specific aspects of a person's identity protected by the Equality Act 2010. These are: • age • gender reassignment • being married or in a civil partnership • being pregnant or on maternity leave • disability • race including colour, nationality, ethnic or national origin • religion or belief • sex • sexual orientation You can find out more at: http://www.legislation.gov.uk/ukpga/2010/15/contents For the purposes of the Airspace Change Programme, we will carry out an Equality Impact Assessment to ensure that we consider any difference in experiencing impacts of aircraft noise related to protected characteristics.
QFE		The atmospheric pressure at the aerodrome (airport) elevation, used to set the altimeter to read zero when the aircraft is on the ground.
QNH		The atmospheric pressure adjusted to mean sea level (MSL), used by pilots to set their altimeter for accurate altitude readings above sea level.
	Regional Cluster	The Masterplan ACPs are organised into four regional clusters based on the interdependencies between the ACPs and analysis into areas of the existing airspace where inefficiencies and delays are expected to worsen as traffic levels grow.

Acronym	Term	Description
	Respite	Planned or notified periods where overflights (i.e. their noise impact) is reduced or halted to allow communities undisturbed time.
RMA	**Radar Manoeuvring Area**	An ATC operational area articulated as a volume of airspace by the ANSP. It facilitates the close-in radar vectoring by ATC that is required to take the aircraft safely from a holding stack and establish onto final approach.
RNAV	**Area Navigation**	Capability of an aircraft to fly any desired flight path, defined by waypoints such as geographic fixes (LAT/LONG) and not necessarily by ground navaids.
RNAV1	**Area Navigation**	The suffix 1 denotes a requirement that aircraft can navigate to within 1nm of the published centreline of a route at least 95% of the time. In practice, accuracy is much greater than this minimum requirement.
RNP-AR	**Required Navigation Performance – Authorisation Required**	An advanced navigation performance under the PBN umbrella. AR refers to aircraft and operators complying with specific airworthiness and operational requirements. RNP-AR allows airspace designers to set extremely specific curved paths to a greater accuracy than RNAV1, these can be designed before and after the final approach fix.
RNP-RF	**Required Navigation Performance – Radius To Fix**	An advanced navigation performance under the PBN umbrella. RF refers to Radius To Fix which allows airspace designers to set extremely specific curved paths to a greater accuracy than RNAV1.
	Route	A specific lateral track and vertical profile designed for channeling the flow of air traffic as necessary for the provision of safe and efficient air traffic services.
SEA	**Strategic Enviromental Assessment**	A systematic process for identifying, reporting and proposing mitigation measures and monitoring the environmental effects of plans, programmes and strategies.
	Separation	Aircraft under air traffic control are kept apart by standard separation distances to agreed international safety standards. Participating aircraft are kept apart by at least 3nm or 5nm lateral separation (depending on the specific air traffic control operation) or 1,000ft vertical separation. Edinburgh Airport is normally permitted to operate with 3nm lateral separation and 1,000ft vertical separation.
SID	**Standard Instrument Departure**	A published set of instructions which a pilot will refer to when departing from the airport. The instructions detail which direction and ground-based beacons a pilot must navigate to.
STAR	**Standard Arrival Route**	A published set of instructions which a pilot will refer to when arriving to the airport. The instructions detail which direction and ground-based beacons a pilot must navigate to.
	Tactical Intervention	Air traffic control methods that involve controllers directing aircraft for specific reasons at a particular moment (see also “Vector”).

Acronym	Term	Description
TMA/ScTMA	**Terminal Manoeuvring Area/ Scottish Terminal Manoeuvring Area**	Can also be known as a Terminal Control Area. TMA is an aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of air traffic. The airspace surrounding Edinburgh and Glasgow Airport is described as the Scottish TMA. This is the area that contains all the arrival and departure routes for Edinburgh and Glasgow Airports from the surface to 6,000ft.
TMZ	**Transponder Mandatory Zone**	Airspace of a defined dimension where the carriage ond operation of a transponder is mandatory.
	Total adverse effects	The cumulative negative effects of a flight path, including noise, increased CO_2 emissions and the possible reduction of air quality.
	Trade Off	Used to describe the decision to resolve a conflict and could be between two or more sponsors of separate ACPs or between two or more competing objectives within a single ACP; such as achieving noise reduction whilst accepting a reduction in fuel efficiency improvements.
	Uncontrolled Airspace	Airspace where aircraft are able to fly freely without being constrained by instructions in routing or by air traffic control, although they may request information or a service from ATC.
	Vector or Vectored or Vectoring	A vector is a specific instruction given by an air traffic controller to a pilot to fly a particular compass heading (and altitude) to keep aircraft safely separated and maintain an expeditious flow of air traffic.
VFR	**Visual Flight Rules**	The rules that govern the operation of aircraft in Visual Meteorological Conditions (VMC); the weather conditions in which flight solely by visual reference is possible.
VMC	**Visual Meteorological Conditions**	The meteorological conditions expressed in of visibility, distance from cloud and ceiling equal to or better than specified minima.
VSA	**VFR Significant Area**	A volume of airspace which has been identified as being particularly important to VFR operations. A VSA may take the form of a route, a zone or an area chosen for its particular importance to VFR operations. These areas do not have any official status but are intended to highlight the importance of a specific area so that future airspace development plans can take account of that GA activity.
	Waypoint	A pre-determined geographical position that is defined in tems of latitude and longitude. Waypoints used in aviation are given 5 letter names and airways always start and finish at a nominated waypoint and airways may cross or join another airway at a waypoint making it safer and easier for aircraft to change from one airway to another. A waypoint is most often used to indicate a change in direction, altituse or speed along the desired path.
	Westerlies	When a runway is operating such that aircraft are taking off and landing in an westerly direction.

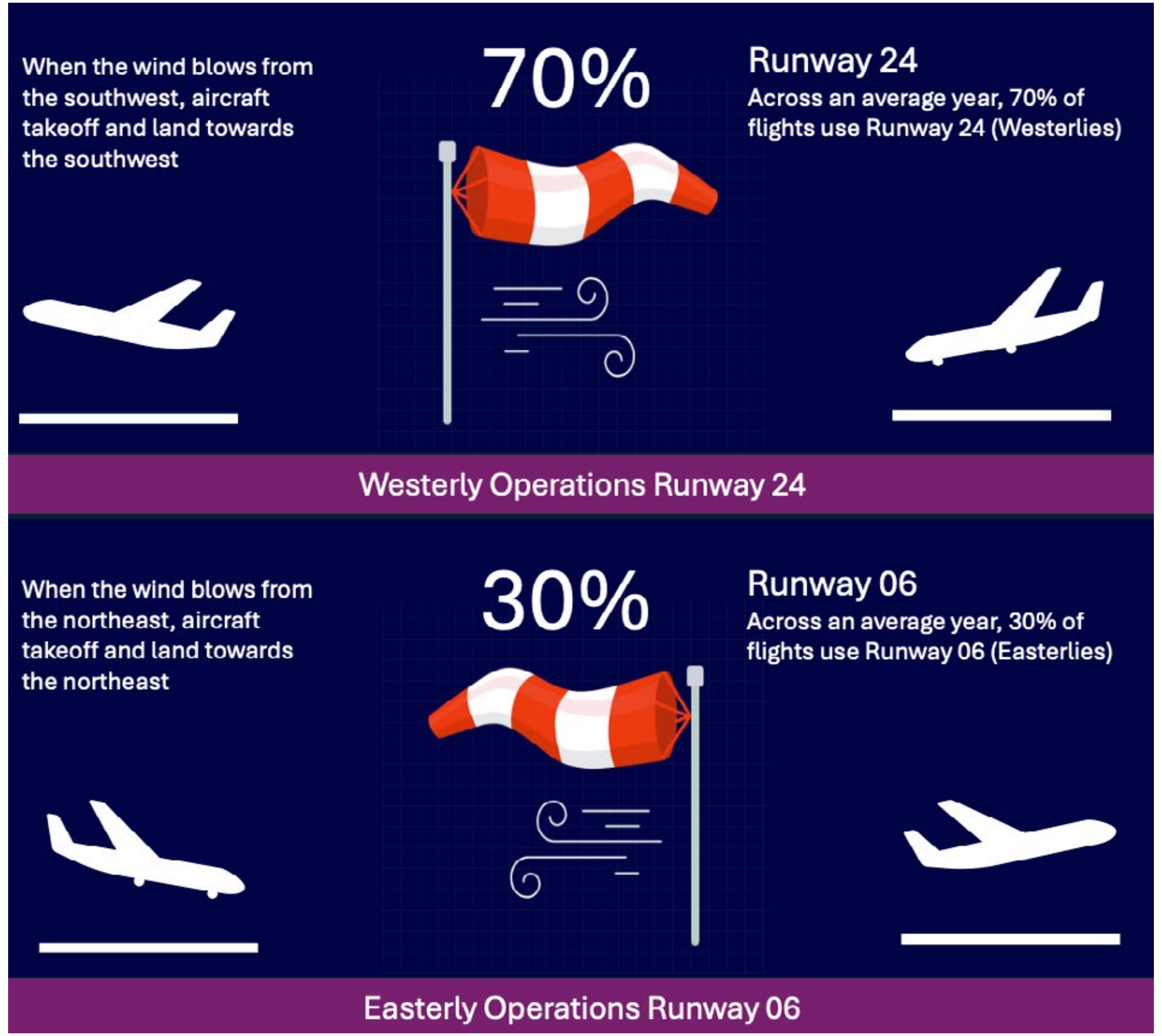
Airport/Aircraft Terminology

Aircraft Movement

An aircraft movement, sometimes known as an Air Transport Movement (ATM), is the landing or take-off of any aircraft at the airport.

How are runways used?

A runway may be used in two directions, depending mainly upon wind direction; as far as possible aircraft need to take-off and land into the wind.



The following images show a selection of the aircraft which are most frequently referred to in our consultation material.

Jet Airbus A319/A320/A321

The Airbus 320 family is widely used by operators at Edinburgh Airport such as easyJet, Jet2, British Airways.

Jet Boeing 737

The Boeing 737 aircraft is widely used by operators at Edinburgh Airport such as RyanAir and Jet2

Jet Airbus A350

The Airbus A350 is commonly used by some of our long haul operators at Edinburgh Airport such as Emirates and Qatar Airways.

Jet Airbus A330

The A330 is used by some of our long-haul operators at Edinburgh Airport such as Virgin Airways and Delta Airlines.

TurboProp ATR42/ATR72

The ATR is a twin-engine turboprop regional aircraft, developed and produced in France and Italy by aircraft manufacturer ATR. The number 72 or 42 in its name is derived from the aircraft's particular standard seating capacity and both types are commonly used by both LoganAir and Aer Lingus at Edinburgh Airport.

Air Navigation Terminology

Performance Based Navigation (PBN)

PBN utilises the currently available technology in the cockpit and the air traffic control facilities to enable more effective use of available airspace in terms of route placement which results in a more fuel-efficient network with optimised noise abatement. One of the key components of PBN is the ability of modern aircraft to accurately determine their exact position relative to a fixed point on the ground. Our current, legacy arrival and departure routes are predicated solely on ground based navigational aids, but it is now possible to establish an aircraft's position using a combination of sources – space based and ground based navigational aids plus the aircraft's own internal navigation system – which places each aircraft accurately on any desired flight path.

Known as RNAV (short for Area Navigation), this can be summarised as the ability of an aircraft to navigate, computing change of tracks from one point to another using only coordinates rather than any fixed navigational aid. Aircraft using RNAV are often said to be "on rails" ie they can follow a defined route accurately and repeatedly.

Instrument Landing System (ILS)

A ground-based instrument approach system that provides precise vertical and lateral guidance to aircraft approaching and landing on a runway, using a combination of radio signals to enable a safe approach and landing even during poor weather and low visibility. The ILS relies on physical infrastructure which is located on the ground at the airport.

***Insert TRAX ILS pic from Glasgow Glossary

Vectoring (also known as tactical controlling)

When there are no set routes for aircraft to fly within controlled airspace, pilots rely on instructions from air traffic control (ATC) to navigate them. These instructions can be a climb or descent instruction and/or a positioning instruction. To ensure the aircraft is flying in the correct direction, ATC will provide the pilot with a right or left turn instruction, usually combined with a compass heading to fly; this compass bearing will be between 001 and 360 degrees. This is known as vectoring.

At larger airports (like Edinburgh), ATC will have radar equipment to see where the aircraft are flying. In that situation it is known as radar vectoring.

Concentration

Refers to a density of aircraft flight paths over a given location; this generally refers to high density where tracks are not spread out. This is the opposite of dispersal.

Dispersion

Refers to the density of aircraft flights paths over a given location, this generally refers to lower density – flights that are spread out. This is the opposite of concentration.

VOR

VOR stands for Very High Frequency Omni-directional Range and refers to a type of navigational aid first introduced in the 1960s. It uses very high frequency radio signals emitted by radio beacons and transmits a signal that can be picked up by aircraft which they then use to navigate by.

DVOR

Doppler VHF Omni-directional Range, a specific type of VOR navigation beacon still commonly in use across the UK.

DME

DME stands for Distance Measuring Equipment; this piece of equipment is usually co-located with a DVOR and provides the pilot with the aircraft's distance from the DVOR.

NDB

NDB Stands for Non-Directional Beacon, a ground-based radio transmitter used to aid navigation and is used as an approach aid at airports.

Airspace Terminology

Controlled Airspace

Controlled airspace is a generic term for airspace in which an air traffic control service is provided and aircraft flying in that controlled airspace must follow instructions from air traffic controllers. Controlled airspace is provided mostly to protect its users, mostly commercial airlines. In the UK there are currently five classes of controlled airspace – A, C, D, E & G. The classification of the controlled airspace in which an aircraft is flying

determines how much control air traffic control provide. Responsibilities of the pilots and air traffic controllers differ amongst the different classes.

In the UK classes A, C, D & E are classed as controlled airspace, and more information can be found on the NATS website **here**.

ATZ

A volume of airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic

CTR

Controlled airspace extending upwards from the surface of the earth to a specified upper limit. Aerodrome CTRs afford protection to aircraft within the immediate vicinity of an aerodrome.

CTA

Controlled airspace extending upwards from a specified limit above the earth. CTAs are situated above the Aerodrome Traffic Zone (ATZ) and afford protection over a larger area to a specified upper limit.

*** Insert Trax picture of CTR, CTA, TMA and then Airway from the Glasgow Glossary

Aircraft Arrival Terminology

Holds/Holding Stacks

Aircraft are sometimes placed into holds or holding patterns which they are waiting their turn to land. Holds are typically used if there are multiple aircraft waiting to land and ATC need to delay other aircraft whilst one is landing. They can also be used when there is bad weather or at the request of the pilot.

Missed Approach

A missed approach occurs when the pilot or air traffic controller judges that an approach cannot continue to a safe landing. This may be due to weather or visibility making it difficult or when the aircraft is unstable and/or not aligned correctly with the runway.

Missed Approach Procedure

The published final approach procedure always has an associated missed approach procedure. This is flown when the aircraft is unable to land and the approach cannot be continued. It provides the pilot with a procedure to reconnect to the final approach procedure and make another attempt to land.

Annex B1 and B2: CAF2 report and CAF2 Technical Annex TBC

CAF2 report is being generated separately by ACOG and will be added in here as Annex B.

Annex C: Consideration of design principles when designing route scenarios for each runway direction

This Annex provides background how design principles were considered when we designed route scenarios for each runway direction as described in Section 2.1. We provide this table as background to demonstrate how the information referred to when developing route scenarios (Section 2.1) link to our design principles. For full details of how our design principles were developed see our Stage 2 material on the **CAA portal**.

Design Principle Number	Design principle	Consideration when developing the scenarios	Covered in the main document under:
DP1	The airspace design and its operation must be as safe or safer than it is today.	When developing the scenarios, the design team ensured compliance with national and international standards for airspace design and undertook operational viability assessments.	
DP2	Flight paths must be flyable and technically supported by air traffic control and airport technical management systems.		• Technical Instrument Flight Procedures (IFP) development and operational viability assessment (See section 2.1.1.2)
DP3	Flight paths must be designed to allow modern aircraft to use performance-based navigation (PBN) in line with CAA's modernisation strategy.		
DP4	Routes to/from Glasgow and Edinburgh airports must be procedurally deconflicted from the ground to a preferred level in coordination with NATS Prestwick.	Network and integration requirements (including separation requirements) were established through the collaborative design process and fed into the design team.	• Integration with the network airspace and neighbouring airports (See section 2.1.1.1)
DP5	The predictability of flight tracks must be maximised for consistency of operations.	The design team has designed all routes to PBN standards. The use of PBN ensures this DP.	• Technical Instrument Flight Procedures (IFP) development and operational viability assessment (See section 2.1.1.2)

Design Principle Number	Design principle	Consideration when developing the scenarios	Covered in the main document under:
DP6	Collaborate with other Scottish airports and NATS to ensure that the airspace design options are compatible with the wider programme of lower altitude and network airspace changes and accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it.	See DP4	• Integration with the network airspace and neighbouring airports (See section 2.1.1.1)
DP7	Flight paths should be designed to minimise the total adverse effect on health and quality of life created by aircraft noise and emissions.	In the pre FOA design of the scenarios the design team referred to population density maps as an indicator (as no detailed noise or air quality modelling was performed at this pre-FOA design stage). It was assumed that adverse impacts would be minimised by designing routes where the minimum altitude expected is below 4,000ft to avoid populated areas where possible. Portions of the tracks where the minimum altitude would be above 4,000ft are beyond the current day LOAEL contours and therefore unlikely to have adverse effects. ANG 2017 states where options for route design from the ground to below 4,000 feet are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements. Existing published airspace arrangements were therefore also a consideration for the design team.	• Local data represented by population, today's flight paths, 'GoldSET' maps and other airspace user requirements (See section 2.1.1.3)
DP8	For flightpaths at or above 4,000ft to below 7,000ft, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the government's overall policy on aviation noise, unless this would disproportionately increase CO_2 emissions.	When designing the scenarios the design team sought to make the routes from 4,000ft as short as possible while considering populations as shown on the population density maps (using population density as an indicator for where noise/overflight effects would occur and using route length as an indicator for fuel and CO_2 efficiency.	• Local data represented by population, today's flight paths, 'GoldSET' maps and other airspace user requirements (See section 2.1.1.3) • Route length was considered indirectly in so much that routes were designed to be as short as possible while being cognisant other impacts (See section 2.1.1.4)

Design Principle Number	Design principle	Consideration when developing the scenarios	Covered in the main document under:
DP9	Flight paths should be designed to minimise population overflown below 4,000ft and, between 4,000ft and 7,000ft, taking into account any potential adverse impact, due to those overflown having protected characteristics, as defined by the Equalities Act 2010.	Population density maps were used by the design team as described in DP7 and DP8. People with protected characteristics are considered to typically be distributed throughout population centres, other than where aggregated in facilities such as schools and hospitals – these were captured in the GoldSET data which was also used by the design team for identifying areas to avoid.	• Local data represented by population, today's flight paths, 'GoldSET' maps and other airspace user requirements (See section 2.1.1.3)
DP10	Flight paths should be designed to minimise overflying sensitive locations and noise-sensitive receptors (for example, the zoo, retirement complexes, green spaces, historic heritage sites, and others).	Where data on specific locations in these categories were captured in the GoldSET data which was used by the design team for identifying areas to avoid. Retirement homes were assumed to be typically distributed throughout population centres. Open water and transportation corridors (motorways in particular) were assumed to be relatively insensitive areas to additional noise. These therefore informed the GoldSET analysis and became a consideration for the design team as relatively favourable areas to position routes.	• Local data represented by population, today's flight paths, 'GoldSET' maps and other airspace user requirements (See section 2.1.1.3)
DP11	Flight paths should be designed to include track concentration and/or track dispersal options to provide noise respite.	The design team had the remit to design PBN procedures to deliver concentration on tracks that best achieved the other DPs (i.e. avoiding population and noise sensitive receptors where possible). Specific opportunities for respite and relief were identified by design team during their development of the scenarios: – Maintain and improve relief for Cramond when operating runway 06 by banking all departures left at the earliest possible point (this is referred to as the Cramond Offset). – Spread low level traffic over 4 routes rather than 3, by utilising the Firth of Forth as much as possible. Other respite solutions were reviewed and discontinued on the basis that there are outstanding safety issues and/or they would reduce capacity during busy periods.	• Potential applications of concentration, respite and relief (See section 2.1.1.5)

Design Principle Number	Design principle	Consideration when developing the scenarios	Covered in the main document under:
DP12	Flight paths should be designed with routes that minimise track miles and fuel burn.	When designing the scenarios, the design team sought to make the routes as short as possible (whilst addressing the noise related DPs which generally have precedence below 7,000ft).	• Route length (See section 2.1.1.4)
DP13	Flight paths should be designed to ensure efficient and effective route management.	When designing the scenarios the design team considered the requirements for effective and efficient route management in terms of ensuring the design was compatible with the network and operable by ATC at Edinburgh and Prestwick. The requirements for this were therefore the same as those listed for DP4.	• Integration with the network airspace and neighbouring airports (See section 2.1.1.1)
DP14	Requirements of airspace users should be taken into account when designing flight paths.	When designing the scenarios the design team were fed the requirement to minimise controlled airspace wherever possible and to take account of local airfields (for example Kirknewton which prevents an early left turn off RWY24).	• Local data represented by population, today's flight paths, 'GoldSET' maps and other airspace user requirements (See section 2.1.1.3)
DP15	Flight paths should be designed to minimise adverse local air quality impacts.	Local air quality impacts are only a possibility where there is a change in aviation emissions (by volume or location) below 1,000ft AAL, and the location of the emissions is within or adjacent to a designated Air Quality Management Area (AQMA). One AQMA was identified to the south west of the airport (Runway 06 arrivals and Runway 24 departures) where flights may be below 1,000ft (Glasgow Rd at Ratho Station). This is immediately southwest of the airport where flights will be heading straight in or straight out and so cannot be avoided by route design. There are no other AQMAs in to the southwest of the airport where tracks might be below 1,000ft. No AQMAs were identified to the north east of the airport (Runway 06 departures and Runway 24 arrivals) where flights may be below 1,000ft. Therefore this requirement was not considered further in the design of the scenarios. A detailed AQMA report was produced later for the FOA.	n/a

Design Principle Number	Design principle	Consideration when developing the scenarios	Covered in the main document under:
DP16	Airspace should be designed to maximise capacity in order to contribute economic benefits to Scotland, including tourism and trade.	The design team sought to design departure routes heading east and southeast over the Firth of Forth and the North Sea. These are part of the network requirements (DP4) which mean more of our departures avoid the congested airspace down the spine of the UK which can cause us ground delay and restrict our effective capacity – so this also contributed to this DP.	• Integration with the network airspace and neighbouring airports (See section 2.1.1.1)

Annex D: GoldSET and Population Analysis of Airspace Scenario Performance

1. Introduction

This report summarises the activities undertaken by WSP, in collaboration with Edinburgh Airport Limited (EAL) and their airspace design technical advisors, To70, to support the assessment of new flight path scenarios as part of EALs Airspace Change Programme (ACP).

Section 2 of the FOA describes how Edinburgh developed the options that were fed into the Full Options Appraisal (FOA). This document describes the data and metrics that informed that design process with respect to ground based environmental and social constraints and opportunities, including population density, noise sensitive receptors, areas of tranquillity, and biodiversity and heritage sites. This included use of WSP's GoldSET decision-support tool to generate a flight suitability surface.

Section 2 of the FOA describes the pre-FOA review of 16 scenarios were assessed using the GoldSET suitability surface and associated population data. The analysis generated performance indicators that facilitate comparison between the different scenarios to aid the identification of the most suitable options to take forward into the FOA.

2. GoldSET Multicriteria Decision Support Tool

2.1 Methodology

GoldSET is a decision-support tool that combines multicriteria analysis with stakeholder feedback to inform decision-making processes. The GoldSET methodology is a robust and systematic approach used to generate suitability surfaces for various applications. It integrates multiple data sources and criteria to create a comprehensive evaluation framework that guides design experts in making informed choices.

The GoldSET analysis took into consideration the design principles submitted to the CAA (Edinburgh Airport Stage 1 submission July 2021 amended, 23/7/2021) during Stage 1 of the ACP process. The design principles addressed by GoldSET are those centred around minimising flight path lengths, respecting areas of tranquillity, minimising impacts on sensitive receptors and minimizing impacts to overflown communities from noise and aircraft exposure. GoldSET does not capture any data relevant to design principles related to safety technical or operational criteria.

The GoldSET decision-making process used technical and non-technical spatial information that was selected by a team of Subject Matter Experts (SMEs) as relevant to the design objectives. The SMEs were drawn from organisations involved in the project: EAL is the airport operator and the sponsor of the ACP; To70 is an international aviation consultancy that provides technical guidance on flight path design; and WSP is a global engineering and professional services firm that provides environmental input to the ACP including the GoldSET analysis.

2.2 Data Sources and Study Area Definition

The GoldSET Study Area was centred on the airport runway with a radius of approximately 32 km[1] as this was the area in which aircraft were expected to be 7,000ft or below. This was truncated in the north at the northern boundary of Edinburgh Airport's controlled airspace (Figure 1).

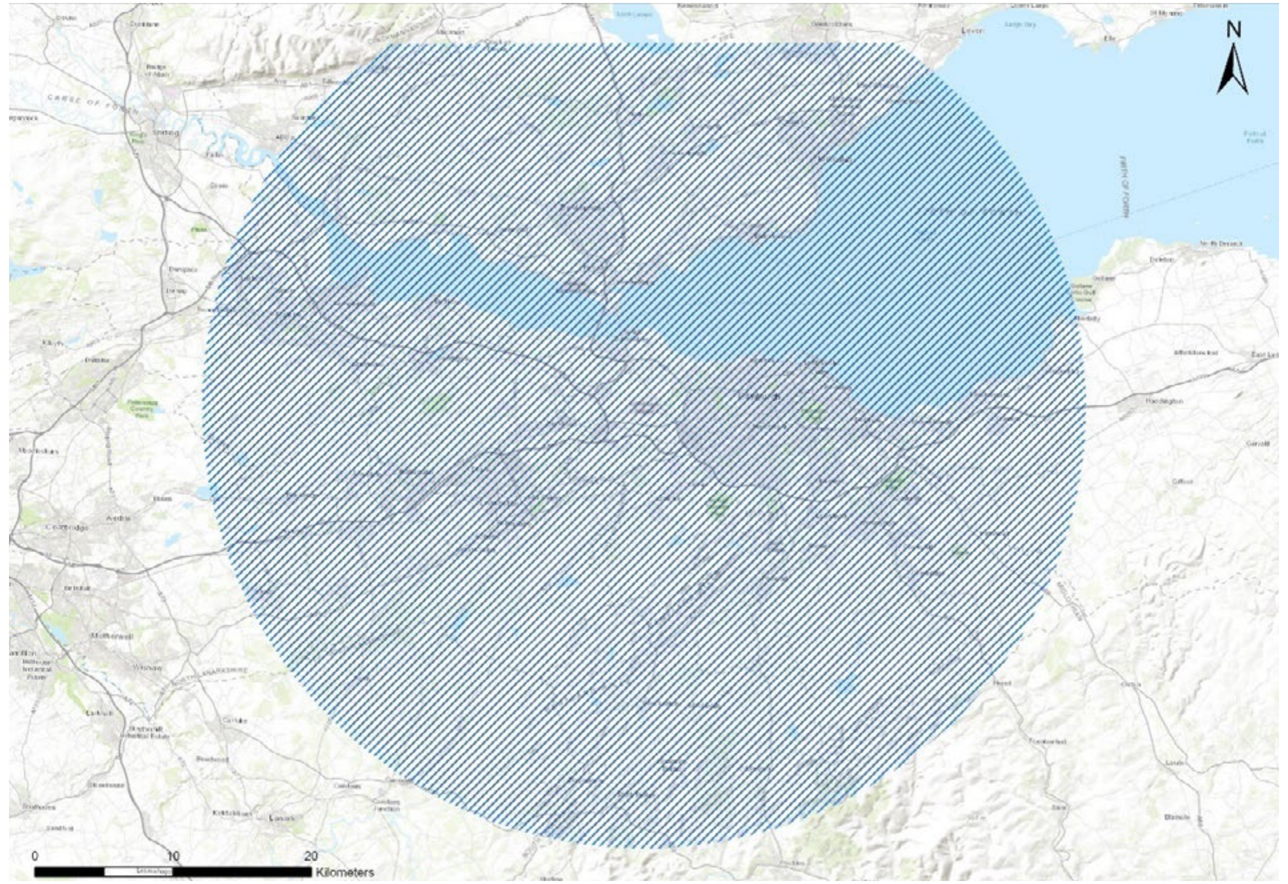


Figure 1: Study area for the GoldSET multi-criteria evaluation.

1 Note that the subsequent design process resulted in designs that extended beyond this study area over a small area of the Fife coast. A review of potential sensitive receptors in this area was undertaken and a conclusion drawn that its absence in the GoldSET dataset would not affect outcomes – See Annex M of the FOA report.

The GoldSET methodology used diverse data inputs to assess the suitability of different scenarios. These data inputs include environmental, social, and economic factors, all of which were weighted according to their relative importance. The multicriteria data encompassed various aspects such as population density, existing flight paths, and environmental receptors.

A GIS database was developed to support the multi-criteria evaluation of the potential flight path scenario options. The database consisted of thematic datasets that represent different aspects of the study area, such as land use, biodiversity, noise, air quality, and socio-economic indicators. These datasets were collected from various sources and assembled into a common spatial framework. The database provided the basis for applying the decision criteria and assessing scenarios. The main providers of data that were used to assemble the database were:

- City of Edinburgh Council Open Spatial Data Portal.
- UK Ordnance Survey.
- Open Street Map.
- Open Data Scotland.

2.3 Criteria Assessment

WSP's proprietary GoldSET flight path assessment methodology and suite of GIS based tools was used for the Study (Error! Reference source not found.). This approach consisted of mapping and quantitatively classifying spatial criteria organised into three high-level themes – environmental, social and technical – selected by SMEs through a facilitated workshop process.

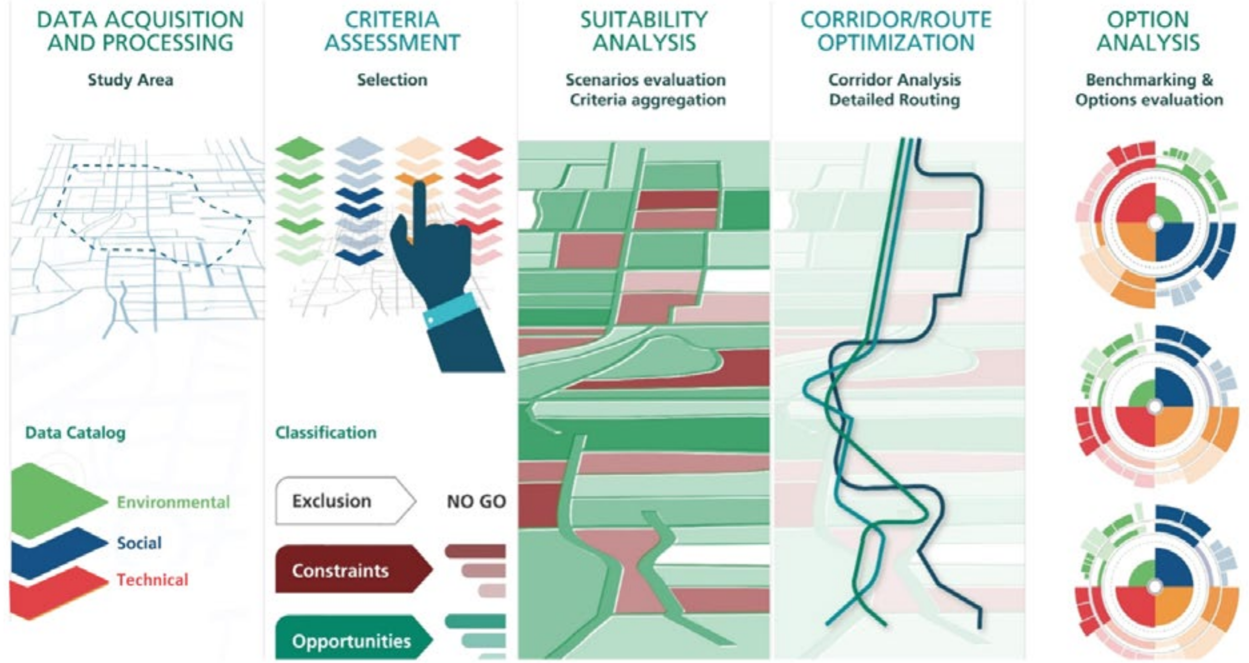


Figure 2: GoldSET approach.

A total of 27 individual spatial criteria layers representing routing decision criteria, referred to as Indicators in GoldSET, were identified by SMEs considering four categories including:

- Exclusion areas
- Constraint areas
- Opportunity areas
- Background (neutral)

Exclusion areas were defined as areas where overflying is prohibited for safety, social, legal or regulatory reasons. Potential flight paths encountering exclusion areas would be forced to divert around them. This category of criteria was examined by the SMEs, and no exclusions were identified within the area of study.

Constraint areas can allow flights to pass over them, and the SMEs assigned them a score based on four levels of sensitivity (i.e., very high, high, medium or low) to overflights. Constraints are cumulative in GoldSET in that several different constraints can overlap on the same area; however, several low constraints do not add up to a single moderate constraint, and several moderate constraints do not add up to a high or very high constraint. Examples of potential constraint areas include parks and greenspaces, approved future developments, populated areas, zones of tranquillity and heritage sites.

Opportunity areas represent potential attractors for routing. Examples of potential opportunities include existing transportation corridors such as the M8 corridor or over water including the Firth of Forth, which are considered desirable for flight path location. SMEs assigned one of three categories to the opportunity areas, defined as high, medium or low. Opportunities are subtractive on constraints; in that, they can lower the level of constraint (i.e., increase the suitability level) on areas they traverse. However, opportunities are not additive on one another and only the highest level of opportunity attributed to a given area is used in the model.

The model configuration was documented by recording Indicators according to their related theme (Environmental, Social, or Technical), their link to the Final Design Principles, the data that supported them, and any processing that was required to display the spatial distribution of the Indicator correctly.

Some Indicators required the specification of a range of values depending on the geographic context, such as potential noise exposure (or a surrogate for this) or distance from the coastline. In these cases, the SMEs used their judgment and expertise to assign the appropriate value within a buffer range, developing multiple sub-criteria within the same realm. The buffer was determined by the SMEs according to the Indicator characteristics, data quality and theme considerations.

Table 1 shows the table of Indicators.

Table 1: GoldSET Indicators for Edinburgh Airport's ACP

Slide ID	Theme	Name	Short description
1	Environmental	Nature Conservation	Minimise overflying nature conservation areas
2	Environmental	Nature Conservation Buffer	Minimise overflying nature conservation areas
3	Environmental	Water (Firth of Forth)	Maximise overflying water
4	Social	Recreational areas	Minimise overflying Country Parks, Gardens and Designed landscapes
5	Social	Population overflown	Minimise population overflown
6	Social	Newly overflown area	Minimise new population overflown
7	Social	New developments	Minimise overflying areas with new planned developments
8	Social	Educational facilities	Minimise overflying educational facilities
9	Social	Hospitals/Health receptors	Minimise overflying hospitals
10	Social	Areas of tranquillity	Minimise overflying areas of tranquillity
11	Social	World Heritage Sites	Minimise overflying heritage areas
12	Social	Registered Battlefields	Minimise overflying registered battlefields
13	Technical	Transportation corridors	Overfly existing transportation corridors
14	Technical	Minimise interference with existing airspace	Avoid airspace already in use by other groups

Once the set of criteria was finalised, a weighting workshop was held to configure the GoldSET model whereby SMEs determined, through consensus, a logical and balanced approach to weighting Indicators by not favouring one perspective (i.e., environmental, social or technical) above another. Using the set of available qualitative weights to differentiate the level of importance and influence of the constraints and opportunities in the model is necessary for several reasons. First, it allows the SMEs to express their judgments based on their knowledge and experience, as well as account for the Final Design Principles and objectives of the project. Second, it helps to balance the trade-offs and synergies among the different Indicators and perspectives. Third, it provides a transparent and consistent method to compare and rank the flight path options based on their performance.

Table 2 shows the outcome of the Indicator assessment from the weighting process. Weightings range from C_1 and O_1 (the highest) to C_4 and O_4 (the lowest). Note that height of flights and route usage are accounted for later in the process.

Table 2: Indicator weights

Slide ID	Theme	Name	Criteria	Weight
1	Environmental	Nature Conservation	Constraint	C_3
	Environmental	Nature Conservation Buffer	Constraint	C_3
3	Environmental	Water (Firth of Forth)	Opportunity Increasing with class distance from the coast	O_1 O_2 O_3 O_4
4	Social	Recreational areas	Constraint	C_3
5	Social	Population overflown	Constraint Increasing with population density class	C_1 C_2
6	Social	Newly overflown area		Background
7	Social	New developments	Constraint	C_2
8	Social	Educational facilities	Constraint Decreasing with class distance from facilities	C_1 C_2 C_3 C_4
9	Social	Hospitals/Health receptors	Constraint Decreasing with class distance from facilities	C_1 C_2 C_3 C_4
10	Social	Areas of tranquillity	Constraint	C_1
11	Social	World Heritage Sites	Constraint	C_3
12	Social	Registered Battlefields	Constraint	C_3
13	Technical	Transportation corridors	Opportunity	O_1
14	Technical	Minimise interference with existing airspace	Constraint Increasing with flight density class	C_1 C_2 C_3 C_4

2.4 Suitability Surface

The configured GoldSET model was used to produce a multi-criteria suitability surface ("suitability surface") for flight path routing across the Study Area (Figure 3). The suitability surface was produced by processing the spatial criteria at a grid (raster) cell of 20m resolution. The suitability surface map indicates the areas of high, medium and low suitability for flight operations based on the combination of all Indicators and their relative weights. Suitability values use a standardized metric scale ranging from 0 to 100.

From a practical standpoint, the suitability surface was used to inform the detailed flight path design step of the process outlines in Section 2 of the FOA. A pictorial representation of the suitability surface for each runway is depicted in Figure 3.

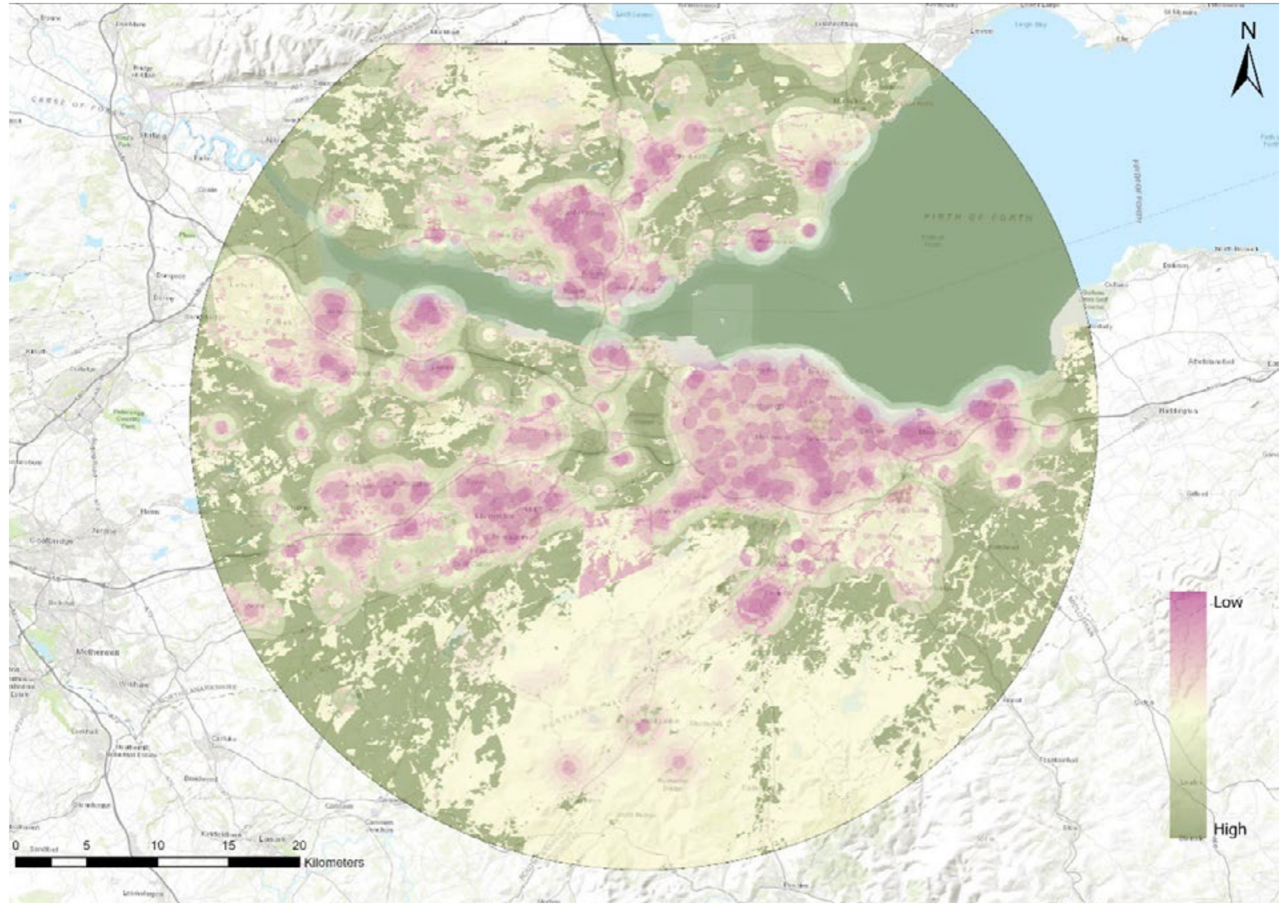


Figure 3: Suitability surface.

3. Population Data

One of the primary data sources used in the GoldSET methodology was population density. Minimizing the impact of aviation noise on populated areas is an important environmental priority, particularly below 4,000 feet. Population density maps were provided to the design experts to give valuable insights to identify areas to avoid in order to reduce the potential adverse noise and overflight impacts on people. By analysing population density maps, experts can identify regions with higher population concentrations and adjust flight paths to minimize the number of individuals likely to be affected.

Population data was already included in the GoldSET multicriteria surface as density within a 2km radius of each grid square and divided into four classes of increasing constraint (see Table 2).

To ensure comprehensive scenario assessments, the population data was extended beyond the original study area designed for the suitability analysis. This expansion was necessary to evaluate new flight paths that exceeded the initial 32 km radius limit at a flight height approaching 7,000ft. This broader dataset enabled more accurate statistics and informed decision-making.

Population density data were calculated using Ordnance Survey AddressBase data, which identified the locations of each dwelling, multiplied by the Scottish Government's forecast 2027 average occupancy rate per dwelling for each local authority. The individual data points were aggregated into one population value to represent the residents living within each 50x50 meter cell.

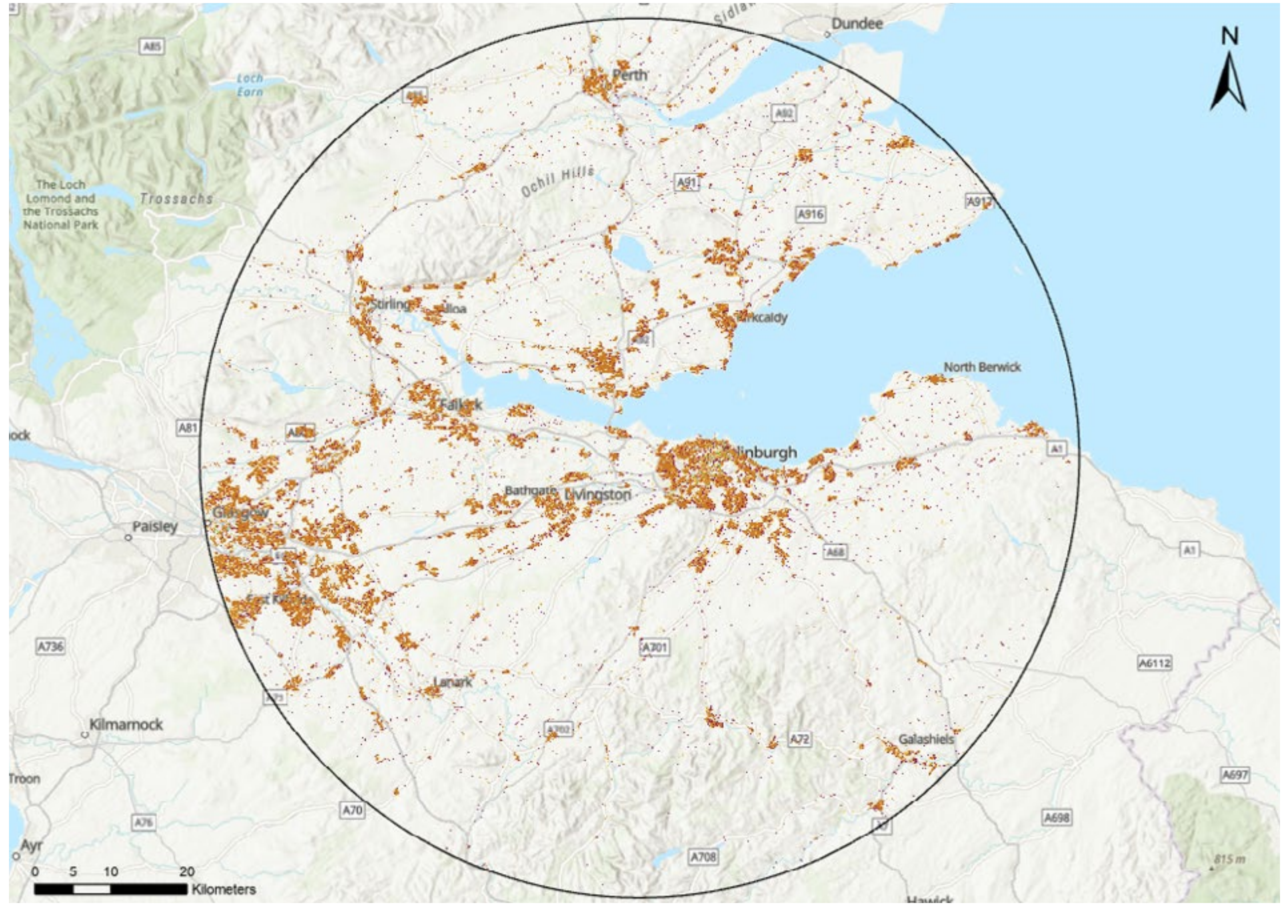


Figure 4: Extended population data for scenario assessment.

4. Population and Overflight Event Index

Because population overflown is a key indicator for noise, and because noise from flights below 7,000ft is a priority, additional metrics relating to population counts were calculated. These were:

- Simple population count of people overflown by each route.
- Overflight Event Index (OEI).
- Weighted OEI (OEIW).

The OEI is a metric which adapts the simple population count to take account of the frequency of flights over each area.

The OEIW adapts the OEI by taking into account the height of the overflight.

The OEIW is a metric which allows direct comparison between overflight footprints for different routes/sets of routes because both the frequency and height of flights are taken into account.

The detailed method and rationale for these metrics can be found in Appendix 2 of the UK Airspace Change Masterplan Iteration 3 – ScTMA (see Section 1.9 of the Full Options Appraisal (FOA) document for a link).

5. Airspace Scenario Development

The process for developing flight paths is described in detail Section 2 of the FOA. This culminated in the design of 16 full airport system scenarios, each of which contained a full set of SIDs and transitions for both runways (note that these are referred to just as 'scenarios' from herein). Pictures and descriptions of these scenarios can be found in Section 2 of the FOA.

These scenarios are listed in Table 3.

Table 3: Full Airport system scenarios

Runway 24 features for:		Runway 06 features for Westbound (STEPS)	
North and Eastbound (STOPP/GULLY/BERRY)	**Southbound (STRAT)**	**Orange (turns west of Aberdour)**	**Red (turns east of Aberdour)**
Green (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 1A&1C	full airport system scenario 1A&2C
	Orange (turns after Livingston)	full airport system scenario 1B&1C	full airport system scenario 1B&2C
Red (turns east of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 2A&1C	full airport system scenario 2A&2C
	Orange (turns after Livingston)	full airport system scenario 2B&1C	full airport system scenario 2B&2C
Orange (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 3A&1C	full airport system scenario 3A&2C
	Orange (turns after Livingston)	full airport system scenario 3B&1C	full airport system scenario 3B&2C
Blue (turns west of Linlithgow)	Red (turns overhead Livingston)	full airport system scenario 4A&1C	full airport system scenario 4A&2C
	Orange (turns after Livingston)	full airport system scenario 4B&1C	full airport system scenario 4B&2C

This table is reproduced from Section 2 of the FOA. The colour references relate to descriptions and pictures in Section 2 of the FOA. Only routes which vary between the scenarios are listed. All other SIDs and all the APP are the same for each scenario.

To70 generated overflight footprints to 7,000ft for a typical medium jet and a typical heavy jet for each route in each scenario in accordance with the Civil Aviation Authority's definition of overflight (CAP1498). These footprints illustrate the areas in which observers on the ground are likely to perceive that they are overflown by aircraft on a particular route.

Overflight footprints are proportional to aircraft height and increase in width as aircraft altitude increases. As medium aircraft climb more quickly than heavy aircraft, they have a shorter overflight footprint (terminating at 7,000ft). Conversely, the more slowly climbing heavy aircraft are closer to the ground for longer and therefore have an elongated overflight footprint. This is illustrated in Figure 5 which shows a medium and heavy footprint for a departure route.

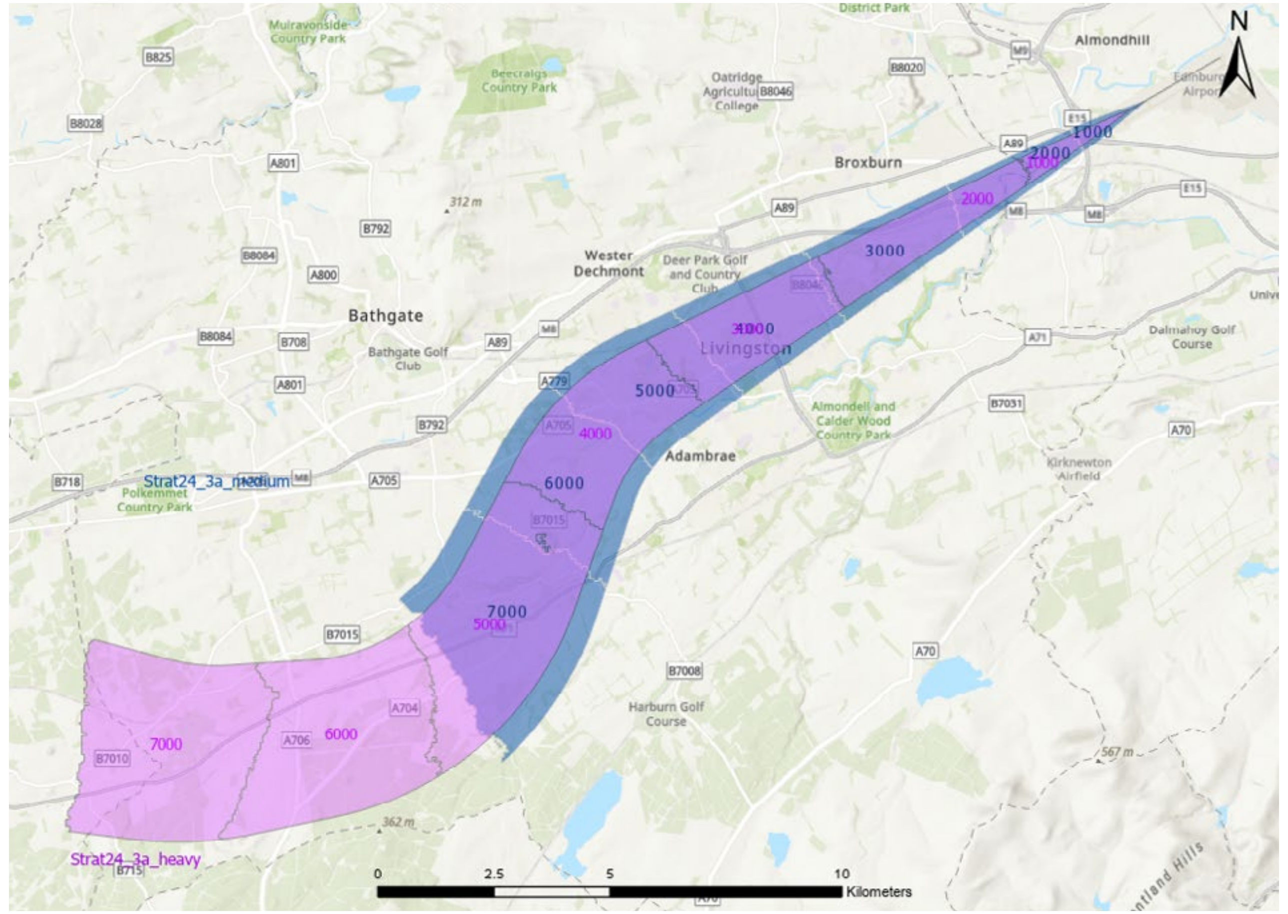


Figure 5: Medium (blue) and heavy (purple) aircraft overflight footprints for route Runway 24 STRAT (orange variation) up to 7,000ft.

With the exception of SKIRL, all options would be used by a mix of aircraft which could be broadly categorised into proportions of flights best represented by the climb profile of a medium jet, or the climb profile for a heavy jet. Turboprops (mainly ATRs) would have a low climb performance more consistent with that of a heavy jet, and therefore were allocated the same footprint as the heavy category.

For SKIRL, all the flights are turboprops (ATRs) and the routes have a 6,000ft restriction at the SID end point. As all the SKIRL flights are turboprops, the heavy footprint was assumed to 6,000ft and then level segment assumed from that point to the SID end.

Arrival footprints are based on a continuous descent approach (CDA) prolife and so are not affected by aircraft type. One overflight footprint was therefore developed for each transition based on a typical CDA gradient.

The overflight footprints for the multiple SIDs and STARs that make up each of the 16 airspace system scenarios were combined to represent each scenario. Figure 6 shows the combined overflight footprints for the 1A & 1C scenario as an example. For pictures of all the scenarios see Section 2 of the FOA.

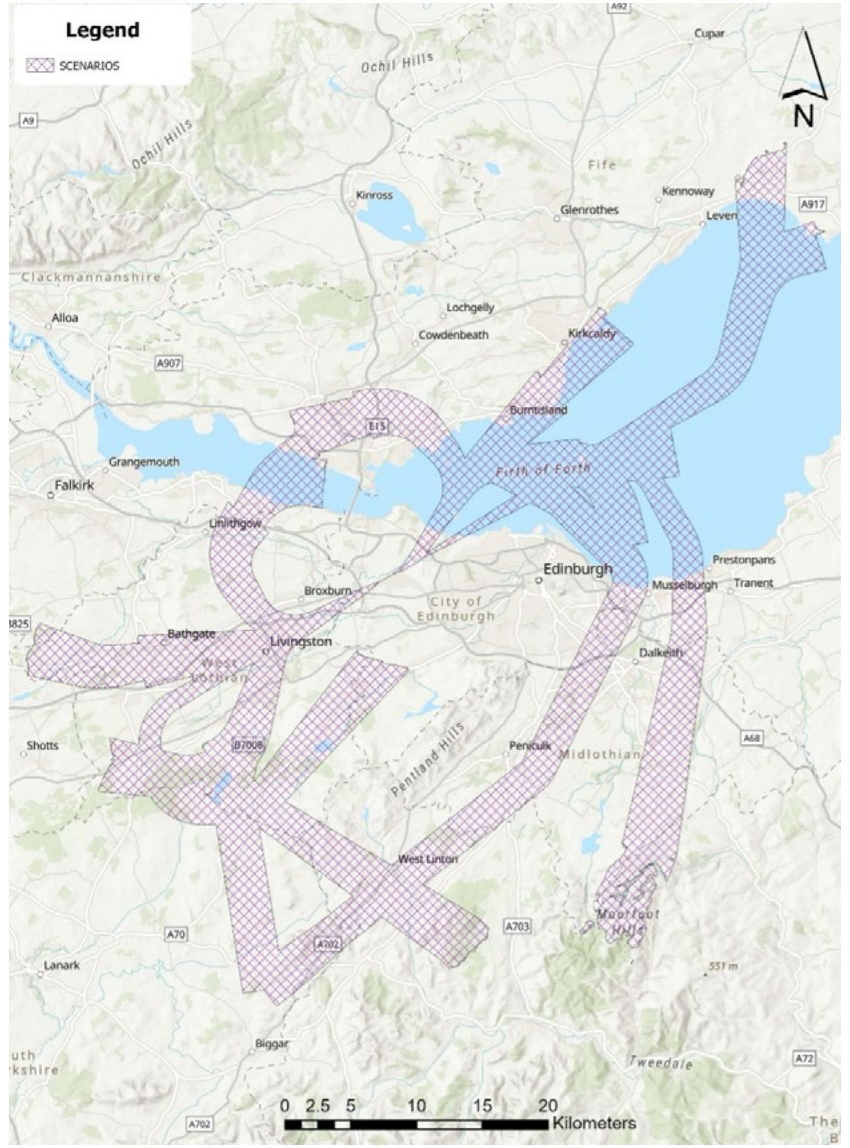


Figure 6: Scenario 1A & 1C combined overflight footprints.

6. Airspace Scenario Assessment Methodology

The combined system overflight footprints were segmented into grid cells measuring 50x50m.

Taking account of Height

For each cell, the ground level in metres above ordnance datum (mAOD) was subtracted from the overflying aircraft altitude (in metres) to calculate the aircraft height in meters above ground level (mAGL). This was then converted to feet above ground level (AGL). This reflects the effective aircraft overflight height for each grid cell, illustrated in Figure 7.

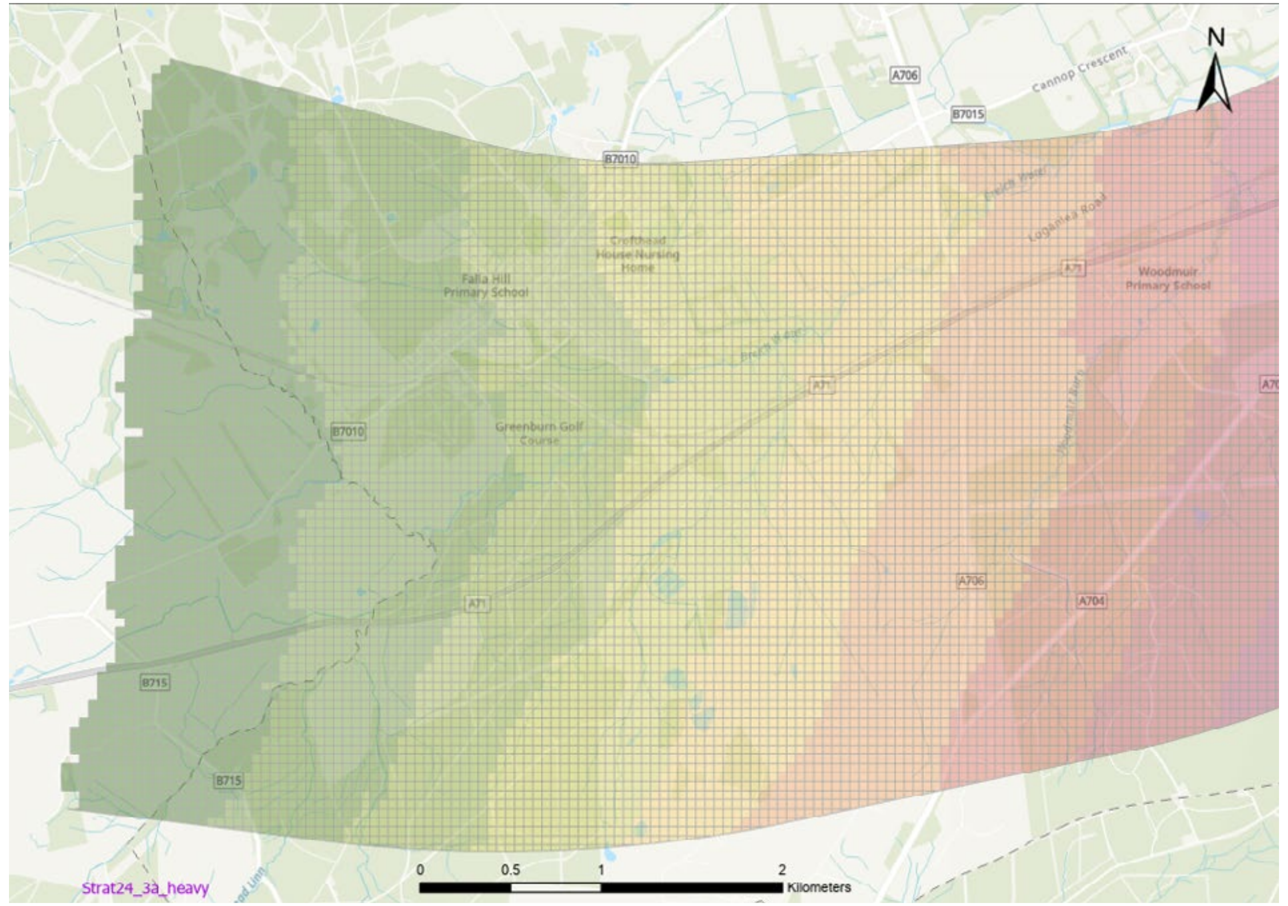


Figure 7: Strat24_3a_heavy overflight footprint: 50m grid segmentation.

As aircraft height AGL increases, impacts on social and environmental factors as a result of disturbance or annoyance caused by aircraft noise, reduce in severity. The GoldSET assessment accounted for this by applying the inverse square law for noise propagation, based on the aircraft height AGL for each grid cell. The inverse square law is a fundamental principle in physics that describes how the intensity of physical quantity (such as sound or light) diminishes as the distance from the source increases. For noise, this law states that the intensity of noise decreases proportionally to the square of the distance from the noise source.

- $I \propto 1/d^2$

Where:

- I is the intensity of the sound
- d is the distance from the sound source

According to this equation, if the distance from the sound source doubles, the sound intensity will be reduced to a quarter of its original value. This is the same equation that is used for the OEIW as described in the Appendix 2 of the UK Airspace Change Masterplan Iteration 3 – ScTMA (see Section 1.9 of the Full Options Appraisal (FOA) document for a link).

Based on the inverse square law equation, the GoldSET suitability surface value increased with aircraft height AGL as illustrated in Figure 8.

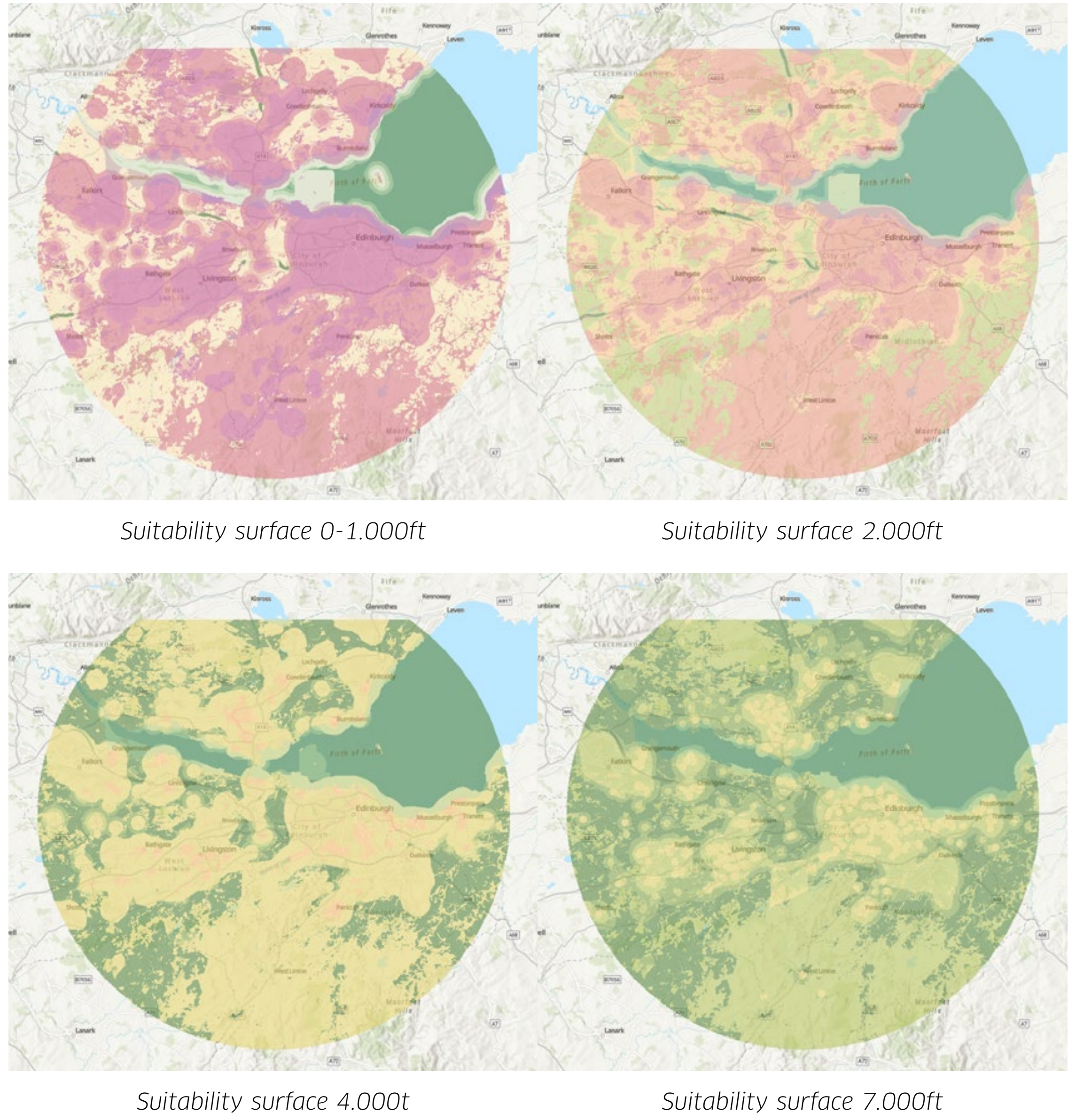


Figure 8. Enhancement of the suitability surface with increasing aircraft height AGL.

Taking account of Route Usage

The proportion of flights of each type was identified for each cell according to the route usage in Table 4 and Table 5. Cumulative overflight from multiple routes was taken into account where the footprints overlap.

Table 4: SID route usage allocation to Medium and Heavy overflight footprints

Category	Route	Allocation to Medium Jet Footprint	Allocation to Heavy Jet Footprint (includes turboprop)
	GULLY/BERRY[2]	27.6%	1.6%
	SKIRL	0.0%	5.2%
	STEPS	10.0%	4.6%
	STOPP	2.9%	2.9%
	STRAT	44.2%	1.0%

Table 5: Transition route usage allocation to overflight footprints

Category	Route	Allocation to CDA based footprint
Transiton	STOBS	3.3%
	TART3	82.2%
	WORM2	14.5%

2 The BERRY route is an alternative to GULLY when Danger Are 514 is not in operation. The GULLY and BERRY percentages are presented as combined because they serve the same flights, and because they do not diverge until they are over water. Therefore for the purposes of this analysis a flight on either route would have the same impact in terms of GoldSET and population metrics.

GoldSET and Population Assessment

The overflight footprints (as represented by the 50 by 50m grid cells) for the 16 airspace scenarios were imported into GoldSET. The GoldSET criteria and suitability surface were then used to calculate a set of spatial metrics to compare the performance of the different scenario alternatives. In addition the 50 by 50m grid cells for the 16 scenarios were analysed against the population data to produce population counts, OEI and OEIW.

Overflight event frequencies were calculated for a month based on data from July 2023 grown to 2027. However, note that the resultant numbers are only for comparative purposes between scenarios for use in the pre-FOA review (see FOA section 2). More granular data that better represents the absolute noise and overflight impact compared to the baseline has since been developed for the FOA – this can be found in the FOA Section 4.

Airspace Scenario Assessment Results

Table 6 provides the results of the aggregation, providing a framework for the assessment of the proposed alternative scenarios. The following metrics were calculated:

- Area of the cumulative scenario overflight footprint in square kilometres (km^2).
- Population resident within the cumulative overflight footprint (POP).
- Sum of the cumulative population overflown by multiple overlapping routes within a scenario according to flight frequency (POPF).
- Sum of the cumulative population overflown flown by multiple overlapping routes within a scenario according to flight frequency, weighted by route height (POPFWH).
- Sum of cumulative population overflown per scenario per month based on flight frequency (overflight event index, OEI).
- Sum of cumulative population overflown per scenario per month weighted by route height (weighted overflight index, OEIW).
- Average of the 0 to 7,000ft GoldSET flight suitability surface for each scenario (FS; on a scale of 0 – 100 with 100 being the most suitable).
- Average of the 0 to 7,000ft GoldSET flight suitability surface for each scenario weighted by aircraft height AGL (FSW, based on a scale of 1 – 100).

Table 6: Aggregated metrics for scenario assessment

Scenario	km²	POP	POPF	POPFWH	OEI	OEIW	FS	FSW
1A&1C	864.5	231,687	532,989	91,357	508,022,136	**93,143,006**	64.97	**96.42**
1B&1C	879.1	234,664	543,418	91,675	523,231,072	**93,573,806**	64.42	**96.40**
2A&1C	858.6	231,847	551,202	93,326	515,600,524	**93,865,106**	64.30	**96.39**
2B&1C	841.0	232,682	561,631	93,644	530,809,459	**94,295,906**	63.75	**96.37**
3A&1C	841.7	229,825	706,778	104,614	595,149,562	**98,584,543**	63.49	**96.36**
3B&1C	865.0	234,849	717,207	104,932	610,358,497	**99,015,343**	62.94	**96.34**
4A&1C	845.5	230,193	686,147	103,926	581,905,410	**98,213,354**	63.72	**96.37**
4B&1C	860.2	233,252	696,576	104,244	597,114,345	**98,644,155**	63.17	**96.35**
1A&2C	879.7	237,826	528,071	91,083	502,645,136	**92,965,821**	64.99	**96.44**
1B&2C	857.8	234,704	538,500	91,401	517,854,072	**93,396,621**	64.45	**96.41**
2A&2C	873.2	234,824	546,284	93,053	510,223,524	**93,687,921**	64.32	**96.40**
2B&2C	872.4	237,681	556,714	93,371	525,432,459	**94,118,721**	63.77	**96.38**
3A&2C	856.4	232,884	701,860	104,340	589,772,562	**98,407,358**	63.51	**96.37**
3B&2C	855.7	235,741	712,289	104,658	604,981,497	**98,838,158**	62.96	**96.35**
4A&2C	844.7	233,050	681,229	103,653	576,528,409	**98,036,170**	63.75	**96.39**
4B&2C	859.5	236,109	691,658	103,971	591,737,345	**98,466,970**	63.20	**96.37**

The key metrics used to assess the 16 scenarios are the weighted GoldSET flight suitability score (FSW) and the monthly weighted overflight event index (OEIW) as highlighted in bold.

7. Conclusion

The key metrics used to assess the 16 scenarios are the weighted GoldSET flight suitability score (FSW) and the monthly weighted overflight event index (OEIW) as highlighted in bold.

The analysis and conclusions drawn from this and other data for the pre-FOA Scenario Review are presented in the FOA Section 2.4.

Annex E: List of planned developments accounted for in the population data

Planning Application Searches

Table 1: Clackmannanshire Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00031/MSC	Residential Development of 51 Houses with Associated Infrastructure Including Roads, Footpaths, Landscaping, Drainage And Associated Works (Phase 1b).	51	Awaiting decision
24/00097/FULL	Alterations And Change of Use of Vacant Bank Premises and Car Park (Class 2) to 2 No. Flats.	2	Awaiting decision
24/00146/PAN	Residential Development and Infrastructure Including Roads, Footpaths, Landscaping, Drainage, Open Space And Associated Works.	1	Awaiting decision

Table 2: East Dunbartonshire Planned Developments

Planning Application Reference	Description	Size (units)	Status
TP/ED/24/0054	Section 42 application to delete condition 5 (agricultural occupancy restriction) of Planning Permission TP/76/209 (for erection of a dwelling house).	1	Decided
TP/ED/24/0156	Erection of new house.	1	Awaiting decision
TP/ED/24/0165	Erection of two storey dwelling and detached garage following demolition of existing house.	1	Awaiting decision
TP/ED/24/0201	Residential development comprising 15 affordable units and associated engineering works.	1	Awaiting decision
TP/ED/24/0240	Conversion and extension of steading buildings to form 2 dwellings, one new build dwelling and extension to existing farmhouse.	2	Awaiting decision
TP/ED/24/0252	New affordable housing development.	1	Decided
TP/ED/24/0285	Erection of dwellinghouse (in principle).	1	Awaiting decision
TP/ED/24/0297	Change of use of existing short stay tourist accommodation to permanent ancillary accommodation to include extension and alterations to existing building.	1	Awaiting decision

Table 2: East Dunbartonshire Planned Developments

Planning Application Reference	Description	Size (units)	Status
TP/ED/24/0332	Erection of new build house.	1	Awaiting decision
TP/ED/24/0376	67 new build social dwellings, a mix of houses and flats including associated engineer/infrastructure, parking and other amenities	67	Decided
TP/ED/24/0379	Conversion and refurbishment including an extension of Huntershill House to form a dwelling. Application for Matters Reserved under Conditions 3 and 4 of the Planning Permission in Principle approval.	1	Awaiting decision
TP/ED/24/0402	Proposed Detached Dwellinghouse.	1	Awaiting decision

Table 3: East Lothian Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/01353/P	Erection of 1 house and associated works.	1	Awaiting decision
23/01364/P	Erection of building, siting of caravan and 4 shipping containers, repositioning of agricultural building and change of use of land from agricultural to class 4 (Part Retrospective).	1	Decided
23/01367/PPM	Planning permission in principle for the redevelopment of existing buildings and new build apartment buildings, associated landscape, roads, access and parking.	1	Awaiting decision
23/01422/P	Erection of 1 house, garage and associated works.	1	Decided
23/01434/P	Erection of 1 house and associated works.	1	Decided
23/01477/P	Erection of 1 house, widening of vehicular access and associated works.	1	Decided
24/00109/P	Erection of 1 house, triple garage with ancillary residential accommodation above and associated works.	1	Decided

Table 3: East Lothian Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00115/P	Erection of 2 houses and associated works.	2	Awaiting decision
24/00115/P	Erection of 2 houses and associated works.	2	Awaiting decision
24/00272/P	Conversion and alterations to building to form 1 house and associated works.	1	Not Available
24/00317/NAF	Prior notification of – For the conversion of farm building to house.	1	Decided
24/00331/LBC	Erection of dwellinghouse with garage.	1	Decided
24/00417/P	Erection of house, garage and associated works.	1	Awaiting decision
24/00513/P	Extension to house, erection of porch, fence and installation of flue.	1	Not Available
24/00524/NAF	Prior notification of – For the conversion of farm building to house.	1	Decided
24/00527/P	Erection of 1 house and associated works.	1	Awaiting decision
24/00608/PP	Planning permission in principle for the erection of 1 house and associated works.	1	Awaiting decision
24/00617/P	Erection of 1 house, triple garage with ancillary residential accommodation above and associated works.	1	Awaiting decision
24/00667/PP	Planning permission in principle for the erection of 3 houses and associated works.	3	Awaiting decision
24/00693/P	Erection of garden building for ancillary residential accommodation.	1	Awaiting decision
TP/ED/24/0332	Erection of new build house.	1	Awaiting decision
TP/ED/24/0402	Proposed Detached Dwellinghouse.	1	Awaiting decision

Table 4: Edinburgh Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/07397/FUL	Conversion of flat and office into a single dwelling, alterations to kitchen and sanitary accommodation new double-glazed windows (as amended).	1	Approved
23/07181/FUL	Planning approval is sought to convert existing large garage to dwelling house and all associated site works (as amended).	1	Approved
23/07154/FUL	Erect dwellinghouse.	1	Awaiting decision
23/07125/FUL	Proposed new dwelling.	1	Approved
23/07100/FUL	Proposed dwelling house.	1	Approved
23/07105/FUL	New build single storey house and workshop.	1	Awaiting decision
23/07058/FUL	Change of use and alteration of existing hotel with car parking to form seven flats and erection of two new mews dwellings with associated car parking (as amended).	9	Awaiting decision
23/06946/FUL	Erect 2 No. mews style dwelling houses on site of existing car park.	2	Approved
23/06567/FUL	Proposed change of use from commercial back to residential accommodation.	1	Approved
23/06495/FUL	Alter and change of use from store to flat.	1	Approved
23/06460/FUL	Proposed residential ground floor flat with change of use from commercial to residential.	1	Approved
23/05994/FUL	Change of use from artists' studio (Class 4) to residential studio apartment (Class 9).	1	Approved
23/05892/FUL	Partial demolition and conversion of office building to 8x residential apartments and 3x residential townhouses with associated infrastructure, parking, and landscaping.	11	Awaiting decision
23/05440/FUL	Demolish and replace existing building creating 2x dwellings within new building (as amended).	2	Approved
23/05064/FUL	Conversion from commercial office to dwelling.	1	Approved

Table 4: Edinburgh Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/05158/FUL	New house and carport garden shed.	1	Approved
23/04676/FUL	Erect house.	1	Approved
23/04276/FUL	Conversion of a double garage to a studio apartment (residential use).	1	Approved
23/04269/FUL	Proposal for 8x new-build flats and communal stair with front and rear garden space, parking provision and shelter for 20x bikes.	8	Awaiting decision
23/04087/FUL	Demolish 2 No. existing dwelling houses and erect residential development comprising 10 No. flats with associated access and landscaping.	10	Approved
23/04075/FUL	Proposed change of use from Class 1A (doctor's surgery) to Sui Generis (residential flat).	1	Approved
23/04029/FUL	Change of use from nursery (Class 10) to residential (Class 9).	1	Approved
23/04003/FUL	Erect 2x semi-detached houses, 3x detached houses and 6x flats.	11	Awaiting decision
23/03943/FUL	Erect house (as amended).	1	Approved
23/03888/FUL	Change of use from offices to form 4x flatted dwellings.	4	Approved
23/03844/FUL	Erect new storey and carry out internal alterations to dwellinghouse to form new flatted dwelling. Resubmission with revised proposals of application ref: 23/01373/FUL which was withdrawn on 18th July 2023.	1	Approved
23/03811/FUL	Change of use from offices (Class 4) to 2x dwellings (Class 9).	2	Approved
23/03786/FUL	Conversion of existing office to 2 No. dwellings (as amended).	2	Approved
23/03728/FUL	Erection of new dwelling in curtilage of existing property (as amended).	1	Approved
23/03696/FUL	New residential flats x11, cycle parking provision, associated works and infrastructure.	11	Awaiting decision

Table 4: Edinburgh Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/03710/FUL	Erection of a new storey and half, 3-bedroom domestic scale house in the rear garden of an existing dwelling.	1	Approved
23/03576/FUL	Proposed change of use from retail shop to studio flat.	1	Approved
23/03318/FUL	Erection of 1 No. dwelling house, associated landscaping, plant room and ancillary works (material amendment to dwelling house consented under Planning Application 15/01051/FUL).	1	Approved
23/02881/FUL	Erection of 3-bedroom upper villa and 2-bedroom lower villa at land adjacent to 169 Gilmerton Dykes Drive.	2	Approved
23/02776/FUL	Change of use from ground floor retail premises to a dwelling (original use). Alter and extend existing ground floor property to form a dwelling with a private patio garden. Alter existing upper floor dwelling, adjusting the external access stair; infilling small windows; altering rear window to form patio doors; and forming a terrace at 1st floor level. Forming private parking, with cycle storage and bin storage areas at the rear of the building.	1	Approved
23/02760/FUL	Erection of two semi-detached 3-storey residential dwellings together with associated landscaping, access, parking, and infrastructure works.	2	Approved
23/02665/FUL	Demolish existing bungalow and erect four storey residential development comprising 6 No. 2 bed and 1 No. 3 bed flats with associated access and landscaping, including change of use. (as amended).	7	Approved
23/02641/Ful	Change of use from newsagents to residential apartment.	1	Approved
23/02302/FUL	Change of use to dwellinghouse.	1	Approved
23/02297/FUL	Change of use from garage to studio dwelling apartment, new frontage to replace garage door, forming new openings through rear elevation and erection of small, glazed extension at rear.	1	Approved
23/02030/FUL	Change of use from office to dwelling.	1	Approved
23/01926/FUL	Change of use from shop to residential unit.	1	Approved
23/01793/FUL	Convert shop and workshop into flat.	1	Approved

Table 4: Edinburgh Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/01418/FUL	Proposed residential development and associated landscaping works (As Amended).	36	Awaiting decision
23/01201/FUL	Clearance and demolition to erect 11x flats and maisonettes, new garden ground and associated infrastructure (As Amended).	11	Approved
23/01160/FUL	Partial demolition and change of use of public house to form 2x flats, erection of 4x houses.	6	Approved
23/01153/FUL	Erection of 8x flats, an office unit, relocation of sub-station and associated landscaping.	8	Approved
23/00897/FUL	Erection of 2x new build, 3 storey, semi-detached townhouses on gap site (as amended).	2	Approved
23/00893/FUL	Convert two floors of townhouse offices from Class 4 offices to 2nr Class 9 (Sui Generis) residential units. Minor internal layout alteration to optimise for residential use.	2	Approved
23/00757/FUL	Change of Use from studio/workshops and erection of extension to form 5x residential apartments.	5	Approved
23/00733/FUL	Conversion of townhouse offices into a residential accommodation.	1	Approved
23/00621/FUL	Subdivision of garden ground of an existing house to create a new house plot, and erection of a detached two-storey dwelling.	1	Approved
23/00539/FUL	Alterations to 1 1/2 storey mews office building including partial removal works to create 2 1/2 storey dwelling for 2 flats and erection of 2 1/2 storey mews house including removal of front boundary wall (as amended).	3	Approved
23/00473/FUL	Change of use and conversion of an office to flatted dwelling.	1	Approved
23/00084/FUL	Residential development of 18 apartments with amenity space, above a business use (Class 2, 3 or 4) on ground floor. The site is former Clermiston Clinic at 7 Rannoch Terrace, which was granted Building Demolition Warrant on 29/09/22 (ref. 22/02736/WARR).	18	Awaiting decision
23/00040/FUL	New build development comprising 3 No. residential flats and ground floor extension to public house (as amended).	3	Approved

Table 4: Edinburgh Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/07358/PPP	Residential development, ancillary retail use, active travel route, open space, landscaping, access, services and all associated infrastructure.	500	Awaiting decision
23/06733/FUL	Erection of 141 new homes and associated landscaping, drainage, and infrastructure works.	141	Awaiting decision
23/03962/FUL	Demolition of yard buildings and garages serving existing tenement properties; construction of replacement parking court comprising 12x garages and 4x parking spaces to serve existing tenement properties; erection of 63x new homes with associated access, landscaping, parking and services.	63	Awaiting decision
23/03649/FUL	Proposed demolition of office building and development of residential development with associated commercial and ancillary uses, landscaping, and parking (as amended).	256	Approved
23/01743/FUL	Residential development comprising a mix of private and affordable homes numbering 220 units and associated infrastructure including landscaping, amenity, green space, parking, and drainage (as amended).	220	Approved
23/01615/FUL	Erection of residential development with associated landscaping and infrastructure (variation of design approved under permission 19/02778/FUL).	123	Approved

Table 5: Falkirk Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/23/0288/COND01	Compliance with Conditions of P/23/0288/FUL – Construction of Dwellinghouse and Outbuilding (Amendment to Planning Permission P/19/0190/FUL).	1	Condition(s) D
P/23/0295/COND01	Compliance with Conditions of P/23/0295/FUL – Construction of Dwellinghouse.	1	Awaiting decision
P/24/0040/PPP	Construction of Dwellinghouse.	1	Awaiting decision
P/24/0141/FUL	Construction of 78 Dwellinghouses with Associated Infrastructure Including Associated Landscaping, Drainage, SUDS and Engineering Works.	78	Awaiting decision

Table 5: Falkirk Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/24/0155/FUL	Construction of Dwellinghouse.	1	Awaiting decision
P/24/0173/FUL	Construction of Dwellinghouse.	1	Awaiting decision
P/24/0218/FUL	Construction of Dwellinghouse (Amendment to Planning Permission P/23/0409/FUL).	1	Awaiting decision
P/24/0292/FUL	Construction of 4 Dwellinghouses.	4	Awaiting decision
P/24/0313/FUL	Construction of 123 Dwellings and Ancillary Works.	123	Awaiting decision
PRE/2024/0001/PAN	Residential Development with Associated Infrastructure.	1	Awaiting decision

Table 6: Fife Planned Developments

Planning Application Reference	Description	Size (units)	Status
19/02018/NMV6	Erection of 158 dwellings and associated works including formation of access, construction of roads and parking, drainage, landscaping and erection of walling and fencing (Non Material Variation to relocate two visitor parking spaces from rear of Plot 29.	158	Decided
20/00912/CDC1	Erection of dwellinghouse with associated access and parking (Completion of Development for approved 20/00912/FULL).	1	Decided
21/00448/NMV1	Change of use from offices (Class 4) to form 2no. flatted dwellings (Sui Generis) and external alterations (Non Material Variation to alter internal layout, install 4 rooflights to rear and relocate soil pipe to Flat 26b (no change to Flat 26a) to 21/0044.	2	Decided
21/03974/NMV1	Erection of dwellinghouse (Non Material Variation to reduce building width, bi-fold door and window added to South elevation wall, bi-fold door reduced on East elevation and window added, courtyard removed and rooflights indicated, internal layout updated.	1	Decided

Table 6: Fife Planned Developments

Planning Application Reference	Description	Size (units)	Status
21/03974/NMV1	Erection of dwellinghouse (Non Material Variation to reduce building width, bi-fold door and window added to South elevation wall, bi-fold door reduced on East elevation and window added, courtyard removed and rooflights indicated, internal layout updated.	1	Decided
22/00848/NMV3	Erection of 4 No dwellinghouses, formation of access, hardstanding and associated infrastructure (Demolition of existing building) – Non Material Variation to approved 22/00848/FULL – increase length of townhouses 3 and 4.	4	Decided
22/03374/NMV1	Erection of dwellinghouse (demolish existing) (Non Material Variation to 22/03374/FULL for amendments including removal of triangular window and timber louvres to gable window and update finishes.	1	Decided
23/02600/NMV1	Erection of dwellinghouse and formation of access (Non Material Variation to relocate access position to 23/02600/FULL).	1	Registered
23/02792/FULL	Change of use of shop (Class 1A) to form dwellinghouse (Class 9) with associated erection of single-storey rear extension, boundary fence/gate and installation of rooflight (demolition of store extension).	1	Decided
23/02970/PPP	Planning permission in principle for erection of single-storey dwellinghouse (Class 9) and associated development.	1	Decided
23/03137/NMV1	Change of use from office (Class 2) to 8 flatted dwellings (Sui Generis) and erection of dwellinghouse (Class 9) with external alterations including replacement windows and doors, erection of boundary fence, installation of rooflights and renewable energy.	9	Decided
23/03163/FULL	Conversion of existing steading and outbuilding to form 5.no dwellinghouses and one live/work unit including formation of access, car parking, retaining wall and steps, boundary enclosures and associated landscaping (with groundworks) and drainage infrastructure.	5	Registered
23/03531/FULL	Alterations and extension (including part demolition) of existing 2.no flatted conversion to form 3. no flatted dwellings including dormer extensions, re-roofing, rendering and installation of replacement windows and erection of 2.no flatted dwellings.	5	Decided

Table 6: Fife Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/03585/NMV1	Change of use from Cafe (Class 3) with dwelling (Class 9) to 2 flatted dwelling houses and 1 HMO (6 persons) (Sui Generis) including erection of porch extension, formation of parking and external alterations (Non Material Variation for internal and external).	2	Decided
24/00116/FULL	Change of use from dog grooming (Class 1A) to flatted dwelling (Sui Generis) including installation of replacement windows and external alterations.	1	Decided
24/00162/FULL	Erection of 2 dwellinghouses, erection of domestic garage and formation of hardstanding.	2	Decided
24/00172/FULL	Change of use from general industry (Class 5) to residential (Class 9) and erection of dwellinghouse and outbuilding (includes partial demolition of existing industrial building).	1	Decided
24/00184/SCR	Screening Opinion for proposed residential park (42 retirement lodges).	42	Decided
24/00211/FULL	Change of use from church (Class 10) to two dwellinghouses (Class 9) and installation of balcony.	2	Awaiting decision
24/00226/FULL	Erection of dwellinghouse and installation of air source heat pump and solar panels Site Address: 18 South Loan.	1	Decided
24/00248/FULL	Residential Development (up to 141 dwellings) with associated infrastructure including accesses, landscaping, drainage, SUDS and engineering works.	141	Registered
24/00255/FULL	Siting of 16 residential units (Caravans) and reconfigure pitch layout including alterations to access road and playpark and erection of boundary fencing (Includes demolition of existing residential units).	16	Registered
24/00285/FULL	Erection of residential cabin and double garage (retrospective).	1	Decided
24/00316/PPP	Planning permission in principle for erection of dwellinghouse (renewal of planning permission 20/02633/PPP).	1	Decided
24/00402/FULL	Erection of 23 affordable housing units and 1 retail unit and associated infrastructure works (renewal of planning permission 21/00056/FULL).	23	Decided

Table 6: Fife Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00567/FULL	Erection of 4.no dwellinghouses with integral garages and erection of 2.no self-contained holiday lets (amendment to 23/00273/FULL).	6	Decided
24/00645/FULL	Change of use from hot food takeaway (Sui Generis) to dwellinghouse (Class 9) and associated works, including part demolition, erection of fence, replacement windows and other alterations.	1	Registered
24/00817/FULL	Erection of dwellinghouse and formation of access.	1	Decided
24/00836/FULL	Change of use from a private equestrian unit to a dwellinghouse (Class 9) and installation of dormer extension, solar panels, flue, rooflights; and, window and door openings.	1	Decided
24/00876/FULL	Siting of caravan for residential use (retrospective.	1	Registered
24/00898/PPP	Planning permission in principle for the erection of dwellinghouse.	1	Registered
24/00898/PPP	Planning permission in principle for the erection of dwellinghouse.	1	Registered
24/00899/FULL	Erection of dwellinghouse and associated hardstanding and car parking.	1	Decided
24/00901/FULL	Change of use from offices (Class 4) to form 3 flats (Sui Generis) including alterations to form door access and erection of stair.	3	Awaiting decision
24/00910/PPP	Planning permission in principle for erection of 5 dwellinghouses and associated access (including demolition of agricultural shed).	5	Registered
24/01031/ARC	Approval of matters specified in condition 2 (a – g) of planning permission in principle 22/02291/PPP for erection of dwellinghouse and formation of access and associated drainage infrastructure.	1	Decided
24/01116/FULL	Change of use from bakery (Class 1) to dwellinghouse (Class 9) (Renewal of 21/01623/FULL).	1	Registered
24/01199/FULL	Erection of single storey dwellinghouse and associated vehicular access, parking, landscaping and drainage infrastructure.	1	Registered
24/01211/PPP	Planning permission in principle for erection of dwellinghouse and associated access and car parking.	1	Registered

Table 6: Fife Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/01282/FULL	Erection of dwellinghouse with associated parking.	1	Registered
24/01306/FULL	Erection of single-storey dwellinghouse and associated development (renewal of planning permission 21/00757/FULL).	1	Registered
24/01317/FULL	Conversion of barn to form dwellinghouse (Class 9) including alterations to erect front porch, rear steps, formation of window and door openings and hardstanding with car parking and associated septic tank and drainage (retrospective).	1	Registered
24/01369/FULL	Change of use from shop (Class 1A) to flatted dwelling (Sui Generis) including installation of replacement windows, rooflights and flue (fence and wooden structure TBC).	1	Registered
24/01400/FULL	Erection of dwellinghouse and formation of access and car parking with associated landscaping and drainage infrastructure.	1	Registered
24/01406/PPP	Planning permission in principle for the erection of dwellinghouse and air source heat pump and formation of hardstanding.	1	Registered
24/01406/PPP	Planning permission in principle for the erection of dwellinghouse and air source heat pump and formation of hardstanding.	1	Registered
24/01408/FULL	Erection of 4 dwellinghouses, communal facility and associated works (Section 42 to remove condition 6 of planning Permission 22/02504/FULL).	4	Decided
24/01422/FULL	Construction of 334 residential units with associated engineering, landscape and infrastructure works (Section 42 to vary Condition 20 of Planning Consent ref: 18/00078/FULL).	334	Registered
24/01448/CLP	Certificate of lawfulness (proposed) for conversion of integral garage to form habitable living space and installation of patio doors to rear of dwellinghouse.	1	Registered
24/01564/PPP	Planning permission in principle for the erection of two dwellinghouses with formation of parking and installation of solar panels (renewal of planning permission 20/02298/PPP).	2	Registered
24/01601/FULL	Erection of 38 dwellings (including affordable housing), formation of vehicular and footpath accesses, open space and drainage infrastructure (amendment to planning permission 23/00547/FULL).	38	Registered

Table 7: Glasgow City Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/01292/PAN	Erection of residential development with associated car parking, amenity space and landscaping.	1	No Objection
23/01410/PAN	rection of development comprising the following potential uses: residential (Class 9), student accommodation (Sui Generis), build to rent private rented accommodation (Sui Generis) and business use Class 1A (Shops and Financial, Professional & Other Services.	1	Decided – Grant
23/01518/FUL	Use of Class 8 (Assisted Care accommodation) as residential flats (13 units) (Sui generis) and associated parking and amenity area.	13	Decided
23/01825/PAN	Erection of student accommodation with ancillary uses and other associated development.	1	No Objection
23/02003/PAN	Erection of residential led mixed use development, with associated access, open space and infrastructure.	1	No Objection
23/02482/PAN	Mixed-use development to provide music rehearsal and performance spaces, film facilities, general industrial and office and production space (Class 11, Class 4, Class 5, and Class 6) and purpose-built student accommodation (Sui Generis); residential accommodation.	1	No Objection
23/02803/FUL	Change of use of retail unit ancillary offices/storage to upper floors as 6No. residential flatted dwellings, includes external alterations.	6	Decided
23/03176/PAN	Erection of residential development, associated roads, parking and landscaping.	1	No Objection
24/00111/PAN	Erection of residential development and associated works.	1	No Objection
24/00457/PAN	Erection of residential development and associated works.	1	No Objection
24/00765/PAN	Erection of purpose-built student accommodation with ground floor Class 1A with associated landscaping, amenity, access and other ancillary works.	1	No Objection
24/01014/PAN	Replan of Sighthill TRA Masterplan including demolition works, erection of residential development with associated local retail/commercial, hotel, student accommodation, associated infrastructure, site remediation and site preparation works.	1	Decided – Grant

Table 7: Glasgow City Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/01029/SCR	Erection of purpose built student accommodation, flatted residential development, community wealth building artistic facility and community lounge with associated community park of circa 2.5 acres, amenity, access and other ancillary works.	1	Not Required
24/01135/PAN	Demolition and façade retention of listed building and erection of purpose built student accommodation (PBSA) with associated public realm and engineering/infrastructure works.	1	No Objection
24/01237/SCR	Erection of residential development (152 Units) and associated works: Request for Screening Opinion under the terms of the Town and Country Planning.	152	Not Required
24/01272/PAN	Erection of flatted residential development (55 units) and associated works.	55	No Objection

Table 8: Midlothian Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/00153/DPP	Erection of 30 dwellings and associated works.	30	Approved
23/00213/MSC	Erection of 17 dwellinghouses, workshop; formation of play area, access, car parking, and associated works (Approval of matters specified in conditions 2, 3, 4, 5, 6, 7, 9, 10, 12 and 13 of planning permission 13/00780/PPP).	17	Awaiting decision
23/00474/DPP	Erection of 32 dwellinghouses.	32	Awaiting decision

Table 9: North Lanarkshire Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/01003/PPP	Residential Development (In Principle).	1	Pending Consideration
23/01234/FUL	Three detached dwellinghouses.	3	Pending Consideration
23/01280/FUL	Single dwellinghouse (application for approval of matters specified by conditions of planning permission in principle 22/01276/PPP).	1	Decided – Permitted
23/01302/PPP	Three dwellinghouses (In Principle).	3	Pending Consideration
24/00003/FUL	Demolition of Cottage and Construction of Two Dwellinghouses (Semi-Detached).	2	Application Permitted
24/00025/PPP	Development of land for two detached dwellinghouses and refurbishment of existing house (application for planning permission in principle).	2	Pending Consideration
24/00049/EIASCR	Residential development comprising residential units associated accesses and roads, car parking, landscaping and associated infrastructure (EIA screening request).	1	Comments
24/00061/MSC	Single dwellinghouse (application for approval of matters specified by conditions of planning permission 22/00997/PPP).	1	Decided – Permitted
24/00089/LBC	Part demolition of boundary wall of listed building curtilage (to facilitate access to new dwellinghouse within grounds).	1	Decided – Permitted
24/00108/FUL	Retrospective Subdivision of single dwellinghouse into two semi-detached houses with ancillary curtilage garden areas.	2	Pending Consideration
24/00141/FUL	Erection of Detached Dwelling and Garage (Plot1).	1	Decided – Permitted
24/00156/FUL	Erection of 100 New Dwellings (mix of two storey houses, bungalows, cottage flats and flats), Associated Infrastructure, and Landscaping.	100	Pending Consideration
24/00163/AMD	Two semi-detached dwellinghouses (renewal of planning permission 20/00545/FUL).	2	Application Permitted
24/00176/PAN	Residential development, Remediation works, noise mitigation works, and all other associated infrastructure.	1	Comments

Table 9: North Lanarkshire Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00179/S42	Application under Section 42 to amend condition 2 of consent 20/01157/MSC to provide clarity and address the reality of the construction programme/phasing.	1	Decided – Permitted
24/00208/PPP	Residential development and associated infrastructure (application for planning permission in principle).	1	Pending Consideration
24/00209/MSC	Approval of matters specified in conditions 1 a, b, c, e, f, g, h, i, j, k, m of planning permission in principle ref 14/01594/PPP for the erection of 155 dwellinghouses with associated roads, infrastructure and landscaping (amended proposals on part of the site pr.	155	Decided – Permitted
24/00210/FUL	Erection of 137 no. two storey dwelling houses and associated infrastructure and landscaping.	137	Pending Consideration
24/00230/PPP	Residential led mixed use development with associated access, open space, landscaping, drainage features and associated infrastructure (in principle).	1	Pending Consideration
24/00242/MSC	Erection of 32 Dwellings with Associated Roads, Parking, Drainage, Open Space and Landscaping (Approval of Matters Specified in Conditions of 19/00563/PPP).	32	Pending Consideration
24/00271/FUL	Dwellinghouse and garage including access and supporting infrastructure.	1	Pending Consideration
24/00280/FUL	Construction of 5 Dwellings.	5	Pending Consideration
24/00319/FUL	Demolition of 169 Flats (Blocks C, D and E) and Construction of 72 Flatted Units for Social Rent Including associated Car Parking & Amenity Landscaping.	72	Pending Consideration
24/00366/FUL	Residential development of 5 houses and all associated site works.	5	Pending Consideration
24/00370/FUL	Construction of Dwelling.	1	Pending Consideration
24/00378/FUL	Erection of detached bungalow.	1	Pending Consideration
24/00387/FUL	Construction of 12 Flats Phases 2 and 3 of permission 12/00520/FUL (amended).	12	Pending Consideration
24/00504/FUL	One dwellinghouse.	1	Pending Consideration

Table 9: North Lanarkshire Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00512/AMD	Substitution of House types – replacing 1 No Semi-Detached dwellings and 2 detached dwellings with 1 No. 5 block of terraced dwellings (Amendment to 20/01338/FUL).	4	Pending Consideration
24/00537/FUL	Change of Use from Nursing Home to Assisted Living Accommodation, including Extension and External Alterations.	1	Pending Consideration
24/00551/PPP	Planning in Principle – Application for 4 Plots.	4	Pending Consideration
24/00558/FUL	Erection of Steel Framed Building.	1	Pending Consideration
24/00580/CLP	Conversion of ground floor of detached garage to residential accommodation.	1	Decided – Permitted
24/00606/PAN	Residential Development.	1	Comments
24/00614/FUL	Erection of Two Dwellinghouses.	2	Pending Consideration
24/00625/FUL	Partial Conversion of Restaurant to Guest Accommodation (16 additional bedrooms) including External Alterations and Other Associated Works.	1	Pending Consideration
24/00649/PPP	Two Storey Dwellinghouse (Planning Permission in Principle).	2	Pending Consideration
24/00661/AMD	Amendment to Permission 19/01434/MSC – Change of layout and substitution of house type to 30 flats in two blocks, one of two storeys and one of three storeys with associated parking and open space.	30	Pending Consideration
24/00707/CAC	Demolish unlisted buildings 1 to 2 Ross Street and C listed building at 1 to 7 Bank Street and construct new building (comprising of a ten bed supported unit) and six flats.	7	Pending Consideration

Table 10: Perth and Kinross Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/02153/FLL	Erection of dwellinghouse.	1	Decided
23/02161/FLL	Erection of a dwellinghouse.	1	Decided
24/00163/FLL	Change of use from hotel to dwellinghouse.	1	Decided
24/00215/FLL	Erection of a dwellinghouse and outbuilding.	1	Decided
24/00333/FLL	Erection of a dwellinghouse.	1	Decided
24/00374/FLL	Erection of dwellinghouse, workshop/ancillary accommodation, and associated works.	1	Awaiting decision
24/00385/FLL	Erection of a dwellinghouse and alterations to ruinous buildings to form a garage/store/workshop and associated works (plot 2).	1	Awaiting decision
24/00388/FLL	Change of use and alterations to shop to form a dwelling.	1	Decided
24/00425/IPL	Erection of dwellinghouse and formation of access (in principle).	1	Awaiting decision
24/00468/FLL	Erection of 4 dwellinghouses, garages and associated works.	4	Awaiting decision
24/00509/FLL	Erection of a dwellinghouse.	1	Awaiting decision
24/00538/FLL	Change of use, alterations and extension of agricultural buildings to form 2 dwellinghouses, and associated works.	2	Awaiting decision
24/00569/FLL	Erection of a dwellinghouse (revised design).	1	Decided
24/00609/IPL	Erection of dwellinghouse and associated works (in principle).	1	Decided
24/00649/FLL	Change of use of medical practice (Class 1A) to form dwellinghouse (Class 9).	1	Awaiting decision
24/00745/FLL	Erection of a dwellinghouse and garage (change of house type for plot 4.5).	1	Awaiting decision

Table 10: Perth and Kinross Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00759/AML	Erection of a dwellinghouse and associated works (approval of matters specified in conditions of 21/01433/IPL).	1	Awaiting decision
24/00815/FLL	Erection of a dwellinghouse and garage.	1	Awaiting decision
24/00943/FLL	Erection of replacement dwellinghouse and associated works.	1	Awaiting decision
24/00957/IPL	Erection of dwellinghouse (in principle).	1	Awaiting decision
24/00961/FLL	Erection of dwellinghouse, installation of air source heat pump and associated works.	1	Awaiting decision
24/00985/FLL	Erection of a dwellinghouse and associated works.	1	Awaiting decision
24/00985/FLL	Erection of a dwellinghouse (revised design).	1	Awaiting decision

Table 11: Scottish Borders Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/01897/FUL	Erection of dwellinghouse with garage.	1	Decided
24/00071/FUL	Installation of ASHP to 14 no. maisonettes and erection of rickshaw store.	14	Decided
24/00181/FUL	Residential development comprising of 2No dwellinghouses and 12No flats with associated works.	14	Registered
24/00247/FUL	Application under Section 42 to vary planning conditions 2 and 7 of planning permission 19/00182/PPP (erection of residential apartments) to vary wording of conditions.	1	Registered
24/00307/FUL	Change of use of restaurant and offices and alterations to form 4 no residential flats.	4	Registered
24/00325/FUL	Erection of dwellinghouse.	1	Registered

Table 11: Scottish Borders Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00384/FUL	Erection of dwellinghouse.	1	Decided
24/00650/FUL	Erection of dwellinghouse .	1	Registered
24/00746/FUL	Erection of dwellinghouse.	1	Registered
24/00770/LBC	Internal and external alterations to existing store and garages to form two dwellinghouses.	2	Registered

Table 12: South Lanarkshire Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/24/0005/PAN	Residential development including formation of road, access, landscaping and infrastructure.	1	Decided
P/24/0005/V	Partial demolition of B-Listed annex building and conversion of retained element to form 8 flats and construction of 31 new dwellings in the cleared area and adjacent playground along with associated ancillary works – Non-material variation of Planning Permission.	8	App approved
P/24/0010/PAN	Proposed residential development with associated infrastructure and amenity space (Proposal of Application Notice).	1	Decided
P/24/0014/PAN	Proposed residential development with associated infrastructure and landscaping (Proposal of Application Notice).	1	Registered
P/24/0028/V	Erection of 2 one and a half storey high detached dwellings and associated access – Variation to permission P/23/0628 with regards to an amended house design and provision of individual vehicular accesses.	2	Awaiting decision
P/24/0089	Change of use of former restaurant and public bar to form 2 flatted dwellings and 1 short stay lettable room, ancillary to existing public bar, and associated alterations.	3	Decided
P/24/0111	Erection of 2no. dwellinghouses.	2	Decided

Table 12: South Lanarkshire Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/24/0139	Demolition of former school building, land engineering operations and erection of 4 bungalows with associated access road and landscaping.	4	Registered
P/24/0165	Erection of housing development (230 homes) on undeveloped vacant land with landscaping, play areas, drainage, road layouts, new accesses arrangements and associated development.	230	Registered
P/24/0168	Erection of dwellinghouse (substitute of house type).	1	Registered
P/24/0192	Demolition of existing outbuilding and erection of 2no. detached dwellings, access road and associated works.	2	Awaiting decision
P/24/0213	Demolition of existing buildings and erection of 21 flats with associated access, parking, landscaping, bin storage, bike storage and heating plant.	21	Registered
P/24/0239	Erection of dwellinghouse (part-retrospective).	1	Awaiting decision
P/24/0255	Erection of 7 dwellings, formation of access road, drainage infrastructure and associated landscaping.	7	Awaiting decision
P/24/0297	Change of use of farm steading to form two dwellings, restoration of farmhouse to form one dwelling, erection of three dwelling houses and associated access improvements – Further application under Regulation 11 to amend layout and design of one of the dw.	3	Decided
P/24/0321	Erection of two dwellinghouses with detached garages (Approval of matters specified in conditions of planning permission in principle P/22/0811).	2	Registered
P/24/0324	Erection of dwellinghouse with detached garage and associated landscaping.	1	Registered
P/24/0329	Demolition of existing building and erection of 4 terraced dwellinghouses with associated parking and landscaping.	4	<Null>
P/24/0330	Erection of 4 dwellinghouses (retrospective).	4	Registered
P/24/0332	Erection of dwellinghouse with associated landscaping and access arrangements.	1	Registered

Table 12: South Lanarkshire Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/24/0346	Erection of two storey dwellinghouse and associated works.	1	Registered
P/24/0346	Erection of two storey dwellinghouse and associated works.	1	Registered
P/24/0361	Erection of single-storey dwellinghouse.	1	Registered
P/24/0374	Erection of 25 dwellinghouses with associated landscaping, access roads and services.	25	Registered
P/24/0401	Use of vacant retail premises (Class 1) as dwellinghouse.	1	Decided
P/24/0402	Partial demolition of agricultural building and erection of dwellinghouse.	1	Registered
P/24/0406	Part conversion of existing outbuilding to form ancillary family accommodation.	1	Decided
P/24/0411	Erection of detached dwellinghouse and associated garage with ancillary accommodation in roof space – Further application under Regulation 11 to amend the layout and design of the dwelling approved under application P/22/0586.	1	Awaiting decision
P/24/0432	Erection of single storey dwellinghouse.	1	Decided
P/24/0449	Erection of 19 houses (Including 8 cottage flats) and formation of new access road, landscaping and fencing.	19	Registered
P/24/0483	Erection of 3 flatted dwellings in garden ground and formation of associated parking.	3	Registered
P/24/0499	Erection of 5 no single storey dwellinghouses, double garage to plot 3, new access road, foul water treatment plant, and associated infrastructure including retaining wall.	5	Registered
P/24/0526	Erection of 2 detached dwellings and formation of associated access (renewal of P/21/0072).	2	Decided
P/24/0529	Erection of 25 dwellinghouses, associated access road, noise bund with fence, suds pond, open space and landscaping (variation to P/19/1802 as approved including layout, siting and design and a reduction in house plots).	25	Registered

Table 12: South Lanarkshire Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/24/0541	Erection of 5 detached single storey dwellinghouses and associated work including access road and landscaping.	5	Registered
P/24/0553	Erection of dwellinghouse (Planning Permission in Principle) – Application to vary condition 18 of planning permission P/22/0360 to amend the timing of the tree planting.	1	Registered
P/24/0562	Erection of 6 no. dwellinghouses and associated infrastructure.	6	Registered
P/24/0573	Redevelopment of existing farm buildings to provide farm workers dwellings, new agricultural buildings, estate office and main farmhouse with access, landscaping and associated infrastructure – Application to discharge conditions 1, 2, 3, 4, 5, 6, 8, 9.	1	Registered
P/24/0581	Erection of farm workers dwellinghouse.	1	Registered
P/24/0598	Formation of house plot (Planning Permission in Principle).	1	Registered
P/24/0606	Erection of 8 dwellings, formation of access road, drainage infrastructure, play area and associated landscaping – Regulation 11 application for P/23/1169 involving change of house design on plot 7 to bungalow with side garage.	8	Registered
P/24/0623	Erection of dwellinghouse and detached garage with associated alterations and landscaping.	1	Registered
P/24/0635	Erection of detached dwellinghouse in conjunction with existing equestrian business and associated works.	1	Registered
P/24/0644	Erection of dwellinghouse.	1	Registered
P/24/0662	Demolition of building and erection of dwellinghouse and associated works.	1	Registered
P/24/0676	Erection of 4 dwellinghouses.	4	Registered
P/24/0680	Conversion and extension of redundant farm building to form dwellinghouse with associated works.	1	Registered
P/24/0697	Erection of dwellinghouse, detached garage and associated works.	1	Registered

Table 12: South Lanarkshire Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
P/24/0721	Demolition of commercial building and erection of dwellinghouse and associated infrastructure.	1	Registered
P/24/0739	Erection of 182 dwellinghouses with associated roads, drainage, landscaping and open space (amendment to P/24/0019).	182	Registered
P/24/0752	Erection of 5 dwellings with associated access.	5	Registered
P/24/0802	Formation of 16 house plots and associated access roads.	1	Registered
P/24/0808	Erection of 6no. dwelling flats and associated infrastructure.	6	Registered

Table 13: Stirling Planned Developments

Planning Application Reference	Description	Size (units)	Status
23/00760/FUL	Subdivision of existing duplex flat at 3rd and attic storey into two separate flats, one on each level, and installation of external slate vent/kitchen extract.	2	Unknown
23/00776/MSC	Application for approval of Matters Specified in Condition 1 of planning permission 18/000850/PPP for erection of 150no. dwellinghouses and associated infrastructure and landscaping (Revision to Phase 1 approval – 22/00778/MSC).	150	Unknown
23/00779/FUL	Erection of dwellinghouse.	1	Unknown
24/00016/FUL	Change of Use from Chiropodists Office (Class 1A) to Residential Flat (Sui Generis) at 1st Floor Level.	1	Unknown
24/00022/FUL	Demolition of existing dwellinghouse and conversion and extension of existing barns to form dwellinghouse together with a detached garage.	1	Unknown
24/00085/PPP	Erection of dwellinghouse.	1	Unknown
24/00103/PPP	Erection of 5no. dwellinghouses.	5	Unknown

Table 13: Stirling Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00138/FUL	Erection of dwellinghouse.	1	Awaiting decision
24/00193/FUL	Change of use from Public House to shop and two flats (one ground rear, one front first floor).	2	Unknown
24/00199/FUL	Erection of new two storey building to form a new (retail) unit on the ground floor and a new (residential) unit at first floor.	1	Awaiting decision
24/00224/FUL	Change of use from Class 1A offices to Class 9 residential and installation of new vent extract on rear elevation.	9	Unknown
24/00241/FUL	Proposed subdivision of flat at ground floor level, including formation of new doorway, to create 2 residential flats (Class 9).	2	Unknow
24/00246/FUL	Erection of 2no. dwellinghouses.	20	Unknown
24/00247/FUL	Erection of dwellinghouse.	1	Awaiting decision
24/00261/FUL	Erection of dwellinghouse and upgrade of existing access junction with public road.	1	Awaiting decision
24/00266/PPP	Erection of single dwellinghouse and garage and formation of access from A807.	1	Awaiting decision
24/00288/LBC	Proposed refurbishment and extension of an existing Coach House ancillary to a B Listed Dwelling to form a new private dwelling – alterations to below ground level of previous consent 22/00122/LBC following revised structural advice on basement formation.	1	Awaiting decision
24/00322/FUL	Erection of 2no. dwellinghouses in walled garden to supersede application ref: 21/01055/PPP (Plot C).	2	Awaiting decision
24/00324/FUL	Convert a garage building into two studio accommodations for use as Student Accommodation between 1st September to 31st May and as Short Term lets between 1st June and 31st August on an ongoing basis, removal of three double garage doors on front elevation.	1	Awaiting decision
24/00334/FUL	Erection of dwellinghouse, including formation of associated curtilage, access arrangements and drainage.	1	Awaiting decision

Table 13: Stirling Planned Developments

Planning Application Reference	Description	Size (units)	Status
24/00342/FUL	Change of use from holiday let to residential dwelling.	1	Awaiting decision
24/00366/PPP	Erection of dwellinghouse and change of use of land from commercial to residential.	1	Awaiting decision
24/00373/LBC	Alterations and extension of basement and alterations to part of the ground floor to form 3no. flatted dwellings.	3	Awaiting decision
24/00398/FUL	Change of use from offices to 5 bed dwellinghouse.	1	Awaiting decision
24/00415/PPP	Demolition of semi-derelict garages and two Flats at 'Heathfield' and erection of 17no. flats and 1no. communal gym, formation of new vehicular access from Edward Road, parking and landscaping.	17	Awaiting decision
24/00428/FUL	Erect Farmhouse and garage to serve farm operations.	1	Awaiting decision
24/00442/FUL	Construction of New 20 bed luxury care home and associated parking and landscaping.	1	Awaiting decision
24/00443/PPP	Demolition of building and erection of a single dwellinghouse, garage and associated works.	1	Awaiting decision

Table 14: West Lothian Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
0253/FUL/23	Erection of 61 houses with associated landscaping and infrastructure.	61	Awaiting decision
0300/FUL/23	Erection of 8 houses with associated works.	8	Awaiting decision
0411/FUL/23	Siting of 15 temporary units for classroom, changing facility, toilet and storage use (in retrospect).	1	Approved
0474/FUL/23	Erection of 14 industrial units (class 5) totalling 3,683 sqm and external works with car parking.	1	Awaiting decision
0580/FUL/23	Erection of a 60-bed care home and 18 flats with associated access, car parking and landscaping.	1	Awaiting decision

Table 14: West Lothian Council Planned Developments

Planning Application Reference	Description	Size (units)	Status
0581/FUL/23	Use of land for siting of 20 holiday lodges; new access; new internal roads and footpaths; surface water and foul drainage.	20	Awaiting decision
0782/MSC/23	Approval of matters specified in conditions of planning permission 1019/P/19 for the erection of 15 houses (modification to 0891/MSC/22 – increase of one unit).	15	Awaiting decision
0308/FUL/23	Erection of 86 houses and 12 flats with access, landscaping, drainage and associated infrastructure.	98	Awaiting decision
0710/FUL/23	Erection of 47 houses and 8 flats with associated roads, landscaping, engineering and infrastructure works.	55	Awaiting decision
0743/FUL/23	Erection of 47 flats with access, landscaping and associated works.	47	Awaiting decision
0795/FUL/23	Erection of 20 houses, 28 flats and one staff building with landscaping, car parking and associated works.	48	Awaiting decision

Local Development Plan Site Allocations

Table 15: Clackmannanshire Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H27 Main Street/North Street, Clackmannan	6 units
H28 Helensfield, Clackmannan	55 units
H29 Burnside, Clackmannan	71 units
H30 Blackfaulds, Devon Village	16 units
H31 Blackfaulds Steading, Devon Village	11 units
H43 Lower Mill Street, Tillicoultry	74 units
H44 Middleton Mill/Upper Mill Street, Tillicoultry	50 units
H45 Coalsnaughton North, Coalsnaughton	240 units
H46 Coalsnaughton North (The Glen), Coalsnaughton	34 units
M06 Former Community Centre, Tillicoultry	50 units
H47 Dollar Settlement Expansion	350 units
H48 Dollar Golf Club, Dollar	4 units
H49 South and East of Pool of Muckhart	35 units
H50 Forestmill	1250 units
H51 Solsgirth	45 units

Table 16: East Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
PROP MH1: Land at Craighall, Musselburgh	Residential development 1,500 units. 41 hectares of employment land.
PROP MH2: Land at Old Craighall Village	100 units
PROP MH5: Former Edenhall Hospital Site, Musselburgh	100 units
PROP MH6: Pinkie Mains, Musselburgh	450 units
PROP MH7: Pinkie Mains, Musselburgh (Intensification)	130 units
PROP MH8: Levenhall, Musselburgh	65 units
PROP MH9: Land at Wallyford	1450 units, community centre and primary centre.
PROP MH10: Land at Dolphingstone	600 units
PROP MH12: Barbachlaw, Wallyford	94 units
PROP MH13: Land at Whitecraig South	Circa 300 units, a small local centre, the expansion of the primary school campus and provision of other community uses.
PROP MH14: Land at Whitecraig North	200 units
Brunton Wireworks	140 units
Monktonhall Terrace	12 units
Drummohr Avenue	10 units
Balcarres Road	44 units
Drummohr House	10 units
Salters Road	46 units

Table 16: East Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
Chalkieside Steading	9 units
PROP PS1: Longniddry South	Circa 450 homes plus associated employment development, a small local centre, community facilities.
PROP PS2: Land at Dolphingstone North, Prestonpans	Circa 140 homes.
Edinburgh Road (HOU1)	31 Units
West Seaside	9 Units
Cockenzie House	20 Units
Seton East Steading	9 Units
PROP BW1 Blindwells New Settlement	1600units
PROP BW2 Safeguarded Blindwells Expansion Site	Undefined units.
PROP TT1: Housing at Windygoul South, Tranent	550 units
PROP TT4: Lammermoor Terrace, Tranent	120 units
PROP TT5: Bankpark Grove, Tranent	80 units
PROP TT7: Macmerry North	150 units
PROP TT9: Gladsmuir East	20 units
PROP TT10: Limeylands Road, Ormiston	140 units
PROP TT11: Elphinstone West	80 units
PROP TT12: Woodhall Road, Wester Pencaitland	16 units

Table 16: East Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
PROP TT13: Lempockwells Road, Wester Pencaitland	115 units
PROP TT14: Park View, Easter Pencaitland	55 units
PROP MH11: New Secondary School Establishment	A minimum campus area of 6.2 hectares will be required for this facility.
PROP MH15: Whitecraig Primary School Expansion Land	Safeguarded for the future expansion of the school campus.
PROP TT2: Windygoul Primary School Expansion Land	1.12 hectares

Table 17: Edinburgh Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
HSG 1 – Name: Springfield, Queensferry	13 hectares/150 dwellings
HSG 2 – Name: Agilent, South Queensferry	14 hectares Estimated total capacity: 450 (440*)
HSG 3 – Name: North Kirkliston	44 hectares Estimated total capacity: 680 (153*)
HSG 4 – Name: West Newbridge	Site area: 20 hectares Estimated total capacity: 500
HSG 5 – Name: Hillwood Road, Ratho Station	Site area: 5 hectares Estimated total capacity: 50-100
HSG 6 – Name: South Gyle Wynd	Site area: 3 hectares Estimated total capacity: 204
HSG 7 – Name: Edinburgh Zoo	Site area: 4 hectares Estimated total capacity: 80
HSG 8 – Name: Telford College (North Campus)	Site area: 3 hectares Estimated total capacity: 330 (119*)
HSG 9 – Name: City Park	Site area: 2 hectares Estimated total capacity: 200

Table 17: Edinburgh Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
HSG 10 – Name: Fairmilehead Water Treatment Works	Site area: 11 hectares Estimated total capacity: 275 (150*)
HSG 11 – Name: Shrub Place	Site area: 2 hectares Estimated total capacity: 410
HSG 12 – Name: Lochend Butterfly	Site area: 5 hectares Estimated total capacity: 590 (198*)
HSG 13 – Name: Eastern General Hospital	Site area: 4 hectares Estimated total capacity: 295 (231*)
HSG 14 – Name: Niddrie Mains	Site area: 21 hectares Estimated total capacity: 814 (498*)
HSG 15 – Name: Greendykes Road	Site area: 3 hectares Estimated total capacity: 145
HSG 16 – Name: Thistle Foundation	Site area: 8 hectares Estimated total capacity: 256 (179*)
HSG 17 – Name: Greendykes	Site area: 12 hectares Estimated total capacity: 990 (841*)
HSG 18 – Name: New Greendykes	Site area: 26 hectares Estimated total capacity: 878 (829*
CC 2 – Name: New Street	Site area: 3 hectares Estimated total capacity: 250
CC 3 – Name: Fountainbridge	Site area: 37 hectares Estimated total capacity: 1,200 (994*)
CC 4 – Name: Quartermile	Site area: 8 hectares Estimated total capacity: 1,110 (340*)
EW 1a – Name: Leith Waterfront (Western Harbour)	Site area: 49 hectares Estimated total capacity: 3,000 (1,873*)
EW 1b – Name: Central Leith Waterfront	Site area: 61 hectares Estimated total capacity: 2,720
EW 1c – Name: Leith Waterfront (Salamander Place)	Site area: 13 hectares Estimated total capacity: 1,500 (1,355*)
EW 2a – Name: Forth Quarter	Site area: 45 hectares Estimated total capacity: 1,800 (1,041*)
EW 2b – Name: Central Development Area	Site area: 41 hectares Estimated total capacity: 2,050 (1,747*)
EW 2c – Name: Granton Harbour	Site area: 38 hectares Estimated total capacity: 1,980 (1,634*)

Table 17: Edinburgh Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
EW 2d – Name: North Shore	Site area: 16 hectares Estimated total capacity: 850
HSG 19 – Name: Maybury	Site area: 75 hectares Estimated number of houses: 1,700-2,000
HSG 20 – Name: Cammo	Site area: 28 hectares Estimated total capacity: 500-700
Policy Emp 6 – Name: International Business Gateway (IBG)	Site area: n/a Estimated number of houses: TBC
Policy Del 4 – Name: Edinburgh Park/South Gyle	Site area: n/a Estimated number of houses: 450-700
HSG 21 – Name: Broomhills	Site area: 30 hectares Estimated total capacity: 425-595
HSG 22 – Name: Burdiehouse	Site area: 14 hectares Estimated total capacity: 250-350
HSG 23 – Name: Gilmerton Dykes Road	Site area: 2.5 hectares Estimated total capacity: 50-70
HSG 24 – Name: Gilmerton Station Road	Site area: 36 hectares Estimated total capacity: 600-650
HSG 25 – Name: The Drum	Site area: 6 hectares Estimated total capacity: 125-175
HSG 26 – Name: Newcraighall North	Site area: 9 hectares Estimated total capacity: 220
HSG 27 – Name: Newcraighall East	Site area: 17 hectares Estimated total capacity: 275-385
HSG 28 – Name: Ellen's Glen Road	Site area: 4 hectares Estimated number of houses: 220-260
Reference : HSG 29 – Name: Brunstane	Site Area: 48 hectares Estmated total capacity: 950-1,330
HSG 30 – Name: Moredunvale Road	Site area: 5 hectares Estimated total capacity: 188
HSG 39 – Name: North of Lang Loan	Site Area: 13 hectares Estimated total capacity: 220
HSG 40 – Name: South East Wedge South: Edmonstone	Site Area: 28 hectares Estimated total capacity: 170-370
HSG 41 – Name: South East Wedge North: The Wisp	Site Area: 2 hectares Estimated total capacity: 71

Table 17: Edinburgh Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
HSG 31 – Name: Curriemuirend	Site area: 6 hectares Estimated total capacity: 150-180
HSG 32 – Name : Builyeon Road, Queensferry	Site Area: 41.5 hectares Estimated total capacity: 700-980
HSG 33 – Name : South Scotstoun, Queensferry	Site Area: 20 hectares Estimated total capacity: 312-437
HSG 34 – Name : Dalmeny	Site Area: 1 hectare Estimated total capacity: 12-18
HSG 35 – Name: Riccarton Mains Road, Currie	Site area: 1 hectare Estimated total capacity: 25-35
HSG 36 – Name: Curriehill Road, Currie	Site Area: 2.5 hectares Estimated total capacity: 50-70
HSG 37 – Name : Newmills Road, Balerno	Site Area: 8 hectares Estimated total capacity: 175-245
HSG 38 – Name : Ravelrig Road, Balerno	Site Area: 14 hectares Estimated total capacity: 120
Portobello High School (SCH 1)	Site area: 7.4 hectares
High School, Craigmillar (SCH 2)	Site area: TBC
New Greendykes (SCH 3)	Site area: TBC
North of Waterfront Avenue, Granton (SCH 4)	Site area: 1.2 hectares
Western Harbour, Leith (SCH 5)	Site area: 1.1 hectares
Maybury (SCH 6)	Site area: 2 hectares
Gilmerton (SCH 7)	Site area: 2 hectares
Broomhills (SCH 8)	Site area: 2 hectares
Brunstane (SCH 9)	Site area: 2 hectares
Queensferry – South (SCH 10)	2 hectares

Table 18: Falkirk Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H01 Drum Farm North	183 units
H02 Kinglass Farm 1	160 units
H03 Kinglass Farm 2	25 units
H04 South Street/Main Street	21 units
H05 Cadzow Avenue	27 units
H06 Union Street	12 units
H07 Banknock South	200 units
H08 Dennyloanhead	550 units
H09 Kilsyth Road 1, Haggs	48 units
H10 Kilsyth Road 2, Haggs	25 units
H11 Falkirk Road, Bonnybridge	35 units
H12 Broomhill Road, High Bonnybridge	30 units
H13 Seabegs Road, High Bonnybridge	48 units
H14 Former Denny High School	200 units
H15 Mydub 1	307 units
H16 Mydub 2	270 units
H17 Carrongrove Mill	200 units
H18 Fintry Road	90 units

Table 18: Falkirk Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H19 Stirling Street	18 units
H22 Rosebank, Dunipace	110 units
H23 Merchiston Road	67 units
H24 Gowan Avenue	44 units
H25 Etna Road 1	40 units
H26 Etna Road 2	150 units
H27 Cauldhame Farm 1	176 units
H28 Cauldhame Farm 2	200 units
H29 Blinkbonny Road	30 units
H30 Carrick Place	20 units
H31 Glenburn Road, Hallglen	26 units
H32 Grangemouth Road	150 units
H33 Tinto Drive	56 units
H35 Oxgang Road	20 units
H36 Bellsdyke	405 units
H37 Hill of Kinnaird	711 units
H38 Lorne Road	72 units
H39 Larbert House/Stables	58 units

Table 18: Falkirk Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H40 Overton	400 units
H41 Redding House	40 units
H42 Redding Park	220 units
H43 Parkhall Farm 1	239 units
H44 Parkhall Farm 2	40 units
H45 Parkhall Farm 3	80 units
H46 Parkhall Farm 4	20 units
H47 The Haining	20 units
H48 Toravon Farm	120 units
H49 Old Redding Road	58 units
H50 Whyteside Hotel	35 units
H51 Lathallan House	48 units
H52 Castle View, Airth	115 units
H53 Graham Terrace, Airth	30 units
H54 Airth Castle South	15 units
H55 The Glebe, Airth	40 units
H56 Former Torwood School	15 units
H57 McLaren Park, Torwood	10 units

Table 18: Falkirk Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H58 Main Street/Slamannan Road, Avonbridge	25 units
H59 Slamannan Road 1, Avonbridge	60 units
H60 Slamannan Road 2, Avonbridge	10 units
H61 Bridgehill, Avonbridge	15 units
H62 Bridgend Road, Avonbridge	30 units
H63 Cockmalane, California	33 units
H64 Church Road 1, California	50 units
H65 Church Road 2, California	12 units
H66 Slamannan Road 1, Limerigg	65 units
H67 Slamannan Road 2, Limerigg	50 units
H68 Reddingmuirhead Road, Shieldhill	10 units
H69 Hillcrest, Shieldhill	30 units
H70 Hillend Farm, Slamannan	Undefined
H71 Avonbridge Road, Slamannan	10 units
H72 The Rumlie, Slamannan	30 units
H73 Standburn West	30 units
H74 Garngrew Road, Haggs	20 units
H75 Pretoria Road	15 units

Table 18: Falkirk Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
M01 Bo'ness Foreshore	750 units
M02 Drum Farm South	120 units
M03 Banknock North	504 units
M04 Bonnybridge Town Centre	Undefined
M05 Broad Street	200 units
M06 Portdownie	500 units
M07 Westburn Avenue	100 units
M08 Grahamston Opportunity Area	Undefined
M09 Falkirk East End Opportunity Area	Undefined
M10 Bank Street	27 units
M11 Williamson Street	54 units
M12 Grangemouth Town Centre	Undefined
M13 Stein's Brickworks, Allandale	71 units
M14 Whitecross	1500 units
M15 East Bonnybridge	200 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
ABD001 Hillside School (Aberdour)	70 units
ABD002 Land at Wester (Aberdour)	20 units
ANS001 Cellardyke Caravan Park	292 units
ANS002 Crichton Street	6 units
ANS003 Bankwell Street	11 units
ANS004 Depot, Pittenweem Road	6 units
AUT001 Camilla Farm (Auchtertool)	16 units
BGY001 Flock House South (Ballingry)	40 units
BGY002 Land to the east of Ballingry (Ballingry)	105 units
BGY003 Ballingry Road (Ballingry)	25 units
BLA001 Land south of Blairhall (Blairhall)	64 units
BLA002 Comrie Castle (Blairhall)	15 units
BLA003 Land West of Rintoul Avenue (Blairhall)	6 units
BLA004 South Avenue (Blairhall)	15 units
BKN 001 Denbeath Parish Church (Buckhaven)	12 units
BUR001 Alcan site (Burntisland)	96 units
BUR002 Grange Farm (Burntisland)	37 units
BUR003 Land at Haugh Road (Burntisland)	20 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
BUR004 Former cinema site, High Street (Burntisland)	40 units
BUR005 Grange Distillery (Burntisland)	49 units
BUR006 Greenmount Hotel (Burntisland)	20 units
CNH001 Pitdinnie Road (Cairneyhill)	10 units
CNH002 Conscience Bridge North (Cairneyhill)	100 units
CNH005 Land north of Cairneyhill (Cairneyhill)	250 units
CDD001 Bowhill Colliery (Cardenden, Dundonald, Auchterderran & Bowhill)	27 units
CDD002 Cardenden South	60 units
CDD003 Dundonald South	450 units
CDD004 Cardenden Road	110 units
CDD005 Cardenden Road East	170 units
CDD006 Woodend Road	145 units
CNK001 Carneil Road (Carnock)	45 units
CHL002 Land at the old school (Charlestown)	5 units
CLB001 Coaltown of Balgonie east (Coaltown of Balgonie)	88 units
CLB002 Land to the north of Pyetree Road (Coaltown of Balgonie)	23 units
CLB003 North of Main Street (Coaltown of Balgonie)	50 units
CLW001 Coaltown of Wemyss North (Coaltown of Wemyss)	110 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
CLW002 Land south of Coaltown of Wemyss (Coaltown of Wemyss)	125 units
COW001 Beath Glebe (Cowdenbeath)	33 units
COW002 King Street 2 (Cowdenbeath)	70 units
COW003 Leuchatsbeath (Cowdenbeath)	406 units
COW004 Adjacent to gas works (Cowdenbeath)	5 units
COW005 Rosebank (Cowdenbeath)	35 units
CRO001 North Knowe, Inverkeithing Road (Crossgates, Fordell & Mossgreen)	174 units
CRO002 Land to the west of Old Perth Road (Crossgates, Fordell & Mossgreen)	200 units
CRO003 Gallows Knowe (Crossgates, Fordell & Mossgreen)	150 units
CRO004 Rear of Hillview Crescent (Crossgates, Fordell & Mossgreen)	5 units
CRO005 Manse Road (Crossgates, Fordell & Mossgreen)	9 units
CRO006 Builders Yard adjacent to Primary School (Crossgates, Fordell & Mossgreen)	18 units
CRH001 Former Meedies Neuk Bar (Crosshill)	14 units
CUL001 Blackadder Haven (Culross)	3 units
DGB001 OCLI, Donibristle Industrial Estate (Dalgety Bay & Hillend)	125 units
DGB002 Fulmar Way 2 (Dalgety Bay & Hillend)	50 units
DGB004 St David's Harbour – Harbour Place (Dalgety Bay & Hillend)	24 units
DUN001 5-7 Comley Park (Dunfermline & Halbeath)	5 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
DUN002 6 Hill Street (Dunfermline & Halbeath)	6 units
DUN003 Beveridge House (Dunfermline & Halbeath)	6 units
DUN004 Brucefield Hotel (Dunfermline & Halbeath)	6 units
DUN005 East Dunfermline North (C) (Dunfermline & Halbeath)	170 units
DUN006 Campbell Street (Dunfermline & Halbeath)	184 units
DUN007 90 Campbell Street (Dunfermline & Halbeath)	24 units
DUN008 East Dunfermline North (F) (Dunfermline & Halbeath)	84 units
DUN009 Kingdom Gateway (G) (Dunfermline & Halbeath)	139 units
DUN010 Kingdom Gateway (EF1) (Dunfermline & Halbeath)	110 units
DUN011 Kingdom Gateway (EF2) (Dunfermline & Halbeath)	80 units
DUN012 Kingdom Gateway (EF3) (Dunfermline & Halbeath)	105 units
DUN013 Trondheim Parkway West (Dunfermline & Halbeath)	80 units
DUN014 Kingdom Gateway (EF4) (Dunfermline & Halbeath)	54 units
DUN015 Kingdom Gateway (EF5) (Dunfermline & Halbeath)	27 units
DUN016 Woodmill Filling Station (Dunfermline & Halbeath)	12 units
DUN017 East Dunfermline (North B) (Dunfermline & Halbeath)	180 units
DUN018 Kingdom Gateway (HI) (Dunfermline & Halbeath)	274 units
DUN019 Masterton Farm (Dunfermline & Halbeath)	35 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
DUN020 Rear of 179 Rumblingwell (Dunfermline & Halbeath)	35 units
DUN021 South Fod Farm (Dunfermline & Halbeath)	26 units
DUN022 Leys Park Road (Dunfermline & Halbeath)	60 units
DUN023 110 Halbeath Road (Dunfermline & Halbeath)	9 units
DUN024 Blacklaw Road (Dunfermline & Halbeath)	131 units
DUN026 North West Corner of Whitefield Road (Dunfermline & Halbeath)	13 units
DUN027 South West Corner of Whitefield Road (Dunfermline & Halbeath)	11 units
DUN028 Meadowland (Dunfermline & Halbeath)	90 units
DUN 029(a & b*) Lynebank Hospital (Dunfermline & Halbeath)	200 units
DUN030 Land at Masterton (west of Masterton Road) (Dunfermline & Halbeath)	45 units
DUN031 Paton Street North (Dunfermline & Halbeath)	30 units
DUN032 Paton Street South (Dunfermline & Halbeath)	20 units
DUN033 School Row (Dunfermline & Halbeath)	20 units
DUN034 Pittencrieff Street (Dunfermline & Halbeath)	Housing undefined units
DUN035 Dunfermline N/W/SW (Dunfermline & Halbeath)	4500 units
DUN036 Elliot Street (Dunfermline & Halbeath)	19 units
DUN037 Dover Heights (Dunfermline & Halbeath)	220 units
DUN038 Kent Street (Dunfermline & Halbeath)	80 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
DUN039 North Dunfermline (Colton) (Dunfermline & Halbeath)	300 units
DUN040 Craigluscar Road/Carnock Road (Dunfermline & Halbeath)	Housing undefined units
DUN041 North Dunfermline (Swallow Drum) (Dunfermline & Halbeath)	900 units
DUN042 Carnock Road (Dunfermline & Halbeath)	30 units
DUN043 Halbeath (Dunfermline & Halbeath)	1400 units
DUN044 Land to the north of Wellwood (Dunfermline & Halbeath)	100 unit
DUN046 Chamberfield Road (Dunfermline & Halbeath)	40 units
DUN047 Halbeath South (Dunfermline & Halbeath)	Housing undefined units
EAE001 Land to the south of A917, East of Elie	55 units
EAE001a Land to north of Grange Road	25 units
EWS001 West of Randolph Street (East Wemyss)	86 units
GLC001 Glencraig East (Glencraig)	275 units
GLC002 Glencraig West (Glencraig)	50 units
GLE001 Balgeddie Riding School (Glenrothes)	72 units
GLE002 Lochtybridge (Glenrothes)	120 units
GLE003 Viewfield (Glenrothes)	360 units
GLE004 Land to the south of Cadham Road (Glenrothes)	200 units
GLE005 Whitehill Industrial Estate (Glenrothes)	230 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
GLE035 Whitehill Industrial Estate (Glenrothes)	230 units
GWH001 Land North of Clune Road (Gowkhall)	10 units
HVF 001 Woodhead Farm (High Valleyfield)	31 units
HVF 002 Land to the north of Woodhead Farm Road (High Valleyfield)	50 units
HVF 003 Abbey Street (High Valleyfield)	10 units
HVF 004 Chapel Place/Carlyle Street (High Valleyfield)	10 units
HOB001 North of Hill of Beath (Hill of Beath)	115 units
INV 001 Borelands Reservoir (Inverkeithing)	18 units
INV 002 The Royal Hotel (Inverkeithing)	8 units
INV 003 Roods (Inverkeithing)	50 units
INV004 Former Inverkeithing Primary School, Roods Road (Inverkeithing)	42 units
INV 005* Spencerfield (Inverkeithing)	295 units
KEL 001 Bath Street Extension 1 (Kelty)	130 units
KEL 002 Bath Street Extension 2 (Kelty)	18 units
KEL 003 Elmwood Terrace (Kelty)	30 units
KEL 004 Netherton Farm (Kelty)	236 units
KEL 005* Kelty South West (Kelty)	900 units
KEL 008 Old Gas Works (Kelty)	44 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
KEN 001 Hallfields Farm 5a (Kennoway)	66 units
KEN002 Land between Halfields Gardens and Leven Road (Kennoway)	190 units
KEN003 Langside Crescent, South (Kennoway)	25 units
KEN 004 Langside Crescent (Kennoway)	5 units
KEN 005 Old Station Road (Kennoway)	30 units
KEN 006 Kennoway School (Kennoway)	60 units
KCD 001 Burnbrae East (Kincardine, New Row & Tulliallan)	30 units
KCD 002 Kincardine Eastern Expansion Phase 1 (Kincardine, New Row & Tulliallan)	300 units
KCD 003 Kincardine Eastern Expansion Phase 2 (Kincardine, New Row & Tulliallan)	190 units
KCD 004 Kincardine Multi Storey Flats (Kincardine, New Row & Tulliallan)	130 units
KCD 005 Land North and East of Burnbrae House (Kincardine, New Row & Tulliallan)	36 units
KNH001 Lochside (Kinghorn)	110 units
KNH002 Viewforth Place (Kinghorn)	18 units
KLS001 Laurence Park South (Kinglassie)	211 units
KLS002 Laurence Park North (Kinglassie)	14 units
KST001 Kingseat Road (Kingseat)	50 units
KDY 001 8 Anderson Street (Kirkcaldy & Dysart)	9 units
KDY 002 Capshard North (Kirkcaldy & Dysart)	189 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
KDY 003 Chapel Extension, John Smith BP (Kirkcaldy & Dysart)	285 units
KDY 004 Dunnikier Maltings (Kirkcaldy & Dysart)	199 units
KDY 005 Ferrard Road (Kirkcaldy & Dysart)	119 units
KDY 006 Katherine Stree (Kirkcaldy & Dysart)	5 units
KDY 007 18 Pottery Street (Kirkcaldy & Dysart)	6 units
KDY 008 45 Pottery Street (Kirkcaldy & Dysart)	5 units
KDY010 Forth Park Hospital (Kirkcaldy & Dysart)	69 units
KDY 011 Park Road/Lawson Road (Kirkcaldy & Dysart)	37 units
KDY 012 257-261 High Street (Kirkcaldy & Dysart)	26 units
KDY 013 Viewforth Terrace (Kirkcaldy & Dysart)	26 units
KDY 014 Hayfield Road (Kirkcaldy & Dysart)	60 units
KDY 015 Smeaton Road (Kirkcaldy & Dysart)	19 units
KDY 016 Junction Road (Kirkcaldy & Dysart)	38 units
KDY 017 Factory Road/Nairn Street (Kirkcaldy & Dysart)	68 units
KDY 018 Den Road Former Tramworks site (Kirkcaldy & Dysart)	90 units
KDY 019 Victoria Fields (Kirkcaldy & Dysart)	100 units
KDY 025 Kirkcaldy East (Kirkcaldy & Dysart)	2850 units
KDY 026 Kirkcaldy South-West (Kirkcaldy & Dysart)	1000 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
LES 001 Leslie House (Leslie)	29 units
LES 002 Prinlaws Mill (Leslie)	85 units
LES 003 South of Walkerton Drive (Leslie)	42 units
LGY 001 Hugh Place (Lochgelly)	25 units
LGY 002 South Street (Lochgelly)	32 units
LGY 003 The Avenue (Lochgelly)	90 units
LGY 004 West Cartmore (Lochgelly)	60 units
LGY007 Lochgelly Strategic Land Allocation (Lochgelly)	2550 units
LHR001 Capledrae Farm (Lochore)	100 units
LHR002 North of Ivanhoe Crescent, Lochore (Lochore)	28 units
LLA001 East of Durham Wynd	62 units
LPH001 Lochgelly Road (Lumphinnans)	100 units
LPH002 Sycamore Crescent (Lumphinnans)	50 units
LPH003 Land to the north of Lumphinnans (Lumphinnans)	300 units
MAR001 Markinch South (Markinch)	300 units
MAR002 Sweetbank Park Terrace (Markinch)	38 units
MAR003 Brunton Road (Markinch)	15 units
MOB001 Balfour Place/Main Street (Milton of Balgonie)	63 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
OAK001 Woodburn Crescent (Oakley)	9 units
OAK002 Land at Pavilion & Bowling Green (Oakley)	15 units
OAK003 Land to north of Oakley (Oakley)	260 units
OAK005 Holy Name Primary School (Oakley)	15 units
PIT001 St Margaret's Farm	36 units
ROS 001 Admiralty Road (Rosyth)	12 units
ROS 002 Brankholme Lane (Rosyth)	9 units
ROS 003 Cochranes Hotel (Rosyth)	54 units
ROS 004 Primrose Lane 2 (Rosyth)	175 units
ROS 015 Land at Admiralty Road & East of Brankholm (Rosyth)	450 units
ROS016 Castlelandhill (north) (Rosyth)	150 units
SAL 001 North Main Street (Saline)	10 units
SAL 002 Kinnedar Mains (Saline)	70 units
SAL003 West Road (Saline)	130 units
SAL004 Saline Park (Saline)	52 units
SOM 001* West End Dairy (Star of Markinch)	20 units
STM001 West of Manse	86 units
THO001 Auction Mart (Thornton)	26 units

Table 19: Fife Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
THO002 Burnbank Terrace (Thornton)	6 units
THO003 Land north and west of Thornton (Thornton)	900 units
THO004 Spittal Farm, Elmbank Terrace/Station Road (Thornton)	73 units
THO005 Land off Main Street (Thornton)	6 units
THO006 Network Rail Land to the east of Thornton (Thornton)	10 units
THO007 Orebank Terrace/Strathore Road (Thornton)	294 units
WWS001 Wemyss Estate Land at West Wemyss (West Wemyss)	42 units
WDY001 Balcurvie Meadows (Windygates)	56 units
WDY002 Land at Temple (Windygates)	75 units
LWD001 Standalane, Nr Saline (Countryside Area)	7 units
LWD003 Glenduckie Farm, Lindores (Countryside Area)	12 units
LWD004 Pitlair 2, Bow of Fife (Countryside Area)	8 units
LWD005 Russell Mains, Springfield (Countryside Area)	6 units
LWD006 Cameron (Housing) (Countryside Area)	15 units
LWD032 Castlehill Mine (Countryside Area)	35 units
GLE028 Stenton (Glenrothes)	School 2.4 hectares
DUN025 Land North of Yewtree House, Masterton (Dunfermline & Halbeath)	Care home 16 units

Table 20: Midlothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
Hs0 – Cauldcoats	550 units
Hs1 – Newton Farm	700 units
Hs2 – Larkfield West, Eskbank	60 units
Hs3 – Larkfield South West, Eskbank	35 units
Hs4 – Thornybank East, Dalkeith	82 units
Hs5 – Thornybank North, Dalkeith	30 units
Hs7 – Redheugh West (Phase 2), Gorebridge	600 units
Hs8 – Stobhill Road, Gorebridge	80 units
Hs9 – Broomieknowe, Bonnyrigg	56 units
Hs10 – Dalhousie Mains, Bonnyrigg	300 units
Hs11 – Dalhousie South, Bonnyrigg	360 units
Hs12 – Hopefield Farm 2, Bonnyrigg	750 units
Hs13 – Polton Street, Bonnyrigg	18 units
Hs14 – Rosewell North	60 units
Hs15 – Edgefield Road, Loanhead	41 units
Hs16 – Seafield Road, Bilston	550 units
Hs17 – Pentland Plants, by Bilston	75 units
Hs18 – Roslin Institute, Roslin	200 units

Table 20: Midlothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
Hs19 – Roslin Expansion	260 units
Hs20 – Auchendinny	350 units
Hs21 – Eastfield Farm Road, Penicuik	12 units
Hs22 – Kirkhill Road, Penicuik	20 units
AHs1 – Rosslynlee, by Rosewell	120-300 units
AHs2 – Burghlee, Loanhead	175 units
AHs3 – Belwood Crescent, Penicuik	25 units
AHs4 – Pomathorn Mill, Penicuik	50 units
AHs5 – Wellington School, by Howgate	50-60 units
H12 – Former Dalkeith High School, Newmills Rd, Dalkeith	173 units
H22 – Rosewell Mains, Rosewell	150 units
H23 – Harvieston	211 units
H24 – Newbyres	76 units
H25 – Greenlaw and adjacent land	458 units
H26 – Deanburn	109 units
H35 – Lingerwood	137 units
H37 – Cockpen	131 units
H38 – South Mayfield	439 units

Table 20: Midlothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H41 – North Mayfield	63 units
H43 – Shawfair	3500 units
H44 – North Danderhall	190 units
H45 – South	300 units
H46 – Cowden Cleugh, Dalkeith	100 units
H48 – Bryans, Easthouses	65 units
h49 – Dykeneuk, Mayfield 50	50 units
h50 – Redheugh/Prestonholm new community	700 units
H51 – Robertson's Bank Gorebridge	55 units
H55 – Seafield Moor Road Bilston	150 units
H57 – Penicuik Road, Roslin	79 units
H58 – North West Penicuik	385 units
H59 – Crichton Road, Pathhead	35 units
H60 – Borthwick Castle Road, North Middleton	15 units
H61 – 72 The Loan, Loanhead	12 units
H69 – Whitehall House	26 units

Table 21: North Lanarkshire Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
NLMW0792 Rosehall Road	28 units
NLMW0788 Paxtane Farm	327 units
NLMW0789 St Catherine's Church	24 units

Table 22: Perth and Kinross Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H47 Lathro Farm	260 units
H48 Pitdownie	40 units
H49 Pace Hill	50 units
H50 Old Perth Road	7 unit
H75 Former High School	70 units
Op15 Lethangie, Primary School	3.5 hectares
Op16 Stirling Road (Employment use and residential on no more than 75% of site)	3.8 hectares

Table 23: Scottish Borders Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
TWL8B Robinsland, West Linton	46 units
AWEST009 Robinsland Steading, West Linton	40 units
TWL15B School Brae, West Linton	10 units
ADOLP003 South of Sandy Hill, Dolphinton	5 units
AEDDL002 North of Belfield Eddleston	35 units
TE6B Burnside Eddleston	30 units
AEDDL010 Land South of Cemetery	30 units
AFOUN005 South Fountainhall	6 units
TB10B Springwell Brae	10 units
TB200 Dreva Road	10 units

Table 24: South Lanarkshire Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
CL0378B Peebles Rd – Phase 2, Carnwath	46 units
CL5062 Kerswell Estate Carnwath	12 units
CL5083B Bertram House Kerswell	20 units
CL5121 Climpy Road Forth	40 units

Table 24: South Lanarkshire Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
CL5144 Garage Site Elsrickle	19 units
CL5147 Estate Yard Carnwath	9 units
CL5157 Kerswell Carnwath	9 units
CL5163 Manse Road Forth	60 units
CL5181 Somerville Drive Carnwath	19 units
CL5182 Heads Inn Farm Carnwath	20 units
CL5184 Carmaben Brae DOLPHINTON	10 units
CL5207 Biggar Road Carnwath	4 units
CL5220 Greenshield House Farm Carnwath	5 units

Table 25: Stirling Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H069 Cushenquarter (SC252)	500 units
H071 Coal Merchants Yard (SC045)	12 units
H072 Touchill Farm (SC041)	167 units
H073 Main Street 1 (SC044)	16 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-AD 1 – Muirhousedykes Mains	5 units
H-AD 2 – Meadowhead Avenue (North)	20 Units
H-AD 3 – Loganlea Road	5 units
H-AD 4 – Loganlea Crescent/Place	35 Units
H-AM 1 – Muirfield, North Street	10 Units
H-AM 3 – Nelson Park/Mallace Avenue	26 units
H-AM 4 – High Academy Street (former nursery)	6 Units
H-AM 5 – Colinshiel (Site A)	135 Units
H-AM 6 – Colinshiel (Site B)	135 Units
H-AM 7 – Tarrareoch (Southdale Meadows)	85 Units
H-AM 8 – Tarrareoch Remainder 1	131 Units
H-AM 9 – Netherhouse, Phase 1, R1A East (Ferrier Path)	13 Units
H-AM 10- Netherhouse, Phase 1, R1B West (Hanlin Park)	26 units
H-AM 11 – Netherhouse Remainder	85 Units
H-AM 12 – Standhill (North)	300 Units
H-AM 13 – Standhill (South)	100 Units
H-AM 14 – Trees Farm	254 Units
H-AM 15 – Lower Bathville	400 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-AM 16 – Mayfield Drive	20 Units
H-AM 17 – Drove Raod	26 Units
H-AM 18 – Stonerigg Farm	11 Units
H-AM 19 – Tarrareoch Farm	320 Units
H-BA 1 – Balmuir Road (former Woodthorpe Garden Centre)	11 units
H-BA 2 – Wester Inch (land to east of Meikle Lane)	70 Units
H-BA 3 – Standhill (Site A), Inchcross Grange	177 Units
H-BA 4 – Standhill Site B)	20 Units
H-BA 5 – Napier Avenue	10 Units
H-BA 6 – Easton Road/Balmuir Road (Sibcas Site)	298 units
H-BA 7 – Little Boghead Remainder	20 Units
H-BA 8 – Wester Inch – Area S	76 Units
H-BA 9 – Wester Inch – Area X, Y, Z & AA, Wester Grove & The Lays	61 Units
H-BA 10 – Wester Inch Areas U & V (Queens' Gait and Reiver Grange)	121 Units
H-BA 11 – Wester Inch (Phase 3)	86 units
H-BA 12 – Main Street	15 Units
H-BA 13 – Jarvey Street	53 Units
H-BA 14 – Windyknowe Glasgow Road (East)	14 Units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-BA 15 – Windyknowe, Glasgow Road (West)	46 Units
H-BA 16 – Whitburn Road (Site B) (former foundry)	170 units
H-BA 17 – Whitburn Road (Site B) (former foundry)	30 Units
H-BA 18 – 9 Hardhill Road (former Creamery garage)	14 Units
H-BA 19 – Bloomfield Place	18 Units
H-BA 20 – Mid Street/Rosemount Court	30 Units
H-BA 21 – Meadowpark, 13-15 Glasgow Road	22 units
H-BA 22 – Bathgate Community Education Centre	6 Units
H-BA 23 – Wester Inch	50 Units
H-BA 24 – Guildiehaugh Depot	100 Units
H-BA 25 – Waverley Street Depot	8 Units
H-BA 26 – Blackburn Road	10 units
H-BA 27 – Whitburn Road (former abattoir)	100 Units
H-BA 28 – Mid Street (former swimming pool site)	10 Units
H-BA 29 – 14-20 Glasgow Road	53 Units
H-BB 1 – Daisyhill Road	9 units
H-BB 2 – Riddochill Road	5 units
H-BB 3 – West Main Street (West)	6 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-BB 4 – West Main Street (East)	6 units
H-BB 5 – 16 Bathgate Road	5 units
H-BB 6 – 11 East Main Street (former garage)	7 units
H-BB 7 – Redhouse West	74 units
H-BB 8 – West Main Street (former adult training centre)	12 units
H-BB 9 – Ash Grove, Site A	5 units
H-BB 10 – Ash Grove, Site B	5 units
H-BL 1 Allison Gardens, Site A	58 units
H-BL 2 Allison Gardens, Site B	19 units
H-BL 3 Westcraigs Road (south of railway line)	10 units
H-BL 4 Craiginn Terrace	210 units
H-BL 5 Woodhill Road	30 units
H-BL 6 South of Craiginn Terrace (part of H-BL 4)	10 units
H-BR 1 – Rashiehill Crescent	5 units
H-BR 2 – Woodmuir Road (West)	3 units
H-BR 3 – Woodmuir Road (East)	70 units
H-BR 4 – Woodmuir Community Hall	5 units
H-BR 5 – Former Woodmuir Primary School	5 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-BR 6 – Blackhill Farm	30 units
H-BD 1 – Willowdean (Site A)	40 units
H-BD 2 – Willowdean (Site B)	90 units
H-BD 3 – Willowdean (Bridgend Golf Course)	40 units
H-BD 4 – Auldhill	5 units
H-BD 5 – Bridgend Farm	30 units
H-BU 1 – Greendykes Road	50 units
H-BU 2 – Holmes (North) Site B	20 units
H-BU 3 – Holmes (North) Site C	8 units
H-BU 4 – Albyn	100 units
H-BU 5 – Candleworks	100 units
H-BU 6 – Holmes (North) Site A	15 units
H-BU 7 – West Main Street (former Broxburn Primary School)	18 units
H-BU 8 – Greendykes Road (West)	590 units
H-BU 9 – Greendykes Road (East)	135 units
H-BU 10 – West Wood	825 units
H-BU 11 – Church Street Depot	6 units
H-BU 13 – Kirkhill North	230 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-BU 14 – East Main Street (former Vion factory site)	200 units
H-DE 1 – Bangour Village Hospital	550 units
H-DE 2 – Main Street	120 units
H-EC 1 – Millbank Depot	22 units
H-EC 2 – Camps Cottage	13 units
H-EC 3 – Broompark Farm	50 units
H-EC 4 – Raw Holdings West (Seven Wells)	117 units
H-EC 5 – Raw Holdings West (Remainder)	553 units
H-EC 6 – Almondell Phase 1, Sites MWc, MWd, MWf, MWe, LKa & LKb	63 units
H-EC 7 – Almondell Phase 1, Sites LKa/LKc	107 units
H-EC 8 – Almondell Phase 1, Sites MWf/LKb	110 units
H-EC 9 – Almondell (Remainder)	2020 units
H-EC 10 – Langton Road	120 units
H-FA 1 – Eastwood Park (East)	68 units
H-FA 2 – Meadow Crescent	7 units
H-FA 3 – Park View (West)	30 units
H-FA 4 – Shotts Road	30 units
H-FA 5 – Breich Water Place	61 units
H-FA 6 – Sheephouse – Hill (North)	48 units
H-FA 7 – Lanrigg Road 3	30 units
H-FA 8 – Eldrick Avenue	8 units
H-FA 9 – Main Street (former cinema	5 units
H-FA 10 – Eastfield Recreation Ground	30 units
H-FA 11 – Former Victoria Park Colliery	90 units
H-KN 1 – Braekirk Gardens	15 units
H-KN 2 – Station Road (East)	90 units
H-KN 3 – Camps Junction (East)	5 units
H-KN 4 – Station Road (south) (Extension)	30 units
H-LW 1 – Gavieside, (by Polbeth)	46 units
H-LW 2 – Craigengall Farm (Lowland Crofts) (by West Calder)	6 units
H-LW 3 – Site of former Breich Inn (by Breich)	5 units
H-LW 4 – West Mains Farm (Lowland Crofts) (by West Calder)	8 units
H-LW 5 – Longford Farm (Lowland Crofts) (by West Calder)	15 units
H-LW 6 – Former Freeport retail village, Westwood (by West Calder)	30 units
H-LL 1 – 81-87 High Street (former bus depot)	41 units
H-LL 2 – Westerlea Court, Friarsbrae	12 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-LL 3 – Boghall East	50 units
H-LL 4 – Land East of Manse Road	25 units
H-LL 5 – Falkirk Road (land at BSW Timber)	18 units
H-LL 6 – Mill Road, Linlithgow Bridge	15 units
H-LL 7 – Clarendon House, 30 Manse Road	8 units
H-LL 11 – Wilcoxholm Farm/Pilgrims Hill	200 units
H-LL 12 – Preston Farm	60 units
H-LL13 – Kettlestoun Mains	210 units
H-LV 1 – Ballantyne Place (South)	8 units
H-LV 2 – Murieston South (6A) (Murieston Gait)	59 units
H-LV 3 – Murieston South (8), Tarbert Drive	9 units
H-LV 4 – Calder Road, Bellsquarry	5 units
H-LV 5 – Ettrick Drive, Craigshill	10 units
H-LV 6 – Forth Drive, Craigshill	6 units
H-LV 7 – Dedridge (East)	15 units
H-LV 9 – Kirkton North (10B)	45 units
H-LV 10 – Deans (West)/Hardie Road	5 units
H-LV 11 – Brucefield Industrial (Limefields)	170 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-LV 12 – Land north of Almondvale Stadium	20 units
H-LV 13 – Gavieside Farm	1900 units
H-LV 14 – Appleton Parkway South East (Eliburn Park)	80 units
H-LV 15 – Kirkton Business Centre	29 units
H-LV 17 – Almond Link Road, Civic Centre Junction	20 units
H-LV 18 – Dedridge East Road (site of former Lammermuir House)	62 units
H-LV 20 – Glen Road/Broomyknowe Drive, Deans	12 units
H-LV 21 – Glen Road (rear of New Deans House)	10 units
H-LV 22 – Kirkton North Road (site of former Buchanan House)	120 units
H-LV 23 – Houston Road (North)	130 units
H-LV 24 – Eagle Brae Depot	30 units
H-LV 25 – Deans South, Phase 1	50 units
H-LV 26 – Deans South, Phase 2	25 units
H-LV 27 – Deans South (Remainder)	165 units
H-LV 28 – Deans South Road	5 units
H-LV 29 – Howden South Road (Former Trim Track)	36 units
H-LV 30 – Land south of Almondvale Stadium	20 units
H-LV 31 – Murieston Valley Road	24 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-LV 32 – Eucal Business Centre, Craigshill Road	25 units
H-LV 33 – Brotherton Farm	150 units
H-LV 34 – Appleton Parkway north east	125 units
H-LV 35 – Wellhead Farm	280 units
H-LR 1 – Curling Pond Lane	25 units
H-LR 2 – Fauldhouse Road (North)	30 units
H-LR 3 – Land at Back O Moss/Main Street	20 units
H-LR 4 – Longridge Park	5 units
H-MC 1 – New Calder Paper Mill	57 units
H-PH 1 – Philpstoun Bowling club	5 units
H-PB 1 – West Calder High School, Limefield	120 units
H-PU 1 – Drumshoreland/Kirkforthar Brickworks	600 units
H-PU 2 – Drumshoreland Road Frontage	25 units
H-PU 3 – Uphall Station Road (former Pumpherston Primary School & Institute)	14 units
H-PU 4 – Beechwood Grove Park	60 units
H-SF 1 – Old Rows	10 units
H-SB 1 – Stoneyburn Farm (East)	50 units
H-SB 2 – Stoneyburn Farm (West)	60 units

Table 26: West Lothian Local Development Plan Site Allocations

Local Development Plan Reference	Size (Hectares and/or Units)
H-SB 3 – Stoneyburn Workshops, Foulshiels Road	8 units
H-SB 4 – Burnlea Place & Meadow Place	35 units
H-SB 5 – Foulshiels Road (Site A)	20 units
H-SB 6 – Meadow Road/Church Gardens	30 units
H-SB 7 – Foulshiels Road (Site B)	150 units
H-WC 1 – Cleugh Brae	120 units
H-WC 2 – Mossend, Phase 1 (Site A)	173 units
H-WC 3 – Mossend, Phase 1 (Site B)	58 units
H-WC 4 – Mossend, (Remainder)	189 units
H-WC 5 – Burngrange (west of West Calder cemetery)	25 units
H-WC 6 – Hartwood Road West	25 units
H-WF 1 – North Logie Brae & South Logie Brae	550 units
H-WH 1 – Polkemmet, Heartlands (1)	68 units
H-WH 2 – Polkemmet, Heartlands, Areas, A, B and C	88 units
H-WH 3 – Polkemmet Remainder	1783 units
H-WH 4 – Whitdale, East Main Street	49 units
H-WH 5 – Dixon Terrace	50 units
H-WH 6 – Polkemmet Business Centre, Dixon Terrace	10 units

Table 26: West Lothian Local Development Plan Site Allocations	
Local Development Plan Reference	**Size (Hectares and/or Units)**
H-WH 7 – Murraysgate, West Main Street	60 units
H-WI 1 – Linburn	50 units
H-WI 2 – East Coxydene Farm	25 units
H-WB 1 – Castle Road	10 units
H-WB 2 – Dunn Place (Winchburgh Primary School)	20 units
H-WB 3 – Niddry Mains (North)	470 units
H-WB 4 – Claypit	166 units
H-WB 5 – Myreside Block AA, (Seton Park)	153 units
H-WB 6 – Myreside Remainder	267 units
H-WB 7 – Glendevon (South) Block K, Site A, (Churchill Brae)	77 units
H-WB 8 – Glendevon (South) Block K, Site B, (Glendevon Gait)	50 units
H-WB 9 – Glendevon (South) (Glendevon Steadings)	32 units
H-WB 10 – Glendevon (South) Remainder	932 units
H-WB 11 – Glendevon (North), Block M, (Winchburgh Village)	111 units
H-WB 12 – Glendevon (North), Remainde	977 units
H-WB 13 – Niddry Mains (South)	410 units
H-WB 14 – Main Street (former School and Winchburgh Day Centre)	11 Units
H-WB 15 – Glendevon (regeneration site)	27 units

Table 26: West Lothian Local Development Plan Site Allocations	
Local Development Plan Reference	**Size (Hectares and/or Units)**
H-WB 16 – Site west of Ross's Plantation	189 units
H-WB 18 – Site adjoining Niddry Mains House	30 units
P-15 Blackridge Primary School	Replacement Primary School

Annex F: ERCD noise and overflight analysis methodology

ERCD Technical Note: Edinburgh Airport ACP Baseline Noise Contour Modelling Methodology (July 2024)

Introduction

1.1 The Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority (CAA) was commissioned by Edinburgh Airport Limited (EAL) to produce noise contours for the Edinburgh Airport Airspace Change Proposal (ACP). The ACP involves the introduction of new RNAV SIDs and STARs.

1.2 This technical note details the noise modelling methodology used for the baseline contours for the forecast years 2027 (year 1) and 2036 (year 10).

1.3 The modelling has been undertaken in accordance with:

- CAP 1616i Environmental Assessment Requirements and Guidance for Airspace Change Proposals, 1st edition, Civil Aviation Authority, November 2023, and
- CAP 2091 CAA Policy on Minimum Standards for Noise Modelling, Civil Aviation Authority, January 2021.

1.4 The noise assessment used radar data from the most recent year, 2023. The mean track and flight profile analyses have therefore been undertaken using 2023 summer radar data provided by EAL.

Noise Modelling Methodology

2.1 In accordance with CAP 1616i, baseline LAeq noise contours have been produced for the implementation year (2027) and 10 years post-implementation (2036), as summarised below:

- 2027 average summer day LAeq,16h without ACP.
- 2027 average summer night LAeq,8h without ACP.
- 2036 average summer day LAeq,16h without ACP.
- 2036 average summer night LAeq,8h without ACP.

2.2 The LAeq,16h contours are plotted from 51 to 72 dB in 3 dB steps, and the LAeq,8h contours from 45 to 72 dB in 3 dB steps. Area, population and household results were estimated using a 2027 population database provided by EAL, which contained data at the address point level.

2.3 The UK civil aircraft noise model, ANCON 2.4, was used in this study. The noise modelling has been carried out in line with the Category C requirements of CAP 2091, using the following data:

- ICAO datasets for noise data (i.e. Noise-Power-Distance curves).
- Local airport radar data from the latest summer period (2023) to calculate departure and arrival mean tracks, and lateral dispersions.
- Local airport radar data from summer 2023 to derive average flight profiles of height, speed and thrust for the major aircraft types contributing 75% or more of the noise energy on departure and arrival.
- ICAO (ANP)[1] dataset flight profiles for all minor aircraft types.

2.4 EAL provided traffic forecasts by route and ICAO aircraft type for each of the above scenarios. The 2027 and 2036 aircraft traffic totals for the average summer 16h day and 8h night periods are summarised in Table 1.

2.5 EAL provided runway usage data so that the 20-year (2004-2023) average runway modal splits for the day and night periods could be determined. The longterm modal splits were:

- Summer 16h day: 70% west/30% east
- Summer 8h night: 74% west/26% east

[1] ICAO Aircraft Noise and Performance Database (https://www.easa.europa.eu/en/domains/environment/policy-support-and-research/aircraft-noise-andperformance-anp-data/anp-legacy-data)

Table 1: 2027 and 2036 average summer day and night forecast movements

Route	2027 day	2027 night	2036 day	2036 day
GOSAM	122.3	17.4	149.4	21.2
GRICE	14.5	1.0	17.6	1.2
TALLA	59.8	12.6	72.9	15.3
ARRIVALS	197.6	34.7	241.1	42.3
Total	**394.2**	**65.7**	**481.1**	**79.9**

Note: Totals are based on unrounded numbers.

2.6 EAL provided radar data covering the 2023 summer period, 16 June to 15 September inclusive. Mean flight tracks and associated lateral dispersions were calculated for each of the three departure routes (GOSAM, GRICE and TALLA) from each runway direction. The TALLA runway 24 route was modelled by 3 separate sub-tracks to provide a better representation of the flight track pattern than would have been possible with a single track. Flight track patterns were also calculated for arrivals. The departure and arrival mean tracks are shown in Figure 1.

2.7 In accordance with CAP 2091, departure and arrival flight profiles of height, speed and thrust were produced for the major ANCON aircraft types[2] (representing more than 75% of the noise energy) using local radar data, calculated as averages across all routes. Edinburgh 2023 summer radar data for operations arriving or departing between 07:00 and 23:00 local time were processed using in-house software to derive average height and speed profiles. These daytime flight profiles were also used for the night contours.

2.8 The 2023 average stage length was used as a proxy for aircraft weight (based on ANP data) during the thrust estimation process for departure ANCON types. Table 2 summarises the ANP departure stage lengths. However, for ANCON types with an average stage length of 1 (0-500 nm), the ANP weight from stage length 2 was used instead as a conservative assumption to allow for the propensity of airlines to tanker fuel on short-haul routes. All arrival ANCON types were modelled with the default ANP landing weight.

2.9 Where required, small adjustments were made to the average heights and speeds to produce profiles that would be realistic for an aircraft undergoing a departure or arrival operation.

Table 2 – ANP departure stage lengths

Stage Length	Trip Distance (nm)
1	0-500
2	500-1000
3	1000-1500
4	1500-2500
5	2500-3500
6	3500-4500
7	4500-5500
8	5500-6500
9	> 6500

2.10 Departure flight profiles (9 in total) were produced for the following ANCON types:

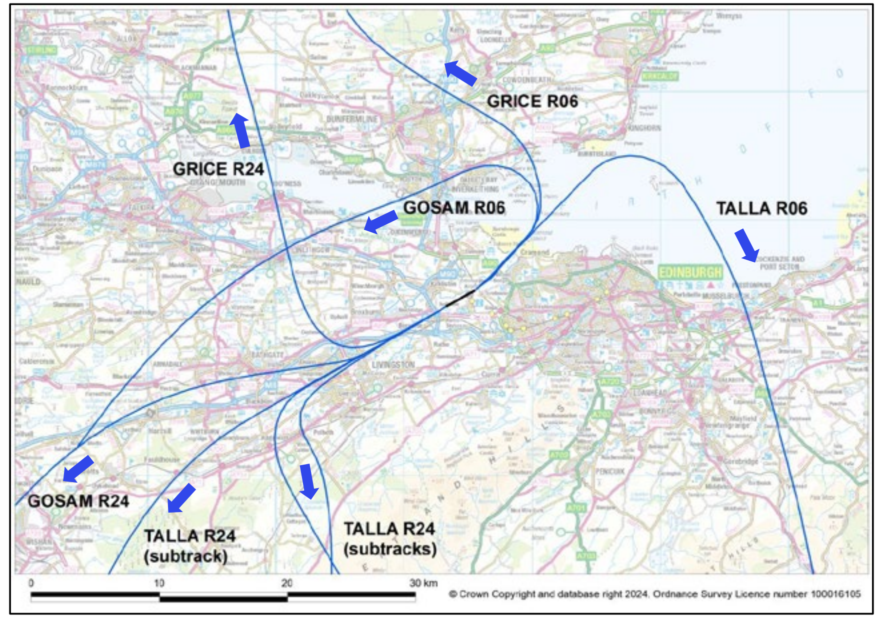
- B733
- B738
- B738MAX
- B763P
- EA319C
- EA320C
- EA320V
- ERJ190
- LTT

[2] See Appendix A for ANCON type descriptions.

2.11 Arrival flight profiles (11 in total) were produced for the following ANCON types:

- B733
- B738
- B738MAX
- B763P
- B788
- EA319C
- EA320C
- EA320NEO
- EA320V
- ERJ190
- LTT

2.12 Departure and arrival flight profiles for minor aircraft types were based on the ICAO (ANP) database, version 2.3. The average distance flown for each departure aircraft type in summer 2023 was used to determine the ANP departure profile (i.e. stage length). Because ANP profiles assume full take-off thrust, the next stage length above the actual average stage length calculated from operational data was modelled to better reflect anticipated operational vertical flight profiles and take a cautious approach with regard to the take-off weight assumption in the ANP database.



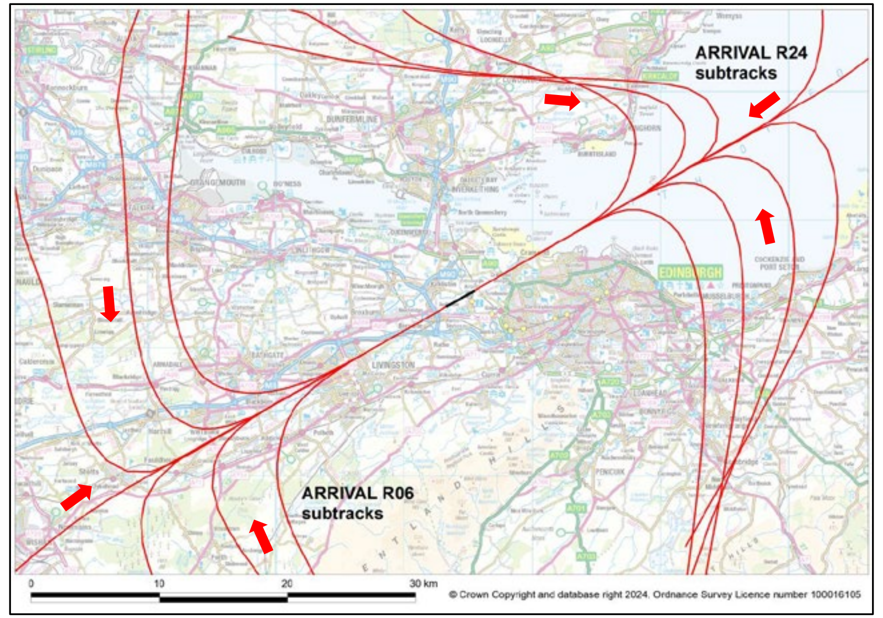


Figure 1: Edinburgh Airport 2023 departure and arrival mean tracks.

ANCON type descriptions

ANCON type	Description
B717	Boeing 717
B727	Boeing 727 (Chapter 2&3)
B732	Boeing 737-200 (Chapter 2&3)
B733	Boeing 737-300/400/500
B736	Boeing 737-600/700
B738MAX	Boeing 737 MAX 8
B738	Boeing 737-800/900
B747	Boeing 747-100 & 200/300 series (certificated to Chapter 3)
B744G	Boeing 747-400 with General Electric CF6-80F engines
B744P	Boeing 747-400 with Pratt & Whitney PW4000 engines
B744R	Boeing 747-400 with Rolls-Royce RB211 engines
B747SP	Boeing 747SP
B748	Boeing 747-8
B753	Boeing 757-300
B757C	Boeing 757-200 with Rolls-Royce RB211-535C engines
B757E	Boeing 757-200 with Rolls-Royce RB211-535E4/E4B engines
B757P	Boeing 757-200 with Pratt & Whitney PW2037/2040 engines
B762	Boeing 767-200
B763G	Boeing 767-300 with General Electric CF6-80 engines
B763P	Boeing 767-300 with Pratt & Whitney PW4000 engines
B763R	Boeing 767-300 with Rolls-Royce RB211 engines
B764	Boeing 767-400
B772G	Boeing 777-200 with General Electric GE90 engines
B772P	Boeing 777-200 with Pratt & Whitney PW4000 engines
B772R	Boeing 777-200 with Rolls-Royce Trent 800 engines
B773G	Boeing 777-200LR/300ER with General Electric GE90 engines
B773P	Boeing 777-300 with Pratt & Whitney PW4000 engines
B773R	Boeing 777-300 with Rolls-Royce Trent 800 engines

ANCON type	Description
B788	Boeing 787-8
B789	Boeing 787-9
BA46	BAe 146/Avro RJ series
CRJ	Bombardier CRJ100/200 series
CRJ700	Bombardier CRJ700 series
CRJ900	Bombardier CRJ900 series
DC10	McDonnell Douglas DC-10
EA221	Airbus A220-100
EA223	Airbus A220-300
EA30	Airbus A300
EA31	Airbus A310
EA318	Airbus A318
EA319C	Airbus A319 with CFM56 engines
EA319V	Airbus A319 with IAE V2500 engines
EA320C	Airbus A320 with CFM56 engines
EA320NEO	Airbus A320neo
EA320V	Airbus A320 with IAE V2500 engines
EA321C	Airbus A321 with CFM56 engines
EA321NEO	Airbus A321neo
EA321V	Airbus A321 with IAE V2500 engines
EA33	Airbus A330
EA34	Airbus A340-200/300
EA346	Airbus A340-500/600
EA359	Airbus A350-900
EA3510	Airbus A350-1000
EA38GP	Airbus A380 with Engine Alliance GP7000 engines
EA38R	Airbus A380 with Rolls-Royce Trent 900 engines
ERJ	Embraer ERJ 135/145
ERJ170	Embraer E-170/175

ANCON type	Description
ERJ190	Embraer E-190/195
EXE2	Chapter 2 executive jets
EXE3	Chapter 3 executive jets
FK10	Fokker 70/100
L101	Lockheed L-1011 TriStar
L4P	Large four-engine propeller
LTT	Large twin-turboprop
MD11	McDonnell Douglas MD-11
MD80	McDonnell Douglas MD-80 series
SP	Single propeller
STP	Small twin-piston
STT	Small twin-turboprop
TU54	Tupolev Tu-154

Glossary

Technical terms and abbreviations	
ACP	Airspace Change Proposal
ANCON	The CAA's civil aircraft noise contour model
ANP	Aircraft Noise Performance database
dB	Decibel units describing sound level or changes of sound level.
dBA	Units of sound level on the A-weighted scale, which incorporates a frequency weighting approximating the characteristics of human hearing.
ICAO	International Civil Aviation Organization
LAeq	Equivalent sound level of aircraft noise in dBA, often called 'equivalent continuous sound level'.
LAeq,16h	Equivalent sound level of aircraft noise in dBA for the 07:00-23:00 local time period.
LAeq,8h	Equivalent sound level of aircraft noise in dBA for the 23:00-07:00 local time period.
nm	Nautical Mile (1,852 metres)
RNAV	Area navigation
SID	Standard Instrument Departure route
STAR	Standard Arrival Route

ERCD Technical Note: Edinburgh Airport ACP Options Noise Contour Modelling Methodology (July 2024)

Introduction

1.1 The Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority (CAA) was commissioned by Edinburgh Airport Limited (EAL) to produce noise contours for the Edinburgh Airport Airspace Change Proposal (ACP). The ACP involves the introduction of new RNAV SIDs and STARs.

1.2 This technical note details the noise modelling methodology used for the ACP options contours for the forecast years 2027 (year 1) and 2036 (year 10).

1.3 The modelling has been undertaken in accordance with:

- CAP 1616i Environmental Assessment Requirements and Guidance for Airspace Change Proposals, 1st edition, Civil Aviation Authority, November 2023.
- CAP 2091 CAA Policy on Minimum Standards for Noise Modelling, Civil Aviation Authority, January 2021.

1.4 The noise assessment used proposed departure and arrival paths, and swathe width data, supplied by EAL's consultant, To70.

Noise Modelling Methodology

1.5 In accordance with CAP 1616i, contours have been produced for the LAeq,16h, LAeq,8h, N65 and N60 metrics for each combined 'ACP option' scenario, for the implementation year (2027) and 10 years post-implementation (2036), as summarised below:

- 2027 average summer day LAeq,16h and N65 for combined ACP option.
- 2027 average summer night LAeq,8h and N60 for combined ACP option.
- 2036 average summer day LAeq,16h and N65 for combined ACP option.
- 2036 average summer night LAeq,8h and N60 for combined ACP option.

1.6 There were three combined 'ACP option' scenarios, based on three separate Runway (RWY) 24 route options and two separate RWY 06 route options as follows:

1. RWY24 (1B) + RWY 06 (1C)
2. RWY24 (2A) + RWY 06 (2C)
3. RWY24 (3B) + RWY 06 (1C)

1.7 The departure flight tracks used for each runway option are summarised in Table 1.

Table 1: Flight tracks modelled for each ACP runway option

SID	Modelled flight track				
	RWY 24 (1B)	RWY 24 (2A)	RWY 24 (3B)	RWY 06 (1C)	RWY 06 (2C)
SKIRL	TALLA24-23	TALLA24-23	TALLA24-23	TALLA06-21	TALLA06-21
STRAT	STRAT24-3a	STRAT24-2a	STRAT24-3a	STRAT06-2	STRAT06-2
STEPS	GOSAM24-8e	GOSAM24-8e	GOSAM24-8e	GOSAM06-8h	GOSAM06-8i
STOPP	GRICE24-9	GRICE24-10	GRICE24-10g	GRICE06-08	GRICE06-08
GULLY	EAST24-6b	EAST24-6c	EAST24-6g	EAST06-4	EAST06-4
BERRY	EAST-S-24-6b	EAST-S-24-6c	EAST-S-24-6g	EAST-S-06-4	EAST-S-06-4

Note: RWY 24 route differences for options 2A and 3B relative to 1B are shown in red, and the RWY06 route difference for option 2C relative to option 1C is shown in blue.

1.8 Arrival movements were allocated across the 3 proposed approach paths using statistics provided by EAL (see Table 2). The approach paths are unchanged for each combined ACP option.

Table 2: Approach path traffic distributions

Approach path	Day %	Night %
STOBS	8.0%	4.4%
TART	77.6%	73.9%
WORMY	14.4%	21.7%

1.9 Mean flight tracks and lateral dispersions for each departure and arrival route were based on data supplied by To70. The total swathe width at each route coordinate supplied by To70 was assumed to cover +/- 3 standard deviations (SDs), thus enabling the SD to be calculated.

1.10 The departure flight paths for each RWY 24 ACP option are indicated in Figures 1-3, and in Figures 4-5 for each RWY 06 ACP option. The ACP arrival flight paths are shown in Figures 6-7 for RWY 24 and RWY 06 respectively.

1.11 The UK civil aircraft noise model, ANCON 2.4, was used in this study. The noise modelling has been carried out in line with the Category C requirements of CAP 2091, using the following data:

- ICAO datasets for noise data (i.e. Noise-Power-Distance curves).
- Flight profiles of height, speed and thrust, produced from summer 2023 local radar data for major ANCON[3] aircraft types contributing 75% or more of the noise energy on departure and arrival.
- ICAO (ANP)[4] dataset flight profiles for all minor aircraft types.

1.12 EAL provided traffic forecasts by route and ICAO aircraft type for each ACP scenario. The 2027 and 2036 aircraft traffic totals for the average summer 16-hour day and 8-hour night periods are summarised in Table 3.

[3] See Appendix A for ANCON type descriptions.

[4] ICAO Aircraft Noise and Performance Database (https://www.easa.europa.eu/en/domains/environment/policy-support-and-research/aircraft-noise-andperformance-anp-data/anp-legacy-data)

1.13 The effects of the surrounding topography were modelled using Meridian 2 Gridded Heights terrain data from Ordnance Survey.

1.14 The contours were modelled assuming the 20-year (2004-2023) average runway modal splits for the day and night periods:

- Summer 16-hour day: 70% west/30% east
- Summer 8-hour night: 74% west/26% east

Table 3: 2027 and 2036 average summer day and night forecast movements

Route	2027 day	2036 day	2027 night	2036 night
Departures				
BERRY	2.9	3.5	1.9	2.3
SKIRL	12.5	15.3	0.0	0.0
GULLY	64.6	78.8	11.6	14.1
STEPS	28.0	34.1	2.9	3.5
STOPP	6.7	8.2	1.0	1.2
STRAT	81.9	100.0	13.5	16.5
Departure total	**196.6**	**240.0**	**30.9**	**37.6**
Arrivals				
STOBS	15.8	19.3	1.5	1.9
TART	153.3	187.1	25.7	31.3
WORMY	28.4	34.7	7.5	9.2
Arrival total	**197.5**	**241.1**	**34.7**	**42.3**
GRAND TOTAL	**394.2**	**481.2**	**65.7**	**79.9**

Note: Totals are calculated from unrounded numbers.

1.15 The LAeq,16h contours are plotted from 51 to 72 dB in 3 dB steps, and the LAeq,8h contours from 45 to 72 dB in 3 dB steps.

1.16 The N65 contours are plotted at levels 5, 10, 20, 50, 100 and 200 events. The N60 contours are plotted at levels 5, 10, 20 and 50 events.

1.17 Area, population and household results were estimated using a 2027 population database provided by EAL, which contained data at the address point level.

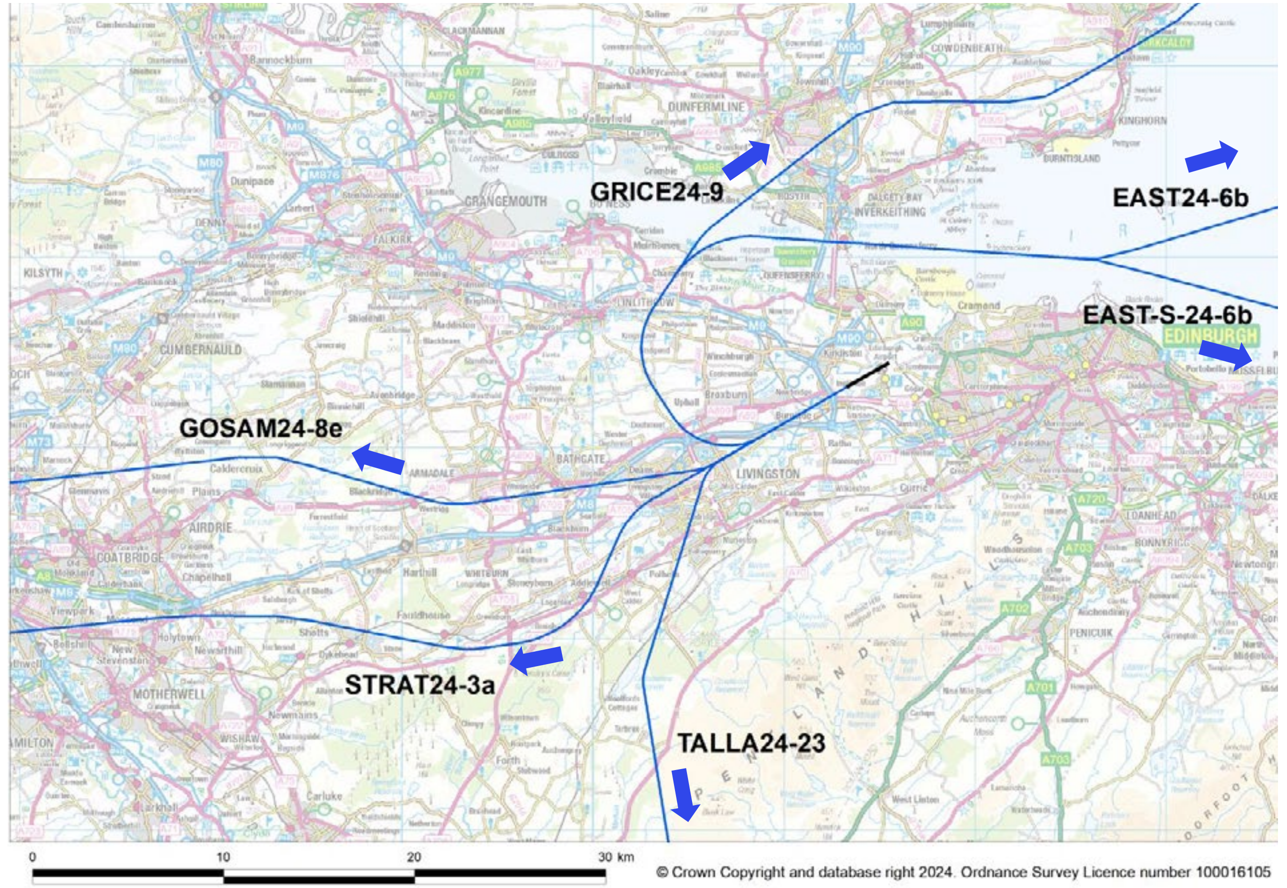


Figure 1: RWY 24 Option 1B departure tracks.

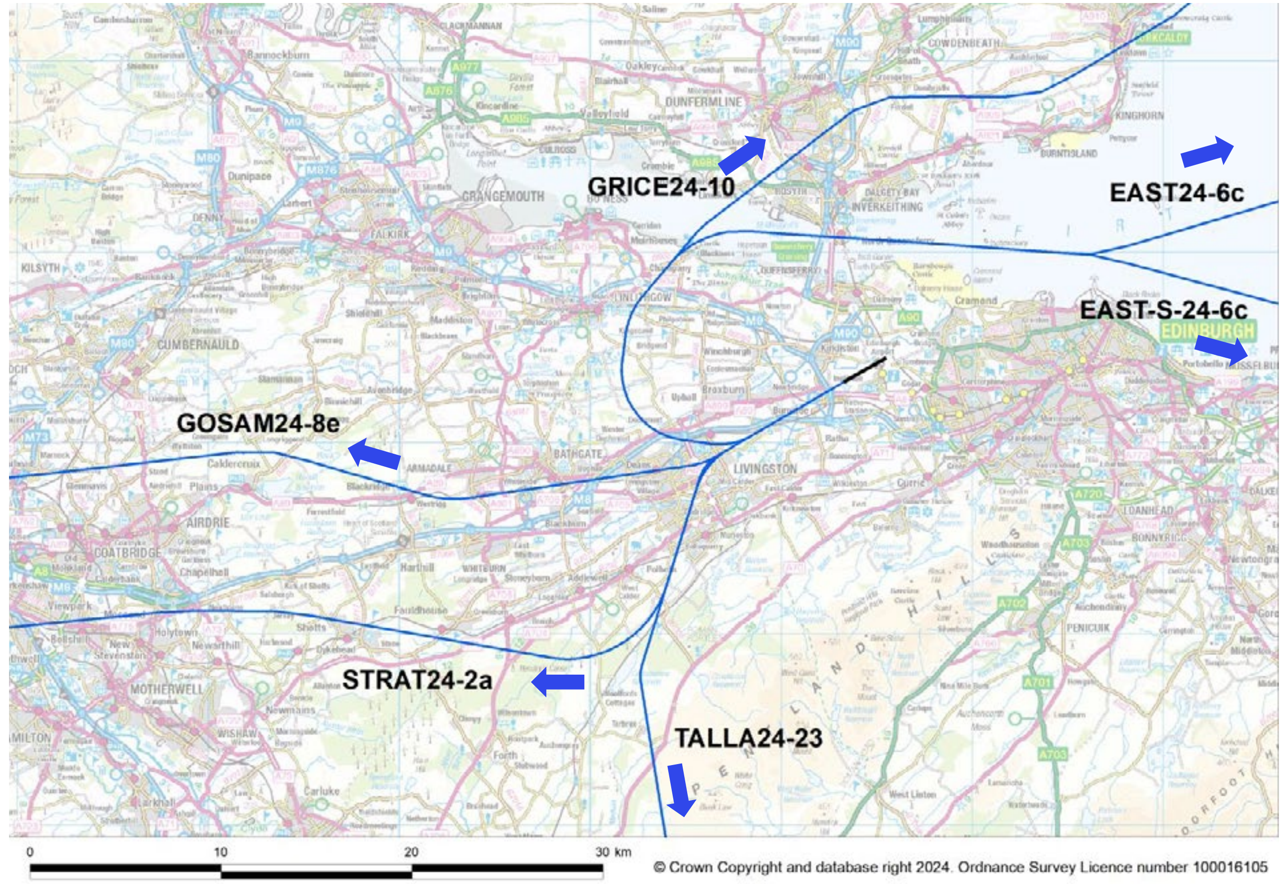


Figure 2: RWY 24 Option 2A departure tracks.

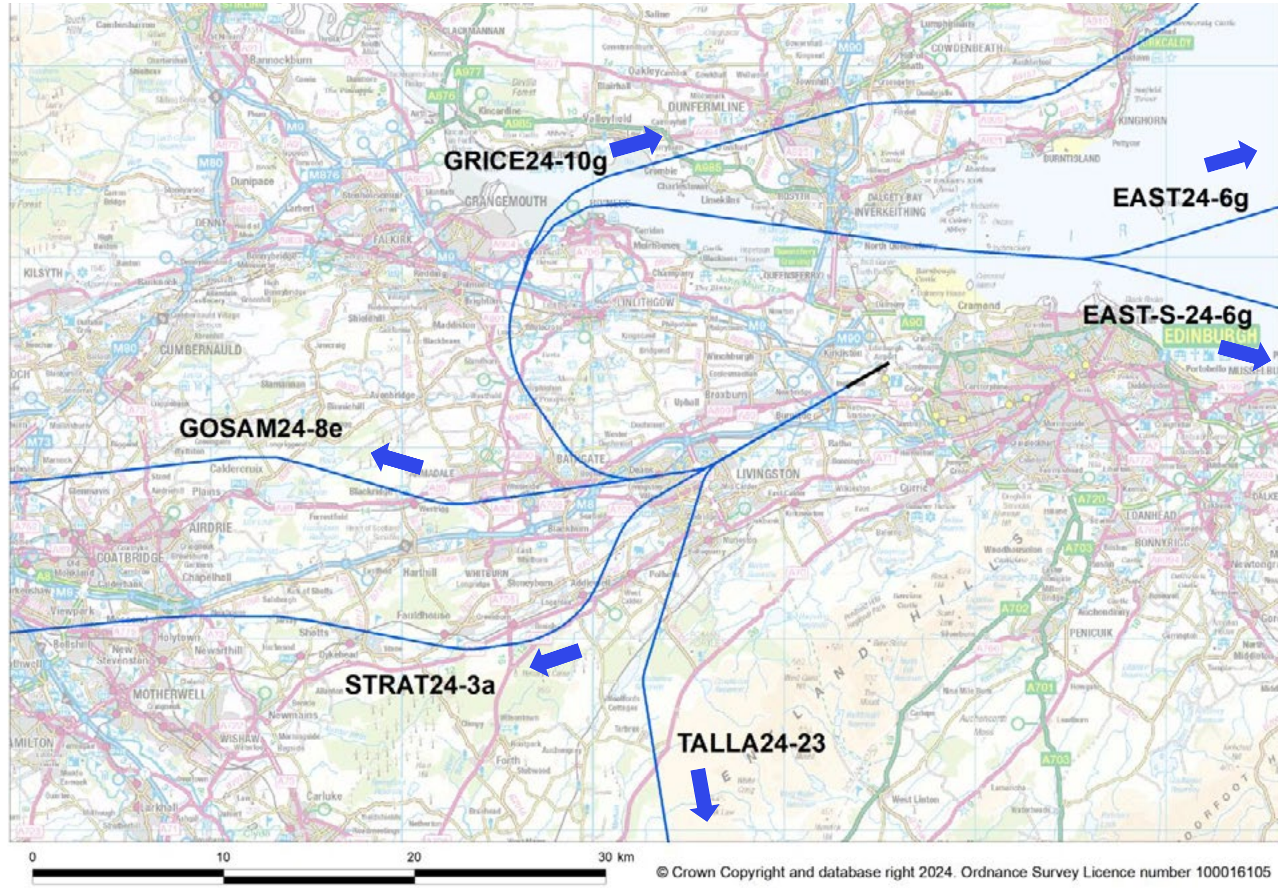


Figure 3: RWY 24 Option 3B departure tracks.

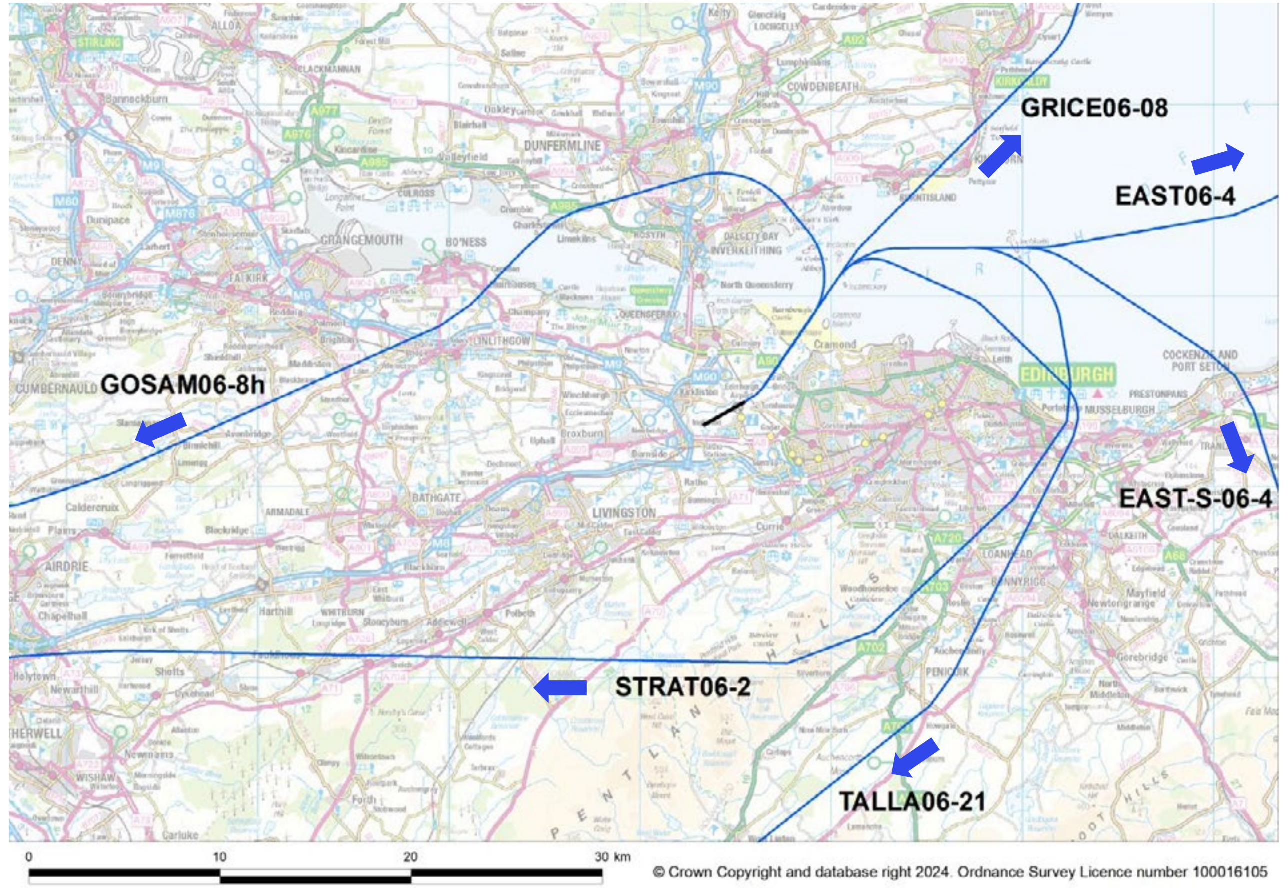


Figure 4: RWY 06 Option 1C departure tracks.

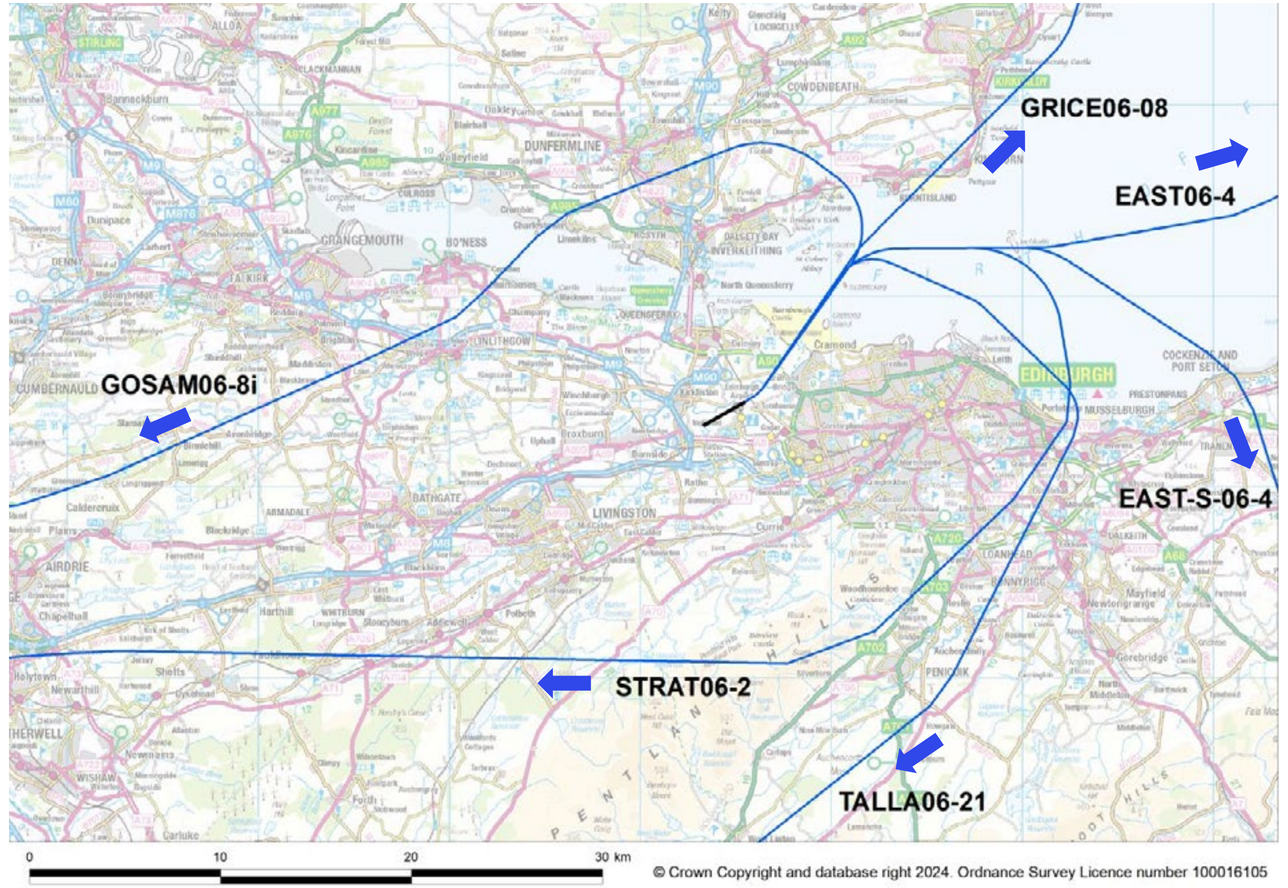


Figure 5: RWY 06 Option 2C departure tracks.

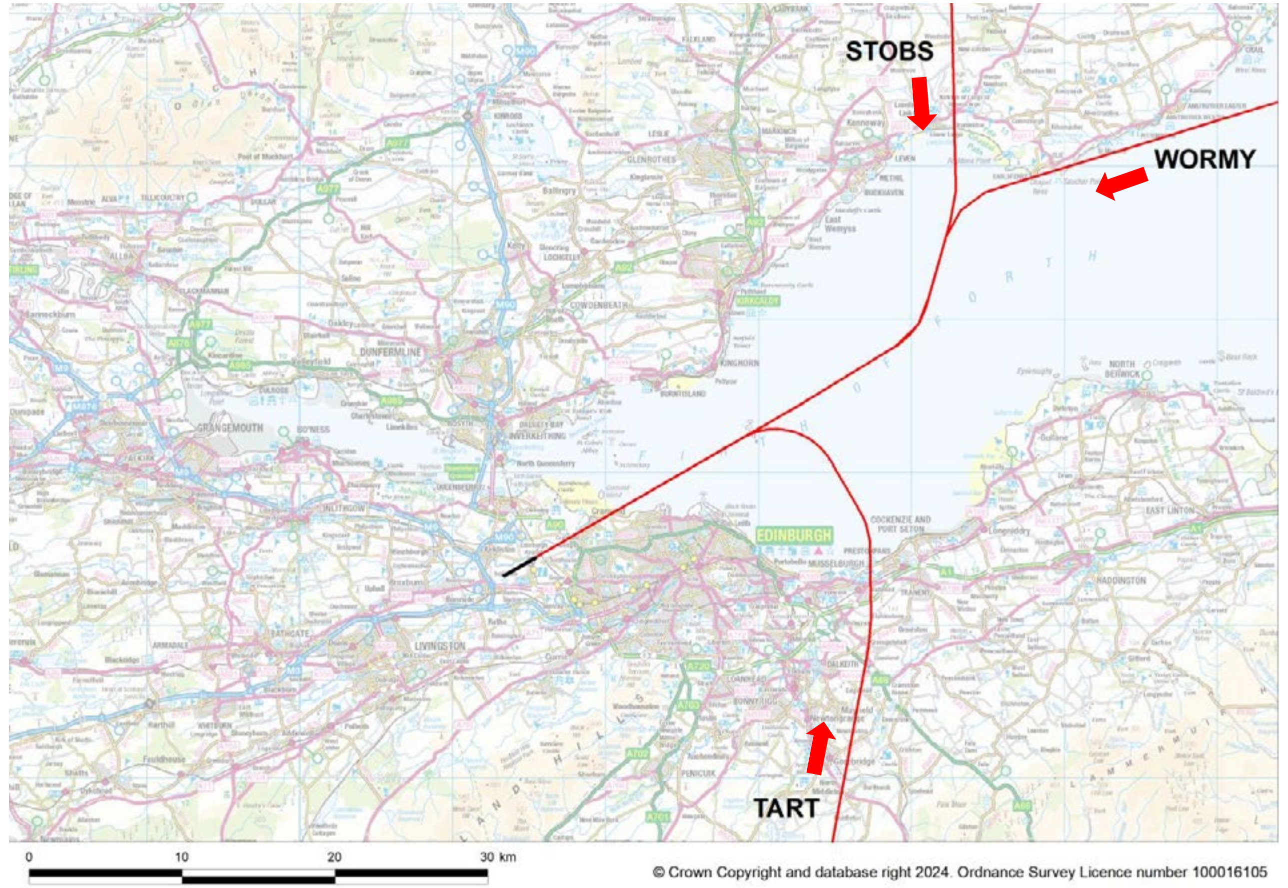


Figure 6: RWY 24 arrival tracks.

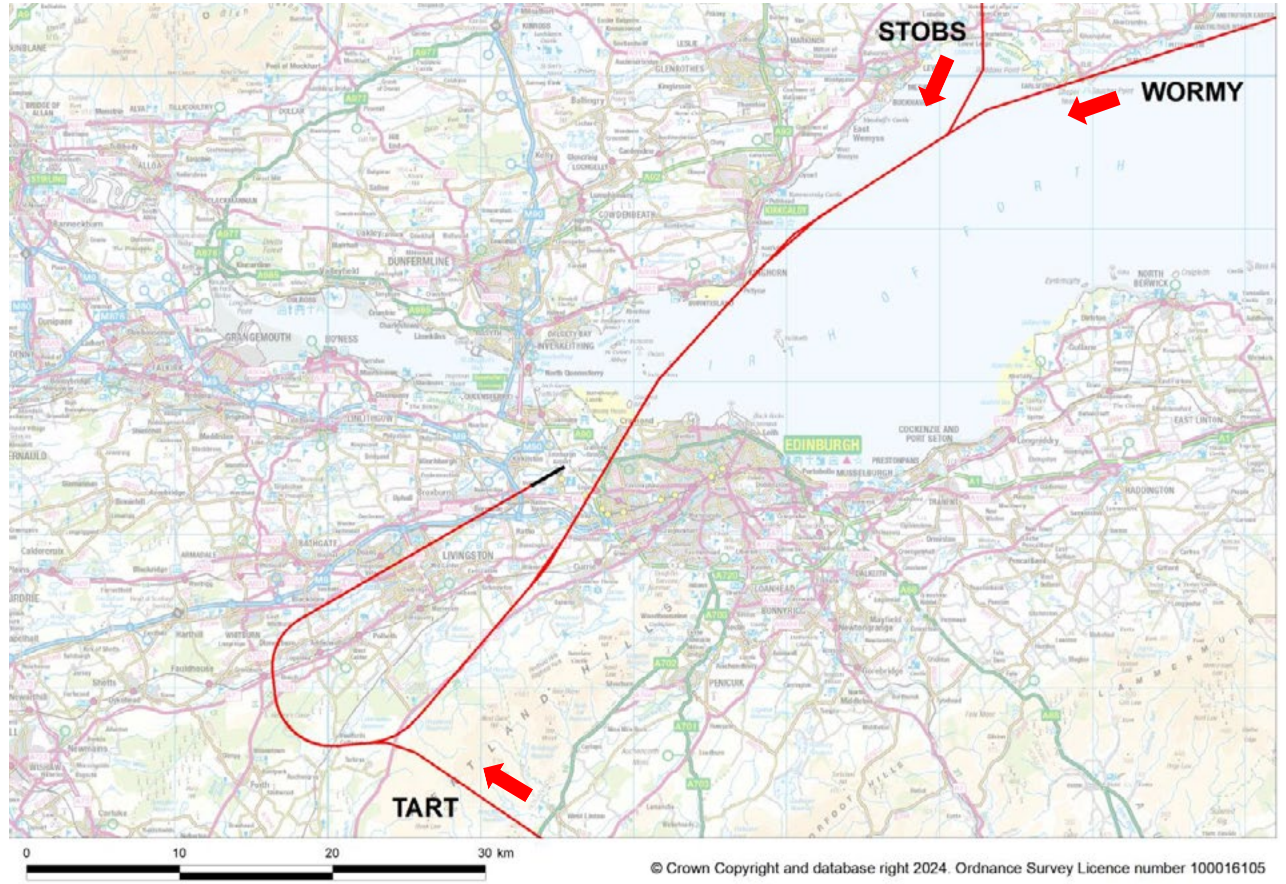


Figure 7: RWY 06 arrival tracks.

ANCON type descriptions

ANCON type	Description
B717	Boeing 717
B727	Boeing 727 (Chapter 2&3)
B732	Boeing 737-200 (Chapter 2&3)
B733	Boeing 737-300/400/500
B736	Boeing 737-600/700
B738MAX	Boeing 737 MAX 8
B738	Boeing 737-800/900
B747	Boeing 747-100 & 200/300 series (certificated to Chapter 3)
B744G	Boeing 747-400 with General Electric CF6-80F engines
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B744R	Boeing 747-400 with Rolls-Royce RB211 engines
B747SP	Boeing 747SP
B748	Boeing 747-8
B753	Boeing 757-300
B757C	Boeing 757-200 with Rolls-Royce RB211-535C engines
B757E	Boeing 757-200 with Rolls-Royce RB211-535E4/E4B engines
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B763P	Boeing 767-300 with Pratt & Whitney PW4000 engines
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B764	Boeing 767-400
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ANCON type	Description
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CRJ700	Bombardier CRJ700 series
CRJ900	Bombardier CRJ900 series
DC10	McDonnell Douglas DC-10
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EA223	Airbus A220-300
EA30	Airbus A300
EA31	Airbus A310
EA318	Airbus A318
EA319C	Airbus A319 with CFM56 engines
EA319V	Airbus A319 with IAE V2500 engines
EA320C	Airbus A320 with CFM56 engines
EA320NEO	Airbus A320neo
EA320V	Airbus A320 with IAE V2500 engines
EA321C	Airbus A321 with CFM56 engines
EA321NEO	Airbus A321neo
EA321V	Airbus A321 with IAE V2500 engines
EA33	Airbus A330
EA34	Airbus A340-200/300
EA346	Airbus A340-500/600

ANCON type	Description
EA359	Airbus A350-900
EA3510	Airbus A350-1000
EA38GP	Airbus A380 with Engine Alliance GP7000 engines
EA38R	Airbus A380 with Rolls-Royce Trent 900 engines
ERJ	Embraer ERJ 135/145
ERJ170	Embraer E-170/175
ERJ190	Embraer E-190/195
EXE2	Chapter 2 executive jets
EXE3	Chapter 3 executive jets
FK10	Fokker 70/100
L101	Lockheed L-1011 TriStar
L4P	Large four-engine propeller
LTT	Large twin-turboprop
MD11	McDonnell Douglas MD-11
MD80	McDonnell Douglas MD-80 series
SP	Single propeller
STP	Small twin-piston
STT	Small twin-turboprop
TU54	Tupolev Tu-154

Glossary

Technical terms and abbreviations	
ACP	Airspace Change Proposal
ANCON	The CAA's civil aircraft noise contour model
ANP	Aircraft Noise Performance database
dB	Decibel units describing sound level or changes of sound level.
dBA	Units of sound level on the A-weighted scale, which incorporates a frequency weighting approximating the characteristics of human hearing.
ICAO	International Civil Aviation Organization
LAeq	Equivalent sound level of aircraft noise in dBA, often called 'equivalent continuous sound level'.
LAeq,16h	Equivalent sound level of aircraft noise in dBA for the 07:00-23:00 local time period.
LAeq,8h	Equivalent sound level of aircraft noise in dBA for the 23:00-07:00 local time period.
nm	Nautical Mile (1,852 metres)
RNAV	Area navigation
SID	Standard Instrument Departure route
STAR	Standard Arrival Route

Annex G: Controlled airspace appraisal for all options

What is Controlled Airspace (CAS)?

Controlled airspace (CAS) is airspace of defined dimensions within which an air traffic control (ATC) service is provided in accordance with the airspace classification. Its purpose is to create a known air traffic environment to achieve the objectives of the ATC service to prevent collisions between aircraft and to expedite and maintain an orderly flow of air traffic.

Different types of airspace are classified by a lettering system specified by ICAO. Class A to E airspace is known as "controlled airspace"; Class G airspace is "uncontrolled airspace". The airspace classification type establishes the extent to which airspace users must comply with various regulations (embracing, for example, aircraft equipage, pilot qualification and applicable Rules of the Air) and the types of air traffic services that are provided in the airspace.

In the UK, controlled airspace is established primarily to protect commercial air transport passenger flights from other flights and is where Air Traffic Control (ATC) needs to have positive control over aircraft flying in the airspace in order to maintain safe separation between them. Uncontrolled airspace is airspace where aircraft are able to fly freely without being constrained by instructions from ATC, unless they request such a service.

Controlled airspace contains the network of corridors (known as Airways or the Route Network) which link the busy airspace surrounding the major airports. The controlled airspace around the major airports is designated variously as Control Zones (CTR), from the ground upwards to a specified upper limit; Control Areas (CTA), from a specified base level and Terminal Control Areas (TMA) which are larger CTAs normally encompassing a number of airports and extend from a specified base level above the ground to a specified upper limit. This can be seen in Figure 1.

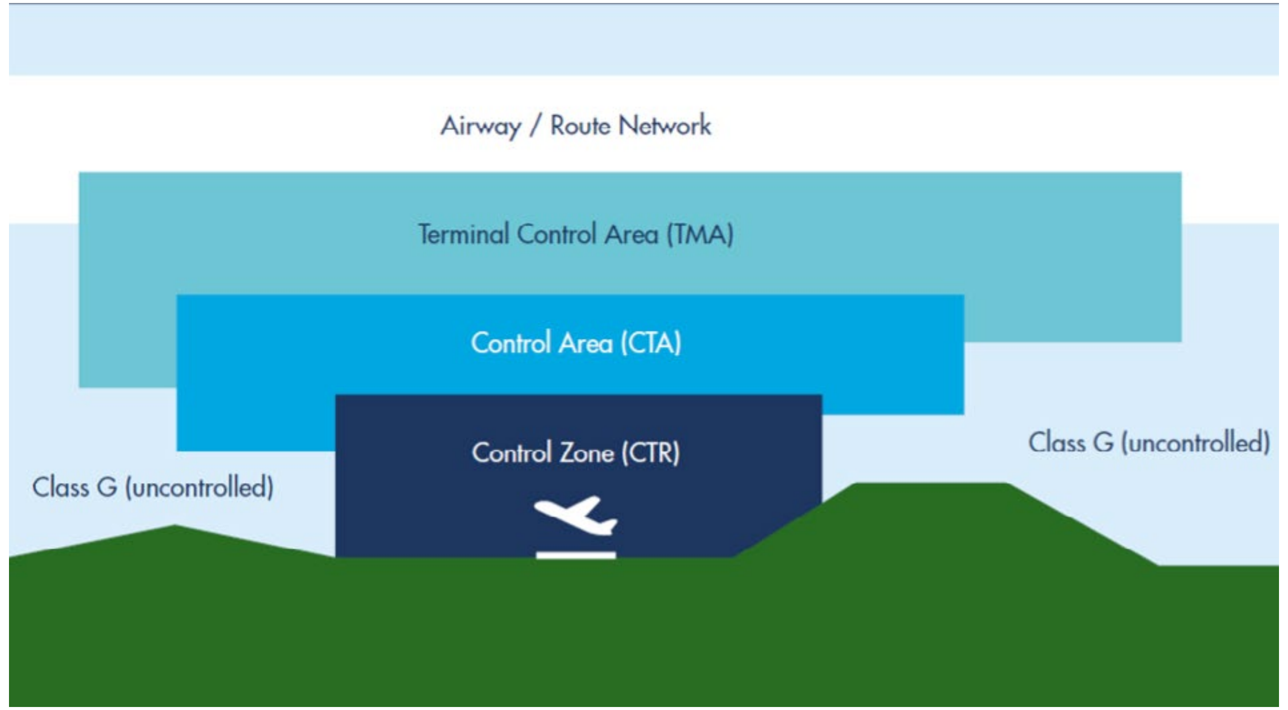


Figure 1: Illustrative example of CAS structures.

The following section describes the proposed changes to Controlled Airspace. This single description applies to all the FOA options – there is no difference between the controlled airspace requirements for each. We recognise that not all consultees may be interested in this section and if you would like to go to the next section please **click here**.

The following section is aimed towards the aviation Industry, and therefore sometimes uses technical language to help describe the CAS proposal. All consultees are welcome to review the information and we would recommend referring to our terminology explained document to understand some of the technical language used.

The Controlled Airspace around Edinburgh Airport today

The chart on the following page shows the existing CAS surrounding Edinburgh Airport. The source of this information is the UK AIP AD2 EGPH 4-1.

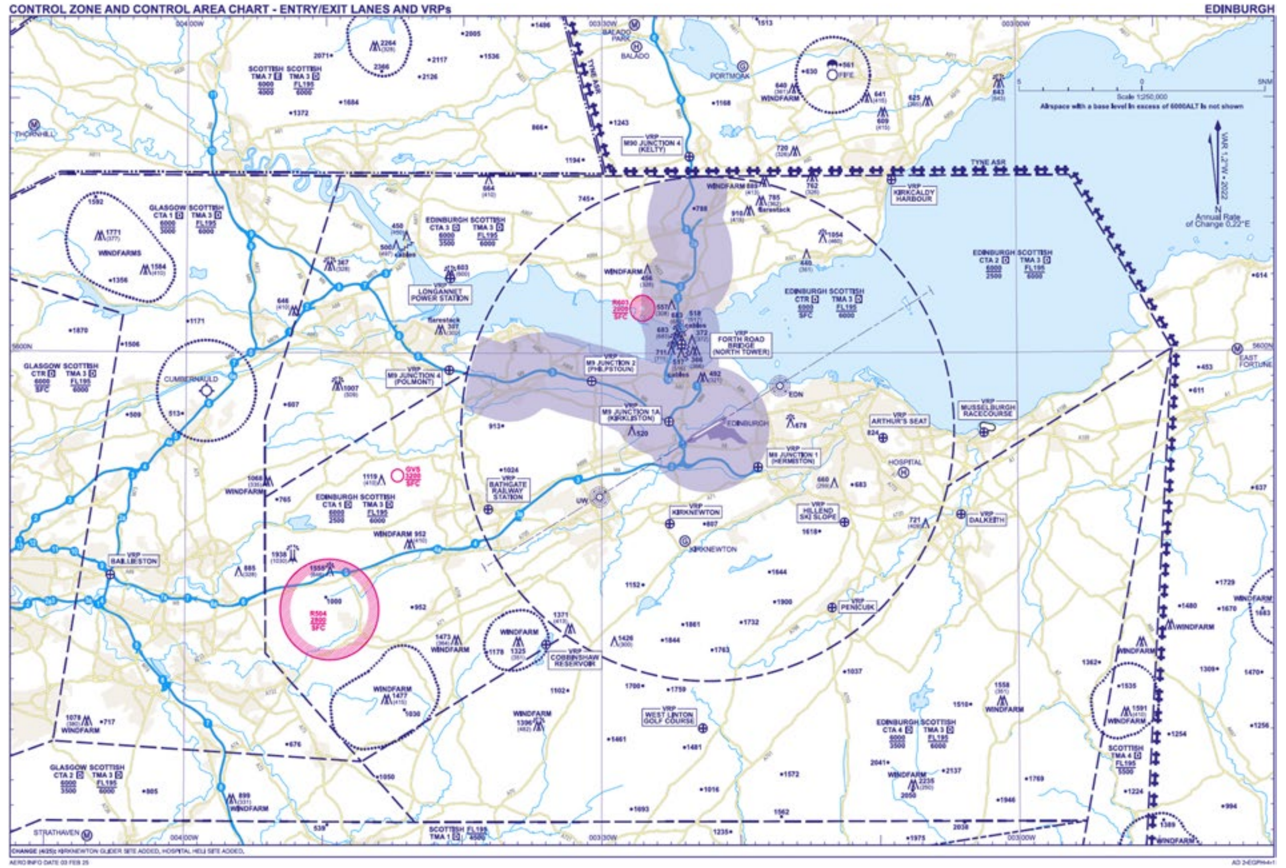


Figure 2: CAS without airspace change. Chart source **UK AIP AD 2.EGPH**.

Developing the Controlled Airspace for our proposals

Edinburgh Airport's ACP requires wholesale changes to Controlled Airspace (CAS) volumes and classifications. In determining the CAS requirements, there are several key CAA documents that all feed in to determining an appropriate volume of airspace. Note the extant CAS arrangements surrounding Edinburgh Airport pre-date many of these policy documents.

- Policy for the Design of Controlled Airspace Structures, 11 Aug 2022
- Policy for the Classification of UK Airspace, 12 Oct 2023
- CAP 778 Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace, 1 Nov 2012
- Performance-based Navigation (PBN): Enhanced Route Spacing Guidance CAP 1385, Dec 2022

In the UK, the guiding principle in establishing a volume of CAS is that sponsors must seek to ensure that the amount of controlled airspace is the minimum required to maintain a high standard of air safety and, subject to overriding national security or defence requirements, that the needs of all airspace users is reflected on an equitable basis. This has led to the adoption that the least restrictive classifications of airspace should be the norm in UK airspace design.

Controlled airspace in the vicinity of an aerodrome consists of a control zone (CTR), control areas (CTA) and may include terminal control areas (TMA).

The CAS volumes and classifications proposed by our ACP are designed to meet all aspects of CAA policy. The following, non-exhaustive, list summarises some of the key requirements:

- CAS containment that provides sufficient airspace to contain instrument approach and departure procedures (including holding and missed approach procedures) and the area in which aircraft receive vectoring instructions to join the final approach track.
  - The term 'sufficient airspace' is considered to mean that the volume of CAS should safely contain the primary areas of these procedures and permit compliance with air traffic management procedures for the tactical handling of flights to achieve a safe and efficient volume of traffic.
  - Where competing airspace requirements preclude containment by primary area, containment of the nominal track defined by the procedures may be less but should not be less than 3nm from the lateral limit of CAS.
  - SIDs and approach transitions should remain wholly within CAS where the nominal track should not be less than 2nm from the edge of CAS on straight or RF legs or 3nm on non-straight legs.
  - Vertical containment that ensures the flight profile remains at least 500ft above the lower limit of CAS.
  - Sponsors may present proposals for a CAS design that results in less lateral containment than this, subject to an acceptable safety assessment.
- The lower limit of a CTA shall not be less than 700ft AGL
- Where practicable, the lower limit of a CTR joining a CTA should be no lower than 1,500ft AGL. The use of an expanded CTR to permit higher CTA base levels is preferable.
- Those portions of airspace where an air traffic control service must be provided to VFR flights shall be Class B, C or D airspace. Class D is the minimum classification notified where a known traffic environment is necessary in both Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC). Though in CTAs where airspace classes A-D cannot be justified, Class E may be notified. The classification depends on consideration of multiple factors including the type and density of air traffic, specifically, the presence of commercial air transport flights involving the movement of passengers on a scheduled journey, the number and frequency of IFR flights and the complexity.
- Instrument Flight Procedure (IFP) design criteria, Flight Management Computer (FMC) coding and the 6,000ft Transition Altitude (TA) limit where waypoints can be placed and what/where altitude/flight level restrictions can be assigned.

Broadly speaking, the release of controlled airspace or airspace which is designated to a lower classification is considered a beneficial change, and an increase in CAS, or an increase in classification is considered a negative impact.

Proposed Controlled Airspace

Figure 3 and Figure 4on the next page show the overall proposed controlled airspace arrangements in and around Edinburgh Airport alongside a simplified version of the without airspace change map shown earlier.

Figure 5 then highlights the differences between each and Table 1 describes each of the changing areas.

The following sub sections then provide a breakdown of the sections of airspace where there are potential areas of benefit and impacts.

This section focusses on the areas of change. For a more general technical description of the proposed airspace and procedures contained within see Annex K and for details of the wider CAS proposed as part of Scottish Airspace Modernisation, please see the ACOG CAF 2 Document.

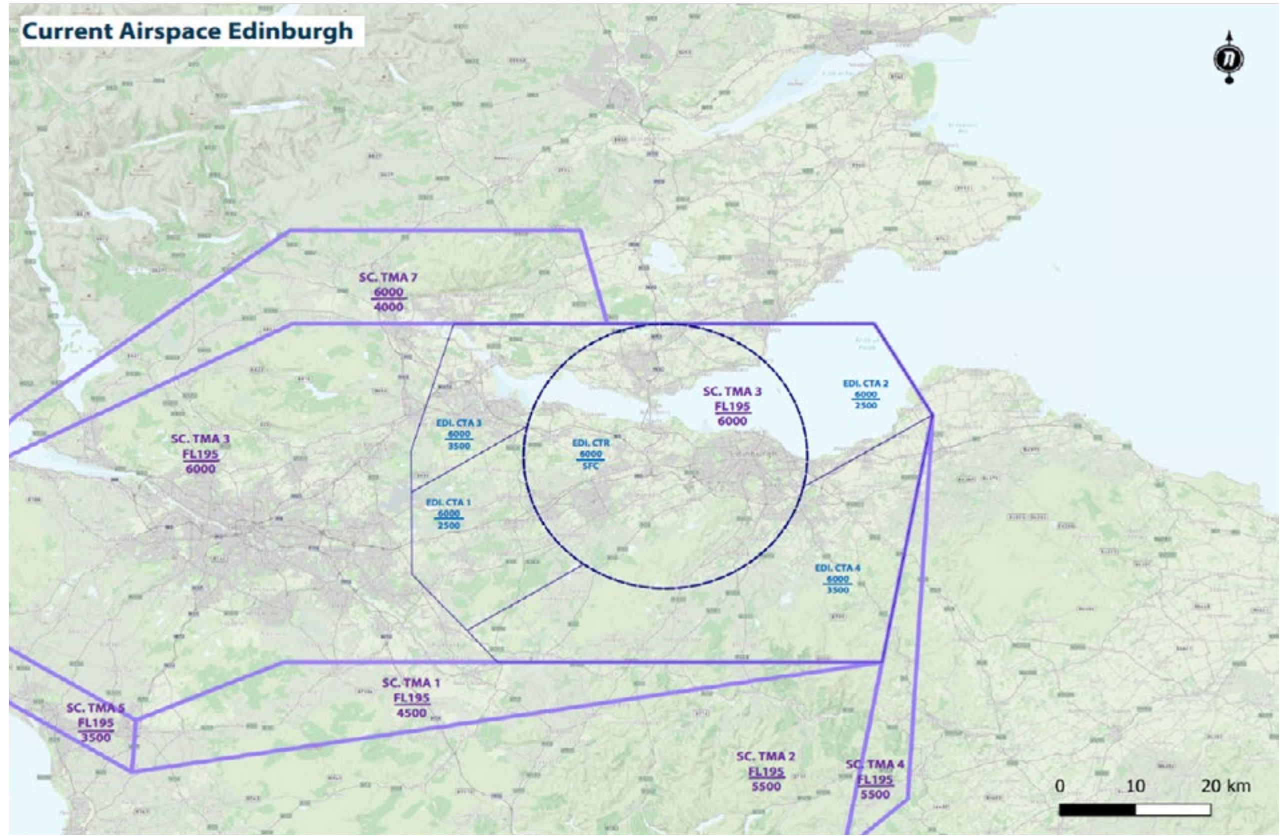


Figure 3: CAS without airspace change (simplified).

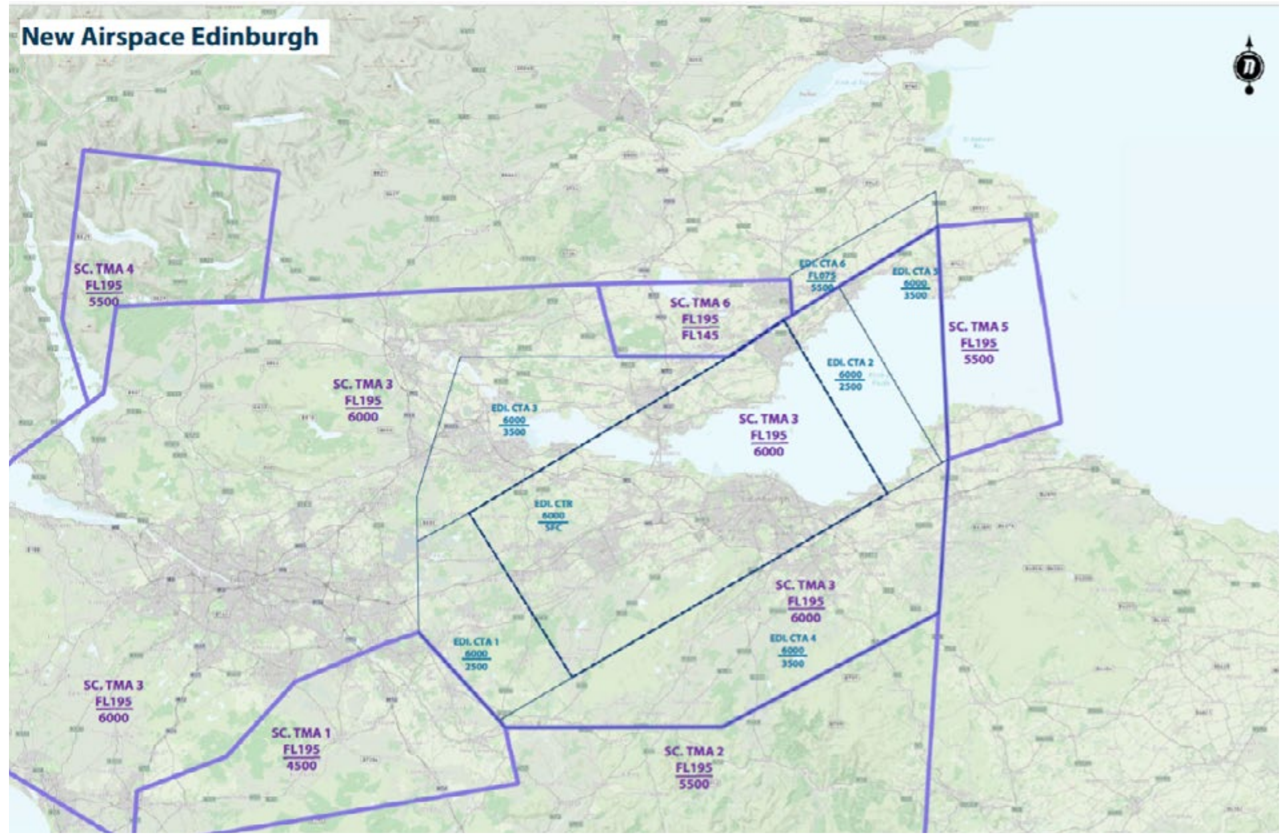
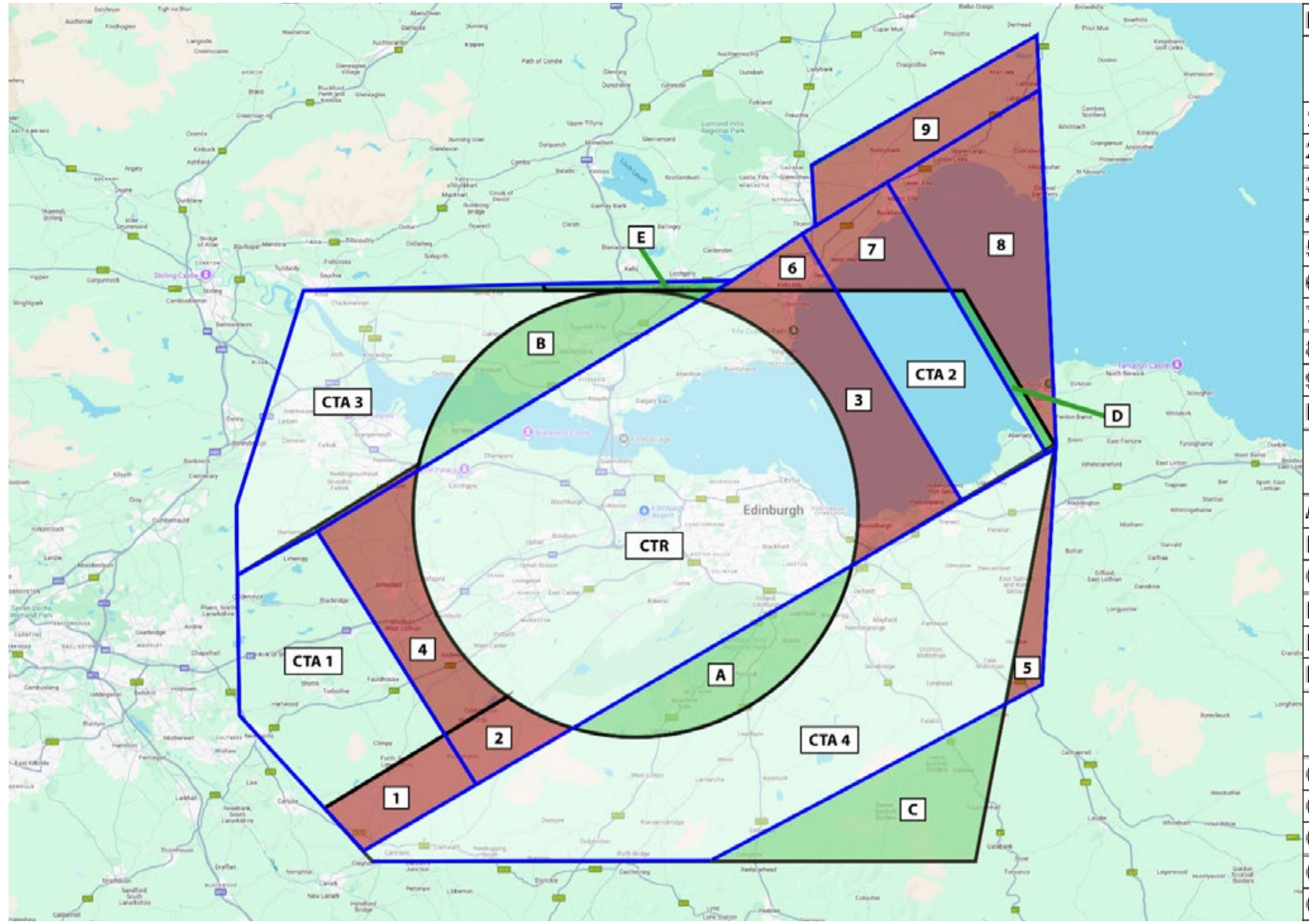


Figure 4: CAS with proposed airspace (applied to Options 1,2 and 3).



Increased CAS (red polygons)		
Label	New definitions	
	Lower limit	Upper limit
1	2500 ft	6000 ft
2	SFC	6000 ft
3	SFC	6000 ft
4	SFC	6000 ft
5	3500 ft	6000 ft
6	SFC	6000 ft
7	2500 ft	6000 ft
8	3500 ft	6000 ft
9	5500 ft	FL 75
Decreased CAS (green polygons)		
Label	New definitions	
	Lower limit	Upper limit
A	3500 ft	6000 ft
B	3500 ft	6000 ft
C	5500 ft	FL 195
D	3500 ft	6000 ft
E	3500 ft	6000 ft
No changes (no shading)		
Label	New definitions	
	Lower limit	Upper limit
CTR	SFC	6000 ft
CTA 1	2500 ft	6000 ft
CTA 2	2500 ft	6000 ft
CTA 3	3500 ft	6000 ft
CTA 4	3500 ft	6000 ft

Figure 5: Areas of difference between the current and proposed airspace for Edinburgh operations (comparing Figure 3 and Figure 4).

This diagram shows only changes involving the Edinburgh CTR or CTA. Changes to TMA areas are covered in the NERL ACP.

Positive changes are shown in green and denoted with a number. Negative changes are shown as red and denoted by a letter.

Proposed boundaries are shown in blue, and existing boundaries that differ are shown in black.

Table 1: Areas of increased CAS in the proposed design[1]

Label (in Figure 5)	This airspace was...	This area would change to ...	Rationale
1	Uncontrolled SFC-3,500ft EDI CTA 4 3,500ft-6,000ft	Uncontrolled SFC-2,500ft EDI CTA 1 2,500ft-6,000ft	Additional Class D CAS established to protect commercial traffic on approach transitions RNAV approaches, and missed approach procedures for runway 06. This airspace is also established around the departure routes for runway 24. In both the case of arrivals and departures the airspace is sufficient to provide vectoring space should vectoring be required for safety or weather reasons. The airspace is also necessary to allow for the correct lateral separation standards between the systemised design and the boundary of CAS.
2	Uncontrolled SFC-3,500ft EDI CTA 4 3,500ft-6,000ft	EDI CTR SFC-6,000ft	Additional Class D CAS established to protect commercial traffic on approach transitions RNAV approaches, and missed approach procedures for runway 06. The airspace is of sufficient dimension to provide vectoring space should vectoring be required for safety or weather reasons. The Intermediate Fix (IF) of RWY 06 lies within this CTR at 1.1 NM from the CTR boundary. The lowering of the base to SFC ensures that arrivals can safely descend below 3,000ft at the IF. With the current (circular) CTR the IF would be positioned outside the CTR where the CTA base is currently 25,000ft – this means a descent below the IF could result in loss of separation with VFR in the Class G airspace beneath.
3	Uncontrolled SFC-2,500ft EDI CTA 2 2,500ft-6,000ft	EDI CTR SFC-6,000ft	Additional Class D CAS established to protect commercial traffic on approach transitions and RNAV approaches arriving at EDI on runway 24. The airspace is of sufficient dimension to provide vectoring space should vectoring be required for safety or weather reasons. For RWY 24 the IF is 1.5 NM from the CTR boundary. The lowering of the base to SFC ensures that arrivals can safely descend below 3,000ft at the IF. With the current (circular) CTR the IF would be positioned outside the CTR where the CTA base is currently 25,000ft – this means a descent below the IF could result in loss of separation with VFR in the Class G airspace beneath.
4	Uncontrolled SFC-2,500ft EDI CTA 1 2,500ft-6,000ft	EDI CTR SFC-6,000ft	See area 2 for rationale.
5	Uncontrolled SFC-5,500ft SCOTTISH TMA 4 5,500ft-*6,000ft+*	Uncontrolled SFC-3,500ft EDI CTA 4 3,500ft-6,000ft	Additional CAS established to protect commercial traffic on approach transitions and RNAV approaches arriving at EDI on runway 24. The airspace allows for the correct lateral separation standards between the systemised design and the boundary of CAS.

[1] Table 1 and Table 2 focus on the areas of change where Edinburgh CTR or CTA is reducing or expanding. Heights and flight levels are shown only where they are relevant to the Edinburgh CTR/CTA levels. TMA and other controlled airspace above is not described. Where an area extends above the ceiling of relevance to this description it is denoted by italic and a '+' suffix.

Table 1: Areas of increased CAS in the proposed design[1]

Label (in Figure 5)	This airspace was…	This area would change to …	Rationale
6	Uncontrolled SFC-5,500ft SCOTTISH TMA 4 5,500ft-*6,000ft+*	EDI CTR SFC-6,000ft	See area 3 for rationale.
7	Uncontrolled SFC – *6,000ft+*	EDI CTA2 2,500ft-6,000ft	Additional Class D CAS established to protect commercial traffic on departure from runway 06 to the northeast.
8	Uncontrolled SFC – *6,000ft+*	EDI CTA5 3,500ft-6,000ft	Additional Class D CAS established to ensure systemised separation for new both arrivals and departures over the Firth of Forth for both runways. This airspace is the minimum volume required for Edinburgh's systemised design whilst enabling safe separation between Edinburgh's traffic and the boundary of CAS.
9	Uncontrolled SFC – *FL75+*	EDI CTA 6 5,500ft – FL75	Additional Class D CAS established to ensure systemised separation for both arrivals and departures at Edinburgh especially using the northeast departure (STOPP) and arrival (STOBS) routes. This airspace is the minimum volume required for Edinburgh's systemised design whilst enabling safe separation between Edinburgh's traffic and the boundary of CAS.

Table 2: Areas of reduced CAS in the proposed design[2]

Label (in Figure 5)	This airspace was…	This area would change to …	Rationale
A	EDI CTR D SFC – 6,000ft	Uncontrolled SFC – 3,500ft EDI CTA 3 3,500ft-6,000ft	The CAS to 3,500ft in areas A and B will be removed as this is controlled airspace that was required for the approach to the cross runway which is no longer in use. The base of CAS will be lifted to 3,500ft in both cases, below this will be reclassified as Class G airspace.
B	EDI CTR D SFC – 6,000ft	Uncontrolled SFC – 3,500ft EDI CTA 4 3,500ft-6,000ft	
C	Uncontrolled SFC – 3500ft EDI CTA 4 3,500ft-6,000ft	Uncontrolled SFC – 5,500ft SCOTTISH TMA 2 5,500ft – 6,000ft+	The systemised design for arrivals means that the CAS in area "C" can have it's base altitude increased to 5,500ft and the airspace below will be reclassified as Class G.
D	Uncontrolled SFC – 2,500ft EDI CTA 2 2,500ft-6,000ft	Uncontrolled SFC – 3,500ft EDI CTA 5 3,500ft-6,000ft	The systemised design for arrivals means that the CAS in area "D" can have it's base altitude increased to 3,500ft and the airspace below will be reclassified as Class G.
E	Uncontrolled SFC – 2,500ft EDI CTA 2 2,500ft-6,000ft	Uncontrolled SFC – 3,500ft EDI CTA 3 3,500ft-6,000ft	The systemised design for arrivals and departures means that the CAS in area "H" can have it's base altitude increased to 3,500ft and the airspace below will change be reclassified as Class G.

[2] See footnote 1 two pages up.

Local Summary

The EDI CTR has been changed in size to what is shown in Figures 2 and 3. The area previously required for the now defunct second runway has been removed, and replaced with a rectangular CTR. This is aligned to the requirements of a single runway airport.

The CAS to the northwest has remained as it is today in order to allow flexibility for departures travelling at different speeds and also some space for vectoring should it be required for safety or weather reasons.

The western boundary of CAS ends at the buffer zone as it does in today's airspace.

The southeastern corner is reduced in volume as the systemised design does not require this airspace.

There is more Controlled Airspace to the northeast to provide protection for proposed arrival and departures routes over the Firth of Forth.

All the new CAS required for the PBN design is classified as class D in order to protect commercial traffic both arriving and departing form Edinburgh airport.

We have sought to minimise the CAS required whilst not overcomplicating the airspace structure.

Overall Volume of Controlled Airspace

The overall volume of CAS is assessed on a system wide perspective, across the ScTMA Cluster.

Table 3 shows the total change in volume of airspace types and classifications for the combined Edinburgh Airport, Glasgow Airport and NERL ACPs. Overall, the proposed, combined design will require an additional 658.8 nm³ of CAS. However, in isolation, 1193.0 nm³ of new CAS is required by NERL above 7,000ft to provide more efficient en-route connectivity which demonstrates that a substantial airspace release has been achieved in the remainder of the design. In addition to the CAS release, the classification of a substantial volume of CAS is proposed to be lowered increasing accessibility to all airspace users.

Table 3: Volume of each type and classification of CAS in the baseline and proposed, combined Edinburgh, Glasgow and NERL ACPs

Airspace Type	Baseline Volume (nm³)	Option Volume (nm³)	Volume Change (nm³)
CTR	773.2	737.6	-35.5
CTA	26129.4	26778.7	649.3
TMA	9467.3	9512.3	45.1
Total	36369.8	37028.7	658.8
Airspace Classification	**Baseline Volume (nm³)**	**Option Volume (nm³)**	**Volume Change (nm³)**
Class A	6714	1417.8	-5296.2
Class C		3713.2	3713.2
Class D	17691.7	19307.5	1615.8
Class E	11964.2	12590.1	626
Total	36369.8	37028.7	658.8

For details of the wider CAS proposed as part of Scottish Airspace Modernisation please see the ACOG system wide description document.

Table 4 below presents the same data as in Table 3 but for CAS with a base of 7,000ft or lower. Overall, the proposed, combined design will result in a reduction of 616.1 nm³ of CAS where bases are below 7,000ft.

Table 4: Volume of each type and classification of CAS in the baseline and proposed, combined Edinburgh, Glasgow and NERL ACPs 7,000ft and below only

Airspace Type	Baseline Volume (nm^3)	Option A Volume (nm^3)	Volume Change (nm^3)
CTR	773.2	737.6	9.0
CTA	7,667.8	7,100.1	567.7
TMA	9,467.3	9,468.8	1.5
Total	17,908.2	17,306.5	601.7
Airspace Classification	**Baseline Volume (nm^3)**	**Option A Volume (nm^3)**	**Volume Change (nm^3)**
Class A	404.4	95.2	309.2
Class C	0.0	0.0	0.0
Class D	13,389.0	13,566.8	177.8
Class E	4,114.9	3,644.6	470.3
Total	17,908.2	17,306.5	601.7

In terms of the overall value to General Aviation, previous engagement with GA stakeholders as part of Stage 2 highlighted that there was a desire from those users that Edinburgh Airport release as much CAS as possible and, broadly speaking, less CAS results in improved access for General Aviation. As outlined in the section above, whilst overall there is a CAS release benefit below 7,000ft, there are some areas which will be negatively impacted and other areas which will see improvements as shown in Figure 5.

We are aware of the value of controlled airspace to Scottish Gliding Centre at Portmoak and general aviation opening from Fife Airfield at Glenrothes. This has been considered as part of the CAS development but some lowering of CAS in their vicinity has been required to provide CAS protection for new PBN route structure.

We have included detailed information on proposed CAS dimensions, and we look forward to feedback through consultation from any other airspace user (including both GA and military) on the proposals.

New and rapidly developing airspace users

The Government's AMS requires us to also consider the benefits and impacts to new or rapidly developing users such as remotely piloted aircraft systems, advanced air mobility, spacecraft, high-altitude platform systems.

We are not aware of any permanent proposals for airspace change in the vicinity of Edinburgh's CAS boundaries concerning remotely piloted aircraft systems, advanced air mobility, spacecraft or high-altitude platform systems. Neither have we had any requests from new airspace users to release airspace in specific geographic regions to support their ambitions.

For the purposes of Scottish Airspace Modernisation we have therefore assumed that the release of CAS in terms of volume or lower classification could benefit new and rapidly developing airspace users. We are interested to hear from new and developing airspace users as to whether our proposals for changes to controlled airspace can benefit them or if there are any specific requests to support firm aspirations.

Annex H: Habitats Regulations Appraisal Screening Report

Cover sheet addendum

Note that this HRA screening report was undertaken before all the details of the options were finalised, therefore the options as depicted in this report do not exactly match those in the main report in all areas.

However, the differences are marginal and do not affect the analysis or change the conclusion that likely significant effects on European Sites can be screened out.

Annex I: Stakeholder Feedback from Stage2 Relating Design Detail

In the Stage 2 approval letter the CAA stated "the sponsor should ensure that feedback received during Stage 2 relating to specific routing options is not lost sight of and is fully considered as it further develops its options in Stage 3".

This table lists the feedback and summarises how we have considered it in our design.

	Stage 2 feedback on specific routing option	From who (Stakeholder)	Specifically what did they want and why	Document reference	How we considered it in our design in Stage 3
1	Routes over the Firth of Forth	Edinburgh Airport Noise Advisory Board (EANAB)	Put routes over Firth of Forth wherever possible to minimise population overflown	**Engagement document v1.3 Mar 2023** Page 30	We have designed both departure and arrival routes to be over the Firth of Forth where it is safe and reasonable to do so. in particular • Runway 24 departures to the east GULLY/BERRY SID and • WORM2 and STOBS arrivals See FOA Section 2 for details.
2	The requirement for Controlled Airspace (CAS) around the Firth of Forth	Light Aircraft Association (LAA)	Less airspace generally because of systemisation and a reduction in buffer zones	**Engagement document v1.3 Mar 2023** Page 89	We have sought to minimise the CAS wherever possible, subject to meeting the safety requirements for protecting PBN routes. We have coordinated our changes with Glasgow Airport and NERL to enable an overall reduction in CAS below 7,000ft. However, the inclusion of new routes over the Firth of Forth does however mean that we are seeking an increase in controlled airspace in that region. See Annex G.
3	Avoiding Winchburgh	Winchburgh estates	Right turns off runway 24 to avoid Winchburgh	**Engagement document v1.3 Mar 2023** Page 120	Compared to today's route, the proposed design of a route for runway 24 departures that turns to the north and east provides an overall benefit with respect to reduced adverse effects. This is in line with government policy[1]. The first turn is delayed until past Broxburn (See FOA Section 2.1.3.4). This was to minimise overall potential adverse effects by avoiding overflight of close communities such as Broxburn and also those north of it including Winchburgh.

[1] Air navigation guidance 2017

	Stage 2 feedback on specific routing option	From who (Stakeholder)	Specifically what did they want and why	Document reference	How we considered it in our design in Stage 3
4	Avoid Kinghorn	Kinghorn community council representatives in the Aviation Airspace and Noise Subgroup This group is part of EANAB	Avoiding Kinghorn by routing down the centre of the Firth of Forth	**Engagement Document v1.3 Mar 2023** Page 58	Kinghorn is overflown by arrivals to runway 24. In the baseline forecast years this is at a rate of 5-10 flights per day. The proposed design would mean these arrivals no longer overfly Kinghorn and would instead approach via the Firth of Forth. See FOA Section 2.1.2.3 for further detail. Kinghorn would however be overflown by departures on the STOPP SID from runway 06. It was not possible to move this route further out over the sea without creating a crossing conflict with the PBN approach transition for runway 06. The runway 06 STOPP SID, is however a relatively lightly used routes with only 1% of flights using it, and so average usage would be less than 5 per day meaning overall we except a reduction of overflight of Kinghorn. See FOA Section 2.1.3.11 for further detail.
5	Controller protection and workload	GATCO	Avoid conflict between: • departures and Arrivals • other routes and procedures • RAF Kirknewton	**Engagement document v1.3 Mar 2023** Page 107	Safety is the number one priority. The designs have been developed to meet all relevant safety standards. PBN is designed to reduce workload by providing assurance separation for aircraft that are kept on their routes. Annex K provides technical details of the routes and level restriction to provide separation.
6	Include a SID directly heading south	British Airways	British Airways specifically wanted a southern SID in order to reduce track miles and reduce fuel and emissions output	**Engagement document v1.3 Mar 2023** Page 50	Work at the start of Stage 3 of the network design we found that there was no reasonable PBN design for a departure route heading directly south that would be safely separated from a new PBN holding stack and/or and PBN arrival routes coming from the south. Any such design would inevitably result in aircraft being taken off their routes through similar levels of tactical intervention as seen today. This would not be in line with the AMS objective for systemisation and would mean the complexity in the airspace south of the airport that exist today would remain. For further details see FOA Section 2.3.1.2.2

	Stage 2 feedback on specific routing option	From who (Stakeholder)	Specifically what did they want and why	Document reference	How we considered it in our design in Stage 3
7	A route down the east coast	EANAB (airlines and communities)	A route down the East Coast southeast of Edinburgh	**Engagement document v1.3 Mar 2023** Page 48	The proposal includes routes that head out over the Firth of Forth for destinations in the east and southeast. These are over the North Sea rather than the east coast and so it is assumed they better meet the objectives of communities. The routes also facilitate reduced fuel and reduced delay for destinations to the east and southeast which is assumed to meet the airline requirements.
8	Avoiding Kirknewton Airfield	LAA and MOD	Avoid Kirknewton to enable operations to continue as today	**Engagement document v1.3 Mar 2023** Page 27, 73, 102	The design of the first turn for runway 24 departures to the south is delayed until past the Kirknewton gliding area (See FOA Section 2.1.3.4). This was to ensure that both Edinburgh and Kirknewton operations can continue safety as they do today.
9	Objection to the TUTUR trail route	Various communities	Objection to the TUTUR Trail route	**Initial consultation report 2016** Page 29, 41, 65	The TUTUR trail route involved an early right turn for runway 24 departures. As a consequence we developed 4 alternative designs for right turns off runway 24. See FOA Section 2.1.3.5. Section 5 provides a detailed justification of for the version of the route that we have chosen to progress, not least the significant reduction in overall adverse noise effects that it brings.
10	The Cramond Offset	Cramond Community Council	Cramond representatives want the offset after departure to remain or be improved	Cramond presentation document **Engagement document v1.3 Mar 2023** Page 39 and 98	The Cramond offset has been improved. See FOA Section 2.1.4.3.
11	Concerns with the clean sheet approach	LAA	Concerns over additional CAS	**Engagement document v1.3 Mar 2023** Page 90	See item 2 in this table.

	Stage 2 feedback on specific routing option	From who (Stakeholder)	Specifically what did they want and why	Document reference	How we considered it in our design in Stage 3
12	Balancing noise between 4,000ft and 7,000ft	EACC EANAB subgroup SRUC Oatridge campus Fife council EANAB individual response	Could 10,000ft be used for noise and how are you treating noise balanced with other priorities?	**Engagement document v1.3 Mar 2023** Page 71, 96, 112, 114, 116	We are following AN2017 which is government guidance on its environmental objectives, including 7,000ft as the level above which carbon should be prioritised over noise.
13	Arrival Option runway 24 from the North	Fife communities and ANSL EANAB BAA Easyjet	Could we reduce noise over Fife especially downwind right for runway 24 and also redesign the STIRA hold	Design meetings throughout 2023 FOA Annex K **Engagement document v1.3 Mar 2023** Page 58	The proposed holding stack for flights from the north has moved from STIRA (near the town of Dollar) east to STOBS (over Dundee) and has been raised from 7,000ft to 11,000ft. This means that the lower-level flights that are currently vectored from STIRA over the southern part of Fife would not exist in the future. Instead, flights would be approaching at higher levels over the northeastern part of Fife, with only a small segment above 7,000ft overland. See FOA Section 2.1.2.3 for further detail.
14	Night flights respite	EANAB EACC	Respite for night flights particularly in the Dalgety Bay area	**Engagement document v1.3 Mar 2023** Page 71, 96	Designs to provide respite or relief were considered but none specifically benefiting Dalgety Bay were progressed See FOA Section 2.1.4. Our redesign using PBN criteria and the resultant concentration of flights would, however, lead to reduced overflight of Dalgety Bay. See FOA Section 2.1.3.10.
15	Pairing of SIDs	Prestwick airport	Truncation or complexity of individual SIDs. Advice given	**Engagement document v1.3 Mar 2023** Page 118	It was suggested by certain stakeholders that we include individual SIDs in the design such as a Firth of Forth SID from runway 06 but none from runway 24. This suggestion is not included in the design and the advice given from Prestwick Airport about standardisation and non-complexity backs this design decision up evidentially.
16	3nm separation	NERL	3nm separation is needed to ensure smooth operation of systemised airspace between airports and sectors	**Engagement document v1.3 Mar 2023** Page 125	The design takes into account the need for 3nm separation throughout it's construction. Where lateral separation of 3nm cannot be achieved then vertical separation is designed to be maintained. The design has now been assured with the continued participation of NERL and GLA.

	Stage 2 feedback on specific routing option	From who (Stakeholder)	Specifically what did they want and why	Document reference	How we considered it in our design in Stage 3
17	Additional CAS to the East	NERL	If the Firth of Forth is developed for arrivals and departures, then these routes would need to be protected by CAS	**Engagement document v1.3 Mar 2023** Page 125	Commercial aviation needs to be protected with CAS and this has been constructed around the systemised design where necessary. The classification would be class D meaning any aircraft with a radio could call to enter it.
18	The STIRA route to the overhead for arrivals	NERL	This is of concern because of complexity and emissions reasons	**Engagement document v1.3 Mar 2023** Page 125	After numerous design workshops there is now no STIRA hold so this issue no longer exists in the proposed arrivals flightpaths and holds.
19	Systemisation	LAA	If the routes and airspace are systemised, aircraft fly more accurately and therefore less CAS is needed	**Engagement document v1.3 Mar 2023** Page 30	There are still separation rules that apply to RNAV routes and these need to be adhered to however the design now incorporates a reduction in CAS where this can be achieved.

Annex J: Today's noise abetment procedures

Reproduced from the **UK AIP** for information. These will remain as today with the exception of the definition of the noise preferential routes (NPRs) which will be changed to represent a swath 1.5km either side of the proposed PBN routes to 4,000ft. See the NPR subsections for each option in section 4 for new NPRs.

EGPH AD 2.21 Noise Abatement Procedures

All aircraft inbound to or outbound from this aerodrome are required to conform to the following procedures, notwithstanding that these may at any time be departed from to the extent necessary for avoiding immediate danger.

a. Any aircraft using the aerodrome shall be operated in such a way that it will not cause a noise reading of more than 94 dBA Lmax by day 0600-2330 (0500-2230) or 87 dBA Lmax by night 2330-0600 (2230-0500) at the relevant noise monitoring terminal(s); the measured noise reading for the event will be taken as the highest recorded at any single noise monitoring terminal.

The sites of the aircraft noise monitoring terminals relating to Edinburgh Airport are:

- EDI 01 – Houston Industrial Estate, Livingston. NT 0620 6903 – *555418N 0033006W;
- EDI 02 – Scottish Power, Broxburn. NT 0924 7061 – *555508N 0033202W;
- EDI 03 – Cramond Kirk Manse, Cramond. NT 1902 7650 -*555829N 0031757W.

b. For visual approaches to Runway 06/24 the following limitations will apply:

i. Propeller driven aircraft whose MTWA does not exceed 5,700 KG will not join the final approach to the runway below 1,000ft AAL.

ii. All visual approaches from the south to Runway 24 by aircraft with an MTWA in excess of 5,700 KG are to be made from a position not less than 7 NM DME on the extended centreline. Aircraft are not to descend below 2,000ft QNH until after crossing the Firth of Forth coastline northbound. All visual approaches from the north to Runway 24 by aircraft with an MTWA in excess of 5700 KG are to be made from a position not less than 4 NM DME on the extended centreline. Aircraft approaching Runway 06 are to join the extended runway centreline at a height of not less than 1,500ft.

c. With the exception of aircraft in an emergency, between the hours of 2230-0630 (2130-0530), no visual approaches to Runway 06/24 are permitted for IFR aircraft. All IFR aircraft to carry out ILS approaches under ATC control.

d. Aircraft using the ILS shall not descend below 3,000ft (Edinburgh QNH), unless instructed by ATC, before intercepting the glidepath nor thereafter fly below it. Aircraft landing without assistance from ILS or radar shall follow a descent path which will not result in their being at any time lower than the nominal ILS glidepath.

e. The Noise Preferential Routeings specified in the following table are compatible with ATC requirements and the tracks are to be flown by all departing jet aircraft and by all other departing aircraft of more than 5,700 KG MTWA unless otherwise instructed by ATC or unless deviations are required in the interests of safety.

f. Noise Preferential Routes must be strictly adhered to. Direct routeings etc offered by ATC should only be taken up after completion of the NPR, unless a mandatory instruction is given or an emergency situation prevails.

Take-off Runway	ATC Clearance	Procedure
06	Via TLA VOR	Climb straight ahead to I-VG D0.5 or 635 QNH, whichever is earlier, then turn left to track 043 then at I-VG D7 turn right onto track 143. At TLA VOR R023 (I-VG/I-TH D12) turn right to intercept TLA VOR R025 to TLA VOR. NPR terminates at TLA VOR D30.
	Via SAB VOR or NATEB	Climb straight ahead to I-VG D0.5 or 635 QNH, whichever is earlier, then turn left to track 043 then at I-VG D7 turn right towards SAB or NATEB. Warning: Pilots are reminded that UK Danger Area EGD512B lies on the direct track from the end of the NPR to NATEB. NPR terminates at I-VG D7.
	Via GRICE	Climb straight ahead to I-VG D0.5 or 635 QNH, whichever is earlier, then turn left to track 043. At I-VG D3 turn left onto SAB VOR 285. Cross SAB D46 above 4,500 (5.1%). NPR terminates at 3,000.
	Via GOSAM (P600/UL612)	Climb straight ahead to I-VG D0.5 or 635ft QNH, whichever is earlier, then turn left to track 043. Then At I-VG D3, turn left onto GOW VOR R076 to CUMBO. Cross GOW D35 at 5,000 or above (8%). Cross GOW D30 at 6000. NPR terminates at 6,000.
	Other Routes	Climb straight ahead to I-VG D0.5 or 635 QNH, whichever is earlier, then turn left to track 043, until I-VG D7 before turning on course. NPR terminates at I-VG D7.
24	Via TLA VOR	Climb straight ahead to UW NDB. At I-TH D7 turn left onto TLA VOR R344 to TLA VOR. NPR terminates at I-TH D7.
	Via SAB VOR or NATEB	Climb straight ahead to UW NDB. At UW NDB turn left towards SAB VOR or NATEB. NPR terminates at 3000.
	Via GOSAM (P600/UL612)	Climb straight ahead to UW NDB. At UW NDB turn right onto UW NDB QDR 261 to MAVIX. Cross I-TH D9.5 at or above 4,500 (7.7%). Cross I-TH D16 at 6,000 (6.6%). NPR terminates at 6,000.
	Via GRICE	Climb straight ahead to UW NDB. At UW NDB turn right onto TLA VOR R351. At TLA D32 turn left to intercept TLA VOR R346 to GRICE. Cross TLA D30 at or above 4,000 (3.4%). NPR terminates at 3,000.
	Other Routes	Climb straight ahead to UW NDB or 3000, whichever is earlier, before turning on course. NPR terminates at 3,000.

g. For environmental reasons, aircraft commanders are requested to avoid the use of reverse thrust/pitch, between the hours of 2300-0600 (2200-0500).

h. With the exception of Military aircraft, aircraft which do not meet the standards specified in Part II, Chapter 3 of Volume 1 ICAO Annex 16 will not be permitted to operate to/from Edinburgh Airport.

Annex K: Technical Design Description for consultation option

1. Introduction

Purpose

This report provides the technical design description for a completely revised airspace, including flight procedures, for Stage 3 of the Edinburgh Airport ACP. It has been developed in parallel with both the airspace redesign for Glasgow Airport (GLA) and the higher and surrounding airspace serving both airports and enroute traffic, which is managed by 'NATS (En Route) Ltd', referred to as 'NERL'. The redesign of Edinburgh's airspace has been developed in close cooperation with GLA and NERL. The collaboration process is guided by the Airspace Change Organising Group (ACOG).

Note that the proposed design is, at this stage, conceptual and subject to change following consultation and/or for reasons of safety or compliance, prior to approval by the CAA.

Context

The initial design described in this document has been developed during stage 3 of the Airspace Change Process (ACP) which is described by the Civil Aviation Authority (CAA) in CAP 1616. This document is an initial description of the technical considerations and rationale behind the design being taken into consultation. The final design detail and safety assurance will be developed during stage 4 of this process when the design is finalised. For more information on this process and the background and phasing of the project, please refer to the FOA (Full options appraisal) document published by Edinburgh Airport.

Target audience

This is a technical design document aimed at aviation and design specialists. Technical terms and standard abbreviations are used throughout. For less technical descriptions of the airspace and routes, plus description of how noise and other impacts have shaped the design, please see the FOA, and for a general description for non-specialists please see the consultation material.

Scope

The scope of the airspace (re)design described in this document is limited to the airspace under responsibility of Edinburgh Airport, which is controlled by Air Navigation Solutions Ltd. (ANSL). This airspace consists of the Edinburgh CTAs (control areas) and the Edinburgh CTR (control zone), all having an upper limit of 6,000ft AMSL. This airspace is covered and surrounded by the Scottish TMA, which falls under responsibility of NERL (although some of the lower sections of the TMA are controlled by ANSL on Edinburgh Airport's behalf). The Glasgow CTAs and Glasgow CTRs fall under responsibility of GLA.

The scope of the flight procedures described in this document is limited to the instrument approach procedures and instrument departures at Edinburgh Airport.

NERL is responsible for the description of the changes in NERL's airspace and the procedures/routes within this airspace. This includes the STARs, the holding stacks at the end of the STARs and, the ATS routes.

It should be noted that the initial parts of the proposed instrument approach procedures and the holding stacks at the beginning of these procedures are contained within NERL's airspace (Scottish TMA), while the traffic in these holdings/procedures is controlled by ANSL. The control of the higher segments of the departure procedures, which are also contained within NERL's airspace, may also be partly executed by ANSL, depending on transfer agreements between both ATC units and the actual traffic situation. Due to the mixed responsibility in the lower parts of NERL's airspace and since EDI's airspace design can only be understood in combination with NERL's airspace design (and vice versa), there is some unavoidable overlap in the airspace and procedures described by NERL and in this report. The same applies to the airspace design described by GLA.

Document structure

Chapter 2 provides some general design considerations and general guidelines which are fundamental for the design. Chapter 3 gives an overview of the envisaged changes in the airspace structure and flight procedures of Edinburgh Airport for the option being taken to consultation. Chapter 4 provides the considerations behind the proposed airspace structure and chapter 5 describes the impact on the VFR traffic. Considerations regarding the new approach procedures and the new departure procedures are given in chapters 6 and 7. Chapter 8 provides an initial view on the ATC procedures. Chapter 9 gives the proposed coding tables and coordinates for the approach and departure procedures. Finaly, in chapter 10 detailed operational design considerations are given for each segment and each procedure. This chapter can be used to obtain a better understanding of the considerations behind the positioning of specific waypoints and/or procedure turns.

The reader will notice that most paragraphs in this document can only be fully understood in combination with an illustration. It is recommended to print out the images provided in Figures 2 and 3 or display them on a screen, so they can be easily used as supporting illustration when needed.

2. General design considerations

References/Design guidelines

The design is primarily based on the guidelines provided in the following documents:

- PANS-OPS: ICAO Doc 8168, Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS), Volume II, amendment 10
- CAP 778 – Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace
- CAP 1385, Version 2 – Performance-based Navigation (PBN): Enhanced Route Spacing Guidance
- CAP 1616 Edition 5 – Airspace Change
- Policy for the Design of controlled airspace structures (V3) – Policy statement issued by Safety and Airspace Regulation Group (SARG).
- Considerations and Guidance for Vertical Interactions in Terminal Airspace (CAGVI)) proposed by NERL
- Practitioners Guide for the Integration of Multiple Interdependent ACPs issued by ACOG. (Specially Figure 5: PBN Separations Quick Start Guide)

General design principles

The current conventional procedures will be replaced by PBN procedures consisting of RNAV 1 SIDs and RNAV 1 approach transitions connecting to ILS approaches and RNP approaches.

The new flight procedures are systemised, meaning that Edinburgh departures are deconflicted from Glasgow procedures and Edinburgh approach transitions are deconflicted from Edinburgh departures. Altitude restrictions on the waypoints ensure vertical separation where horizontal separation criteria couldn't be met.

All waypoints in the design are fly-by waypoints, except for the turn at altitude applied on the first segment of the RWY 06 departures and the fly-over WPTs applied for the initial turns of the proposed missed approach procedures. There are no radius to fix (RF) legs in the design because they wouldn't have provided any obvious benefits, also considering that part of the Edinburgh Airport fleet can't fly RF legs, meaning that two versions of the procedures would have been required if RF legs had been introduced.

All (consecutive) turns in the proposed design should be flyable since the required stabilisation distances as prescribed in PANS-OPS (ICAO Doc 8168 Vol II) are taken into account. Speed constraints are defined where required in order to meet stabilisation distance criteria.

Waypoint and ATS route names

Waypoint (WPT) names with 5 letters (or 4 letters plus a number, e.g. 'TART3') are temporary design names and will be replaced by officially requested 5-letter-name-codes in the final design. These name codes are so-called pronounceable names, which should only be used for waypoints that are likely to be used by controllers for instructions to pilots. Waypoints with 5-letter-name-codes must be used on ATS routes, on STARs and at the end of departures and at the beginning of approach procedures. In addition, they are used on specific points on the approach procedures where vectoring instructions (e.g. to resume the approach procedure) may be required on occasions to maintain safety or avoid weather situations e.g. thunderstorms. Since these waypoint names will be replaced in the final design, the associated names of the procedures will be changed too.

Other waypoint names, such as "PHW01" are considered less pronounceable and are used for waypoints which will normally not be used for ATC instructions. These names consist of an airport code ("PH" in the case of Edinburgh Airport) followed by a direction indicator (W/E/N/S) and a number. It is more likely that these names remain unchanged, but this depends on the choices made for the final design.[1]

ATS routes have names with numbers and letters such as "T8G". New ATS routes have temporary design names and may change in the final design. It should be noted that design of ATS routes and STARs is not in scope of this document, since they are designed by NERL.

[1] Due to a 'last minute' change a few waypoint names are defined by "PH" plus three digits. These waypoint names will be changed into the prescribed format (PH###) in stage 4. This may also result in the renumbering of other waypoints if it is considered desirable to improve the logic of the consecutive numbers.

Altitude and speed constraints

Altitude constraints are indicated in the following formats:

Altitude constraint	Map format	Text/table format
At 6,000ft/FL090	6,000 FL090	6,000(ft) FL090
At or above 6,000ft/FL090	6,000 FL090	+ 6,000(ft) + FL090
At or below 6,000ft/FL090	6,000 FL090	- 6,000(ft) - FL090
At or below 6,000ft and at or above 5,000ft	6,000 5,000	- 6,000(ft) + 5,000(ft) Or: 5,000 – 6,000

Speed constraints are indicated in the following formats:

Speed constraint	Map format	Text/table format
MAX 230 KTS IAS	MAX 230 KIAS	- 230

3. Overview changes

Airport and runway

Edinburgh Airport (IATA code: EDI, ICAO code: EGPH) has one runway (RWY 06-24). There are no planned changes to the runway or other airspace infrastructure that would affect the proposed design.

Glasgow Airport (IATA code: GLA, ICAO code: EGPF) is situated at 36NM west of Edinburgh airport, which causes complexities for the flight procedure design of both airports.

Due to prevailing winds, the annual modal split based on the long-term average runway usage measured between 07:00 & 23:00 each day is 70% for RWY 24 and 30% for RWY 06.

Figure 1. Edinburgh Airport.

The runway dimensions and characteristics are provided in the tables below (derived from the AIP, AMDT 12/2024).

EGHP AD 2.12 Runway physical characteristics

Designations RWY Number	True bearing	Dimensions of RWY	Surface of RWY/ SWY/ Strength (PCN)	THR co-ordinates/ THR Geoid undulation	THR elevation/ Highest elevation of TDZ or precision APP RWY	Slope of RWY/SWY
1	2	3	4	5	6	7
06	058.85º	2558 x 45 M	RWY surface: Asphalt, Grooved PCN 68/R/B/W/T	555641.99N 0032313.90W 173.5ft	THR 110.1ft TDZ 110.1ft	
24	238.88º	2558 x 45 M	RWY surface: Asphalt, Grooved PCN 68/R/B/W/T	555717.66N 0032128.66W 173.4ft	THR 99.8ft TDZ 100.0ft	

SWY Dimensions	Clearway Dimensions	Strip Dimensions	RESA Dimension, Overshoot/ Undershoot	Location/ description of arresting system	OFZ	Remarks
8	9	10	11	12	13	14
60 x 45 M	60 x 150 M	2798 x 280 M				RWY 06 Runway 06 threshold is inset 214 M Paved shoulders exrtend 8 M beyond each side of runway
60 x 45 M	448 x 150 M	2798 x 280 M				RWY 24 Runway 24 threshold is inset 211 M Paved shoulders exrtend 8 M beyond each side of runway

EGHP AD 2.13 Declared distances

Runway designator	TORA	TODA	ASDA	LDA	Remarks
1	2	3	4	5	6
06	2556 M	2616 M	2616 M	2344 M	
24	2556 M	3002 M	2614 M	2347 M	
06	1891 M	1951 M	1951 M		Take-off from intersection with Hold Bravo 1. Information signage in place adjacent to Hold Bravo 1.
24	1891 M	2339 M	1951 M		Take-off from intersection with Hold Charlie 1. Information signage in place adjacent to Hold Charlie 1.

Overview new design

The new procedure design for Edinburgh Airport consists of the following procedures:

- Three RNAV 1 approach transitions for each RWY direction, with holding stacks on the Initial Approach Fixes (IAFs) (note that the holding stacks themselves are defined in the STARs which are contained in the associated but separate NERL proposal);
- For each RWY direction the transitions lead to an ILS or LOC approach and an RNP approach (with LNAV, LNAV/VNAV and LPV minima);
- 6 RNAV 1 SIDs for each RWY end.

The Approach transitions are the following:

- TART3 approach 06/24
- WORM2 approach 06/24
- STOBS approach 06/24

The SIDs are the following:

- STOPP 1A/1B SID
- GULLY 1A/1B SID
- BERRY 1A/1B SID
- SKIRL 1A/1B SID for (turbo) props only
- STRAT 1A/1B SID
- STEPS 1A/1B SID

The designator 1A is used for SIDs from RWY 24; 1B for SIDs from RWY 06.

The figures below give an overview of the new flight procedures for RWY 06 and for RWY 24.

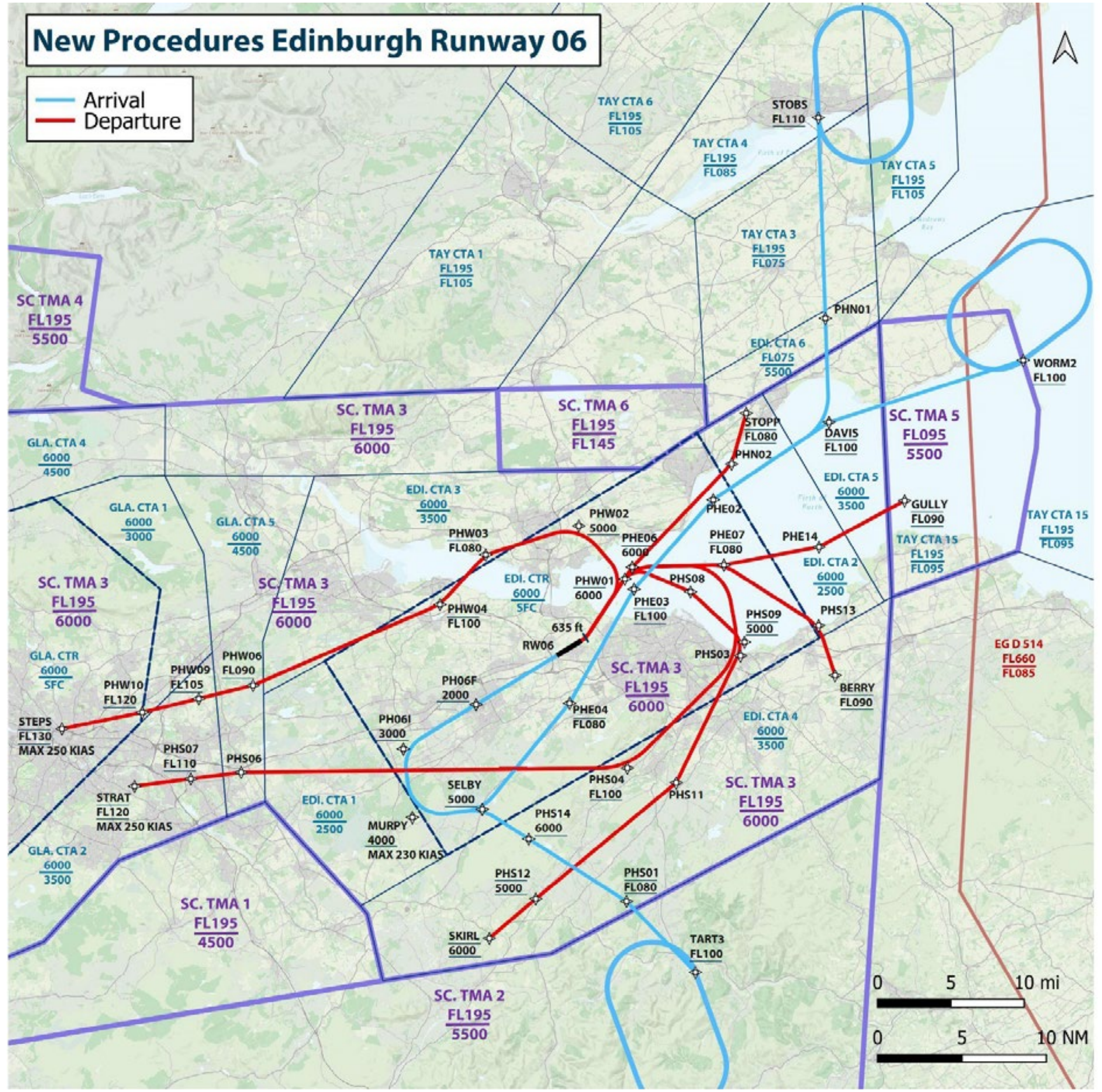


Figure 2. New procedures RWY 06.

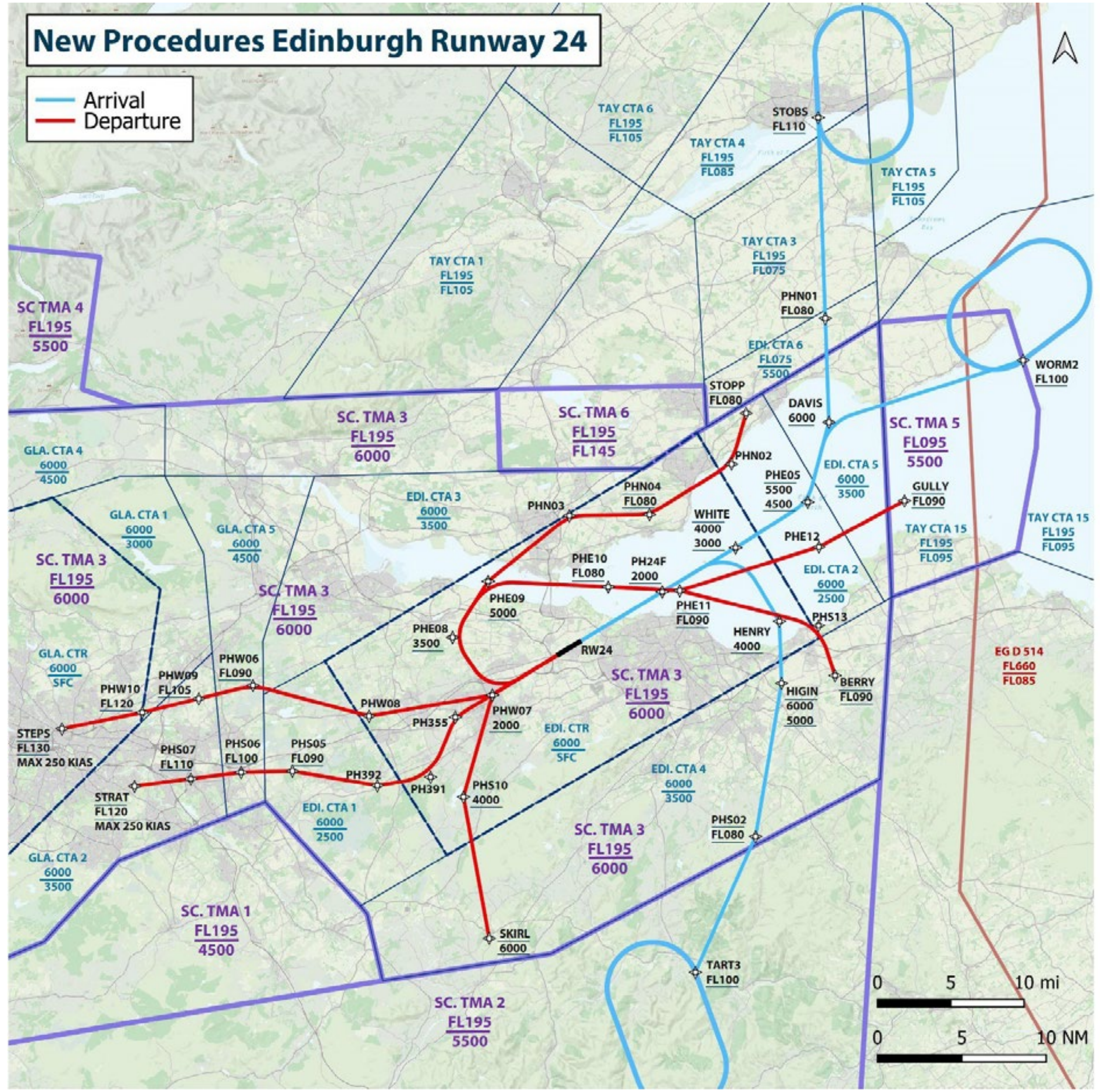


Figure 3. New procedures RWY 24.

Design changes flight procedures

Below images show the current procedures (left) and the proposed new procedures (right). Note that the trajectories of the current procedures are indicative since vectoring is used extensively, meaning that the actual flown tracks are currently spread over a wide area. For details of today's vectoring patterns see Section 4 of the FOA.

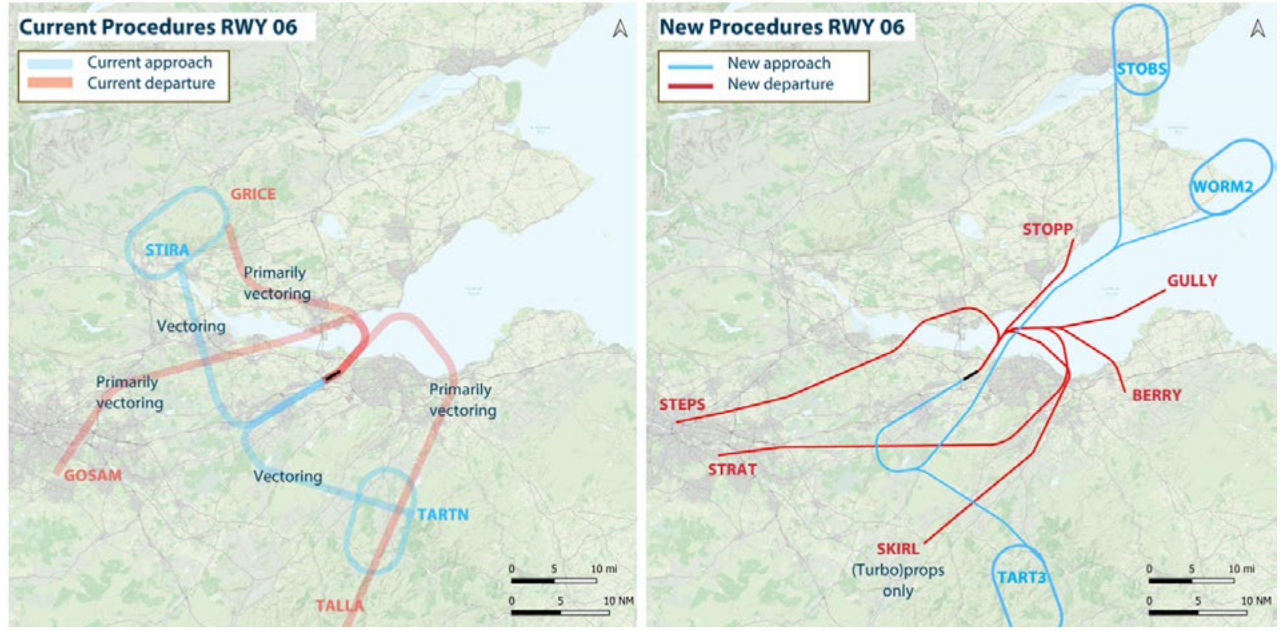


Figure 4. Current versus new procedures RWY 06.

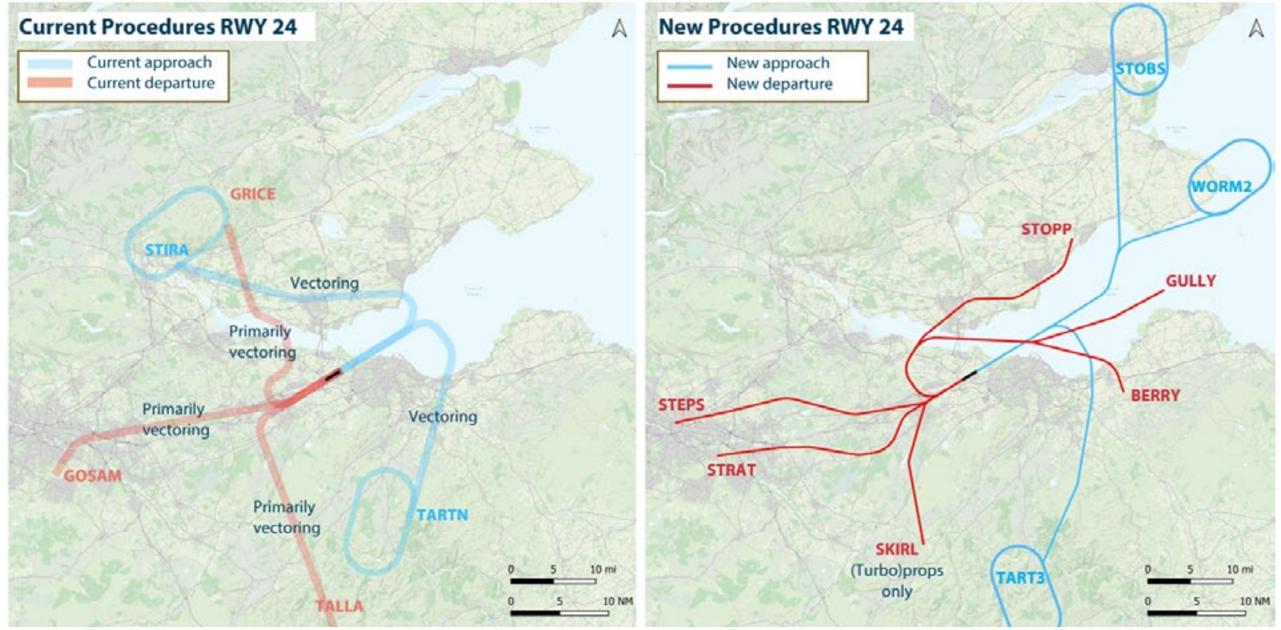


Figure 5. Current versus new procedures RWY 24.

Below images show the new procedures overlaid over the current procedures.

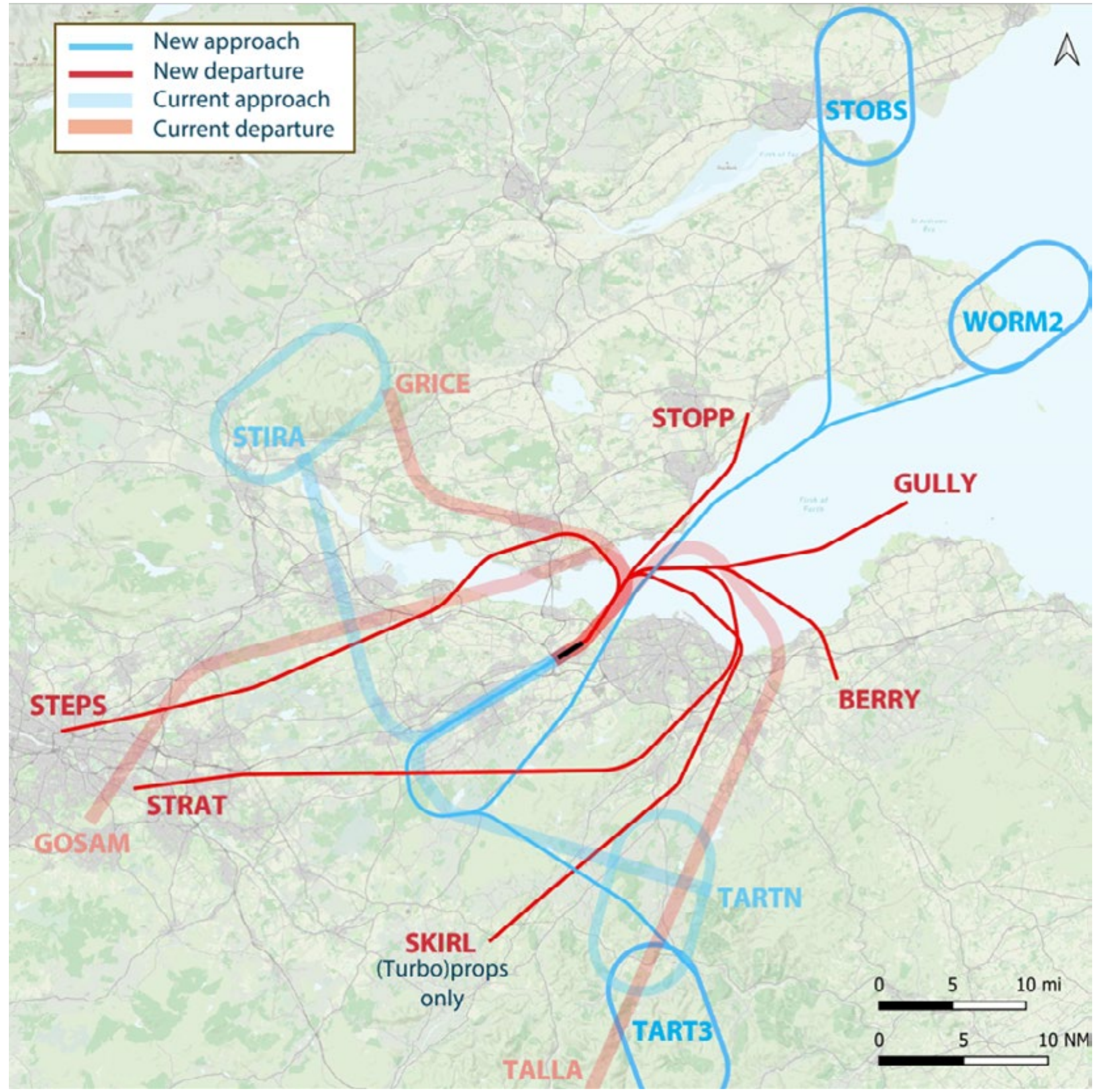


Figure 6. Current versus new procedures RWY 06.

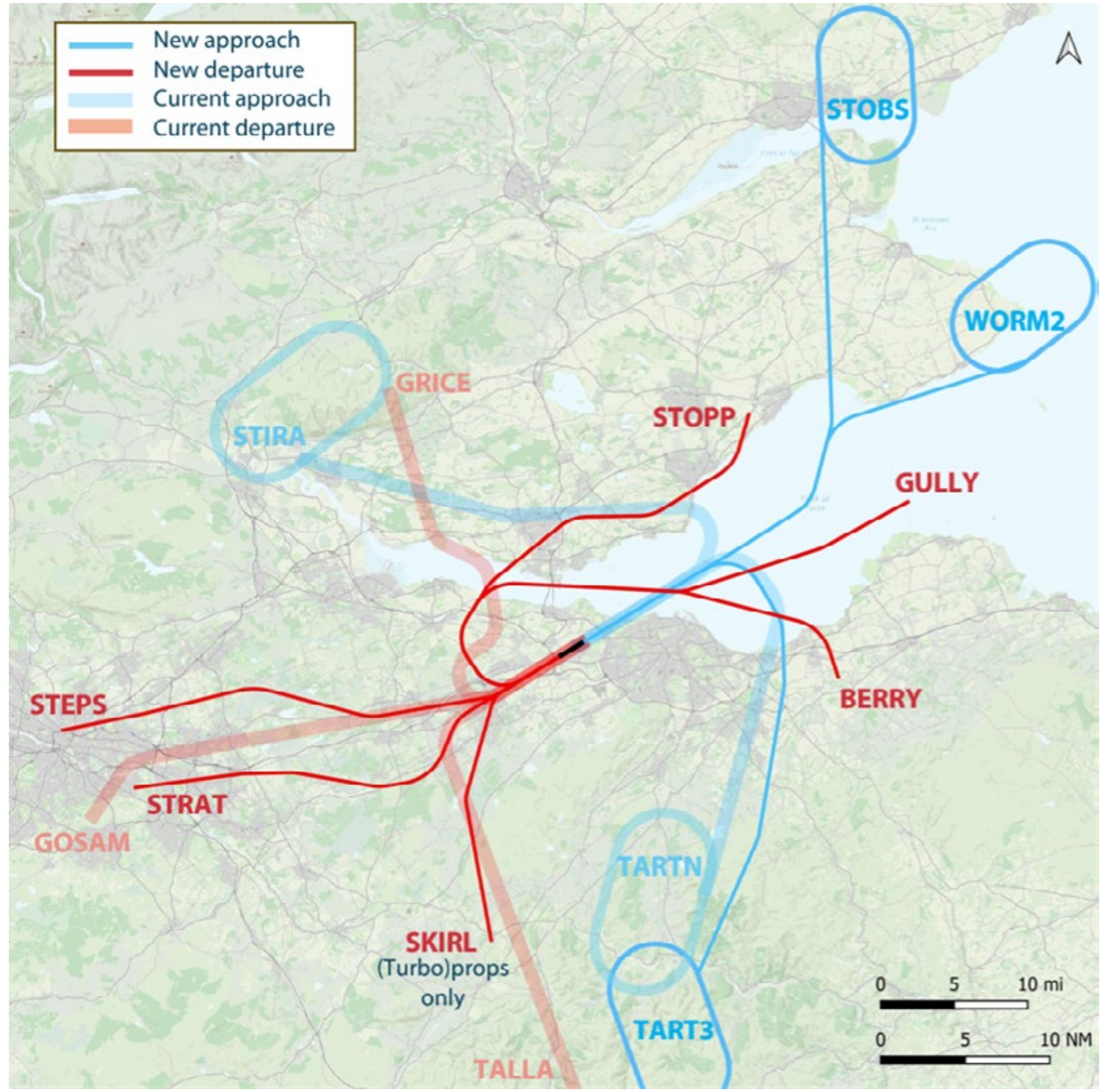


Figure 7. Current versus new procedures RWY 24.

The main differences in the flight procedure design are the following (new versus current procedures):

- The arrivals and departures are systemised with vectoring only ever used for safety reasons or perhaps to avoid weather e.g. thunderstorms;
- There are three holds instead of two, none of the new holds are shared holds and the holds have been repositioned to TART3, WORM2 and STOBS;
- ILS approaches remain available, but are revised with RNAV 1 transitions;
- NDB approaches are removed;
- New RNP approaches are added with RNAV 1 transitions;
- A new approach transition (WORM2) and departure (GULLY) along the Firth of Forth have been created to shorten the trajectories for easterly destinations;
- The northerly departure to GRICE and the nearby STIRA arrival have been replaced by the more easterly STOPP departure and STOBS approach, to avoid the complex interaction between arrivals and departures and between EDI and GLA traffic;
- The southern jet departures towards TALLA are replaced by STRAT for destinations to the south and BERRY/GULLY for departures to the southeast. These routes avoid the area south of the airport that is congested with arrivals for both Edinburgh and Glasgow.
- Routes via a new point SKIRL are provided for each runway for westbound and southbound turboprops that cannot make the climb gradients on the STEPS and STRAT SIDs. These are the only proposed SIDs that terminates below 7,000ft, although it is expected that the majority of traffic would get a tactical climb before the end of the SID.

4. Considerations airspace design

Overview airspace design Edinburgh

This document only describes the airspace design considerations for the Edinburgh CTR and CTAs which contain the Edinburgh SIDs and the approach transitions. The maps also show surrounding airspace which are described in the designs of NERL and Glasgow Airport (see Section 1of the FAO for links to their ACP material).

To understand the airspace design it is important to realise that VFR traffic underneath controlled airspace may fly up to the lower limit of that airspace. The minimum safe altitude in an airspace lies 500ft above the lower limit of a controlled airspace.

Edinburgh CTR

The rectangular shape of the Edinburgh CTR makes it easier for VFR traffic to fly along the CTR boundaries since pilots can use a constant bearing while flying parallel along one of the CTR sides. This decreases the risk of airspace infringements. The length of the CTR is sufficient to climb to or descend from 4,000ft, which is the required altitude in the airspace along the long sides of the CTR (CTA 3 and 4). The required safe altitude in the airspace along the short sides of the CTR (CTA 1 and 2) is 3,000ft. This allows descending to 3,000ft while vectoring towards the initial fixes. The CTR is extended in the runway direction to provide sufficient margin between the Intermediate Fixes (IFs) and VFR traffic which may fly up to 2500ft along the short CTR sides.

The IF of RWY 06 lies within this CTR at 1.1 NM from the CTR boundary. For RWY 24 the IF is 1.5 NM from the CTR boundary. The lowering of the base to SFC ensures that arrivals can safely descend below 3,000ft at the IF. With the current (circular) CTR the IFs would be positioned outside the CTR where the CTA base is currently 2,500ft – this means a descent below the IF could result in loss of separation with VFR in the Class G airspace beneath.

CTAs

Edinburgh CTA 1 (2500 – 6000 Class D)

This CTA is positioned along the south-western side of the CTR and serves to contain the RWY 06 approach transitions descending between MURPY (+4000) and PH06I (IF, +3000) and to provide vectoring space west of the IF should vectoring be required for safety or weather reasons, or to handle missed approaches from RWY 24. The CTA is controlled by Edinburgh Airport (ANSL).

Edinburgh CTA 2 (2500 – 6000 Class D)

This CTA is positioned along the north-eastern side of the CTR and serves to contain the WORM2/ STOBS approach transitions to RWY 24. It allows descent while on the transition and provides space for vectoring, should vectoring be required for reasons for safety or weather reasons. If vectoring through this airspace is required, traffic may be instructed to descend to 3,000ft to WHITE, which allows for a moderate descent to 2,000ft on the intermediate approach segment, including a level segment prior to the FAF/FAP if required. The CTA also provides airspace to manage a missed approach from RWY 06. The CTA is controlled by Edinburgh.

Edinburgh CTA 3 (3500 – 6000 Class D)

This CTA is positioned along the north-western side of the CTR and serves to keep VFR traffic without clearance underneath this CTA below 3,500ft, assuring sufficient vertical separation against the departures that climb northward and turn near the northwestern CTR boundary. This applies for the SIDs from RWY 06 (STEPS) and from RWY 24 (STOPP/GULLY/BERRY). Although these SIDs do not need the entire CTA 3, the airspace is kept for Edinburgh Airport ATC to deal with incidents which may lead to traffic congestion near the airport. In such cases it seems desirable that ATC can use airspace on the northwestern side of the CTR to avoid separation conflicts. The CTA is controlled by Edinburgh (ANSL).

Edinburgh CTA 4 (3500 – 6000 Class D)

This CTA is positioned along the southeastern side of the CTR and serves to contain the TART3 approach transitions while those aircraft are descending from FL080 to 5,000ft (approximately). The CTA also provides space for vectoring should vectoring be required for reasons for safety or weather. If vectoring is required through this airspace, traffic may be instructed to descend to 4,000ft, although a descent to 5,000ft or 6,000ft is normally preferred since the CTA is also used for vectoring of missed approaches at 4,000ft and for the RWY 06 SKIRL departure at 5,000ft. Descents to 4,000ft should also be avoided to minimise the noise impact. The CTA is controlled by Edinburgh (ANSL).

Edinburgh CTA 5 (3500 – 6000 Class D)

This CTA is positioned north-east of Edinburgh CTR and CTA 2 and serves to contain the WORM2 approach transitions to RWY 24, while descending via DAVIS (+6000) and PHE05 (4500-5500). The CTA also provides vectoring space should vectoring be required for reasons for safety or weather. If vectoring is required through this airspace, traffic may be instructed to descend to 4,000ft or 5,000ft to lose sufficient altitude for the subsequent descent. The CTA may also be used to manage missed approaches from RWY 06. The CTA is controlled by Edinburgh (ANSL).

Edinburgh CTA 6 (5500 – FL075 Class D)

This CTA is positioned north-east of Edinburgh CTR and serves to contain the STOBS approach transition to RWY 24, while descending from PHN01 (+FL080) to DAVIS (+6000). The CTA also provides vectoring space should vectoring be required for reasons for safety or weather. The CTA is controlled by Edinburgh (ANSL).

5. Considerations Approach Procedures

General considerations approach transitions

Three RNAV 1 approach transitions are designed for each RWY direction. Each transition starts at an Initial Approach Fix (IAF) with a holding stack (TART3, STOBS and WORM2). For both RWY directions the transitions lead to the intermediate and final approach which can be flown as an ILS/LOC approach or as an RNP approach with three minima (LNAV, LNAV/VNAV and LPV[2]). The pilot can request either an ILS (LOC[3]) or an RNP approach with one of the three minima, depending on the navigation capabilities of the aircraft.

Note that that UK publishes approach transitions and IAP separately; CAP 785 provides the formal UK definition of an approach transition. However, in the world of Air Traffic Management (ATM) the term 'transition' can have different meanings. In this document the term 'transition' technically refers to the RNAV 1 initial approach segments (between IAF and IF), but in many cases it may also be understood as a reference to the entire approach procedure (from IAF to threshold).

The Final Approach Fix (FAF) for each runway is positioned at 2,000ft, 5.8 NM before threshold and the IFs at 10.8 NM before threshold, at or above 3,000ft.

Separation considerations are important factors for the design. These considerations are described in the paragraphs below and in more detail (per procedure segment) in chapter8.

This document describes the technical and operational considerations for each route. The design to minimise noise and other impacts are described in Section 2 of the FOA.

[2] See https://www.caa.co.uk/media/kfdo4q05/egnos_v4.pdf for an overview of RNP approach specifications.

[3] The ILS approach uses two antenna's, a localizer and a glidepath antenna; the LOC (only) approach only uses the localizer and is normally only used if the glidepath antenna or receiver is inoperable.

Separation considerations approach transitions RWY 06

The TART3 approach passes waypoint (WPT) PHS01 at FL080 to ensure that the procedure remains within the 'Scottish TMA 2' controlled airspace (CAS) and maintains separation against the STRAT departure, which passes PHS04 at or above FL100. Next, the approach passes PHS14 at or above 6,000ft to ensure vertical separation against the SKIRL departure, which crosses underneath at 5,000ft. The TART3 approach between TART3 and SELBY is turned slightly eastward to prevent that the descent gradient being too steep and to decrease the turn angle at SELBY. The latter is needed to decrease the stabilisation distance on the next short segment to MURPY and it supports the merging with traffic from STOBS and WORM2, that has a similar turn angle at SELBY. The following trajectory towards the IF is routed such that the number of overflown residents is kept to a minimum.

The STOBS approach goes via WPT DAVIS at FL100 to maintain lateral separation against northbound departures once they have passed STOPP. This position of DAVIS allows traffic on this route to climb above FL080 independently of STOBS approaches. The departures are kept at or below FL080 at STOPP to keep vertical separation against the approach transitions west of WPT DAVIS. The WORM2 approach joins the STOPP approach at DAVIS to provide lateral separation against the GULLY approach and connecting route.

The STOBS and WORM2 approach are bent slightly at WPT PHE02 and PHE03 to cross over the lowest section of the RWY 06 departures. On these segments vertical separation from the departures is maintained by level restriction at FL100 on the approach, while all departures are kept below FL080.

The approach crosses the east and southbound departures soon after their initial right turn. Vertical separation is maintained by restrictions on the departures at or below FL080 until WPT PHE07 for GULLY, BERRY and STRAT, or 5,000ft at PHS09 for SKIRL. Lateral separation is assured once the approach has crossed, allowing the departures to climb further, independently from STOBS and WORM2 approach.

The STEPS departure turning left is kept below FL080 until WPT PHW03. From there lateral separation is ensured, allowing to let the departures climb further independently from STOBS and WORM2 approach.

Beyond WPT PHE03 the STOBS and WORM2 transitions descend, passing PHE04 at or below FL080. The latter WPT ensures that the transitions will cross underneath STRAT departures, which should be at or above FL100 when passing WPT PHS04.

WPT PH06I (IF) must be passed at or above 3,000ft to ensure traffic remains within controlled airspace. Minimum altitudes on SELBY (+5,000ft), MURPY (+4,000ft) and PH06I (+3,000ft) keep the traffic as high as possible while keeping the descent gradient acceptable.

Separation considerations approach transitions RWY 24

The TART3 approach passes WPT PHS02 at FL080 to ensure traffic remains inside controlled airspace whilst maintaining an acceptable continuous descent approach track and remains clear of the BERRY departures. The approach passes HIGIN at or below 6,000ft to ensure vertical separation (also in case of low pressure) against the BERRY departure which has a procedural restriction at FL090 between PHE11 and BERRY.

The STOBS approach passes PHN01 at or above FL080 to ensure traffic remains inside controlled airspace whilst maintaining an acceptable continuous descent approach track. The STOBS approach goes via DAVIS to keep it horizontally separated from the departures on route T8G.

The WORM2 approach goes via DAVIS to keep it horizontally separated from the last part of the GULLY departure and the connecting route R3G.

The STOBS and WORM2 approaches join at DAVIS and continue via PHE05 to keep them horizontally separated from the STOPP departure. The routing via DAVIS and PHE05 also ensures aircraft are able to maintain an acceptable continuous descent approach track. PHE05 is passed at or below 5,500ft. This ensures that traffic approaching PHE05 will have descended to 5,500ft (or lower) before horizontal separation is lost with departures at FL090 between PHE11 and GULLY. The 5,500ft restriction on PHE05 also ensures vertical separation against departures at FL090 to BERRY.

At WPT WHITE all approaches pass at or below 4,000ft assuring vertical separation against the STOPP departure, which passes at FL080 between PHN04 and STOPP. The 4,000ft constraint at WHITE is primarily essential for the TART3 approach, because horizontal separation can't be ensured beyond this point due to the sharp turn which may lead to considerable overshoots. WPT WHITE must be passed at or above 3,000ft to stay within the CTA 2 CAS.

Traffic is kept above 5,000ft until WPT HIGIN and above 4,000ft until WPT HENRY to keep traffic in controlled airspace. The remaining part of the approach, below 4,000ft, continues over sea.

The STOBS and WORM2 approach are kept above 6,000ft until DAVIS, to in controlled airspace. The remaining part of the approach, below 6,000ft, continues over sea.

Descent gradients approach transitions

Required gradients for ATM purposes are given in the table below. Descent gradients are calculated for the indicated trajectories. For trajectories passing through the transition layer gradients are given for both standard pressure (1013 hPa) and high pressure (1050 hPa).

Descent gradients approach transitions RWY 06

APCH	Trajectory	Dist (NM)	Req. gradient		Purpose altitude constraint (at end of specified trajectory)
			STD	High	
TART3	TART3 PHS01 FL100 FL080	6.1	5.4 %		N.A.
TART3	PHS01 PH06F FL080 2,000ft	22.1	4.5 %	5.2 %	N.A.
WORM2	WORM2 PHE03 FL100 FL100	26.9	0 %		Assuring vertical separation when crossing over departures.
WORM2	PHE03 PH06F FL100 2,000ft	27.7	4.8 %	5.4 %	N.A.
STOBS	STOBS DAVIS FL110 FL100	26.9	0 %		Bringing traffic to the same level as approach from WORM2.
STOBS	DAVIS PHE03 FL100 FL100	14.9	0 %	0 %	Assuring vertical separation when crossing over departures.
STOBS	PHE03 PH06F FL100 2,000ft	27.7	4.8 %	5.4 %	N.A.

Descent gradients approach transitions RWY 24

APCH	Trajectory	Dist (NM)	Req. gradient		Purpose altitude constraint (at end of specified trajectory)
			STD	High	
TART3	TART3 PHS02 FL100 FL080	8.7	3.8 %		N.A.
TART3	PHS02 PH24F FL080 2,000ft	22.1	4.5 %	5.2 %	N.A.
WORM2	WORM2 PH24F FL100 2,000ft	26.3	5 %	5.6 %	N.A. (passing PHE05 below 5,500ft)
STOBS	STOBS PHN01 FL110 +FL080	11.6	1.4 %		N.A.
STOBS	PHN01 PH24F FL080 2,000ft	10.8	4.8 %	5.6 %	N.A. (passing PHE05 below 5,500ft)

6. Considerations departure procedures

General considerations departures

For each runway direction there will be 5 departure procedures that are primarily meant for jets plus one departure for (turbo)props only. The new SIDs will have NAV-spec RNAV 1. The new SIDs will replace the three conventional departures that are currently published.

The initial legs for both RWY directions are designed as a course to an altitude, or so-called CA leg. The CA leg is preferred as the initial segment to prevent inadvertent banking at low altitudes.

Separation considerations are described in the paragraphs below and in more detail (per procedure segment) in chapter 8.

Separation considerations departures RWY 06

The STOPP departure is kept below 6,000ft at PHE06 and below FL080 up to STOPP to maintain vertical separation against the nearby STOBS and WORM2 approach transitions that are kept at FL100 up to PHE03.

The STOPP departure is not kept longer over sea since it is considered unsafe to cross the STOBS and WORM2 transitions twice. The traffic flows would be more complex, increasing the risk of separation loss and increasing clutter of labels on the radar screen. The STOPP departure is therefore designed parallel to the approach transitions at a distance of at least 0.7 NM.

The RWY 06 departures that turn right are kept below 6,000ft at PHE06 and below FL080 at PHE07 to maintain vertical separation against the nearby STOBS and WORM2 approaches crossing overhead at FL100. Beyond PHE07 the departures become horizontally separated from these approaches.

The STRAT departure passes PHS04 at or above FL100 to provide vertical separation against the approaches since horizontal separation is no longer maintained west of PHS04.

The STEPS departure is kept below FL100 up to PHW04 to ensure vertical separation against the Glasgow MOODI departures that pass MOODI at or above FL110. West of PHW04 the STEPS departure will be horizontally separated from the MOODI departures (see figure below).

The STEPS and STRAT departures contain several altitude constraints on the west side to ensure vertical separation against the underlying LESMA approach to Glasgow RWY 23. STEPS is passed at FL130 to ensure vertical separation against the underlying BEEFY departure from Glasgow RWY05 (see figure below). The STRAT and STEPS departures remain horizontally separated from each other.

The SKIRL departure is kept at 5,000ft up to PHS12 to remain vertically separated from the TART3 approach crossing overhead. From there it climbs to 6,000ft at SKIRL where the ATCO instructs to climb further depending on the traffic in or towards the TART3 and LESMA holding.

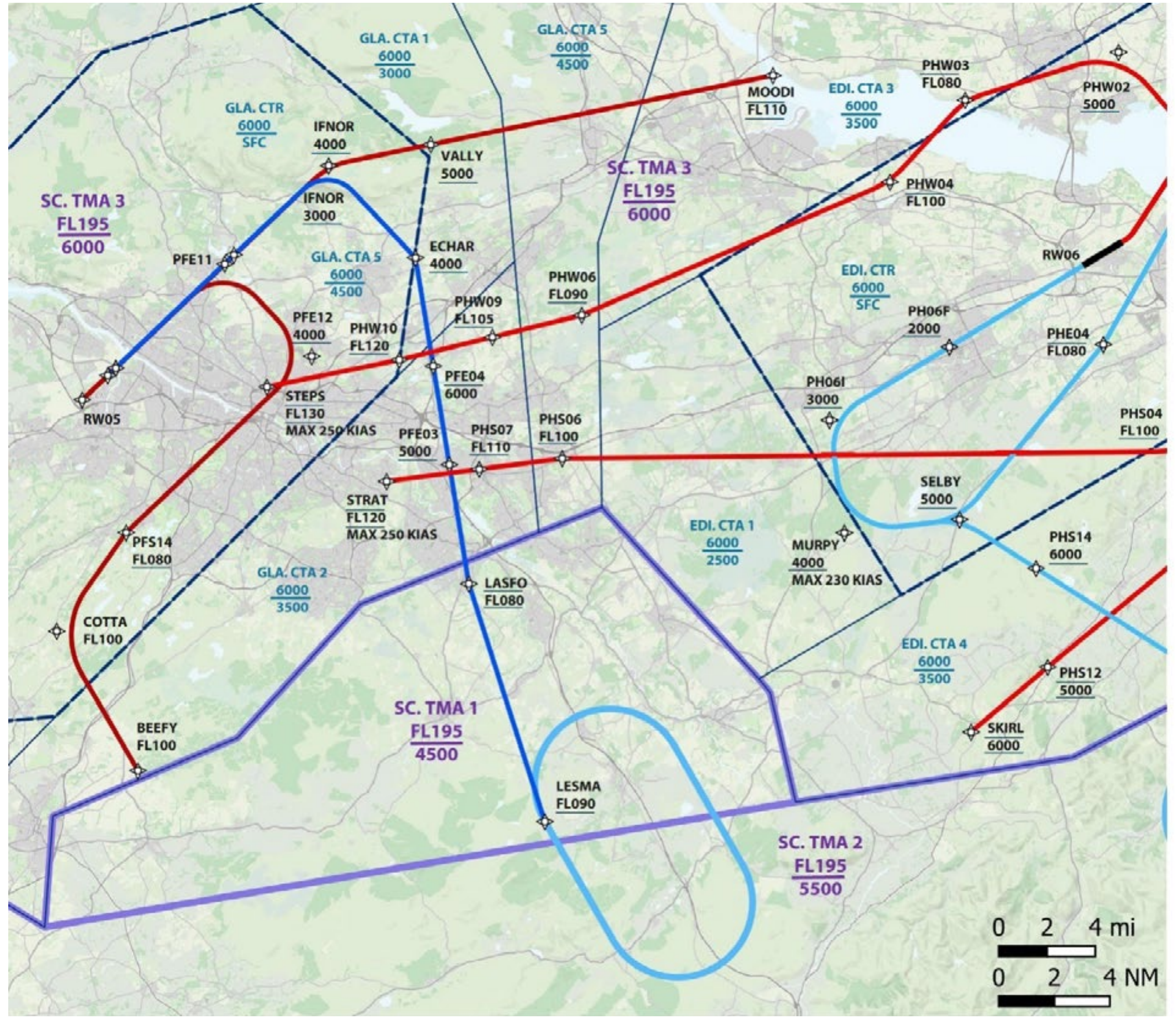


Figure 8. Interaction EDI departures RWY 06 versus GLA procedures[4].

[4] Note that this shows only a part of the Glasgow Airport design relevant to the Edinburgh Airport procedures. For full details of the Glasgow Airport proposal see the Glasgow Airport consultation material that can be accessed from a link in Section1 of the FOA document.

Initial turn for departures RWY 06

A turn at an altitude has been designed since the turn will be much closer to the runway end (on average) than a turn at a WPT. This is to maintain and improve the noise benefits (see of the Cramond Offset (see of 2.1.3.9 of the FOA).

All departures start with a CA leg ending at 635ft[5]. At 635ft the departures turn left towards the next WPT. A warning will be included in the procedure/chart indicating that turns before the DER (Departure End of Runway) are not allowed. The position of the next WPT after the CA means that the turn angle would typically be c.10° greater than the turn onto a 043 bearing as per todays procedure; this would enhance the noise relief as a result of the Cramond Offset (see of 2.1.3.9 of the FOA).

Separation considerations departures RWY 24

The RWY 24 departures turning (initially) northward (GULLY, BERRY and STOPP departures) pass WPT PHE09 at or above 5,000ft to ensure that aircraft remain within controlled airspace.

The STOPP departure, east of WPT PHN03, is horizontally separated from the GULLY and BERRY departures and from the STOBS and WORM2 approach. Vertical separation against TART3 approach is also ensured near WPT WHITE, where the horizontal separation is not sufficient given the sharp turn of TART3 approach.

GULLY and BERRY departures pass PHE10 at FL080 and PHE11 at FL090 assuring vertical separation against the three approach transitions. GULLY will have reached horizontal separation against STOBS/WORM2 approach east of PHE12 on the border of CTA 2. BERRY will maintain vertical separation against TART3 approach until horizontal separation has been reached. This will be on the connecting ATS route Z249, at the northern border of Scottish TMA 2.

The STEPS and STRAT departure contain several altitude constraints on the west side (from PHW06/PHS05) to ensure vertical separation against the underlying LESMA approach to Glasgow RWY 23. STEPS is passed at FL130 to ensure vertical separation against the underlying BEEFY departure from Glasgow RWY05. The STRAT and STEPS departures remain horizontally separated from each other, west of PHS10.

The SKIRL departure passes PHS10 at 4,000ft to stay within CTA 4 CAS. From there the departure climbs to 6,000ft at SKIRL where ATC will determine if climbing further is feasible with respect to traffic flying in the TART3 and LESMA holds and other traffic, e.g. on the STARs south of the TART3 hold which lead towards the LESMA hold.

[5] A turn at 635ft AMSL is 500ft AAL (Above Aerodrome Level), which is the minimum turn altitude prescribed by CAP 788. A turn at 600ft AMSL would be preferred if CAA can accept a minor deviation from CAP 788. Note that PANS-OPS prescribes a minimum turn altitude of 400ft AAL. See chapter 8 for more explanation on this topic.

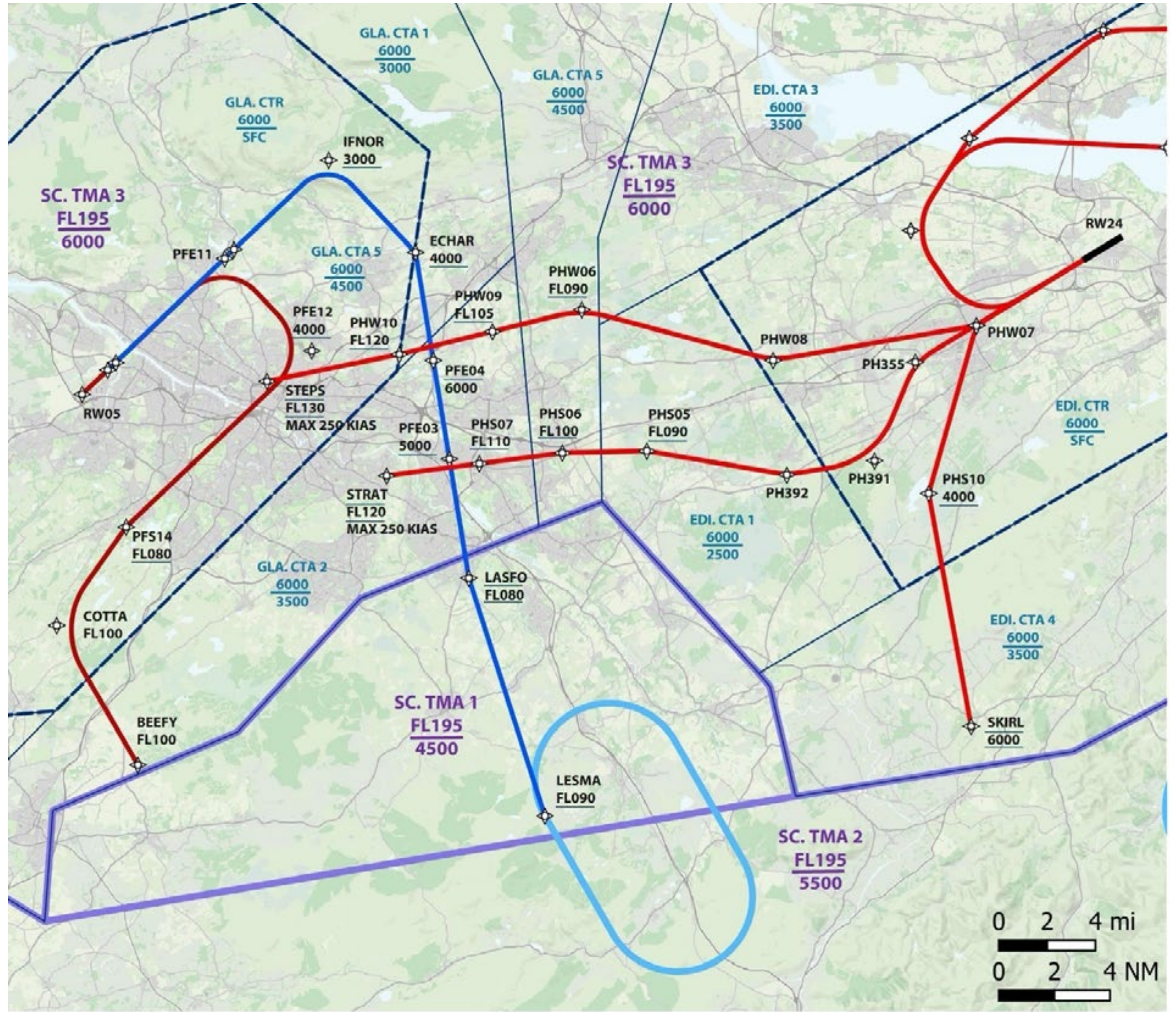


Figure 9. Interaction EDI departures RWY 24 versus GLA procedures[6].

[6] Note that this shows only the part of the Glasgow Airport design relevant to the design of Edinburgh Airport procedures. Note also that Glasgow arrivals are expected to be vectored on a regular basis. For full details of the Glasgow Airport proposal see the Glasgow Airport consultation material that can be accessed from a link in Section1 of the FOA document.

Required climb gradients

Required gradients for ATM purposes are given in the table below. Gradients are calculated from 5m above the DER (departure end of RWY). Note that these gradients are conservative since aircraft are normally considerably higher when passing the DER, especially in case of RWY 24, where the DER lies 448m beyond the RWY end. For trajectories passing through the transition layer gradients are given for both standard pressure (1013 hPa) and high pressure (1050 hPa).

Climb gradients SIDs RWY 06

SID	Trajectory		Dist (NM)	Req. gradient		Purpose altitude constraint (at end of specified trajectory)
				STD	High	
STEPS 1B	DER06 116ft	PHW02 +5,000ft	8.0	10.0 %		Assuring that 4,000ft is reached at least 2 NM from boundary CTA 4.
STOPP 1B	DER06 116ft	STOPP FL080	16.5	7.9 %	8.9 %	End altitude SID.
GULLY 1B	DER06 116ft	GULLY FL090	21.9	6.7 %	7.4 %	End altitude SID.
BERRY 1B	DER06 116ft	BERRY FL090	20.1	7.3 %	8.1 %	End altitude SID.
STRAT 1B	DER06 116ft	PHS04 +FL100	24.2	6.7 %	7.4 %	Assuring vertical separation when crossing over approach transitions.
SKIRL 1B	DER06 116ft	PHE09 5,000ft	12.9	6.2 %		Assuring that 4,000ft is reached at least 2 NM from boundary CTA 3.

Climb gradients SIDs RWY 24

SID	Trajectory	Dist (NM)	Req. gradient		Purpose altitude constraint (at end of specified trajectory)
			STD	High	
STEPS 1A	DER24 PHW06 126ft +FL090	18.7	7.8 %	8.7 %	Assuring vertical separation when crossing over LESMA approach.
STOPP 1A GULLY 1A BERRY 1A	DER24 PHE08 126ft +3,500ft	7.6	7.3 %		VFR route along M9. Assuring that 4,000ft is reached at least 2 NM from boundary CTA 3.
idem	PHE08 PHE09 +3,500ft +5,000ft	3.7	6.7 %		Assuring that 4,000ft is reached at least 2 NM from boundary CTA 3.
GULLY 1A BERRY 1A	DER24 PHE10 126ft +FL080	18.0	7.2 %	8.1 %	Assuring vertical separation when crossing over approach transitions.
STRAT 1A	DER24 PHS05 126ft FL090	18.6	7.9 %	8.8 %	Assuring vertical separation when crossing over LESMA approach.
SKIRL 1A	DER24 PHS10 126ft +4,000ft	10.5	6.1 %		Assuring that 4,000ft is reached at least 2 NM from boundary CTA 4.

Missed approach procedures

Todays missed approaches are described in Edinburgh section of the UKAIP. The initial design work for missed approaches has been undertaken. These designs are shown in the figures below. Detailed design for these contingency procedures will be completed in CAP1616 stage 4.

The proposed missed approach for RWY 06 is a straight-out missed approach towards a (fly-over) turning point, followed by a turn right to WPTs ROSBY and MANCA, the latter being a holding fix. The MANCA hold lies at 4,000ft, within CTA 4. WPTs ROSBY and MANCA are positioned at 3 NM from the southern CTA 4 boundary. WPT ROSBY assures a straight entry into the hold, the reason why 3 NM is considered a sufficient margin between hold and the CAS boundary. The approach transitions are separated from the hold as WPT SELBY must be passed at or above 5,000ft. When an aircraft is in the hold, ATC can instruct a direct route to SELBY to resume the approach procedure from there (at 4,000ft). In most cases it is expected that ATC will direct the missed approach aircraft to SELBY even before the aircraft has arrived at the hold; the hold will only be used if required to avoid interference with other approaches.

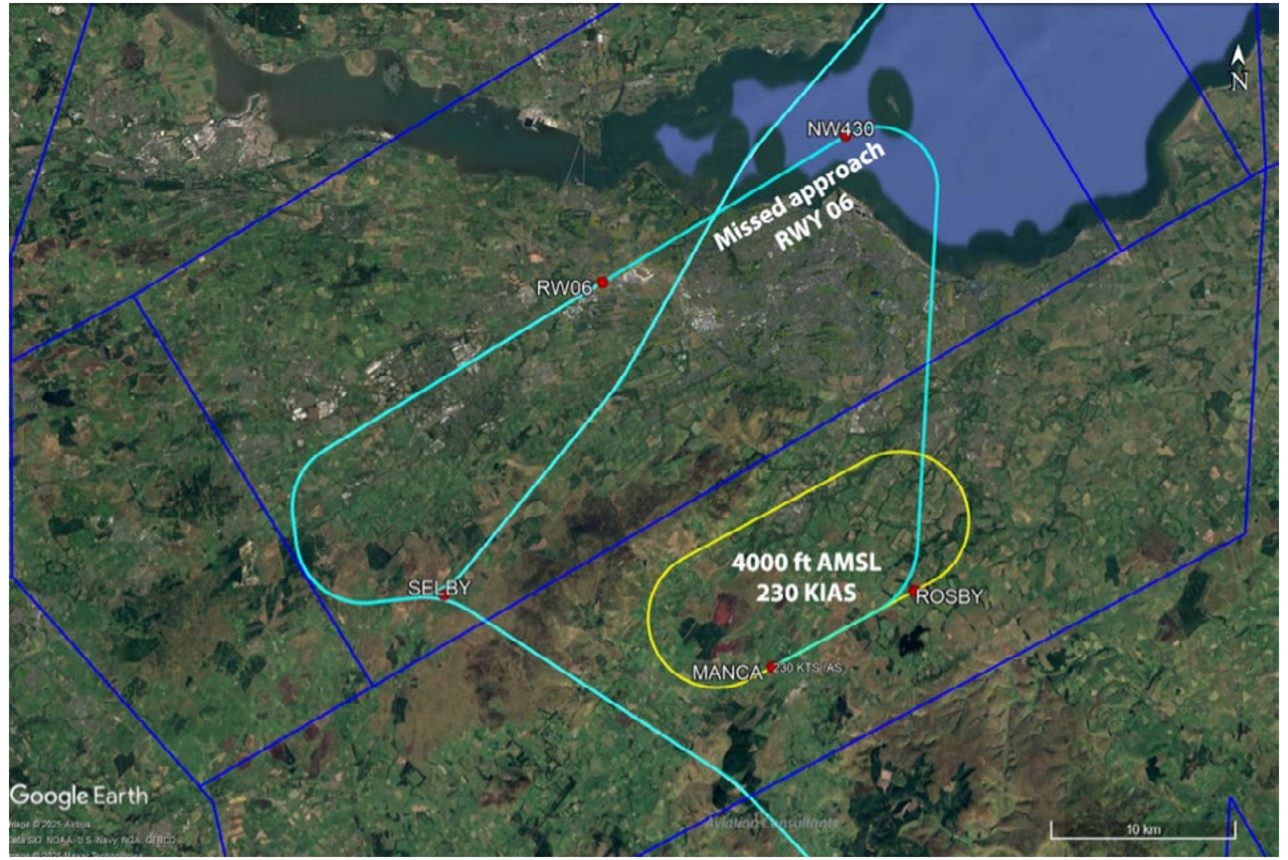


Figure 10. Proposed missed approach procedure RWY 06.

The proposed missed approach procedure for RWY 24 is shown below. It has a similar design as for RWY 06. The hold will however be used in opposite direction with WPT ROSBY as the holding fix and WPT MANCA assuring a straight hold entry. The approach transitions are separated from the holding since WPT HIGIN must be passed at or above 5,000ft. When an aircraft is in the hold, or heading towards it, ATC can instruct a direct route to HIGIN or HENRY to resume the approach procedure from there (at 4,000ft).

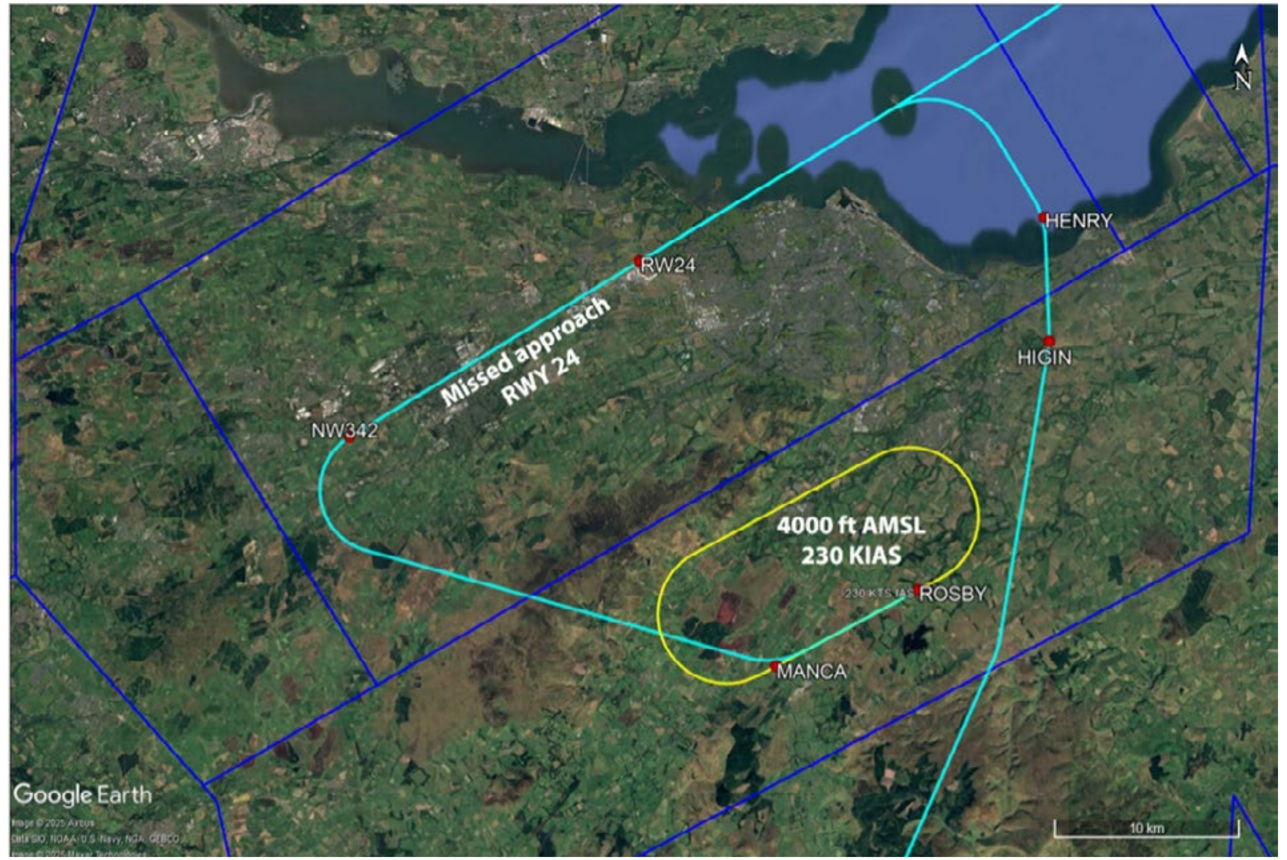


Figure 11. Proposed missed approach procedure RWY 24.

7. ATC procedures

This chapter outlines the ATC procedures as they are envisaged at this stage. The ATC procedures are to be fine-tuned at a later stage based on ATC simulation sessions and discussions with controllers from ANSL and NERL.

ATC concept

Whilst the currently published approaches and departures are rarely followed exactly as published and most of the traffic is handled by tactical vectoring, the new PBN design is systemised meaning that traffic following the procedures should have sufficient separation (either horizontal, vertical, or both).

An advantage of the systemised design is that ATCOs do not need to provide altitude and course instructions to aircraft, as long as the traffic follows the published procedures. This will reduce workload considerably.

In the new design ATC should permit aircraft to follow the published procedures as far as possible in order to reduce both pilot and controller workload and keep the noise where it is planned to be. This is also safer.

As an initial solution to keep sufficient distance between consecutive aircraft speed instructions are to be preferred, both for arrivals and departures. When speed instructions are given, monitoring remains important since pilots do not always adhere rigidly to speed instructions.

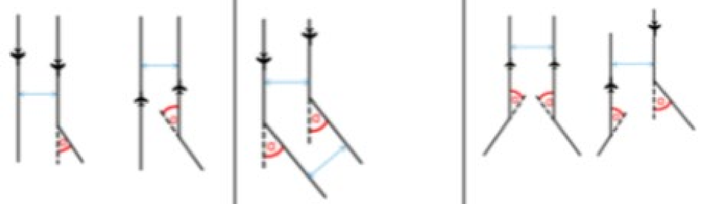
In case speed control is not sufficient to achieve the required distance between consecutive aircraft vectoring is to be applied.

8. Detailed design considerations

This chapter contains detailed operational design considerations per procedure and per segment. Noise and other considerations are described in section 2 of the FOA.

Separation criteria between routes/procedures

Where vertical separation between routes/ procedures cannot be assured, horizontal separation shall be provided to make them independent. In this chapter interactions between nearby procedure segments are coded with codes in the range P1-P24. These codes refer to the codes (in red) shown in below figure. Each code identifies one of the interaction types and associated required horizontal separations described in CAP 1385. Below figure is derived from CAP 1385. The codes (in red) are added by ACOG (Source: Practitioners Guide for the Integration of Multiple Interdependent ACPs – Specially Figure 5: PBN Separations Quick Start Guide)).



Turn descriptor	Single turn in the vicinity of straight route	Two routes turning together	Two routes turning apart
<25° fly-by turns in terminal airspace*	Same: MRS + 0.9NM Opp: MRS + 1.2NM P1	Same: MRS + 0.9NM Opp: MRS + 1.2NM P2	Same: MRS + 1.0NM Opp: MRS + 1.3NM P3
25°-55° fly-by turns in terminal	Same: MRS + 1.2NM Opp: MRS + 1.6NM P4	Same: MRS + 1.2NM Opp: MRS + 1.7NM P5	Same: MRS + 1.4NM Opp: MRS + 1.7NM P6
55°-90° fly-by turns in terminal, 220kts speed constraint	Same: MRS + 0.9NM Opp: MRS + 1.2NM P7	Same: MRS + 1.0NM Opp: MRS + 1.4NM P8	Same: MRS + 1.0NM Opp: MRS + 1.2NM P9
55°-90° fly-by turns in terminal	Same: MRS + 1.4NM Opp: MRS + 1.8NM P10	Same: MRS + 2.2NM Opp: MRS + 2.7NM P11	Same: MRS + 1.8NM Opp: MRS + 2.1NM P12
90°-180° fly-by wraparound‡ turns in terminal, 220kts speed constraint	Same: MRS + 3.4NM Opp: MRS + 4.6NM P13	NA P14	NA P15
Radius to Fix (RF) path in terminal	Same: MRS + 0.9NM Opp: MRS + 1.3NM P16	Same: MRS + 0.9NM Opp: MRS + 1.3NM P17	Same: MRS + 1.0NM Opp: MRS + 1.4NM P18
<25° fly-by turns in en-route airspace**	Same: MRS + 0.8NM Opp: MRS + 1.2NM P19	Same: MRS + 1.3NM Opp: MRS + 1.6NM *(See Note below)* P20	Same: MRS + 0.8NM Opp: MRS + 1.2NM P21
25°-35° fly-by turns in en-route	Same: MRS + 0.8NM Opp: MRS + 1.2NM P22	Same: MRS + 3.5NM Opp: MRS + 4.0NM *(See Note below)* P23	Same: MRS + 0.8NM Opp: MRS + 1.2NM P24

Approach transitions RWY 06

TART3 RWY 06

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	IF	TART3 (IAF) +FL100	N	**Flyability:** For the STAR end point/holding fix it is essential that +FL100 is coded to allow for higher entry into the holding. It is also essential that the altitude constraint on the approach is the same as on the STAR. ATC must however be aware that the approach should not be initiated higher than FL100.
002	TF	PHS01 FL080	N	**Separation:** The altitude constraint of FL080 ensures 2,000ft vertical separation against the STRAT SID (which should fly +FL100 beyond PHS04). The distance between PHS01 and PHS04 is 7.8 NM. West of these WPTs the transition and SID are slowly converging, while the vertical separation should further increase. **Airspace containment:** The altitude constraint of FL080 ensures that traffic stays above the minimum safe flight altitude of 6,000ft applicable in Scottish TMA 2. **Flyability:** The WPT creates a small detour which is considered important to slightly increase the trajectory, thereby ensuring a more comfortable descent gradient.
003	TF	PHS14 + 6000	N	**Separation:** The altitude constraint is set at +6,000ft to ensure vertical separation against traffic on the SKIRL SID (@ 5,000ft) up to 3 NM beyond the crossing.
004	TF	SELBY + 5000	N	**Separation:** Traffic should have descended below 6,000ft at this point, while traffic on the nearby STRAT departure should normally fly at least 5,000ft higher.
005	TF	MURPY + 4000 -230 KIAS	N	**Separation:** The altitude constraint is set at +4,000ft to prevent traffic descending lower than required for a comfortable descent gradient. **Airspace containment:** The altitude constraint of +4,000ft ensures that traffic on the segment to MURPY stays above the minimum safe flight altitude of 4,000ft, which is applicable in the nearby CTA 4 (the first part of this segment lies at 1.2 – 2 NM from the CTA boundary). **Flyability:** The speed restriction of 230 KIAS is defined to meet the required stabilization distances on the segments to and from MURPY.
006	TF	PH06I (IF) + 3000	N	**Separation:** The altitude constraint of +3,000ft prevents traffic descending lower than required for a comfortable descent gradient. **Airspace containment:** The altitude constraint of +3,000ft ensures that traffic stays above the minimum safe flight altitude of 3,000ft applicable in CTA 1, which lies less than 0.1 NM from the nominal path of the transition (near the end of the MURPY turn).
007	TF	PH06F (FAF) + 2000	N	Final Approach Fix
008	TF	RW06 (MAPT)	Y	Missed Approach Fix

WORM2 RWY 06

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	IF	WORM2 (IAF) +FL100	N	**Flyability:** For the STAR end point/holding fix it is essential that +FL100 is coded to allow for higher entry into the holding. It is also essential that the altitude constraint on the approach is the same as on the STAR. ATC must however be aware that the approach should not be initiated higher than FL100.
002	TF	DAVIS	N	**Separation:** The WPT ensures sufficient lateral separation (> 5.6 NM) with the GULLY SID and the connecting route (R3G).
003	TF	PHE02	N	**Separation:** The WPT ensures that the transition stays at 3NM from PHE07, which is the point on the GULLY, BERRY and STRAT SID from where traffic may climb above FL080. At 1 NM beyond PHE07 the GULLY SID may have climbed to FL090 (assuming a steep 16.5% gradient). From there 1,000ft vertical separation between the SID and transition will be lost but horizontal separation against the 'opposing' transition towards PHE02 will be at least 4.2 NM and increasing (when measured perpendicular from the GULLY SID). The transition keeps 2,000ft vertical separation against the STOPP SID, since the SID is kept at FL080 up to STOPP. In addition, the distance to the last segment of the STOPP SID is at least 4.8 NM which meets the horizontal separation requirements of a P5 interaction (4.7 NM required).
004	TF	PHE03 FL100	N	
005	TF	PHE04 - FL080	N	**Separation:** The altitude constraint of – FL080 ensures that traffic on the transition has at least 2,000ft vertical separation against the STRAT SID where the horizontal separation against the STRAT SID gets less than 5 NM (i.e. west of PHE04 and PHS04). Beyond PHE04, positioned at 5 NM before the crossing, the vertical separation between the transition and the SID will further increase and should normally be at least 5,000ft at the crossing.
006	TF	SELBY + 5000	N	See TART3 transition RWY 06.
007	TF	MURPY + 4000 -230 KIAS	N	See TART3 transition RWY 06.
008	TF	PH06I (IF) + 3000	N	See TART3 transition RWY 06.
009	TF	PH06F (FAF) + 2000	N	See TART3 transition RWY 06.
010	TF	RW06 (MAPT)	Y	See TART3 transition RWY 06.

STOBS RWY 06

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	IF	STOBS (IAF) +FL110	N	**Flyability:** For the STAR end point/holding fix it is essential that +FL110 is coded to allow for higher entry into the holding. It is also essential that the altitude constraint on the approach is the same as on the STAR. ATC must however be aware that clearance for the approach higher than FL110 may lead to unacceptable descent profiles.
002	TF	DAVIS FL100	N	**Separation:** The distance between the transition and the route T8G (the continuation of the STOPP SID, is at least 4.8 NM which meets the horizontal separation requirements of a P5 interaction (4.7 NM required).
003	TF	PHE02	N	See WORM2 transition RWY 06.
004	TF	PHE03 FL100	N	See WORM2 transition RWY 06.
005	TF	PHE04 - FL080	N	See WORM2 transition RWY 06.
006	TF	SELBY + 5000	N	See TART3 transition RWY 06.
007	TF	MURPY + 4000 -230 KIAS	N	See TART3 transition RWY 06.
008	TF	PH06I (IF) + 3000	N	See TART3 transition RWY 06.
009	TF	PH06F (FAF) + 2000	N	See TART3 transition RWY 06.
010	TF	RW06 (MAPT)	Y	See TART3 transition RWY 06.

Approach transitions RWY 24

TART3 RWY 24

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	IF	TART3 (IAF) +FL100	N	**Flyability:** For the STAR end point/holding fix it is essential that +FL100 is coded to allow for higher entry into the holding. It is also essential that the altitude constraint on the approach is the same as on the STAR. ATC must however be aware that the approach should not be initiated higher than FL100.
002	TF	PHS02 FL080	N	**Separation:** The FL080 restriction ensures vertical separation with traffic on the BERRY SID which should fly at or above FL090 when heading to BERRY and should continue climbing south of BERRY on route Z249. **Airspace containment:** The FL080 restriction assures that traffic stays within CAS in Scottish TMA 2.
003	TF	HIGIN - 6000 + 5000	N	**Separation:** HIGIN lies 4NM before the crossing with BERRY SID. HIGIN must be passed between 5,000-6,000ft and is positioned such that double pressure proof separation is ensured before the distance to the BERRY SID becomes less than 3 NM. The lower limit of 5,000ft ensures that traffic stays above a potential missed approach aircraft which may be holding at 4,000ft in the CTA 4.
004	TF	HENRY + 4000	N	**Airspace containment:** The 4,000ft constraint assures that traffic stays within CAS in CTA 4.
005	TF	WHITE (IF) - 4000 + 3000	N	**Separation:** Traffic must pass WHITE below 4,000ft, which ensures a comfortable vertical margin with nearby traffic on the GULLY, BERRY (at FL090) or STOPP SID (at FL080). As soon as traffic on these SIDs have passed WPT PHE08, a missed approach on the runway heading, that stays at or below 4,000ft after passing WHITE will remain separated from traffic on these SIDs (either horizontally or vertically, or both). **Airspace containment:** The MNM altitude of 3,000ft on WHITE assures that descending traffic stays at least 500ft higher than VFR traffic, which may fly at 1.5NM northeast of the track towards WHITE at an altitude or 2500ft (below CTA 2, while flying along the CTR boundary).
006	TF	PH24F (FAF) + 2000	N	**Separation:** Vertical separation with the crossing SIDs is more than sufficient. At 4.8 NM beyond WHITE, just before the FAF (PH24F), the approach transition crosses the GULLY and BERRY SIDs. Traffic on the SIDs must fly above FL080 on PHE10, 3.3 NM before the crossing, while approaching traffic beyond WHITE flies below 4,000ft and should normally pass the FAF at 2,000ft.
007	TF	RW24 (MAPT)	Y	

WORM2 RWY 24

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	IF	WORM2 (IAF) +FL100	-	**Flyability:** For the STAR end point/holding fix it is essential that +FL100 is coded to allow for higher entry into the holding. It is also essential that the altitude constraint on the approach is the same as on the STAR. ATC must however be aware that the approach should not be initiated higher than FL100.
002	TF	DAVIS + 6000	N	
003	TF	PHE05 - 5500 + 4500	N	**Separation:** While descending to PHE05, which must be passed at or below 5,500ft, vertical separation against the GULLY SID (at FL090) is achieved at least 3NM from the GULLY SID (even in case of low pressure).
004	TF	HENRY + 4000	N	**Airspace containment:** The 4,000ft constraint assures that traffic stays within CAS in CTA 4.
005	TF	WHITE (IF) - 4000 + 3000	N	**Airspace containment:** The MNM altitude of 3,000ft ensures that descending traffic stays within CAS (CTA 2).
006	TF	PH24F (FAF) + 2000	N	See TART3 transition RWY 24.
007	TF	RW24 (MAPT)	N	See TART3 transition RWY 24.

STOBS RWY 24

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	IF	STOBS (IAF) +FL110	–	**Flyability:** For the STAR end point/holding fix it is essential that +FL110 is coded to allow for higher entry into the holding. It is also essential that the altitude constraint on the approach is the same as on the STAR. ATC must however be aware that clearance for the approach higher than FL110 may lead to unacceptable descent profiles.
002	TF	PHN01 + FL080	N	**Separation:** The altitude constraint (+FL080) ensures that descending traffic stays within CAS (TAY CTA 3).
003	TF	DAVIS + 6000	N	**Noise:** Limited noise impact since traffic will fly above 6,000ft while descending towards DAVIS (and the last part is over sea).
004	TF	PHE05 - 5500 + 4500	N	See WORM2 transition RWY 24.
005	TF	WHITE (IF) - 4000 + 3000	N	See WORM2 transition RWY 24.
006	TF	PH24F (FAF) + 2000	N	See TART3 transition RWY 24.
007	TF	RW24 (MAPT)	Y	See TART3 transition RWY 24.

Departures RWY 06

STOPP 1B

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	–	**Flyability:** Turn at altitude (635ft) ensures earliest possible turn away from Cramond at the same height as today's procedure.
002	DF	PHE06 - 6000	N	**Separation:** From this WPT the STOPP SID becomes independent from the other SIDs (deviation is at least 45°).
003	TF	PHN02	N	**Separation:** SID kept at or below FL080; vertically separated from transitions at FL100. SID is kept at 0.7 NM from transitions to minimize risks in case of level burst on SID or transitions. A more eastward route with double crossing of the transitions would be better in terms of noise, but would increase radar clutter, workload and collision risks.
004	TF	STOPP FL080	N	**Separation:** SID kept at or below FL080; vertically separated from transitions at FL100. SID is kept at 5 NM from STOBS transition and 2 NM from uncontrolled airspace (corner north-west of segment).

GULLY 1B

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	–	**Flyability:** Turn at altitude (635ft) ensures earliest possible turn away from Cramond at the same height as today's procedure.
002	DF	PHE06 - 6000	N	**Separation:** From this WPT the GULLY SID becomes independent from STEPS and STOPP SID (deviation with STOPP SID is 45°).
003	TF	PHE07 - FL080	N	**Separation:** From this WPT the GULLY SID becomes independent from the BERRY, STRAT and SKIRL SID (deviation with BERRY SID is 45°). The WPT ensures that the SID stays at or below FL080, vertically separated from WORM2 and STOBS transition which cross the SID at FL100. At the WPT the lateral separation against the transitions is 3NM and increasing, reason why traffic on the SID may resume climbing from there. At 1 NM beyond PHE07 the GULLY SID may have climbed to FL090 (assuming a steep 16.5% gradient). From there 1,000ft vertical separation between the SID and transition will be lost but horizontal separation against the 'opposing' transitions towards PHE02 will be at least 4.2 NM and increasing (when measured perpendicular from the GULLY SID).
004	TF	PHE14	N	**Separation:** The WPT is positioned such that the SID traffic keeps deviating from the transitions. When fast climbing SID traffic reaches FL090 (1,000ft below the transitions), the horizontal separation against the transitions is approximately 4.2 NM, increasing to 5.7 NM at the WPT. The latter separation is greater than required. The reason is that the WPT is also used for the GULLY SID from RWY 24.
005	TF	GULLY FL090	N	**Separation:** Lateral separation against the transitions remains sufficient (> 5.6 NM).

BERRY 1B

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	–	**Flyability:** Turn at altitude (635ft) ensures earliest possible turn away from Cramond at the same height as today's procedure.
002	DF	PHE06 - 6000	N	**Separation:** From this WPT the BERRY SID becomes independent from the STEPS and STOPP SID (deviation with STOPP SID is 45°).
003	TF	PHE07 - FL080	N	**Separation:** From this WPT the BERRY SID becomes independent from GULLY and STRAT SID (deviation with GULLY/STRAT SID is 45/47°). The WPT ensures that the SID stays at or below FL080, vertically separated from WORM2 and STOBS transition which cross the SID at FL100. At the WPT the lateral separation against the transitions is 3NM and increasing, reason why traffic on the SID may resume climbing from there.
004	TF	PHS13	N	**Separation:** The WPT is positioned such that the SID traffic keeps deviating from the transitions. When fast climbing SID traffic reaches FL090 (1,000ft below the transitions), the horizontal separation against the transitions is approximately 4.2 NM, increasing to 5.7 NM at the WPT. The latter separation is greater than required. The reason is that the WPT of the GULLY SID from RWY 24 is used. A straight segment between PHE07 and GULLY was considered but the deviation from the transitions would be less meaning that the required horizontal separation for opposing tracks (4.2 NM) may not be reached before the required vertical separation (1,000ft) is lost.
005	TF	BERRY FL090	N	**Separation:** Lateral separation against the transitions remains sufficient (> 5.6 NM).

SKIRL 1B

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	–	**Flyability:** Turn at altitude (635ft) ensures earliest possible turn away from Cramond at the same height as today's procedure.
002	DF	PHE06	N	**Separation:** From this WPT the SKIRL SID becomes independent from STEPS and STOPP SID.
003	TF	PHS08	N	**Separation:** The WPT creates a shortcut (compared to STRAT SID) to decrease the impact on the GULLY, BERRY and STRAT SID. The SKIRL SID is only used for slow (turbo) PROPs.
004	TF	PHS09 5000	N	**Separation:** Traffic must pass this WPT at 5,000ft to ensure that missed approaches at 4,000ft are vertically separated from the SKIRL SID south/east of this WPT. The SKIRL SID will cross underneath the STRAT SID near this WPT. Since the trajectory of the STRAT SID is longer and jet traffic on the STRAT SID climbs faster the STRAT traffic is expected to have reached at least 7,000ft (2,000ft vertical separation) where the SIDs cross. Due to the time interval between jets on STRAT SID following props on SKIRL SID, the jets are expected to overtake the props south of this WPT, meaning that vertical separation should normally have been achieved before horizontal separation is lost. A safety case and/orftS could further ensure this and the departure intervals could be optimised based on such analysis. It remains however essential that ATC carefully monitors this interaction, especially because the vertical separation could not be ensured by constraints on the WPTs of the STRAT SID. It is impossible to add a +6,000ft constraint on PHS09 (with -FL080 already defined on PHE07), while @FL080 on PHE07 is too high and +FL080 on PHE09 may also be too high for some jets.
005	TF	PHS11	N	**Separation:** The deviation from the STRAT SID is not sufficient to achieve horizontal separation, but the deviation does support deconfliction of the labels on the radar.
006	TF	PHS12 5000	N	**Separation:** The WPT shall be passed at 5,000ft and is positioned at 2.9 NM beyond the crossing with the TART3 transition, assuring that vertical separation is maintained up to the point where horizontal separation is achieved. The TART3 transition is kept at or above 6,000ft up to WPT PHS14, at 3.1 NM beyond the crossing. At the crossing the TART3 traffic is expected to fly at 7,000ft approximately.
007	TF	SKIRL 6000	N	**Noise:** The WPT is positioned such that residential areas are avoided as far as possible. Traffic is climbing from 5,000 to 6,000ft, meaning that the noise impact is limited. **Separation:** The end altitude of the SID is defined at 6,000ft to ensure that the SKIRL traffic is vertically separated from traffic in the TART3 or LESMA holding when continuing on ATS route N864. Further climb before SKIRL or on N684 is based on tactical decision and depends on the traffic on the arrivals and the holds. **Airspace containment:** The traffic shall pass SKIRL at 6,000ft. SKIRL lies 1.4 NM north of the boundary of Scottish TMA 2 below which VFR traffic may fly up to 5,500ft.

STRAT 1B

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	–	**Flyability:** Turn at altitude (635ft) ensures earliest possible turn away from Cramond at the same height as today's procedure.
002	DF	PHE06 - 6000	N	**Separation:** From this WPT the STRAT SID becomes independent from STEPS and STOPP SID (deviation with STOPP SID is 45°).
003	TF	PHE07 - FL080	N	**Separation:** From this WPT the STRAT SID becomes independent from GULLY and BERRY SID (deviation with BERRY SID is 47°). The WPT ensures that the SID stays at or below FL080, vertically separated from WORM2 and STOBS transitions which cross the SID at FL100. At the WPT the lateral separation against the transitions is 3NM and increasing, reason why traffic on the SID may resume climbing from that point.
004	TF	PHS03	N	**Separation:** At this WPT the SID turns right while keeping sufficient horizontal separation against the WORM2/STOBS transition.
005	TF	PHS04 FL100	N	**Separation:** Up to this WPT horizontal separation against the WORM2/STOBS transition is ensured (> 5NM). The WPT lies 6.5 NM before the crossing with the transitions and shall be overflown at or above FL100 to ensure vertical separation before horizontal separation will be lost. WPT PHE04 on the transitions shall be passed at or below FL080 assuring at least 2,000ft vertical separation at 5 NM before the crossing. The vertical separation on the crossing is expected to be 5,000ft approximately, since the traffic on the SID should continue climbing and the traffic on the transitions should continue descending.
006	TF	PHS06	N	**Separation:** The WPT is positioned such that the SID keeps 9 NM distance from the nominal LESMA holding. A shorter, more southerly trajectory for the remaining SID was preferred but NERL concluded that this would not be possible with a systemised solution, causing too much workload for ATC. Along the segment towards the WPT the distance from the STEPS SID is at least 4.8 NM, while 4.3 NM is required (P3). The WPT lies 4 NM before the crossing with the LESMA approach transition and shall be passed at or above FL100 due to the constraint on the previous WPT. Normally an altitude of FL120, as defined on STRAT, is to be expected. WPT LASFO, defined on the LESMA transition at 4 NM before the crossing, shall be passed at FL080. Therefore 2,000ft vertical separation is ensured at 4 NM before the crossing.
007	TF	PHS07 + FL110	N	**Separation:** Along the segment towards the WPT the distance from the STEPS SID is at least 4.4 NM, while 3.9 NM is required (P1). The WPT lies 1 NM before the crossing with the LESMA transition and shall be passed at or above FL110, assuring 3,000ft vertical separation between the SID and the transition which passes LASFO at FL080 at 4 NM before the crossing. Since traffic normally keeps climbing on the SID and descending on the approach the real vertical separation on the crossing is expected to be 4,500ft approximately.
008	TF	STRAT FL120	N	**Separation:** At the WPT the distance from the STEPS SID is 4.2 NM, while 3.9 NM is required (P1). The WPT lies at 10.7 NM from the nominal LESMA hold, assuring that more than 9 NM distance is kept during the 30° turn onto the ATS route.

STEPS 1B

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	–	
002	DF	PHW01 - 6000	N	**Separation:** The design with fly over turns presents no separation considerations. However, it should be noted that consideration was given to a sharp fly-over turn to try to bring traffic further south. But his was discarded because the separation between consecutive aircraft on the same SID may decrease considerably if the second aircraft flies a much wider turn than the first aircraft. Airspace containment: The WPT is positioned at 3.2 NM from the northern boundary of Scottish TMA 3, which ensures that sufficient distance to the airspace boundary is kept during the turn.
003	TF	PHW02 + 5000	N	**Airspace containment:** The altitude constraint is set at +5,000ft, which ensures that traffic on the SID heading to the WPT will have reached 4,000ft at least 2 NM south of the southern airspace boundary of Edinburgh CTA 3, giving at least 500ft vertical separation against the VFR traffic below CTA 3 which may fly up to 3,500ft. Note that 3NM radar separation is not required in this case and that it is the responsibility of the VFR flyer to keep sufficient distance to the traffic on the SID. At the WPT, which is positioned 0.9 NM south of the CTA boundary the SID traffic shall fly at or above 5,000ft, so at least 1,500ft higher than the VFR traffic under the CTA. The fact that the SID starts turning left before the WPT and leaves the CTR boundary 3.9 NM beyond the WPT also decreases the chance of conflicts with VFR traffic under the CTA. The local configuration of roads and towns supports visual navigation and helps the VFR flyer to avoid airspace infringements (accidently flying into the CTR).
004	TF	PHW03 - FL080	N	**Separation:** Traffic is kept at or below FL080 to avoid the loss of vertical separation against the WORM2/STOBS transitions before lateral separation is ensured. This constraint should preferably be closer to the RWY (e.g. at PHW02) but no feasible solution was found to achieve this (a 5000-FL080 window on PHW02 was considered, but a local airlines pointed out that this may cause unexpected behavior within the FMS). **Flyability**: A sharper turn at this WPT was considered but would not respect the required stabilisation distances between the turns on PHW02 and PHW03.
005	TF	PHW04 - FL100	N	**Separation:** On the segments to this WPT traffic shall stay at or below FL100, assuring at least 1,000ft vertical separation against traffic on route R2G (i.e. the MOODI departures passing MOODI at or above FL110). Since the distance between MOODI and PHW04 is 5.6 NM the required horizontal separation of 4.2 NM (P1) is already achieved 0.7NM before PHW04. The lateral separation is further increasing west of this WPT.
006	TF	PHW06 + FL090	N	**Separation:** The WPT lies 5.5 NM before the crossing with the LESMA approach transition and shall be passed at or above FL090. WPT PFE04, defined on the LESMA transition at 0.5 NM before the crossing, shall be passed at or below 6,000ft. Therefore, traffic on the SID passing the WPT at 5.5. NM before the crossing will already have ensured vertical separation of 3,000ft in case of standard pressure (1015 HPa) and 1,500ft in the case of the lowest pressure ever measured (960 HPa). Along the segment towards the WPT the distance from the STRAT SID is at least 5 NM, while 3.9 NM is required (P1).

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
007	TF	PHW09 + FL105	N	**Separation:** The WPT lies 2.2 NM before the crossing with the LESMA approach transition and shall be passed at or above FL105. WPT PFE04, defined on the LESMA transition at 0.5 NM before the crossing, shall be passed at or below 6,000ft. Therefore, traffic on the SID passing the WPT at 2.2 NM before the crossing will already have ensured vertical separation of 4,500ft in case of standard pressure (1015 HPa) and 3,000ft in case of the lowest pressure ever measured (960 HPa). Since the traffic normally keeps climbing on the SID and descending on the transition the actual separation at the crossing is expected to be at least 5,000ft under standard pressure conditions and at least 3500ft in low pressure conditions. Along the segment towards the WPT the distance from the STRAT SID is at least 4.5 NM, while 3.9 NM is required (P1).
008	TF	PHW10 + FL120	N	**Separation:** Traffic shall pass the WPT at or above FL120 assuring 2,000ft vertical separation against the BEEFY1Y departure from Glasgow, which is kept at or below FL100 (defined at COTTA). The WPT lies 4.2 NM before the crossing with the BEEFY1Y departure, 3.1 NM from the flyby WPT PFE12 of the BEEFY1Y departure and approximately 3.7NM from the fly-by turn. In case of an error by a pilot flying the BEEFY 1Y departure (for example, if the pilot forgets to set standard pressure) the aircraft on this SID may climb to 10,000ft instead of FL100. The traffic on the STEPS SID will pass PHW10 at FL120 which is at 10,500ft in case of extremely low pressure (960 HPa). This leaves only 500ft vertical separation. Although 500ft vertical separation at 4.2 NM before the crossing is not desirable, the chance of this occurring is extremely low since it requires that both aircraft arrive at the crossing simultaneously, combined with an error, combined with extremely low pressure and combined with a fast climber on BEEFY 1Y (15% is required over a distance of 10.4 NM to reach 10,000ft at the crossing). Such a low chance is considered acceptable, also taking into account that if all these events happen simultaneously, the vertical separation will still increase to approximately 1,500ft near the actual crossing (near STEPS, which shall be passed at FL130). In other words, the simultaneous occurrence of these events may lead to a temporary loss of separation but would not lead to a collision. A further mitigation could be that ATC gives additional instructions (e.g. to reduce the climb rate) in case of low pressure. Along the segment towards the WPT the distance from the STRAT SID is at least 4.2 NM, while 3.9 NM is required (P1).
009	TF	STEPS + FL130	N	**Separation:** Along the segment towards the WPT the distance from the STRAT SID is at least 4.2 NM, while 3.9 NM is required (P1).

Departures RWY 24

STOPP 1A

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	-	
002	CF	PHW07 + 2000	N	**Separation:** From this WPT the STOPP SID becomes independent from STEPS, STRAT and SKIRL SID (deviation with STEPS SID is 65°).
003	TF	PHE08 + 3500 - 230 KIAS	N	**Flyability:** The speed is restricted to 230 KIAS to respect the required stabilisation distances before and after the WPT.
004	TF	PHE09 + 5000	N	**Separation:** From this WPT the STOPP SID becomes independent from GULLY and BERRY SID (deviation is 40°). **Airspace containment:** The altitude constraint is set at +5,000ft, which ensures that traffic on the SID heading to the WPT will have reached 4,000ft approximately 2 NM south of the southern airspace boundary of Edinburgh CTA 3, giving at least 500ft vertical separation against the VFR traffic below CTA 3 which may fly up to 3,500ft. Note that 3NM radar separation is not required in this case and that it is the responsibility of the VFR flyer to keep sufficient distance to the traffic on the SID. At the WPT, which is positioned 0.9 NM south of the CTA boundary the SID traffic shall fly at or above 5,000ft, so at least 1,500ft higher than the VFR traffic under the CTA. At the WPT, which is positioned 0.9 NM south of the CTA boundary the SID traffic shall fly at or above 5,000ft, so at least 1,500ft higher than the VFR traffic under the CTA.
005	TF	PHN03	N	**Separation:** Beyond this WPT the SID is horizontally separated from GULLY/BERRY SID by at least 3.9 NM, which is the required separation (P1).
006	TF	PHN04 FL080	N	**Separation:** On this segment and during the turn on PHN04, vertical separation against the WORM2/STOBS/TART3 transition (west of WHITE) is ensured since the SID shall fly at or above 5,000ft from PHE09 (and climb to FL080 before PHN04), while the transitions shall fly at or below 4,000ft west of WHITE. In addition, horizontal separation against WORM2/STOBS transition is also ensured since the separation is at least 4.2 NM (P1 interaction). Horizontal separation against the TART3 transition is not ensured east of PHN04 since it is a P10 or P12 interaction (vertical separation is however ensured). **Airspace containment:** The segment towards this WPT stays at least 2.6 NM south of the northern boundary of Scottish TMA 3. When turning at PHN04 the nominal stays at least 2.4 NM from this boundary. Given the moderate turn angles at PHN03 (38°) and PHN04 (31°) it is extremely unlikely that flightpaths come closer than 2 NM from the boundary.

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
007	TF	PHN02	N	**Separation:** On this segment vertical separation against the TART3 transition is ensured since any overshoot on the turn at WHITE shall be below 4,000ft while the SID already flies at or above 5,000ft from PHE09 and climbs to FL080 before PHN04. On this segment vertical separation against the WORM2/STOBS transition (west of PHE05) is also ensured since the SID shall fly at FL080 from PHN04, while the transitions shall fly at or below 5,500ft west of PHE05. In the case of the lowest pressure ever measured (960 HPa) FL080 equals 6,500ft, which still ensures 1,000ft vertical separation. In addition, also the horizontal separation against the WORM2/STOBS transition is ensured since the distance is at least 4.2 NM, meeting the required separation for opposing traffic (P1). Due to the relative positioning of the turns (SID PHN02 versus transitions PHE05) it is unlikely that the distance between aircraft in these turns will be less than 4.2 NM. West of these WPTs the interaction is therefore considered a P1 interaction. If the interaction west of these WPTs is seen as a P5 interaction, the horizontal separation requirement (4.8NM) is not met but note that vertical separation is still ensured west of these WPTs. East of the WPT the distance between the SID and the WORM2/STOBS transition is at least 4.8 NM which meets the requirements of a P5 interaction (4.7 NM required). **Airspace containment:** The segment towards this WPT stays at least 2.5 NM southeast of the boundary of Scottish TMA 3. The WPT lies at 2.6 NM from the boundary. Given the moderate turn angle (42°) it is unlikely that flightpaths come closer than 2 NM from the boundary.
008	TF	STOPP FL080	N	**Separation:** The horizontal separation against the WORM2/STOBS transition is at least 4.8 NM, both before and beyond STOPP and DAVIS, which meets the requirements. The SID and the STOBS transition have a P5 interaction (4.7 NM required) and the SID and the WORM2 transition have a P10 interaction (4.8 NM required). The latter could also be considered a P12 interaction, but given the consecutive and moderate left turns on the SID an overshoot on the right side of the SID may be expected to be minor. Note that the P12 buffer is based on two opposing turns up to 90°, which would be over-conservative in this case. **Airspace containment:** The segment towards this WPT stays at least 2 NM from the northern/eastern airspace boundary (corner). The WPT lies at 2.3 NM from the boundary. Given the moderate turn angle (18°) it is unlikely that flightpaths in the turn come closer than 2 NM from the boundary.

GULLY 1A

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	-	
002	CF	PHW07 + 2000	N	**Separation:** From this WPT the GULLY SID becomes independent from STEPS, STRAT and SKIRL SID (deviation with STEPS SID is 65°).
003	TF	PHE08 + 3500 - 230 KIAS	N	**Flyability:** The speed is restricted to 230 KIAS to respect the required stabilisation distances before and after the WPT.
004	TF	PHE09 + 5000	N	**Separation:** From this WPT the GULLY SID becomes independent from the STOPP SID (deviation is 40°). **Airspace containment:** The altitude constraint is set at +5,000ft, which ensures that traffic on the SID heading to the WPT will have reached 4,000ft approximately 2 NM south of the southern airspace boundary of Edinburgh CTA 3, giving at least 500ft vertical separation against the VFR traffic below CTA 3 which may fly up to 3,500ft. Note that 3NM radar separation is not required in this case and that it is the responsibility of the VFR flyer to keep sufficient distance to the traffic on the SID. At the WPT, which is positioned 0.9 NM south of the CTA boundary the SID traffic shall fly at or above 5,000ft, so at least 1,500ft higher than the VFR traffic under the CTA. The 5,000ft constraint on the WPT also ensures that SID traffic beyond this WPT is vertically separated from approaches or missed approaches west of WHITE, which shall be passed at or below 4,000ft.
005	TF	PHE10 + FL080	N	**Separation:** The WPT is positioned at 3.3 NM before the crossing with the intermediate approach (near the FAF) where approaching traffic should normally fly at 2,000ft approximately and certainly not above 4,000ft (ensured by the constraint on WHITE at 4.7 NM before the crossing). The WPT is positioned at 8.3 NM before the crossing with the TART3 approach transition. Traffic shall pass the WPT at or above FL080, which provides preliminary assurance that vertical separation against the TART3 transition has already been achieved (or will be achieved timely in case of extremely low pressure). Note that traffic on the transition shall fly at or below 6,000ft beyond HIGIN.
006	TF	PHE11 FL090	N	**Separation:** Traffic shall pass the WPT at FL090 which ensures vertical separation against the TART3 approach transition at 4.2 NM before the crossing (between HENRY and WHITE) under all pressure conditions, since traffic on the transition shall fly at or below 6,000ft from HIGIN at 7.1 NM before the crossing.
007	TF	PHE12	N	**Separation:** At the crossing (between HENRY and WHITE) traffic on the TART3 transition should normally fly well below 5,000ft since WHITE shall be passed at or below 4,000ft. Vertical separation at the crossing is therefore expected to be at least 4,000ft in case of STD pressure and at least 2,500ft in case of extremely low pressure (960 HPa). The track to WPT PHE12 shall be flown at FL090 while the WORM2/STOBS approach transitions pass PHE05 at or below 5500. WPT PHE05 is positioned at 2.6 NM from the SID meaning that traffic on the transition between DAVIS and PHE05 should have descended below 6,000ft at 3.6 NM from the SID. In case of extremely low pressure (960 HPa) FL090 equals 7,500ft meaning that 1,500ft vertical separation should still exist when traffic on the transitions from DAVIS comes within 3.6 NM from the SID and approximately 1,000ft (and increasing) within 4.6 NM from the SID.
008	TF	GULLY FL090	N	**Separation:** While approaching GULLY horizontal separation against the WORM2 approach transition towards DAVIS is at least 5.7 NM, while 4.2 NM is required (P1). When approaching traffic passes DAVIS vertical separation is achieved timely (see previous WPT).

BERRY 1A

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	-	
002	CF	PHW07 + 2000	N	**Separation:** From this WPT the GULLY SID becomes independent from STEPS, STRAT and SKIRL SID (deviation with STEPS SID is 65°).
003	TF	PHE08 + 3500 - 230 KIAS	N	**Flyability:** The speed is restricted to 230 KIAS to respect the required stabilisation distances before and after the WPT.
004	TF	PHE09 + 5000	N	**Separation:** From this WPT the GULLY SID becomes independent from the STOPP SID (deviation is 40°). **Airspace containment:** The altitude constraint is set at +5,000ft, which ensures that traffic on the SID heading to the WPT will have reached 4,000ft approximately 2 NM south of the southern airspace boundary of Edinburgh CTA 3, giving at least 500ft vertical separation against the VFR traffic below CTA 3 which may fly up to 3,500ft. Note that 3NM radar separation is not required in this case and that it is the responsibility of the VFR flyer to keep sufficient distance to the traffic on the SID. At the WPT, which is positioned 0.9 NM south of the CTA boundary the SID traffic shall fly at or above 5,000ft, so at least 1,500ft higher than the VFR traffic under the CTA. The 5,000ft constraint on the WPT also ensures that SID traffic beyond this WPT is vertically separated from approaches or missed approaches west of WHITE, which shall be passed at or below 4,000ft.
005	TF	PHE10 + FL080	N	**Separation:** The WPT is positioned at 3.3 NM before the crossing with the intermediate approach (near the FAF) where approaching traffic should normally fly at 2,000ft approximately and certainly not above 4,000ft (ensured by the constraint on WHITE at 4.7 NM before the crossing). The WPT is positioned at 8.3 NM before the crossing with the TART3 approach transition. Traffic shall pass the WPT at or above FL080, which provides preliminary assurance that vertical separation against the TART3 transition has already been achieved (or will be achieved timely in case of extremely low pressure). Note that traffic on the transition shall fly at or below 6,000ft beyond HIGIN.
006	TF	PHE11 FL090	N	**Separation:** Traffic shall pass the WPT at FL090 which ensures vertical separation against the TART3 approach transition at 5.7 NM before the crossing under all pressure conditions, since traffic on the transition shall fly at or below 6,000ft from HIGIN at 4 NM before the crossing.
007	TF	PHS13	N	**Separation:** At the crossing (between HENRY and WHITE) traffic on the TART3 transition shall fly at or below 6,000ft. Vertical separation at the crossing is therefore expected to be at least 3,000ft in case of STD pressure and at least 1,500ft in case of extremely low pressure (960 HPa). Vertical separation against the WORM2/STOBS approach transitions is ensured well before horizontal separation against this SID segment is lost. The track to WPT PHS13 shall be flown at FL090 while the transitions pass PHE05 at or below 5500 at 6.8 NM from the SID.
008	TF	BERRY FL090	N	**Separation:** At the segment towards BERRY and beyond BERRY on route Z249 vertical separation against TART3 approach transition is ensured. **Airspace containment:** The segment towards this WPT and the consecutive route segment stays at least 3 NM from the eastern airspace boundary.

SKIRL 1A

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	-	
002	CF	PHW07 + 2000	N	**Separation:** From this WPT the SKIRL SID becomes independent from STEPS, STOPP, GULLY and BERRY SID (deviation with STEPS SID is 65°).
003	TF	PHS10 + 4000	N	**Separation:** The traffic turns left around the glider area of Kirknewton. This area blocks an earlier turn left, which would have been preferred to decrease the dependency from the other SIDs (especially since the SKIRL SID is intended for slow (turbo) props). **Airspace containment:** The altitude constraint ensures that traffic on the SID will have reached 4,000ft at 2.3 NM from the Edinburgh CTA 4. VFR traffic may fly up to 3,500ft below this CTA.
004	TF	SKIRL 6000	N	**Separation:** The end altitude of the SID is defined at 6,000ft to ensure that the SKIRL traffic is vertically separated from traffic in the TART3 or LESMA holding when continuing on ATS route N864. Further climb before SKIRL or on N684 is based on tactical decision and depends on the traffic on the arrival routes and in the holds. **Airspace containment:** The traffic shall pass SKIRL at 6,000ft. SKIRL lies 1.4 NM north of the boundary of Scottish TMA 2 below which VFR traffic may fly up to 5,500ft.

STRAT 1A

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	-	
002	TF	PH355	N	**Separation:** The left turn at this WPT and the following right turns are required to gain altitude before overflying the LESMA approach to Glasgow. The turn also creates distance between the STRAT and STEPS SID, making both departures independent.
003	TF	PH391	N	**Separation:** The right turn is defined by two WPTs (rather than one) to prevent a sharp turn that would increase spread and would therefore increase the number of aircraft flying near Addiewell and Fauldhouse.
004	TF	PH392	N	**Separation:** The turn right at this WPT assures that the SID stays at 9 NM from the nominal LESMA hold.
005	TF	PHS05 + FL090	N	**Separation:** The WPT is positioned such that the SID keeps 9 NM distance from the nominal LESMA holding. A shorter, more southerly trajectory for the remaining SID was not be possible with a systemised solution, causing too much workload for ATC. Along the segment towards the WPT the distance from the STEPS SID is at least 3.9 NM, which is the required separation (P1). The WPT lies 7 NM before the crossing with the LESMA approach transition and shall be passed at or above FL090, assuring timely vertical separation against the transition which shall pass LASFO at or below FL080 at 4 NM before the crossing.
006	TF	PHS06 + FL100	N	**Separation:** The WPT is positioned such that the SID keeps 9 NM distance from the nominal LESMA holding. Along the segment towards the WPT the distance from the STEPS SID is at least 4.2 NM, while 3.9 NM is required (P1). The WPT lies 4 NM before the crossing with the LESMA approach transition and shall be passed at or above FL100. WPT LASFO, defined on the LESMA transition at 4 NM before the crossing, shall be passed at FL080. Therefore 2,000ft vertical separation is ensured at 4 NM before the crossing.
007	TF	PHS07 + FL110	N	**Separation:** Along the segment towards the WPT the distance from the STEPS SID is at least 4.4 NM, while 3.9 NM is required (P1). The WPT lies 1 NM before the crossing with the LESMA transition and shall be passed at or above FL110, assuring 3,000ft vertical separation between the SID and the transition which passes LASFO at FL080 at 4 NM before the crossing. Since traffic normally keeps climbing on the SID and descending on the approach, the real vertical separation on the crossing is expected to be 4,500ft approximately. The interaction is safe even if a serious error was made. If a pilot on the LESMA approach sets QNH too early (before LASFO) he may fly at 8,000ft when passing LASFO rather than at FL080. PHS07 will be passed at FL110 which in the worst case equals 9,500ft in extremely low pressure (960 HPa). In that case the vertical separation (at LASFO versus PHS07) is still 1,500ft and will normally further increase on the 4 NM between LASFO and the crossing.
008	TF	STRAT FL120 - 250 KIAS	N	**Separation:** Along the segment towards the WPT the distance from the STEPS SID is at least 4.2 NM, while 3.9 NM is required (P1). The WPT lies at 10.7 NM from the nominal LESMA holding, assuring that more than 9 NM distance is kept during the 30° turn onto the ATS route.

STEPS 1A

Seq. Number	Path Term.	WPT/ Constraint	Fly-over	Considerations
001	CA	+ 635	-	
002	CF	PHW07 + 2000	N	**Separation:** From this WPT the STEPS SID becomes independent from STOPP, GULLY, BERRY, STRAT and SKIRL SID (deviation with SKIRL/STRAT SID is 65°).
003	TF	PHW08	N	**Separation:** Along the segment towards the WPT the distance from the STRAT SID is at least 3.9 NM, which is the required separation (P1).
004	TF	PHW06 + FL090	N	**Separation:** The WPT lies 5.5 NM before the crossing with the LESMA approach transition and shall be passed at or above FL090. WPT PFE04, defined on the LESMA transition at 0.5 NM before the crossing, shall be passed at or below 6,000ft. Therefore, traffic on the SID passing the WPT at 5.5. NM before the crossing will already have ensured a vertical separation of 3,000ft in case of standard pressure (1015 HPa) and 1,500ft in case of the lowest pressure ever measured (960 HPa). Along the segment towards the WPT the distance from the STRAT SID is at least 3.9 NM, which is the required separation (P1).
005	TF	PHW09 + FL105	N	**Separation:** The WPT lies 2.2 NM before the crossing with the LESMA approach transition and shall be passed at or above FL105. WPT PFE04, defined on the LESMA transition at 0.5 NM before the crossing, shall be passed at or below 6,000ft. Therefore, traffic on the SID passing the WPT at 2.2 NM before the crossing will already have ensured a vertical separation of 4,500ft in case of standard pressure (1015 HPa) and 3,000ft in case of the lowest pressure ever measured (960 HPa). Since the traffic normally keeps climbing on the SID and descending on the transition the actual separation at the crossing is expected to be at least 5,000ft under standard pressure conditions and at least 3,500ft in low pressure conditions. Along the segment towards the WPT the distance from the STRAT SID is at least 4.5 NM, while 3.9 NM is required (P1).
006	TF	PHW10 + FL120	N	**Separation:** Traffic shall pass the WPT at or above FL120 assuring 2,000ft vertical separation against the BEEFY1Y departure from Glasgow, which is kept at or below FL100 (defined at COTTA). The WPT lies 4.2 NM before the crossing with the BEEFY1Y departure, 3.1 NM from the flyby WPT PFE12 of the BEEFY1Y departure and approximately 3.7 NM from the fly-by turn. In case of a blunder error on the BEEFY 1Y departure (when the pilot forgets to set standard pressure) the aircraft on this SID may climb to 10,000ft instead of FL100. The traffic on the STEPS SID will pass PHW10 at FL120 which is at 10,500ft in case of extremely low pressure (960 HPa). This leaves only 500ft vertical separation. Although 500ft vertical separation at 4.2 NM before the crossing is not desirable the chance of this occurring is extremely low since it requires that both aircraft arrive at the crossing simultaneously, combined with a serious error, combined with extremely low pressure and combined with a fast climber on BEEFY 1Y (15% is required over a distance of 10.4 NM to reach 10,000ft at the crossing). Such a low chance is considered acceptable, also taking into account that if all these events happen simultaneously the vertical separation will still increase to approximately 1,500ft near the actual crossing (near STEPS, which shall be passed at FL130). In other words, the simultaneous occurrence of these events may lead to a temporary loss of separation but would not lead to a collision. A further mitigation could be that ATC gives additional instructions (e.g. to reduce the climb rate) in case of low pressure. Along the segment towards the WPT the distance from the STRAT SID is at least 4.2 NM, while 3.9 NM is required (P1).
007	TF	STEPS + FL130 - 250 KIAS	N	**Separation:** Along the segment towards the WPT the distance from the STRAT SID is at least 4.1 NM, while 3.9 NM is required (P1).

Annex L: Technical annex to FOA results

1. Introduction

This document contains the contours and supporting data tables to the FOA results presented in Section 4. Sections 7 and 8 provide a complete list of all the Tables and Figures with links.

2. Additional Figures for "without airspace change" baseline

2.1 LAeq Contours for Baseline

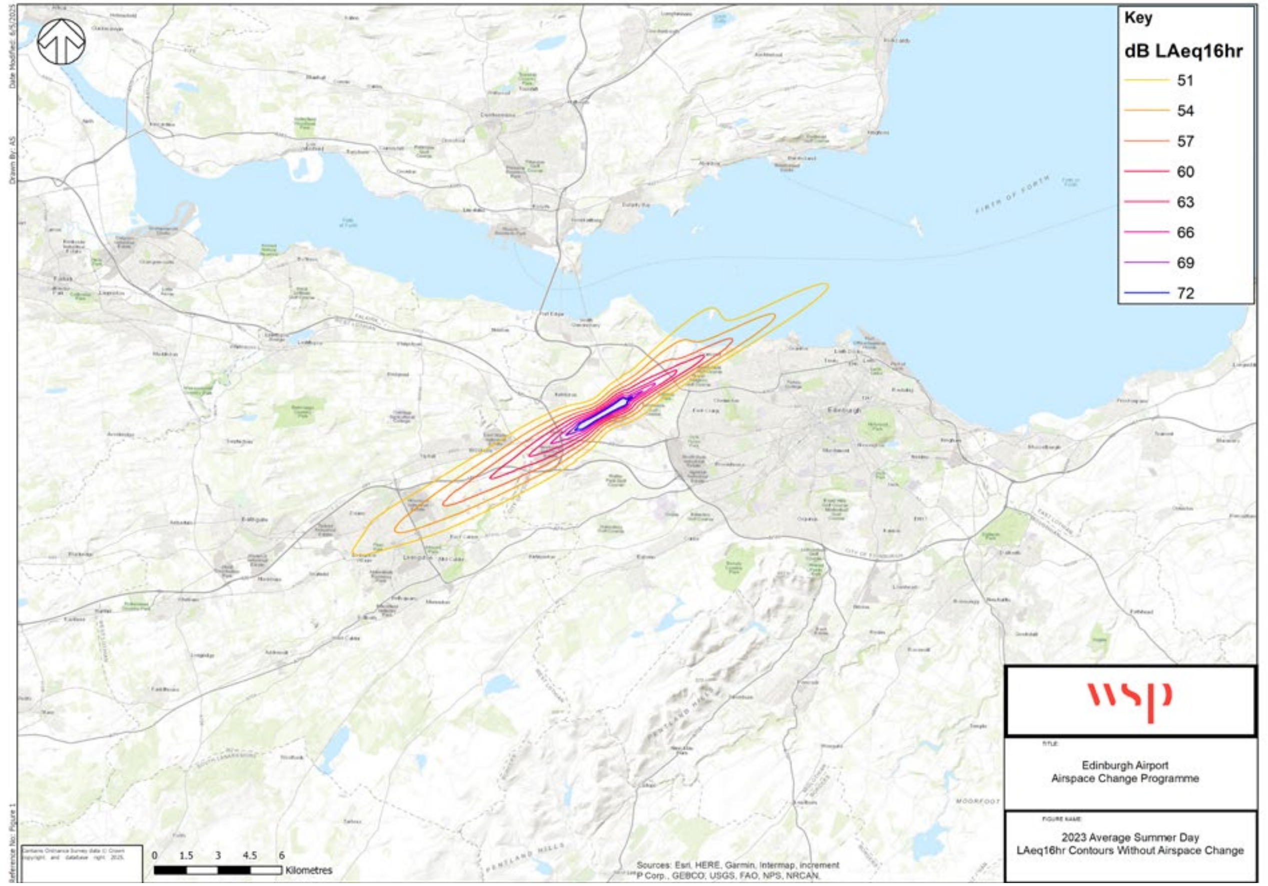


Figure 1: LAeq, 16 Hr, Daytime "Without Airspace Change" Baseline, Current Day.

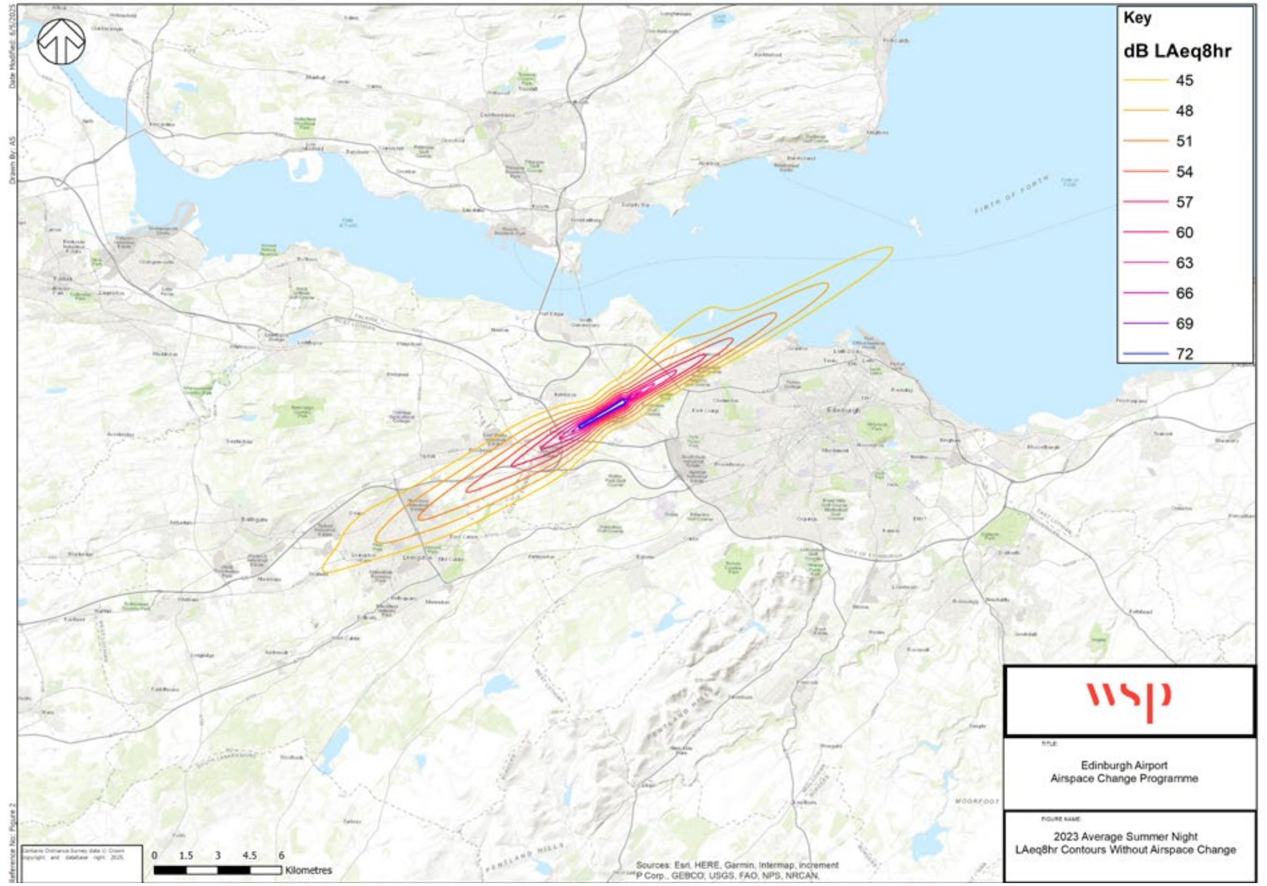


Figure 2: LAeq, 8 Hr, Night-Time "Without Airspace Change" Baseline, Current Day.

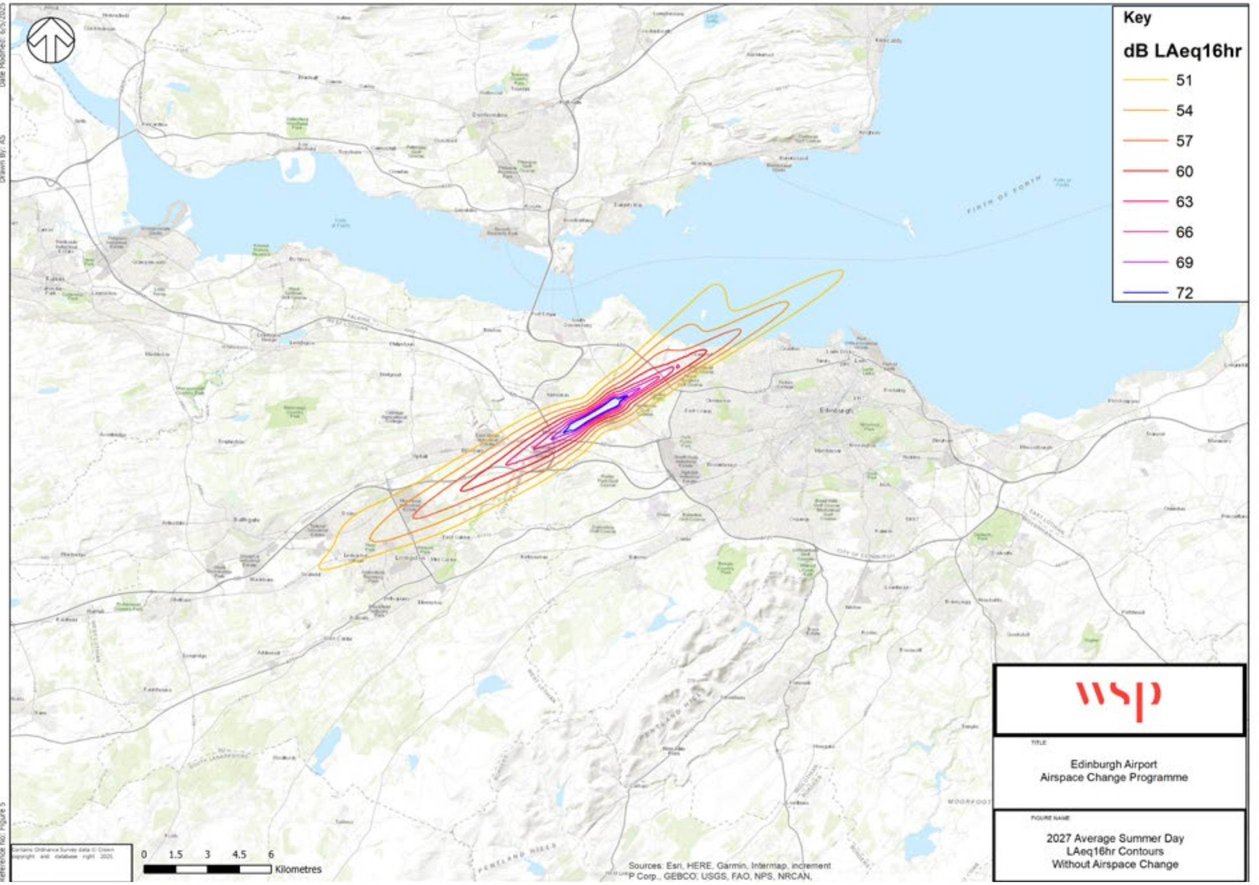


Figure 3: LAeq, 16 Hr, Daytime "Without Airspace Change" Baseline, 2027.

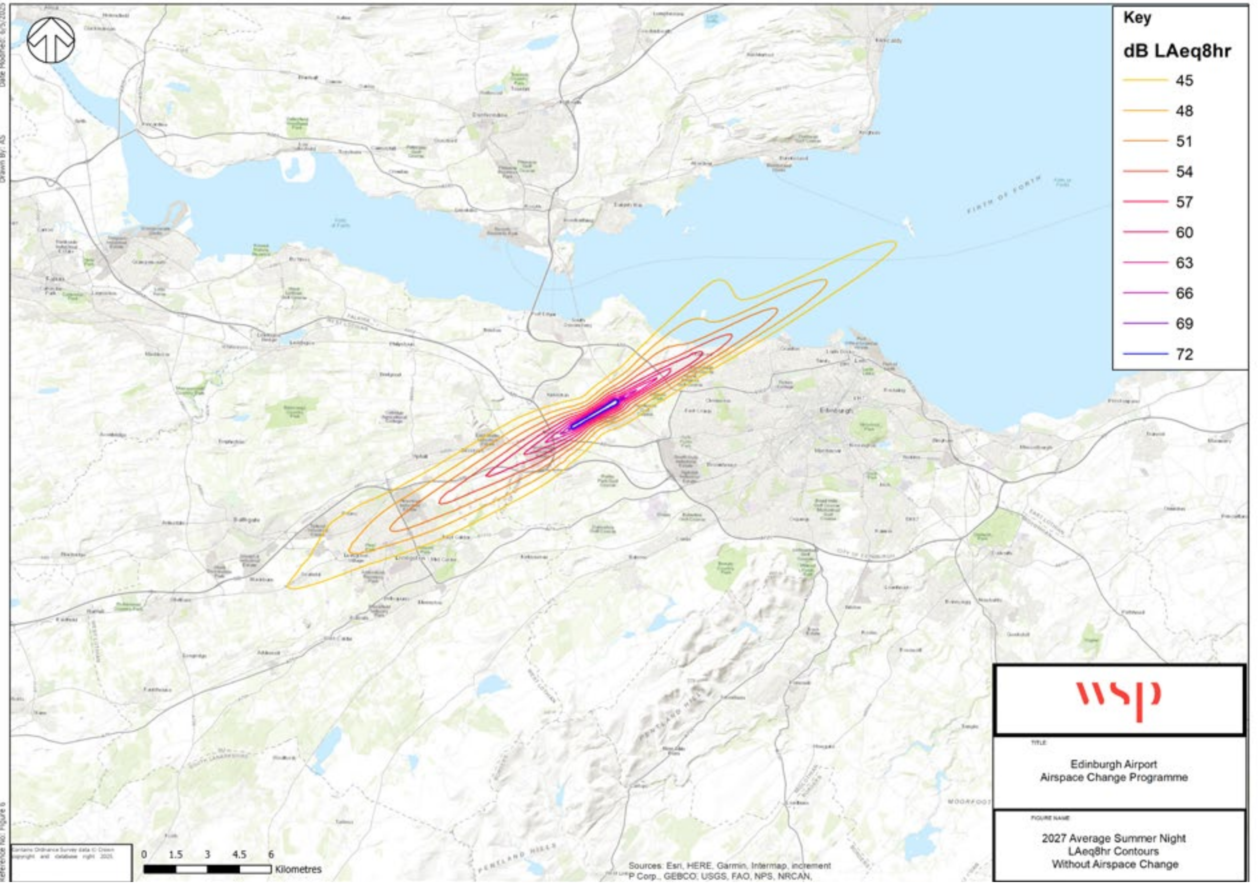


Figure 4: LAeq, 8 Hr, Night-Time "Without Airspace Change" Baseline, 2027.

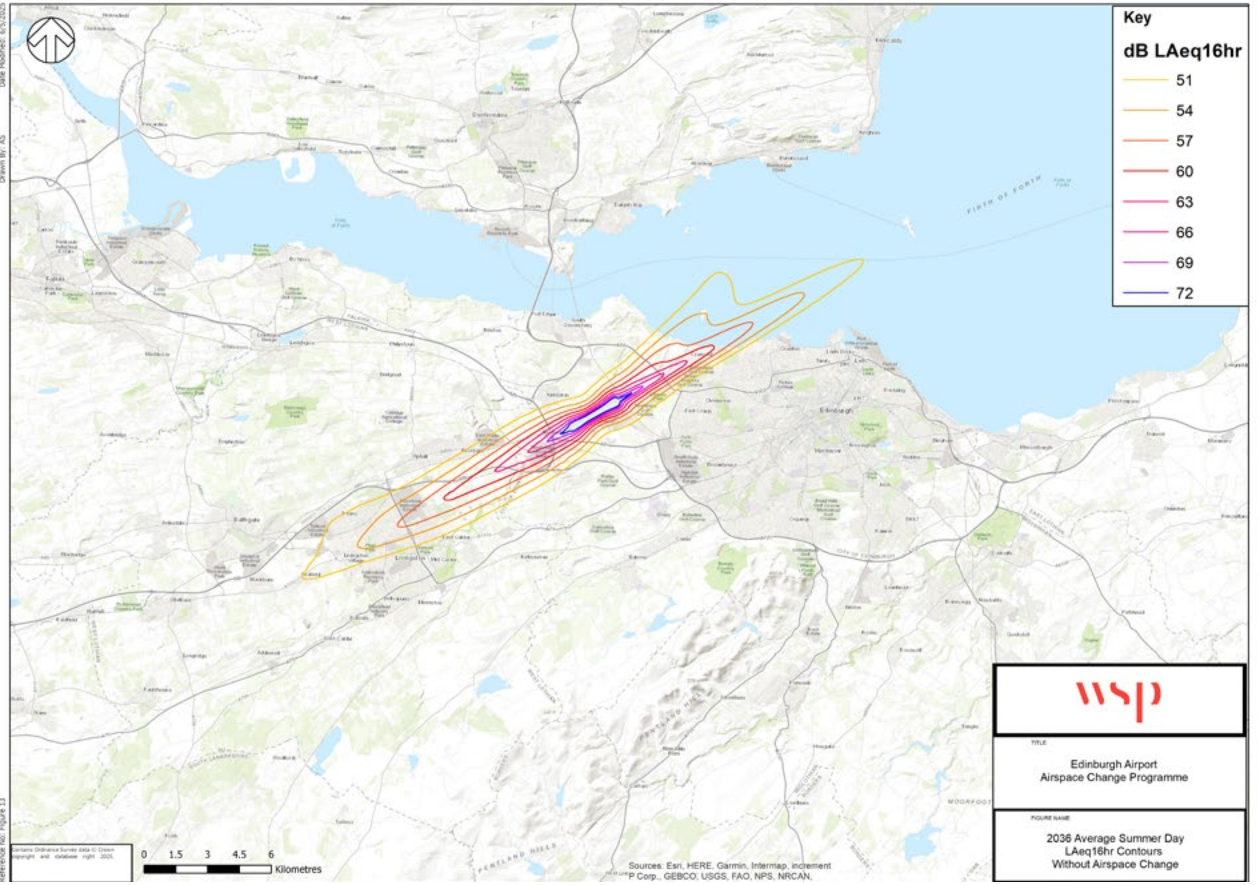


Figure 5: LAeq, 16 Hr, Daytime "Without Airspace Change" Baseline, 2036.

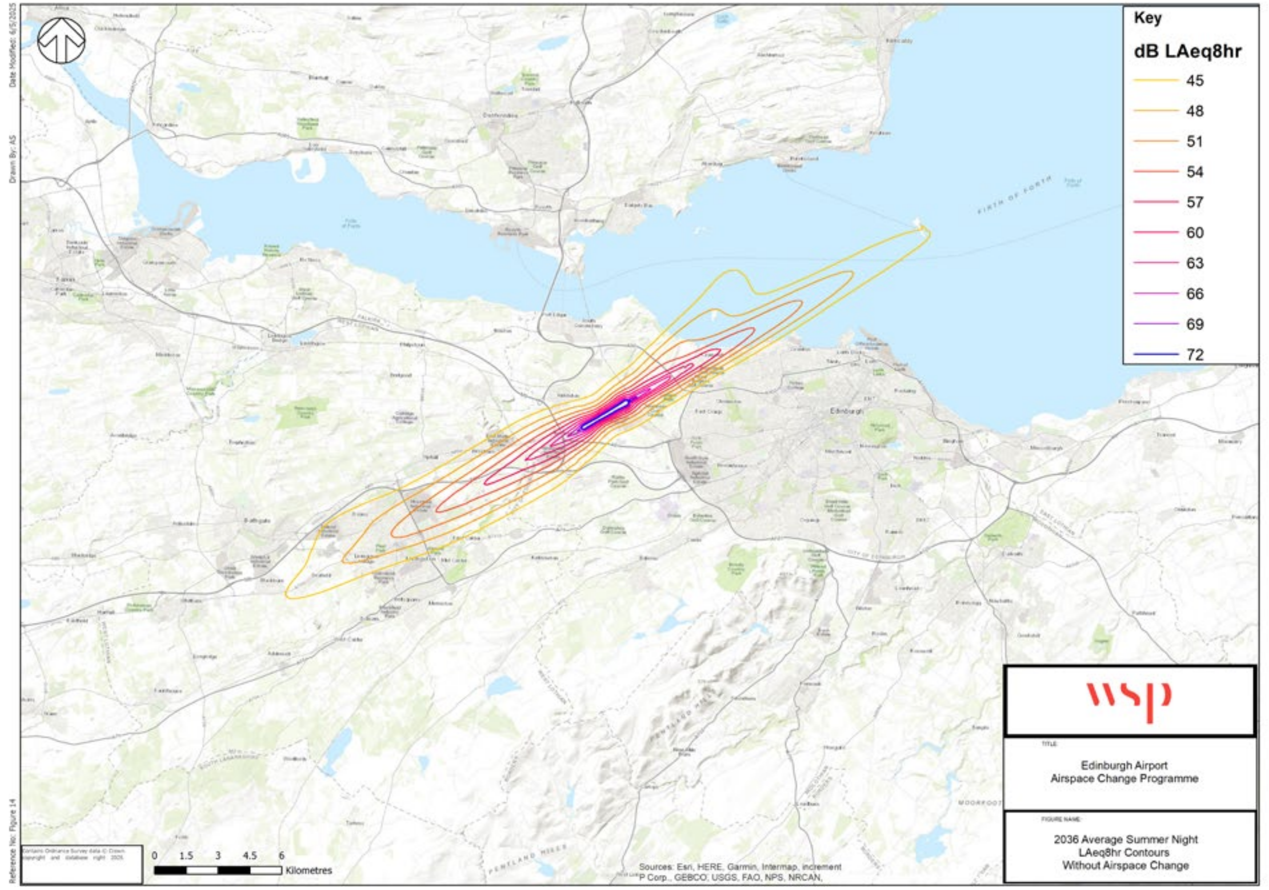


Figure 6: LAeq, 8 Hr, Night-Time "Without Airspace Change" Baseline, 2036.

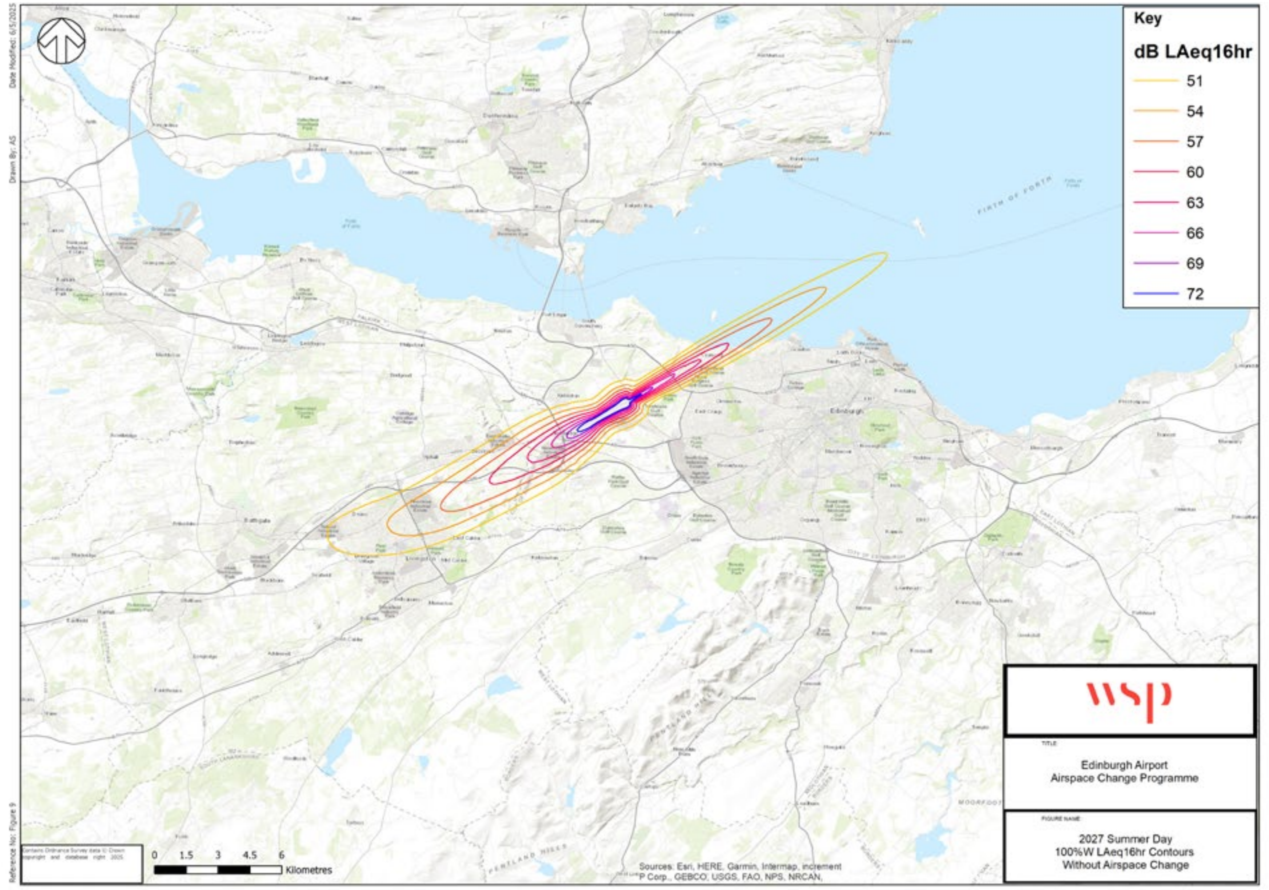


Figure 7: LAeq, 16 Hr, Day-Time 100% West "Without Airspace Change" Baseline, 2027.

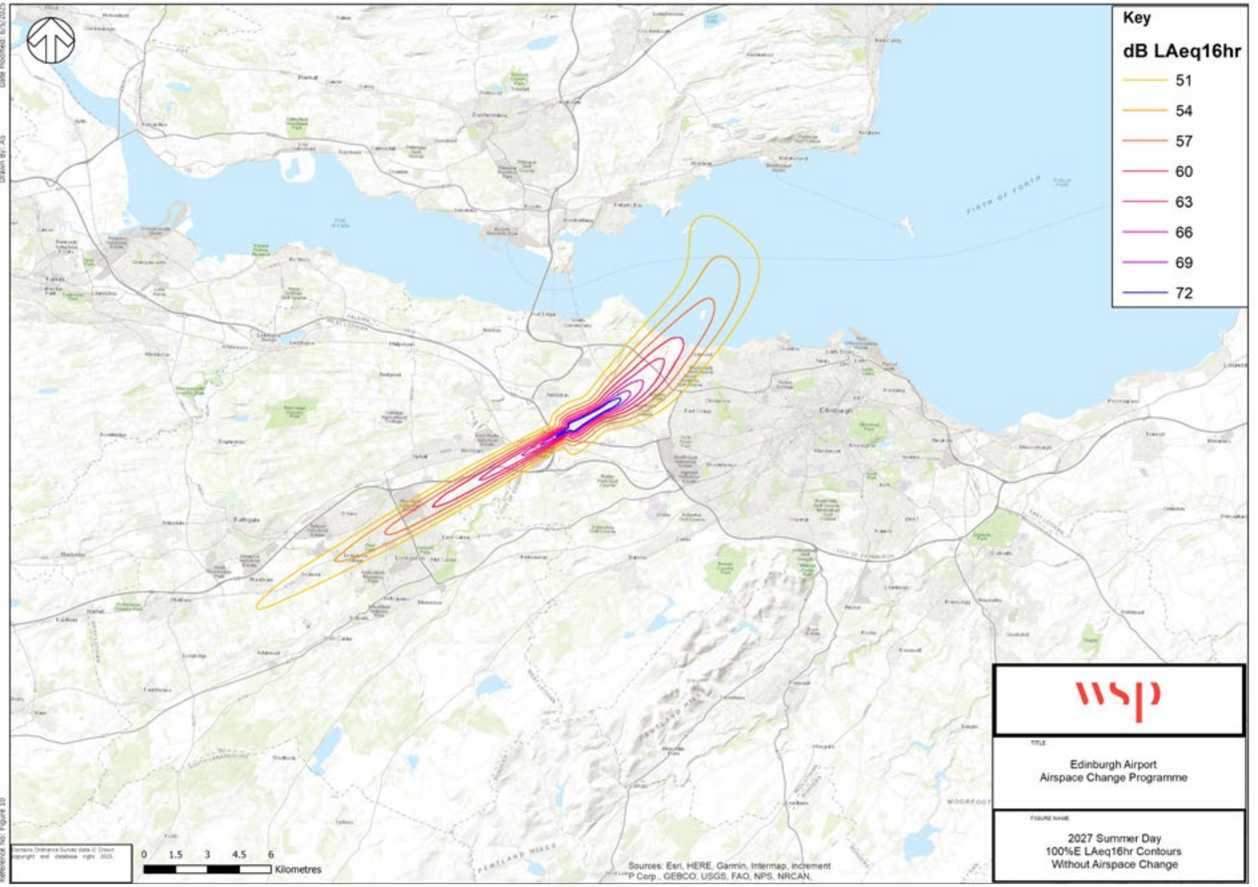


Figure 8: LAeq, 16 Hr, Day-Time 100% East "Without Airspace Change" Baseline, 2027.

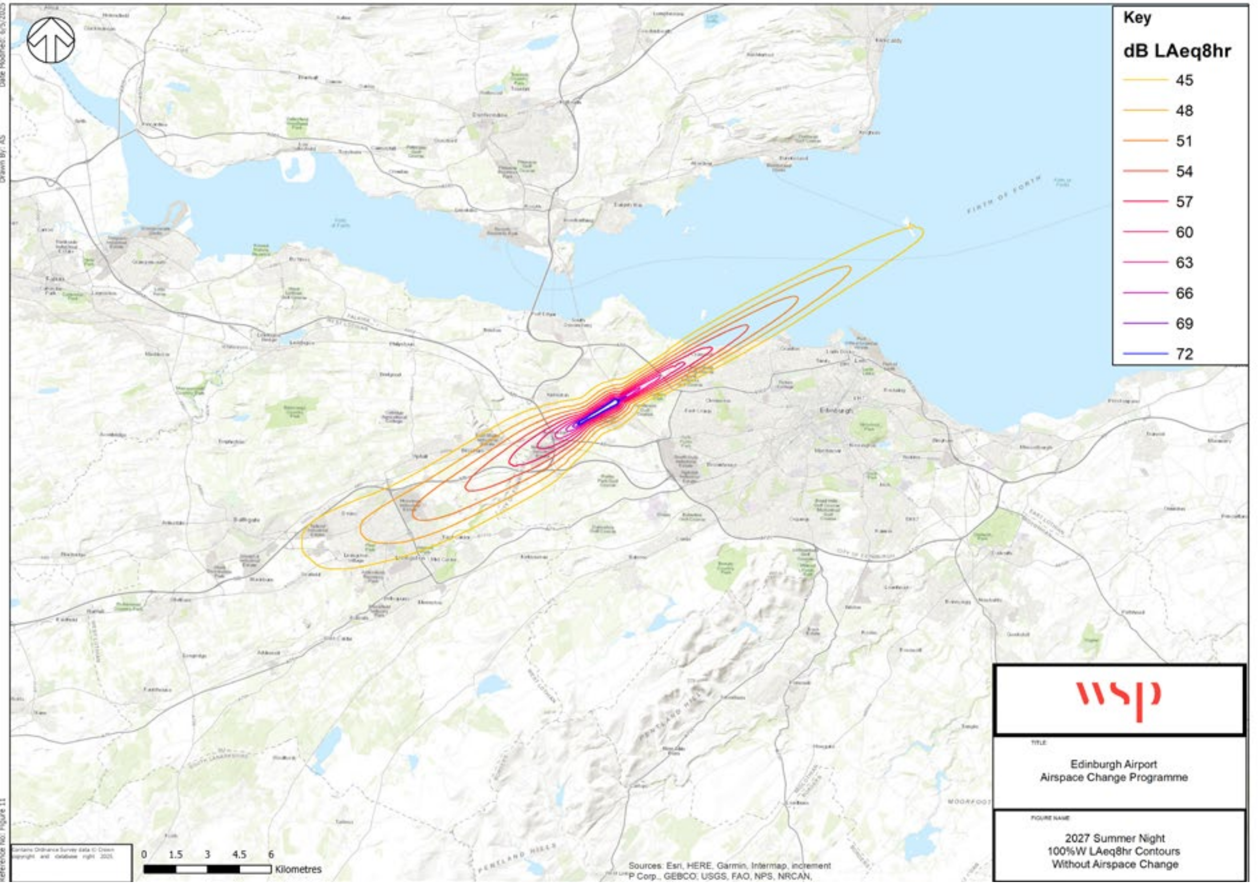


Figure 9: LAeq, 8 Hr, Night-Time 100% West "Without Airspace Change" Baseline, 2027.

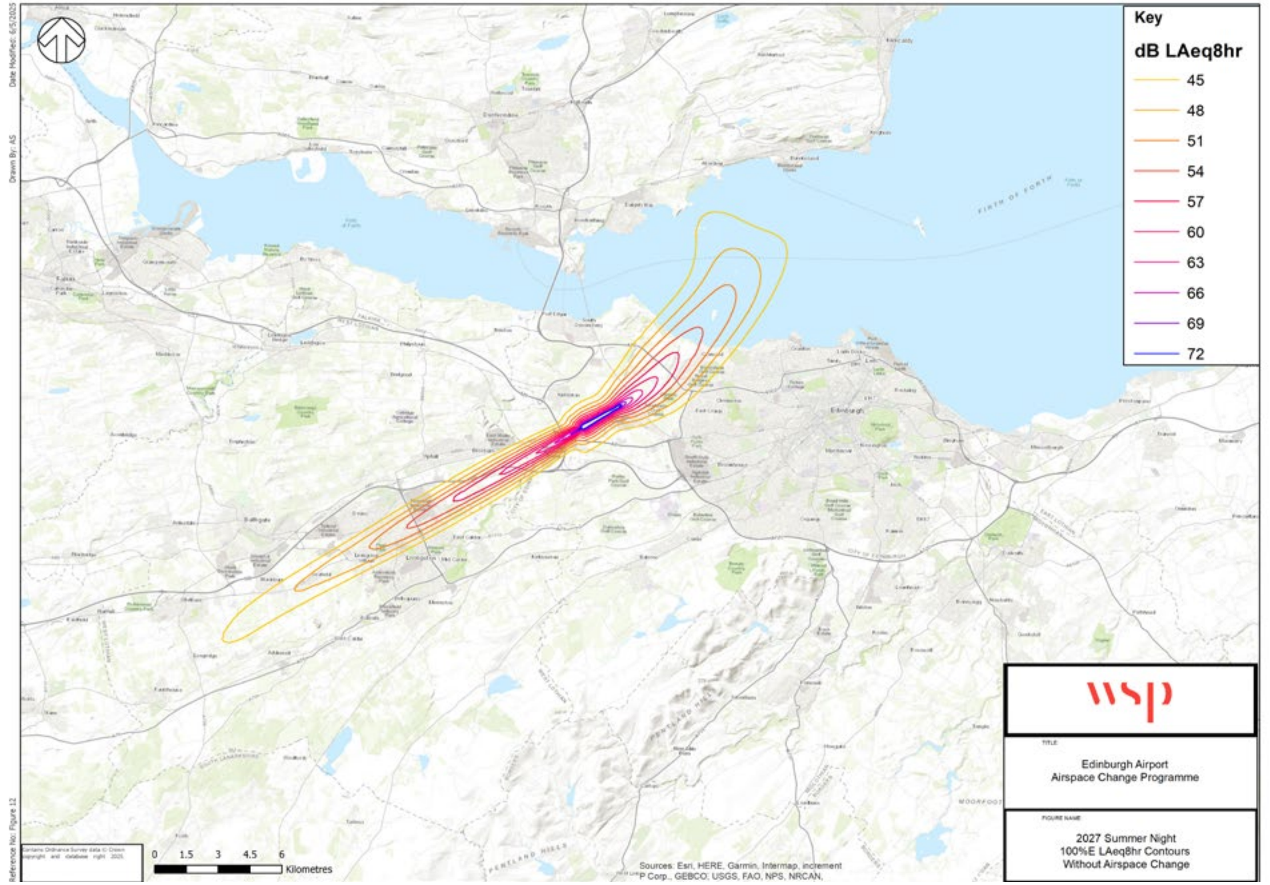


Figure 10: LAeq, 8 Hr, Night-Time 100% East "Without Airspace Change" Baseline, 2027.

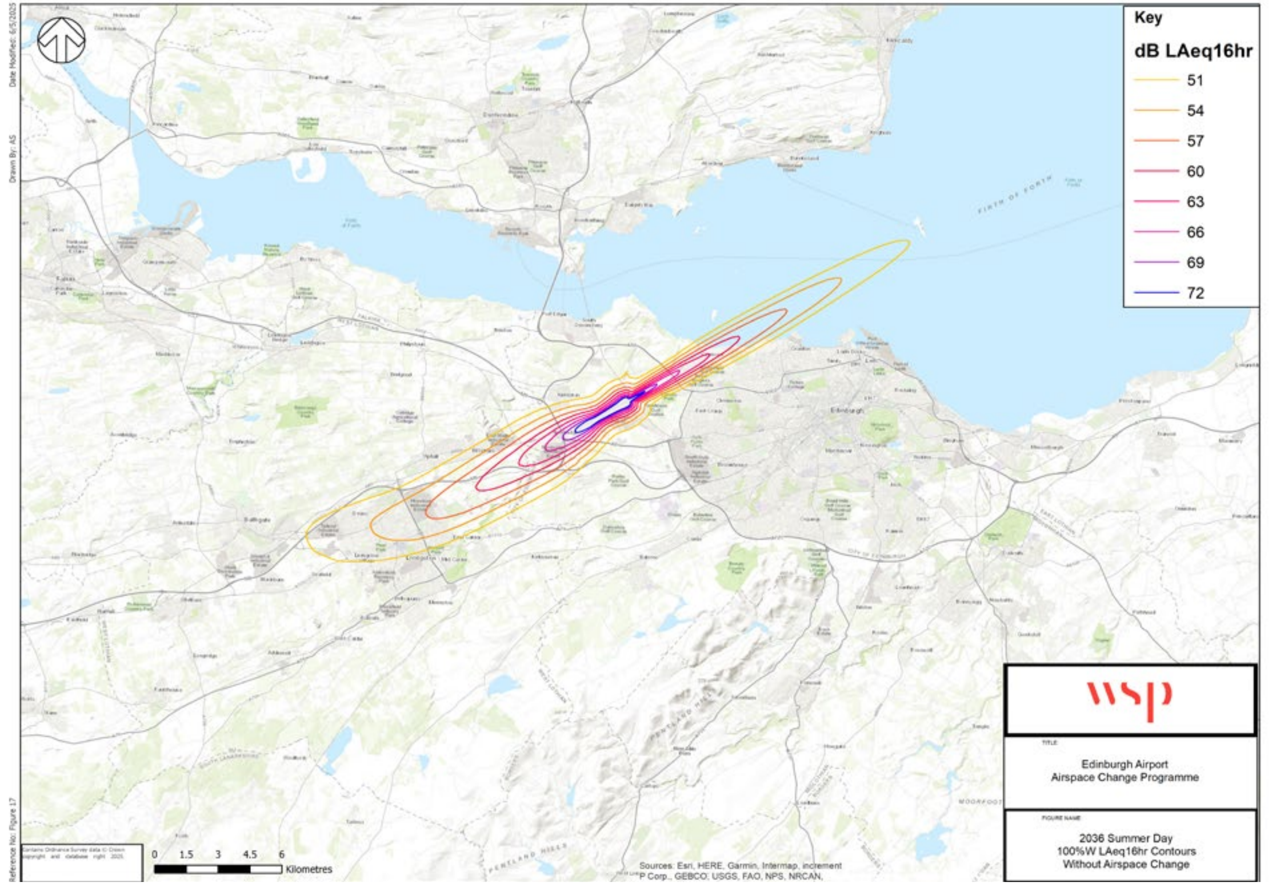


Figure 11: LAeq, 16 Hr, Day-Time 100% West "Without Airspace Change" Baseline, 2036.

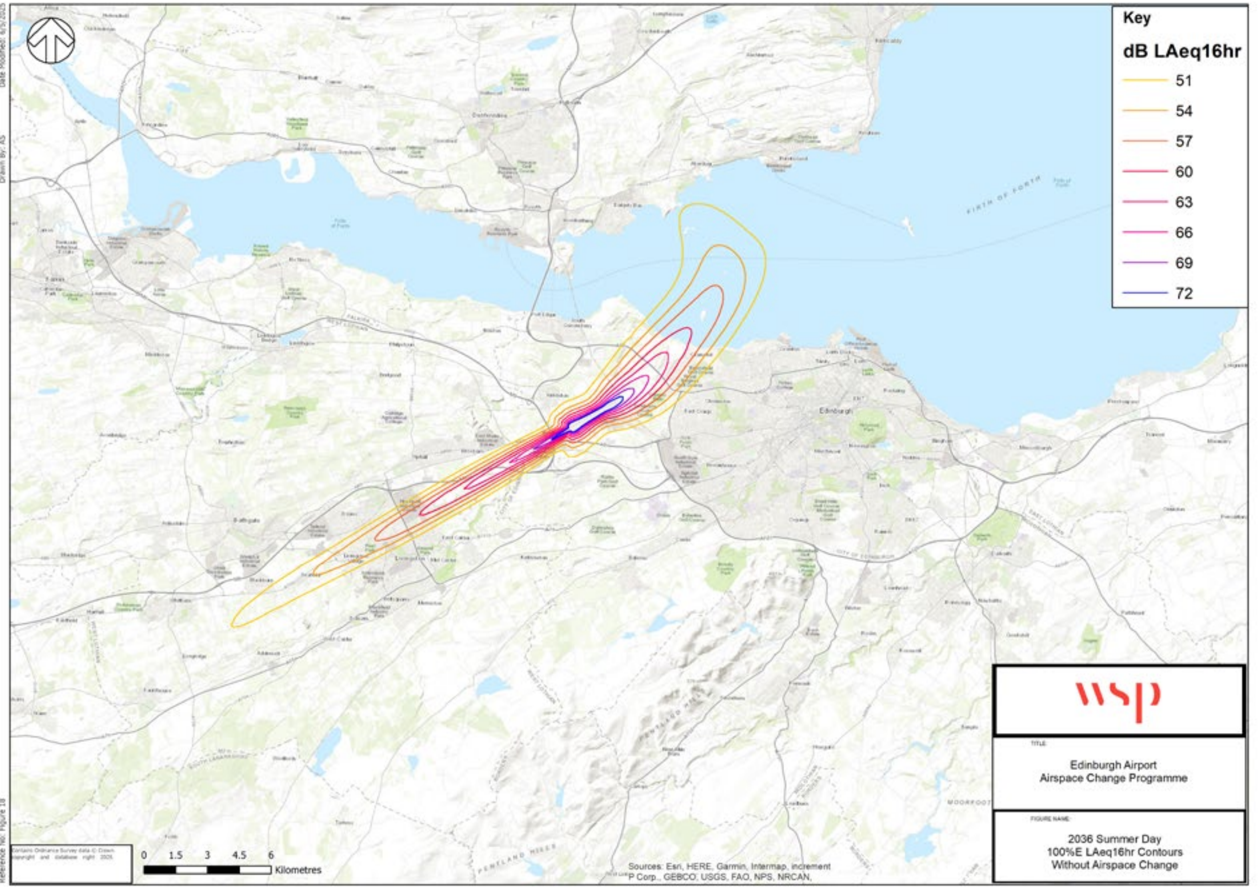


Figure 12: LAeq, 16 Hr, Day-Time 100% East "Without Airspace Change" Baseline, 2036.

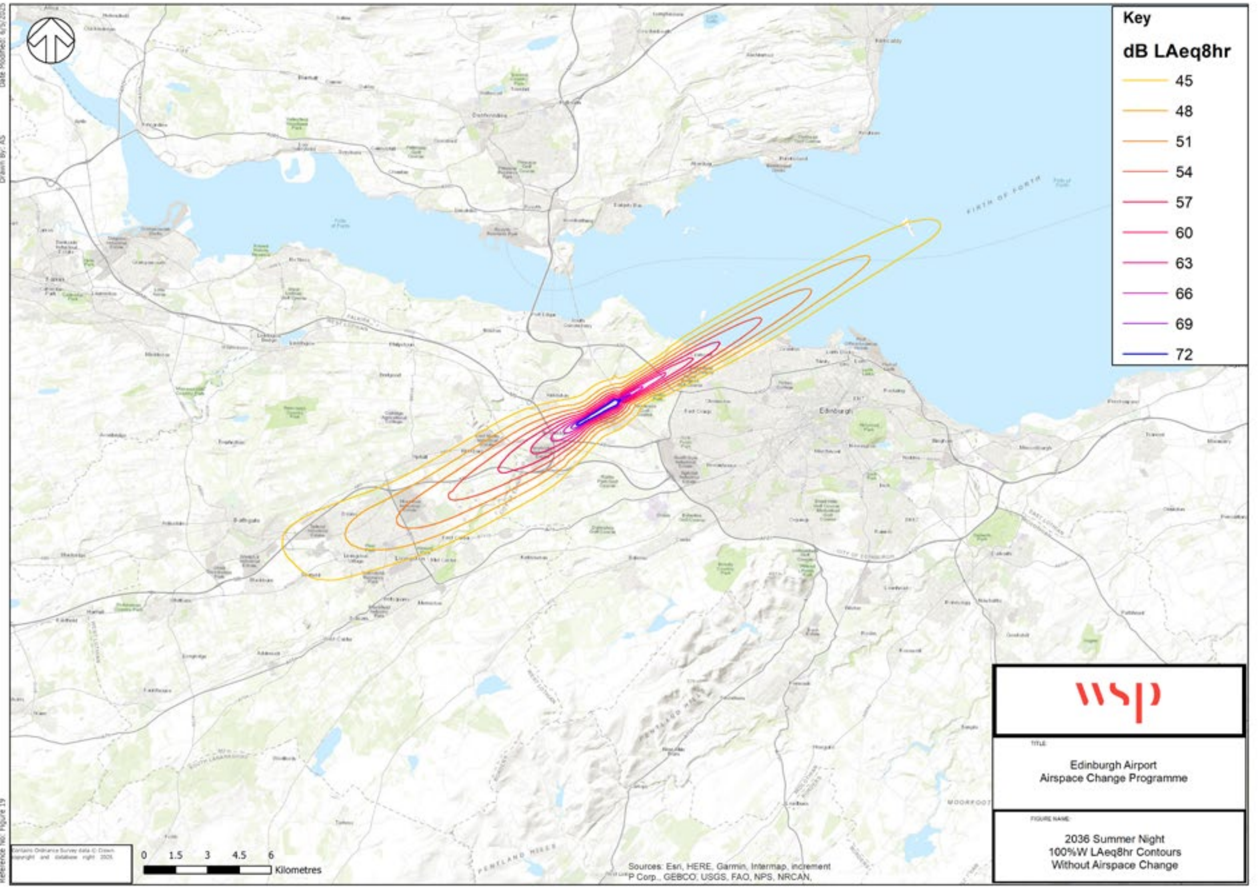


Figure 13: LAeq, 8 Hr, Night-Time 100% West "Without Airspace Change" Baseline, 2036.

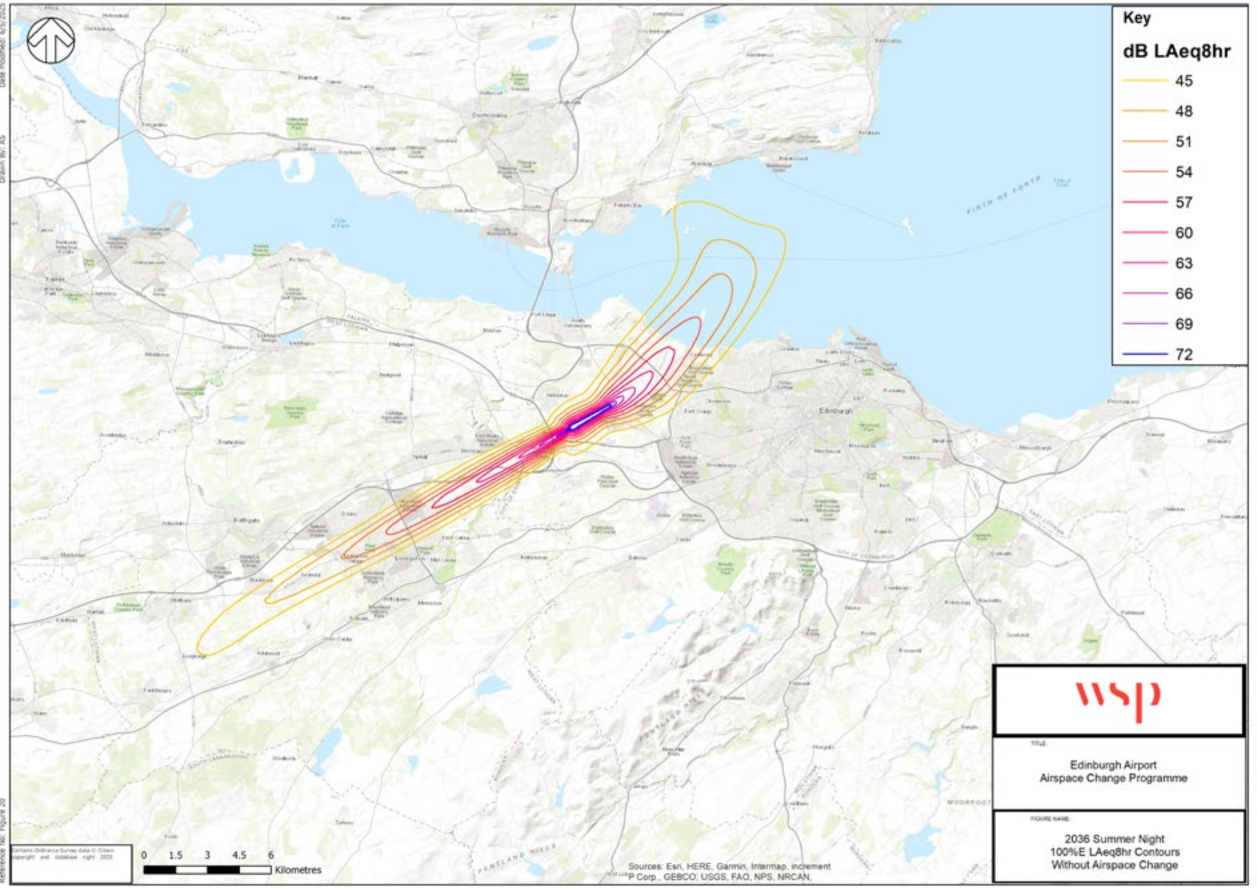


Figure 14: LAeq, 8 Hr, Night-Time 100% East "Without Airspace Change" Baseline, 2036.

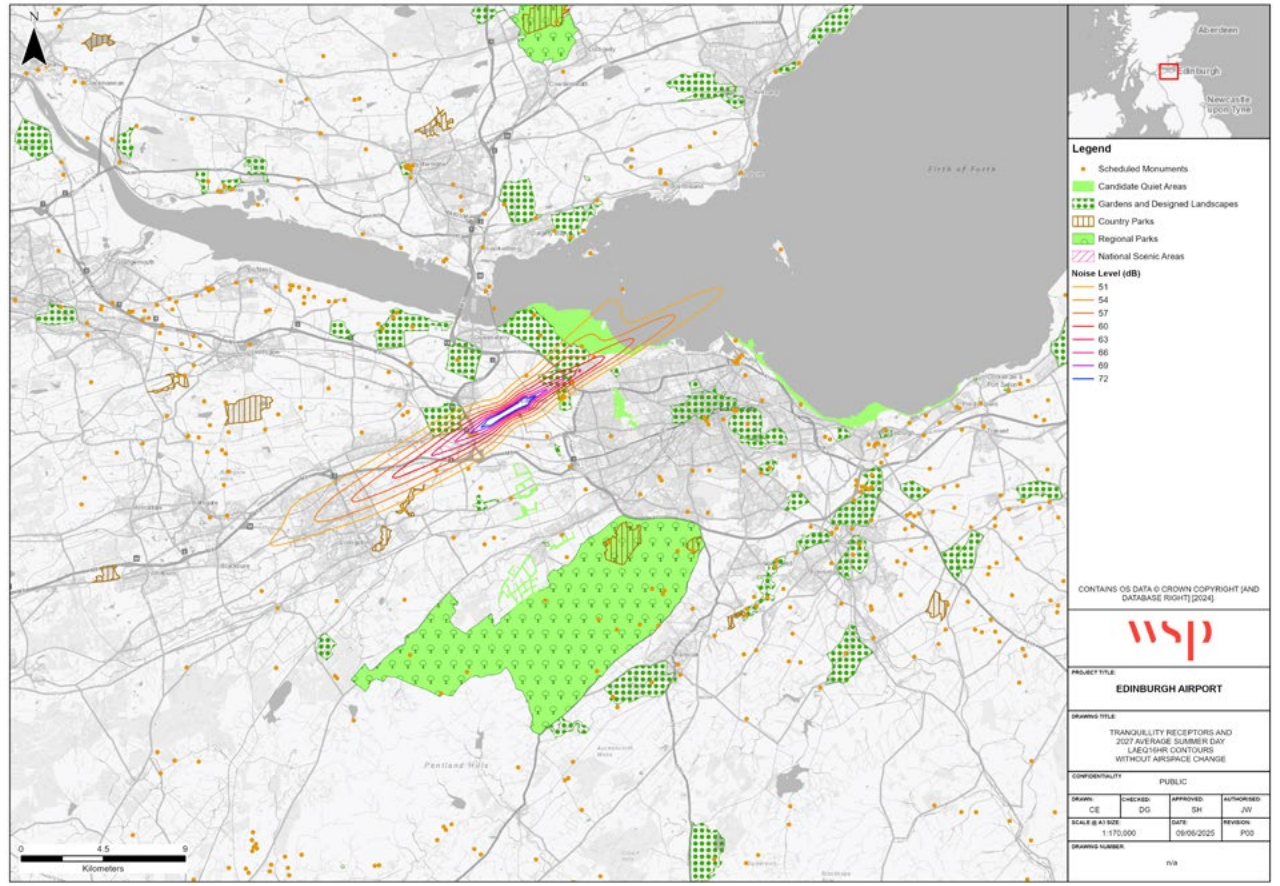


Figure 15: Tranquillity Receptors LAeq, 16 Hr, Day-Time "Without Airspace Change" Baseline, 2027.

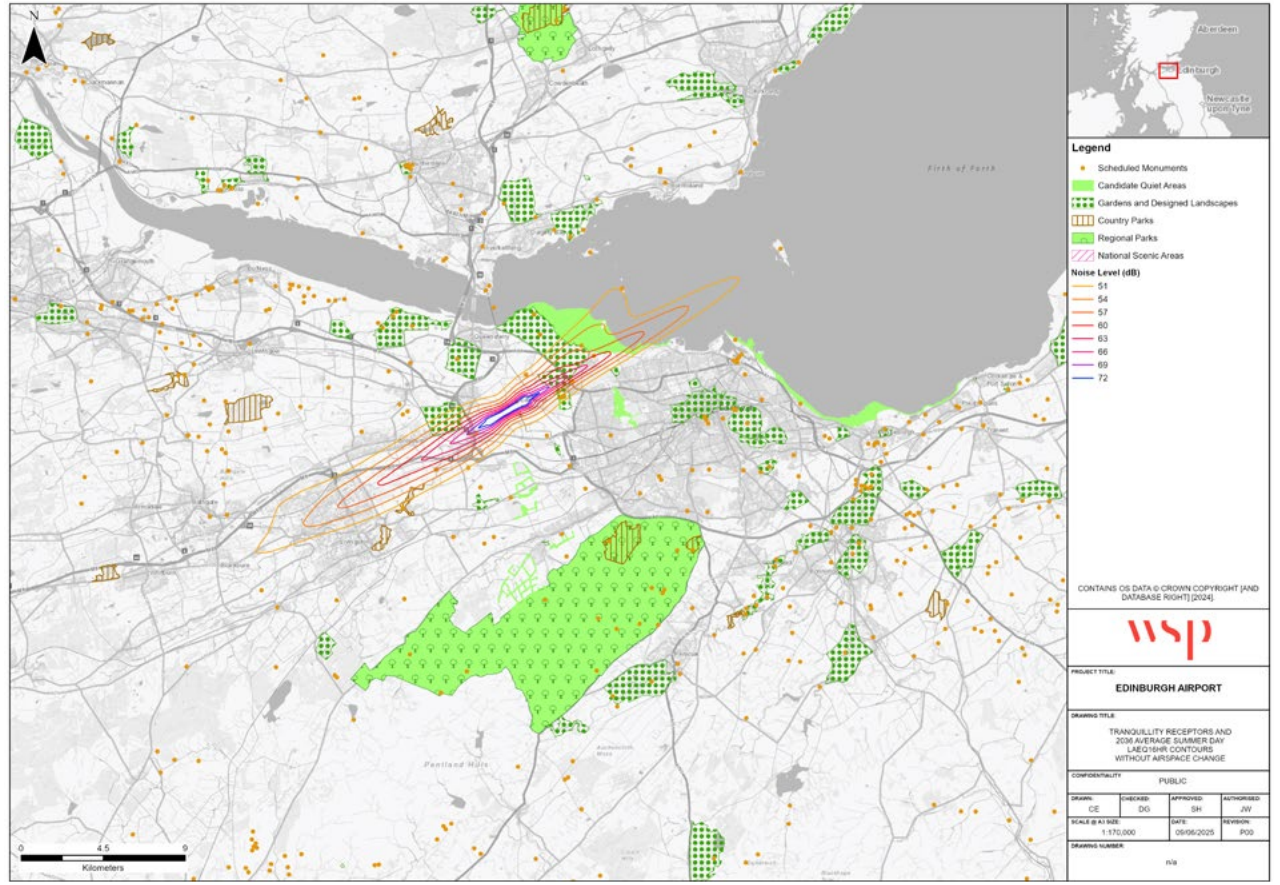


Figure 16: Tranquillity Receptors LAeq, 16 Hr, Day-Time "Without Airspace Change" Baseline, 2036.

2.2 Nx Contours for Baseline

Nx contours for the 'without airspace change' baseline are provided below.

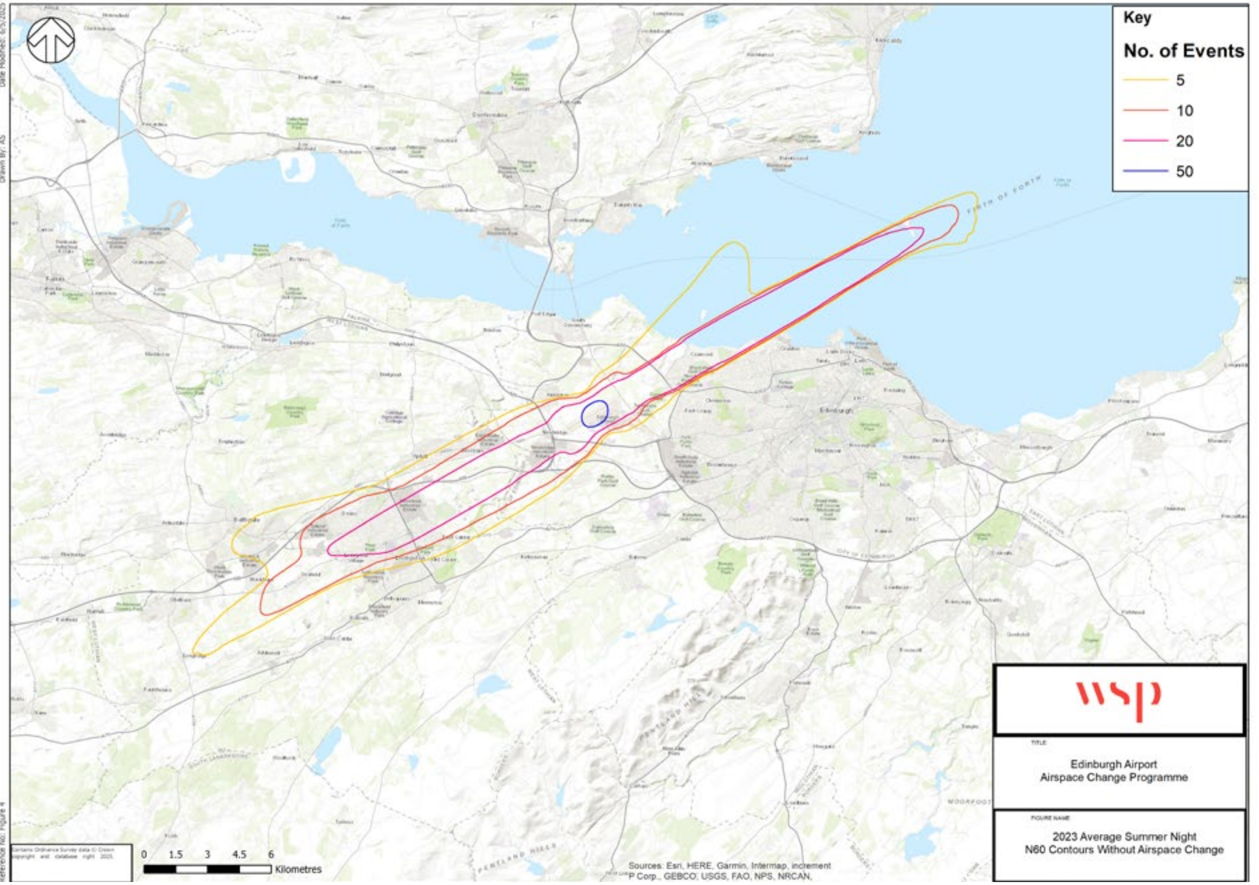


Figure 17: N60 Night-Time "Without Airspace Change" Baseline, Current Day.

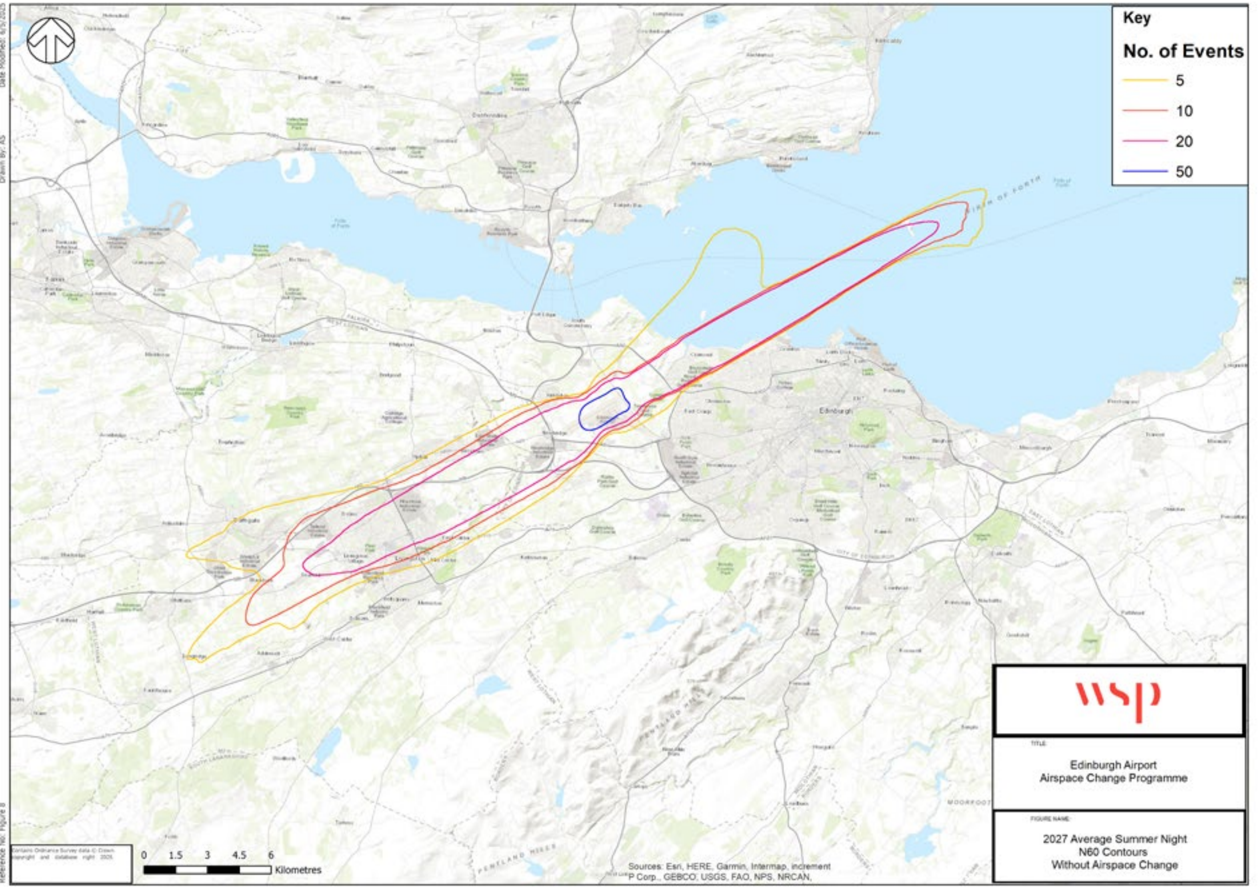


Figure 18: N60 Night-Time "Without Airspace Change" Baseline, 2027.

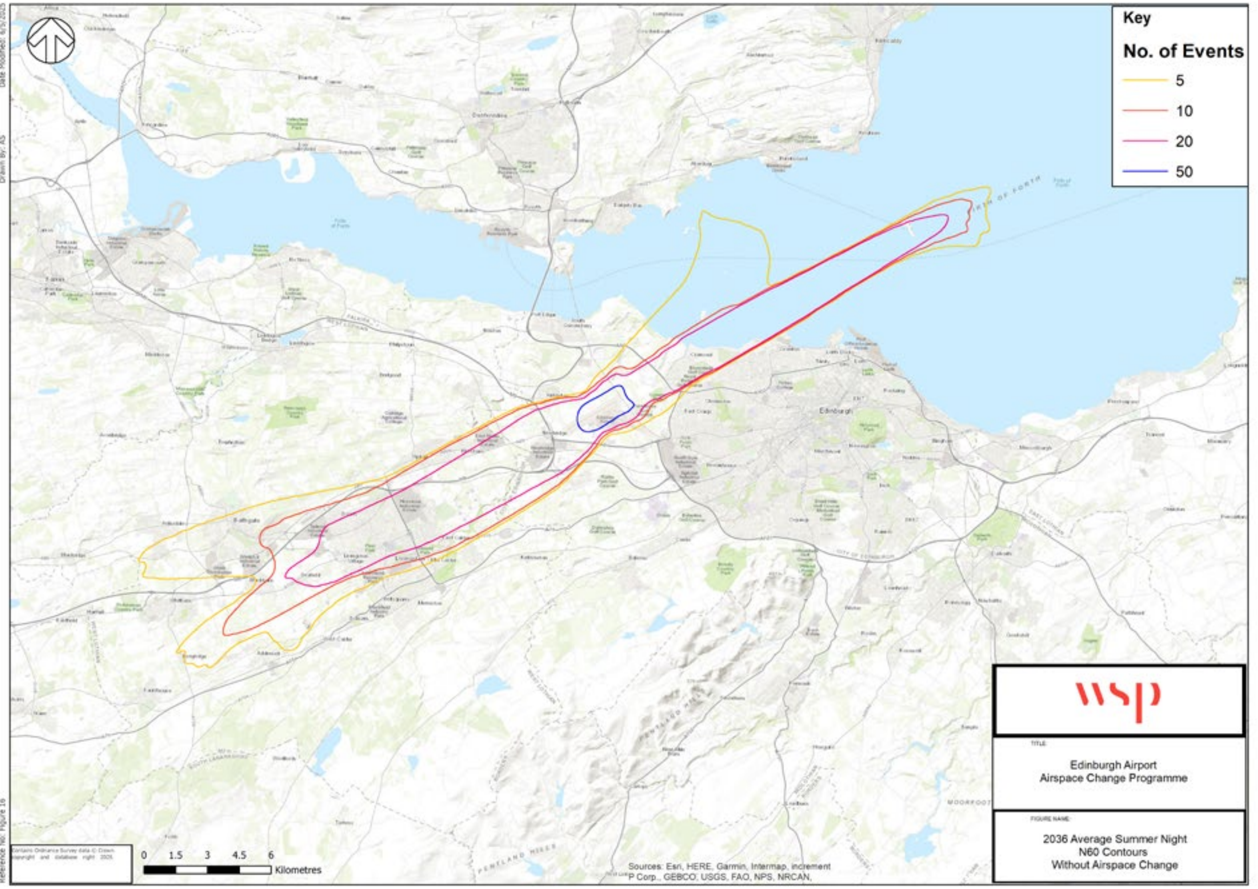


Figure 19: N60 Night-Time "Without Airspace Change" Baseline, 2036.

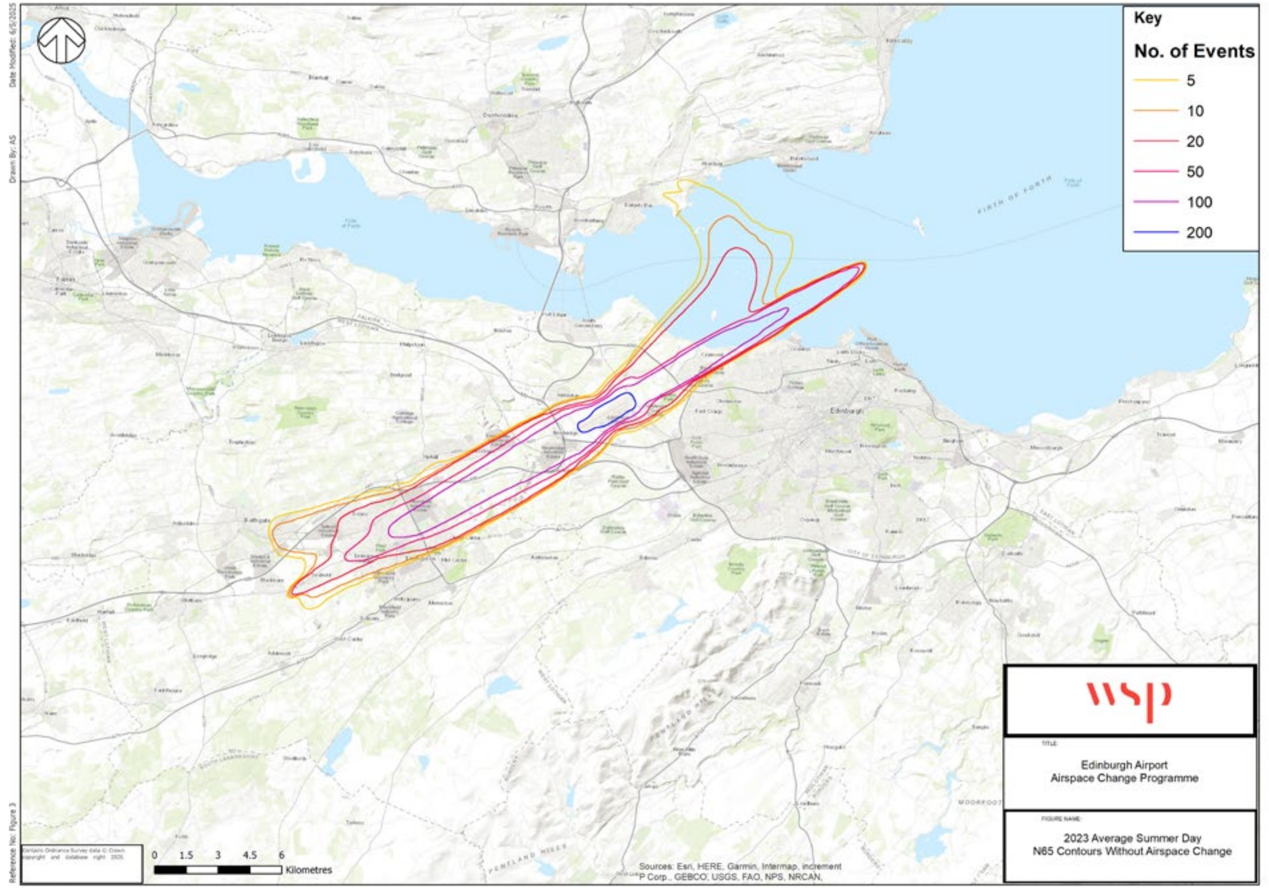


Figure 20: N65 Daytime "Without Airspace Change" Baseline, Current Day.

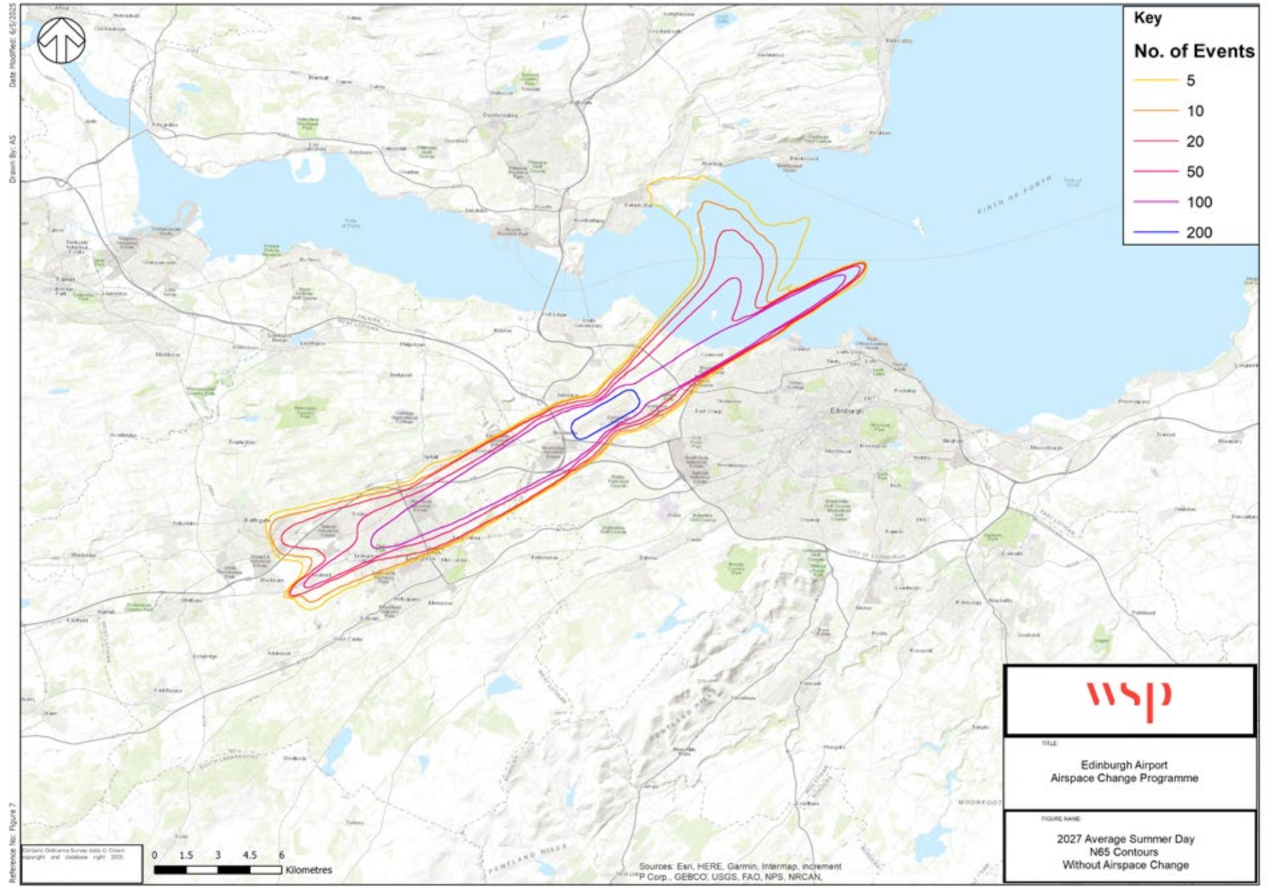


Figure 21: N65 Daytime "Without Airspace Change" Baseline, 2027.

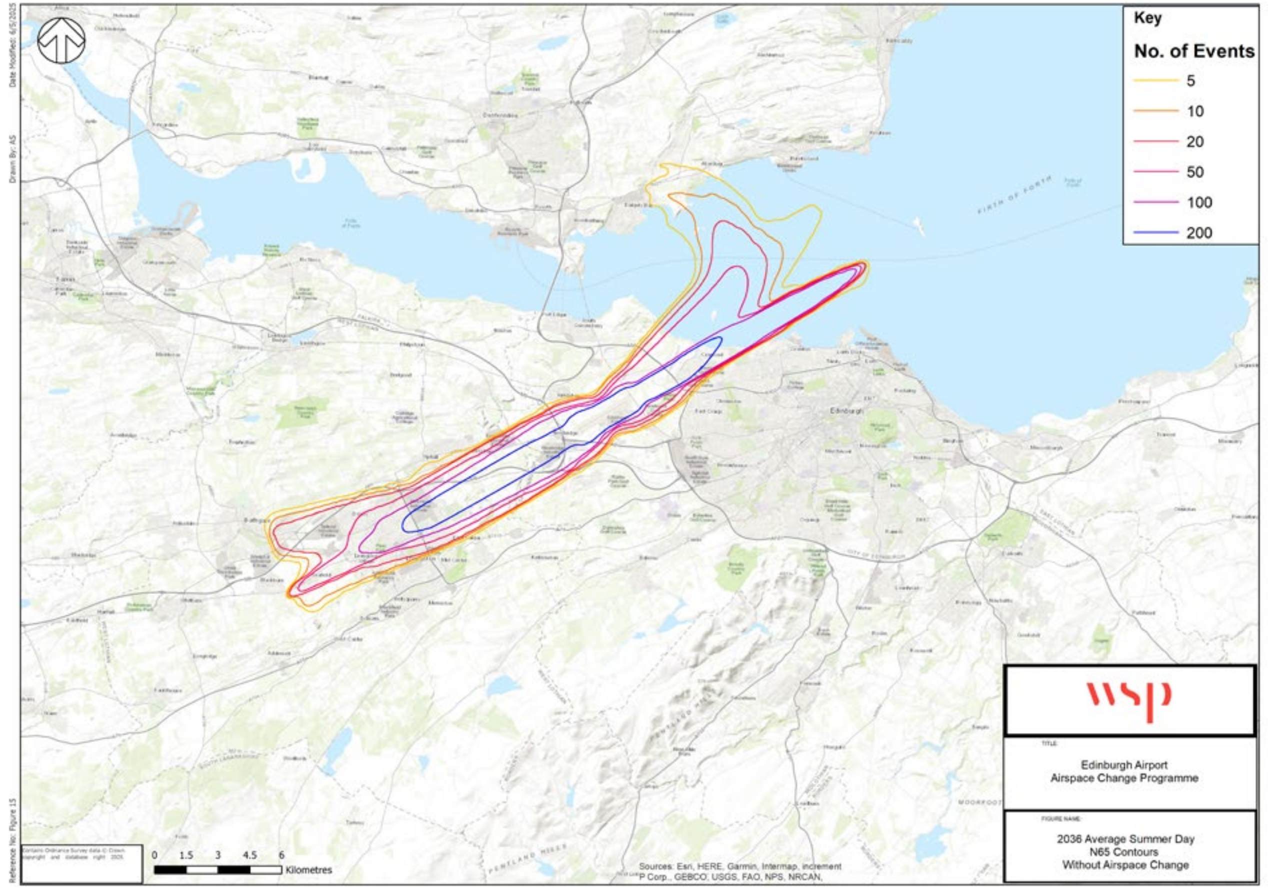


Figure 22: N65 Daytime "Without Airspace Change" Baseline, 2036.

2.3 Overflight Contours for Baseline

Overflight contours for the 'without airspace change' baseline are provided below.

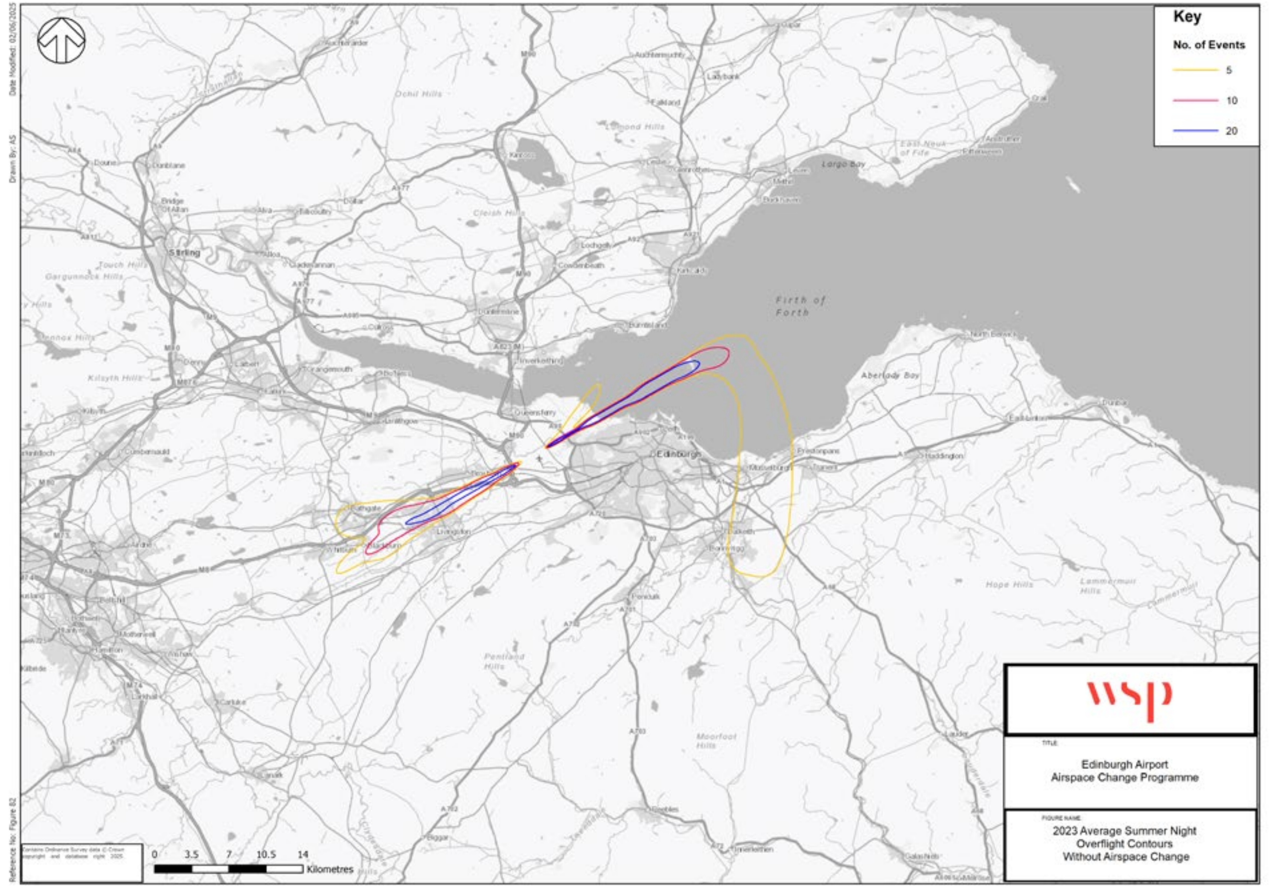


Figure 23: Overflight Night-Time "Without Airspace Change" Baseline, Current Day.

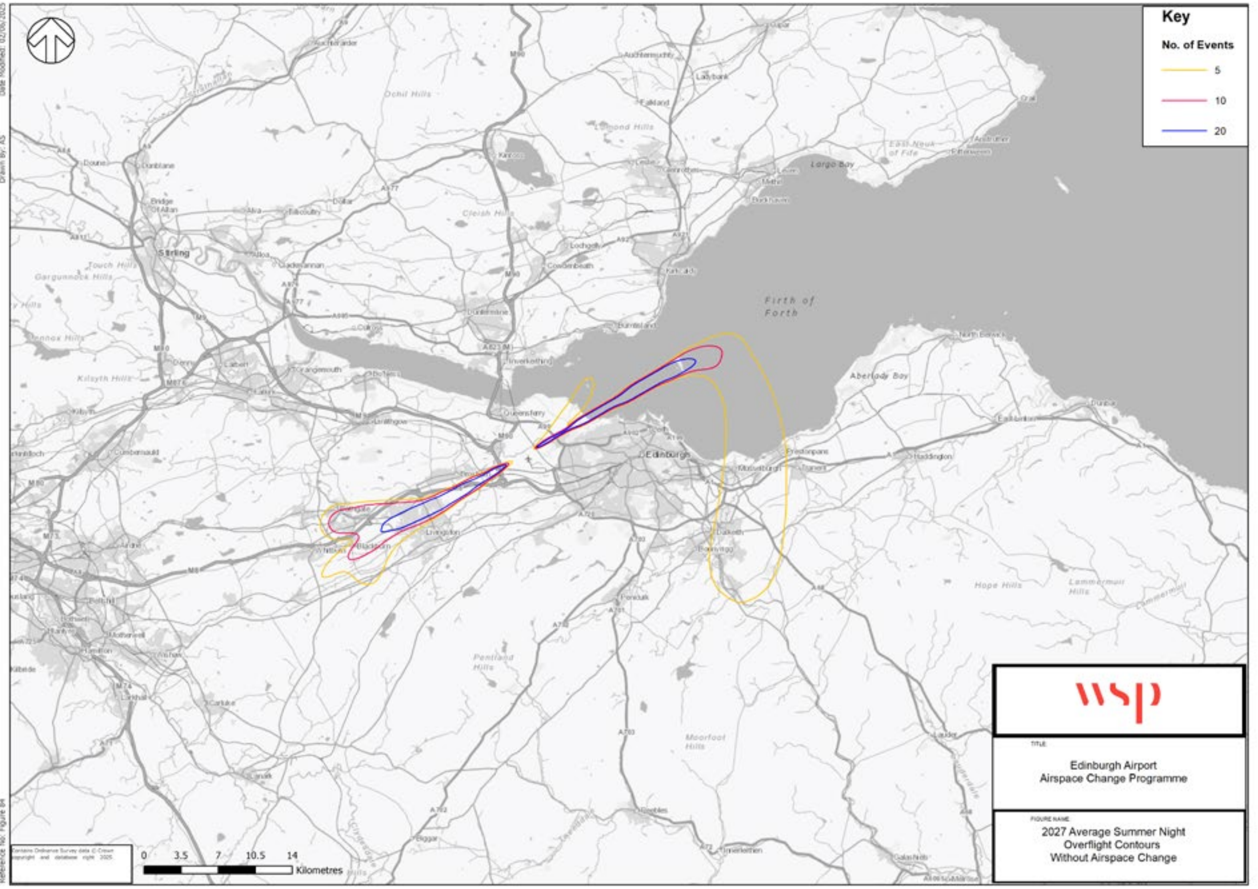


Figure 24: Overflight Night-Time "Without Airspace Change" Baseline, 2027.

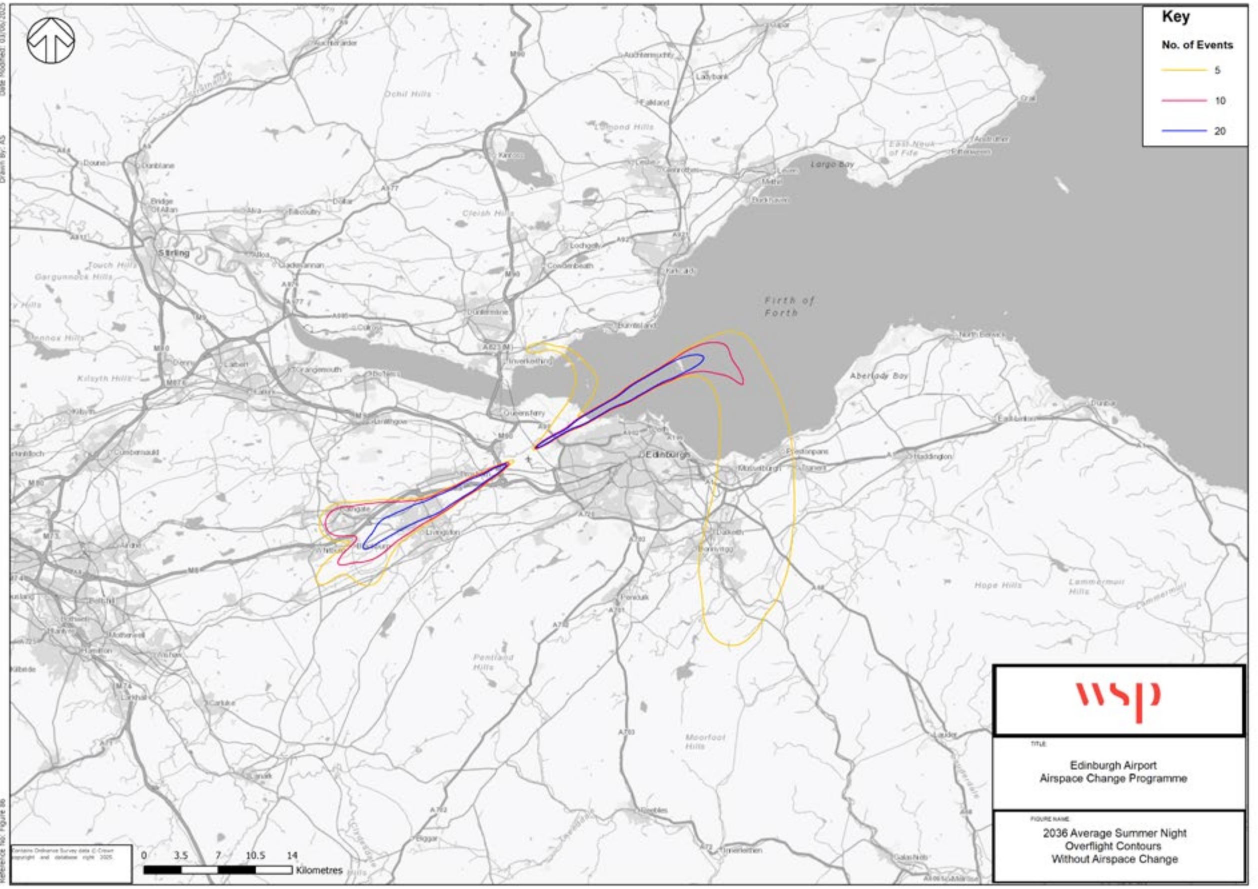


Figure 25: Overflight Night-Time "Without Airspace Change" Baseline, 2036.

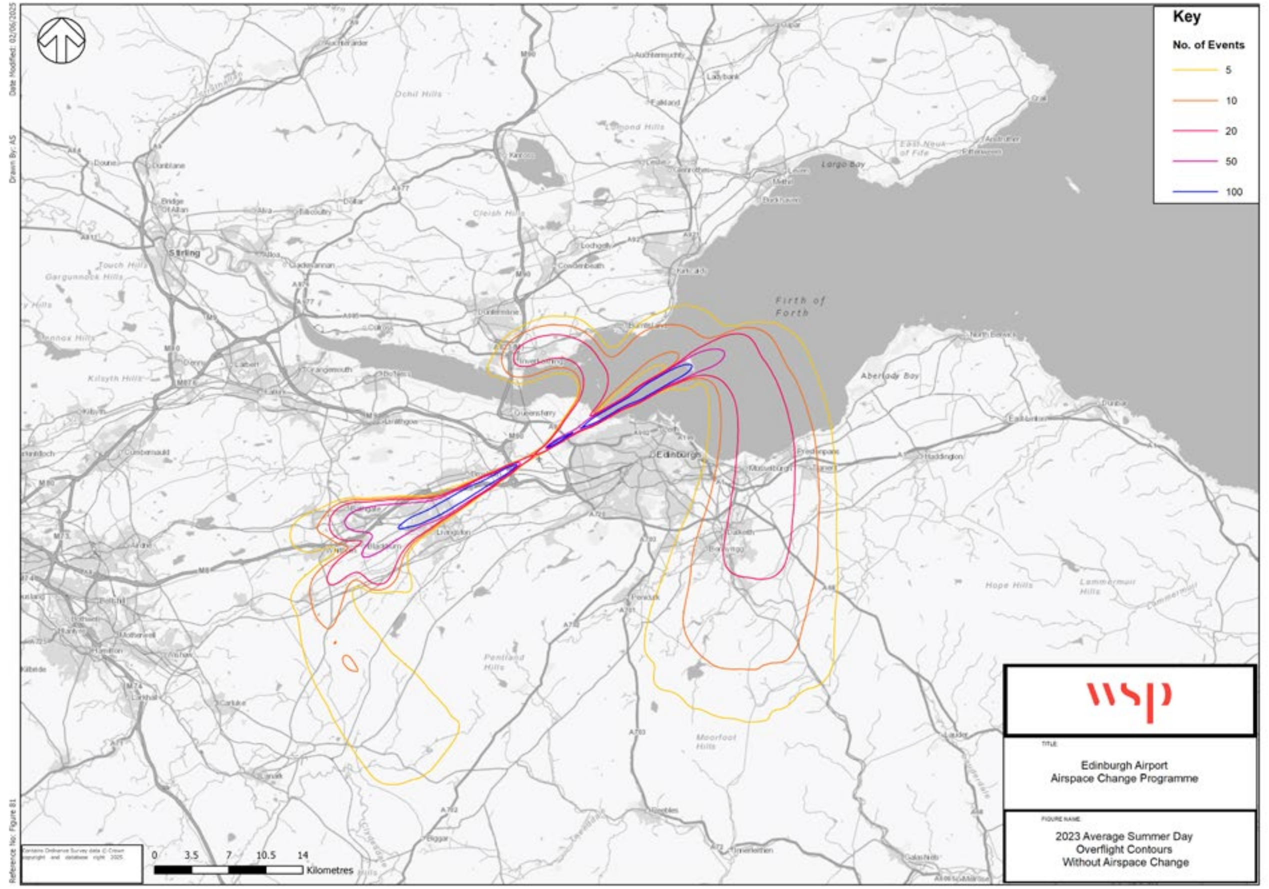


Figure 26: Overflight Daytime "Without Airspace Change" Baseline, Current Day.

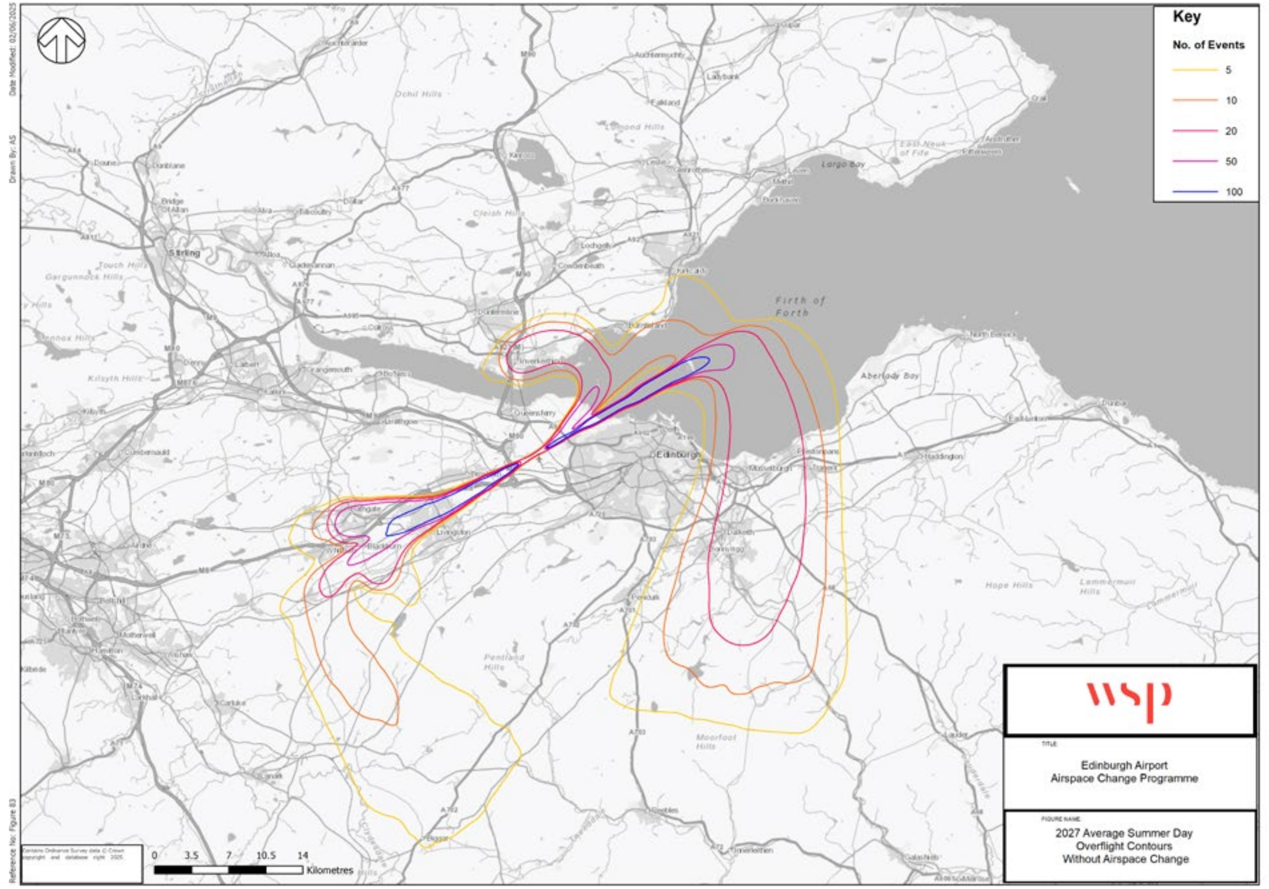


Figure 27: Overflight Daytime "Without Airspace Change" Baseline, 2027.

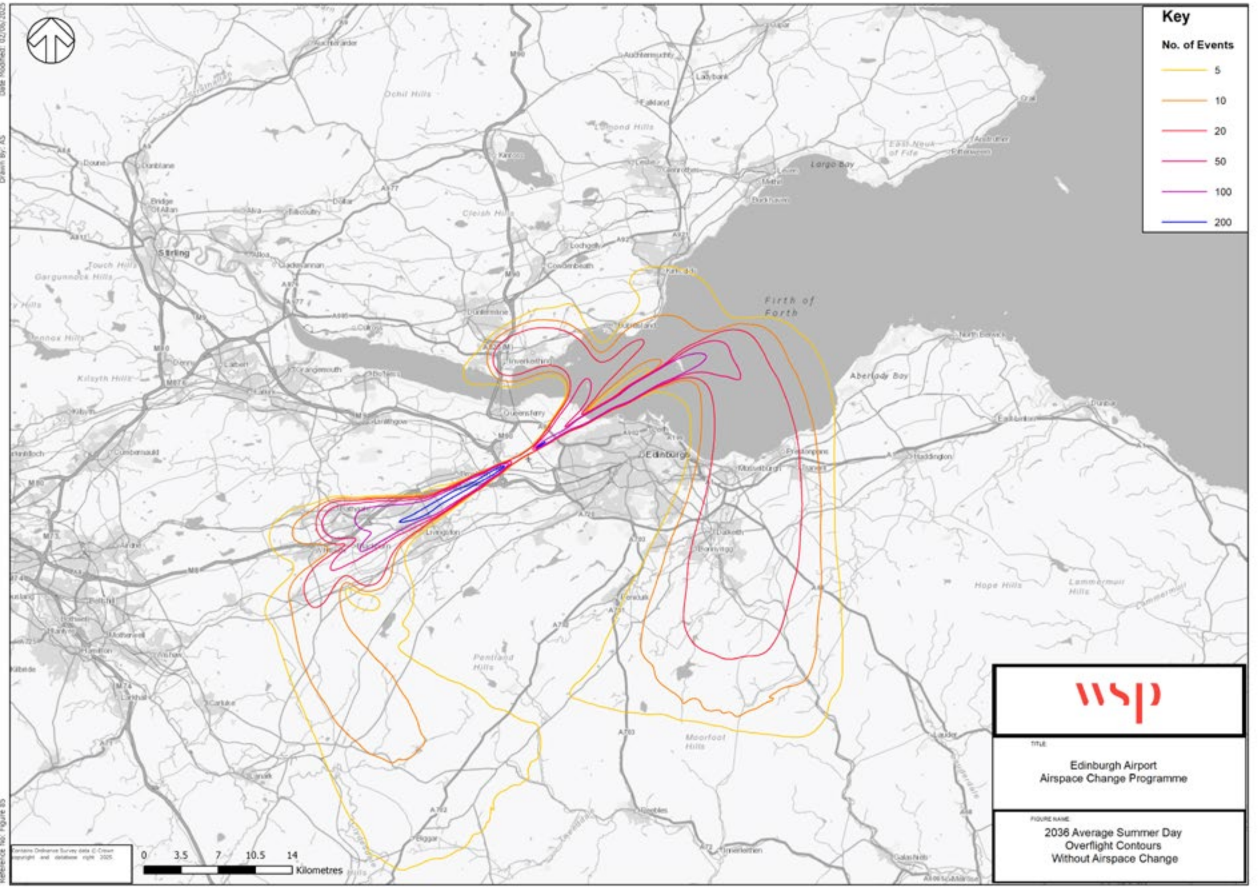


Figure 28: Overflight Daytime "Without Airspace Change" Baseline, 2036.

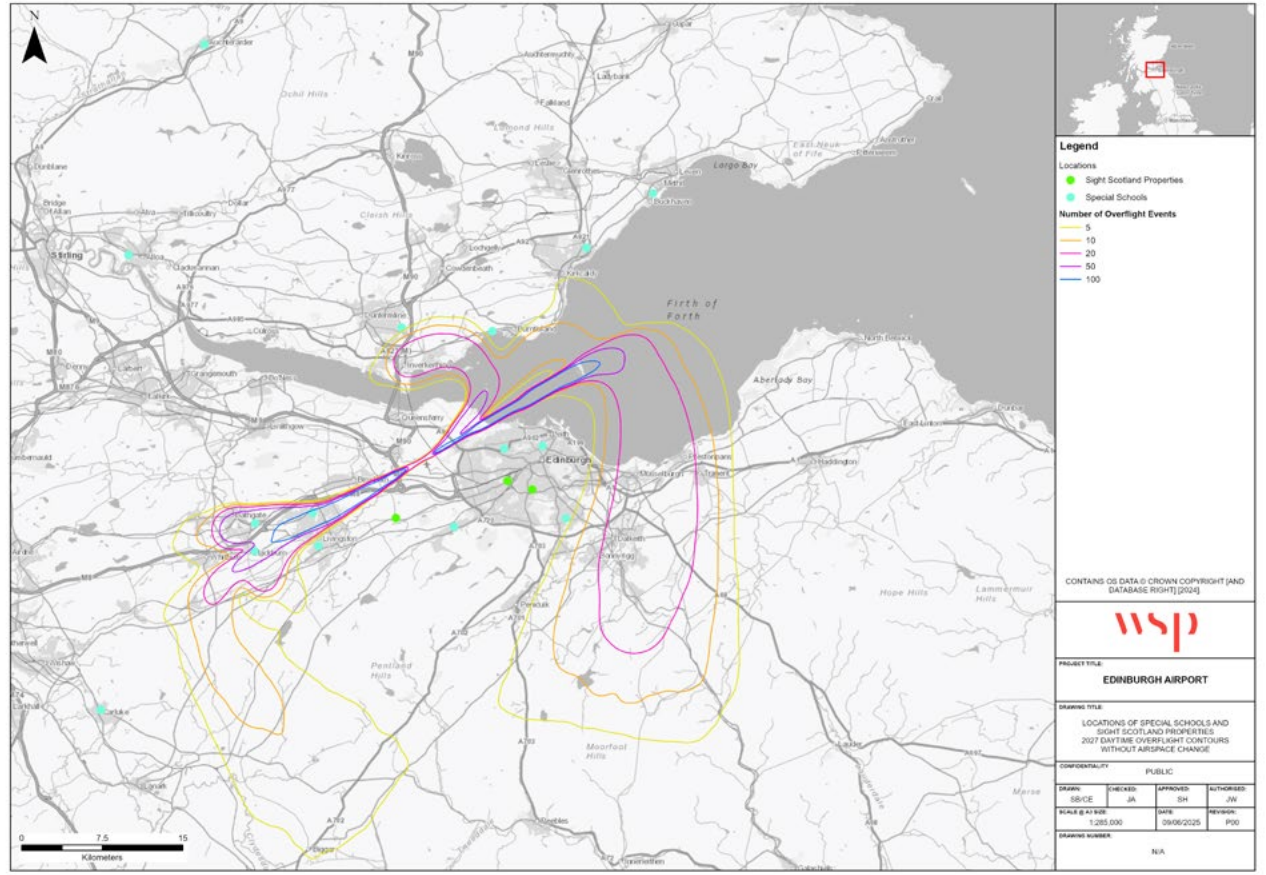


Figure 29: Special Schools and Sight Scotland Sites Overflight Daytime "Without Airspace Change" Baseline, 2027.

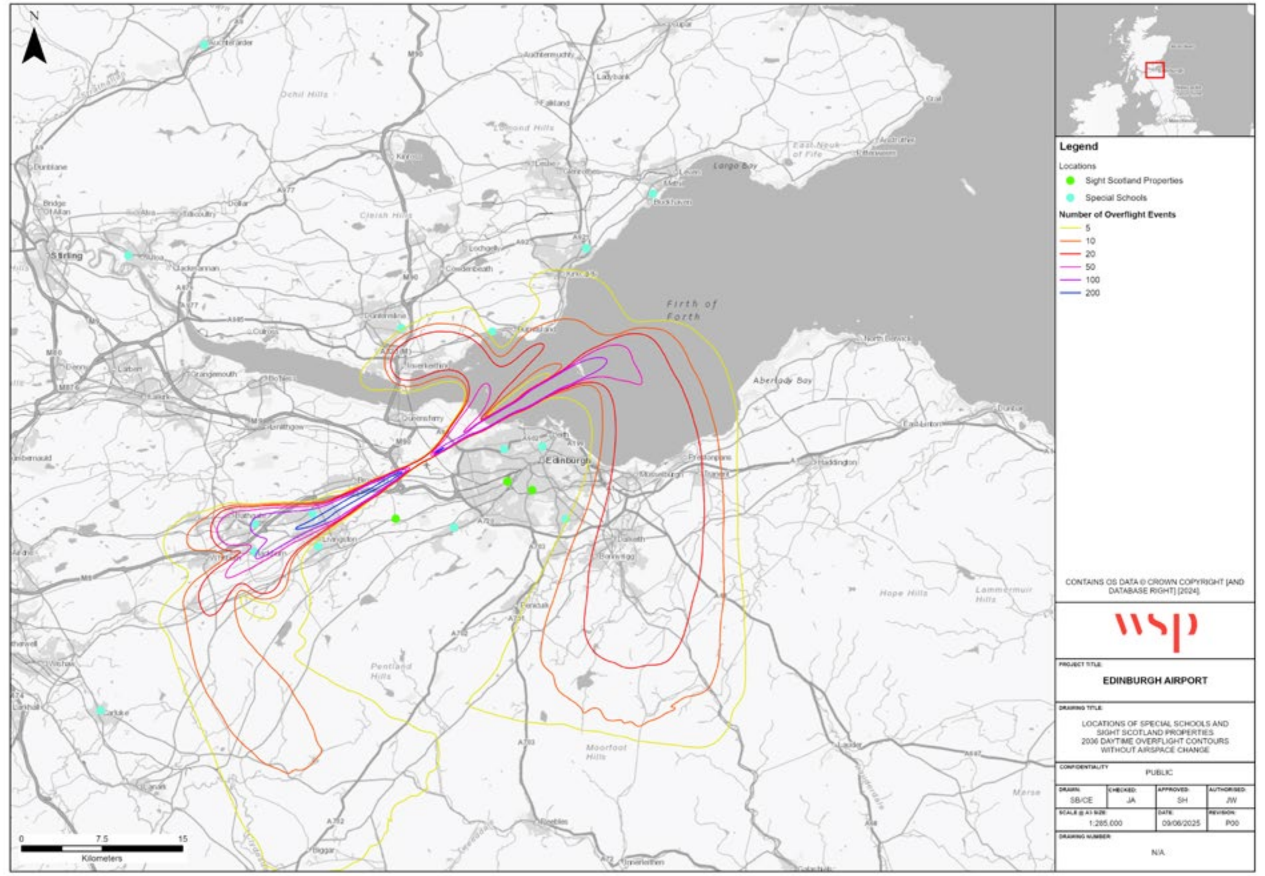


Figure 30: Special Schools and Sight Scotland Sites Overflight Daytime "Without Airspace Change" Baseline, 2036.

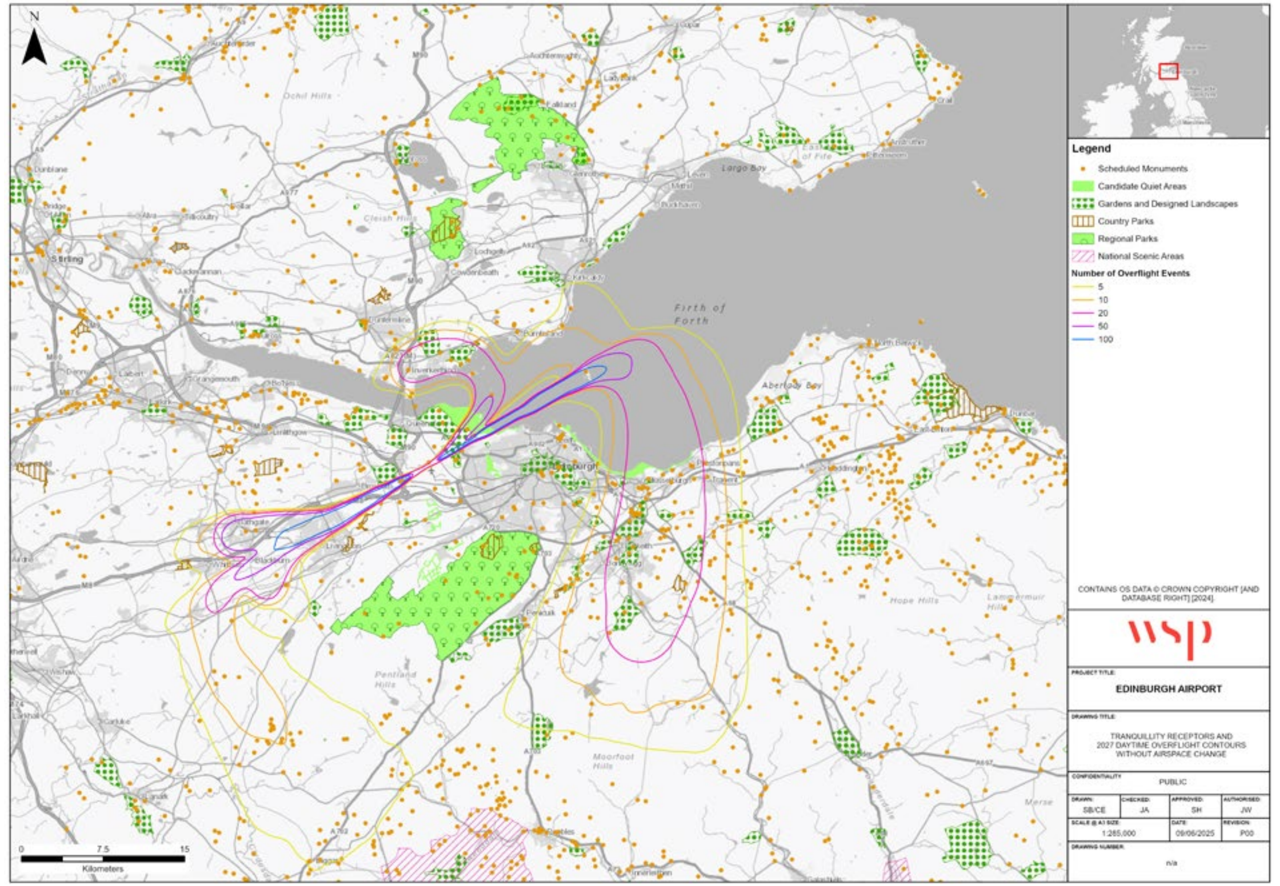


Figure 31: Tranquillity Receptors Overflight Daytime "Without Airspace Change" Baseline, 2027.

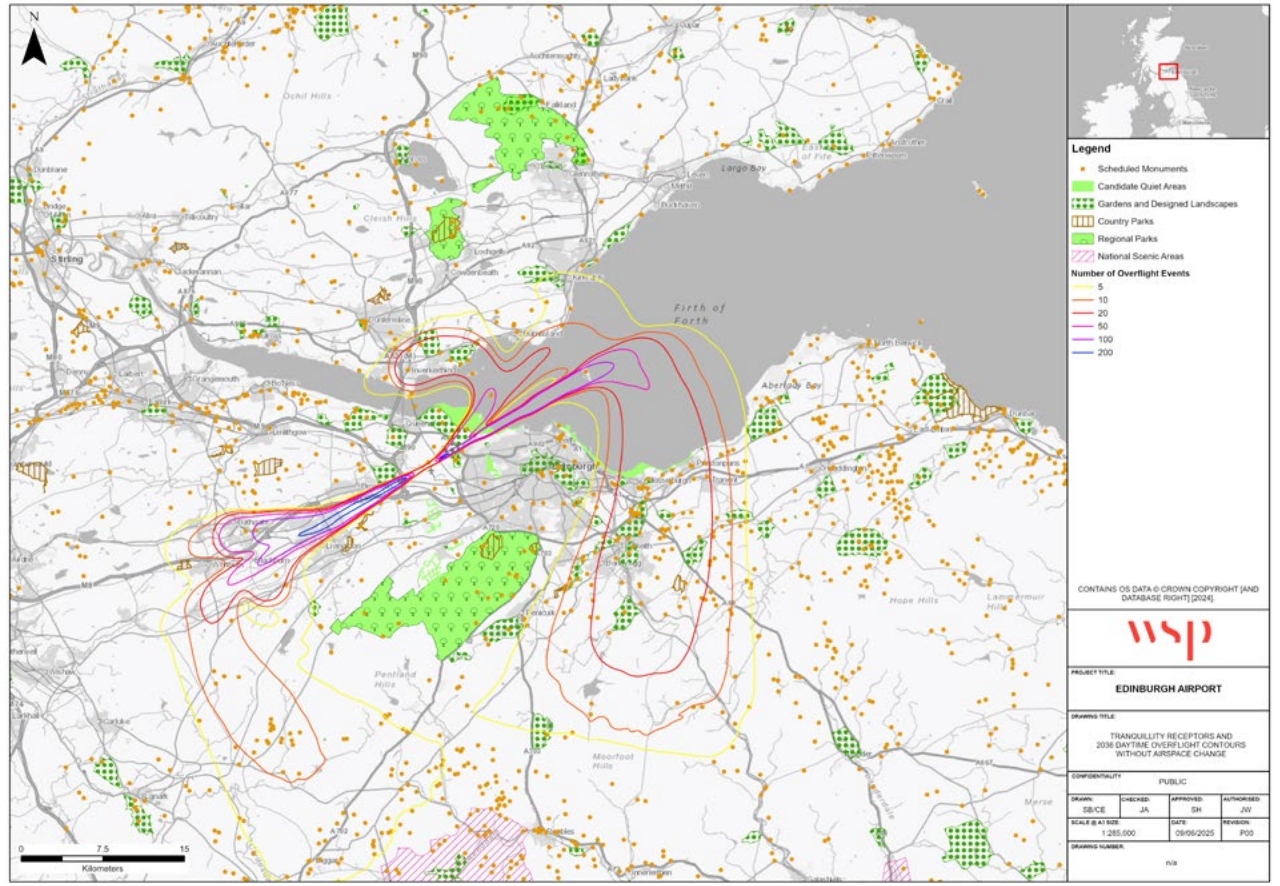


Figure 32: Tranquillity Receptors Overflight Daytime "Without Airspace Change" Baseline, 2027.

2.4 Baseline 100% Mode Noise Tables for LAeq, 16hr and LAeq, 8hr

LAeq, 16Hr and LAeq, 8Hr noise 100% mode contour tables for the "without airspace change" baseline are provided below. LAeq, 16Hr, LAeq, 8Hr, N65, N60, Overflight Day and Overflight Night Tables are provided in the Section 4 of the FOA.

Table 1: LAeq, 16 Hr, Day-Time 100% West "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Without Airspace Change	100% west LAeq 16hr	51	62.8	66,800	30,200	6	1	5	16	174
			54	37.3	17,700	8,100	3	0	1	6	132
			57	21.0	4,700	2,300	1	0	0	2	69
			60	11.2	2,900	1,400	1	0	0	1	36
			63	5.8	1,000	500	0	0	0	0	9
			66	3.0	200	100	0	0	0	0	1
			69	1.6	<100	<100	0	0	0	0	0

Table 2: LAeq, 16 Hr, Day-Time 100% West "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Without Airspace Change	100% west LAeq 16hr	51	73.1	72,900	33,000	7	1	5	19	182
			54	43.3	41,200	18,700	5	0	1	6	144
			57	25.0	6,600	3,100	1	0	0	2	82
			60	13.4	3,200	1,500	1	0	0	1	46
			63	7.0	1,900	900	1	0	0	1	15
			66	3.6	400	200	0	0	0	0	2
			69	1.9	100	<100	0	0	0	0	0

Table 3: LAeq, 16 Hr, Day-Time 100% East "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Without Airspace Change	100% east LAeq 16hr	51	61.8	28,700,	13,200	6	1	3	7	153
			54	36.9	18,500	8,500	4	1	1	4	111
			57	21.4	5,700	2,700	0	0	0	2	70
			60	11.6	800	400	0	0	0	0	25
			63	6.1	500	200	0	0	0	0	18
			66	3.0	100	<100	0	0	0	0	4
			69	1.6	<100	<100	0	0	0	0	0

Table 4: LAeq, 16 Hr, Day-Time 100% East "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Without Airspace Change	100% east LAeq 16hr	51	71.9	33,300	15,300	8	1	3	9	158
			54	42.9	20,200	9,300	6	1	2	4	122
			57	25.2	8,500	3,900	0	0	0	4	81
			60	13.8	1,500	700	0	0	0	0	29
			63	7.4	500	200	0	0	0	0	21
			66	3.6	200	100	0	0	0	0	11
			69	1.9	100	<100	0	0	0	0	0

Table 5: LAeq, 8 Hr, Night-Time 100% West "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Without Airspace Change	100% west LAeq 8hr	45	78.3	74,300	33,600	7	1	6	19	207
			48	46.7	43,300	19,600	5	1	2	9	145
			51	27.3	7,000	3,300	1	0	0	2	100
			54	14.5	3,400	1,700	1	0	0	1	57
			57	7.4	2,600	1,300	1	0	0	1	23
			60	3.7	600	300	0	0	0	0	4
			63	1.9	<100	<100	0	0	0	0	0
			66	1.0	0	0	0	0	0	0	0

Table 6: LAeq, 8 Hr, Night-Time 100% West "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Without Airspace Change	100% west LAeq 8hr	45	90.1	82,900	37,500	7	1	6	21	224
			48	53.9	53,100	24,100	5	1	3	12	152
			51	32.1	9,000	4,200	3	0	1	2	111
			54	17.5	3,700	1,800	1	0	0	2	66
			57	9.0	2,800	1,400	1	0	0	1	35
			60	4.5	1,300	600	1	0	0	1	9
			63	2.3	100	<100	0	0	0	0	0
			66	1.1	0	0	0	0		0	0

Table 7: LAeq, 8 Hr, Night-Time 100% East "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Without Airspace Change	100% east LAeq 8hr	45	77.0	39,900	18,300	8	1	4	10	181
			48	46.4	23,400	10,700	6	1	2	6	119
			51	27.3	12,400	5,700	2	0	1	4	85
			54	15.2	2,700	1,300	0	0	0	0	29
			57	8.2	500	300	0	0	0	0	20
			60	3.9	300	100	0	0	0	0	9
			63	1.9	100	<100	0	0	0	0	0
			66	1.0	<100	<100	0	0	0	0	0

Table 8: LAeq, 8 Hr, Night-Time 100% East "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Without Airspace Change	100% east LAeq 8hr	45	88.6	44,500	20,400	8	1	5	10	193
			48	53.3	27,500	12,600	6	1	2	6	132
			51	31.8	16,500	7,600	4	1	1	4	97
			54	18.0	4,900	2,300	0	0	0	2	54
			57	9.8	700	300	0	0	0	0	24
			60	4.8	300	100	0	0	0	0	14
			63	2.3	100	<100	0	0	0	0	1
			66	1.2	100	<100	0	0	0	0	0

2.6 Baseline Tranquillity Tables for LAeq, 8hr, N65, N60 and Overflights Night-Time

LAeq, 8Hr, N65, N60 and Overflight Night tables for the "without airspace change" baseline in relation to tranquillity sites are provided below. LAeq, 16Hr, and Daytime Overflight Tables are provided in Section 4 of the FOA.

Table 9: Tranquillity Sites, LAeq, 8 Hr, Night-Time "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2023	Without Airspace Change	LAeq8hr	45	1	0.2	2	3.5	5	5.8	0	0.0	0	0.0	11	0.3
			48	1	0.0	2	1.6	4	4.3	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	0.8	4	2.5	0	0.0	0	0.0	6	0.1
			54	0	0.0	1	0.3	3	1.3	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	2	0.7	0	0.0	0	0.0	3	0.0
			60	0	0.0	0	0.0	2	0.3	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 10: Tranquillity Sites, LAeq, 8 Hr, Night-Time "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Without Airspace Change	LAeq8hr	45	1	0.3	2	4.2	5	6.4	0	0.0	0	0.0	12	0.3
			48	1	0.0	2	2.8	4	4.9	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	1.0	4	3.3	0	0.0	0	0.0	6	0.2
			54	0	0.0	2	0.4	3	1.7	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	2	0.8	0	0.0	0	0.0	5	0.0
			60	0	0.0	0	0.0	2	0.4	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 11: Tranquillity Sites, LAeq, 8 Hr, Night-Time "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	LAeq8hr	45	1	0.3	2	4.5	5	6.9	0	0.0	0	0.0	15	0.4
			48	1	0.1	2	3.4	4	5.3	0	0.0	0	0.0	10	0.3
			51	0	0.0	2	1.2	4	3.8	0	0.0	0	0.0	7	0.2
			54	0	0.0	2	0.6	3	2.0	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	1.0	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 12: Tranquillity Sites, N65 Daytime "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	N65 (day)	5	1	0.3	2	5.6	5	8.5	0	0.0	0	0.0	17	0.5
			10	1	0.3	2	5.3	4	7.0	0	0.0	0	0.0	14	0.3
			20	1	0.2	2	4.6	4	6.3	0	0.0	0	0.0	12	0.3
			50	1	0.0	2	1.4	4	3.5	0	0.0	0	0.0	7	0.2
			100	0	0.0	2	1.0	4	2.3	0	0.0	0	0.0	6	0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 13: Tranquillity Sites, N65 Daytime "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Without Airspace Change	N65 (day)	5	1	0.3	2	5.7	5	9.8	0	0.0	0	0.0	19	0.5
			10	1	0.3	2	5.4	4	7.2	0	0.0	0	0.0	15	0.3
			20	1	0.3	2	4.9	4	6.7	0	0.0	0	0.0	12	0.3
			50	1	0.1	2	3.9	4	5.5	0	0.0	0	0.0	11	0.3
			100	1	0.0	2	1.2	4	3.0	0	0.0	0	0.0	6	0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 14: Tranquillity Sites, N65 Daytime "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	N65 (day)	5	1	0.4	2	5.8	7	10.1	0	0.0	0	0.0	19	0.5
			10	1	0.3	2	5.5	5	7.7	0	0.0	0	0.0	16	0.4
			20	1	0.3	2	5.1	4	6.8	0	0.0	0	0.0	14	0.3
			50	1	0.1	2	4.2	4	5.9	0	0.0	0	0.0	12	0.3
			100	1	0.0	2	1.3	4	3.2	0	0.0	0	0.0	7	0.2
			200	0	0.0	2	0.3	4	1.8	0	0.0	0	0.0	5	0.1

Table 15: Tranquillity Sites, N60 Night-Time "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2023	Without Airspace Change	N60 (night)	5	2	0.5	2	5.1	5	7.9	0	0.0	0	0.0	17	0.7
			10	1	0.3	2	2.0	5	5.1	0	0.0	0	0.0	12	0.5
			20	0	0.0	2	1.8	5	3.1	0	0.0	0	0.0	8	0.3
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 16: Tranquillity Sites, N60 Night-Time "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Without Airspace Change	N60 (night)	5	2	0.5	2	5.5	5	8.2	0	0.0	0	0.0	18	0.7
			10	1	0.3	2	2.1	5	5.4	0	0.0	0	0.0	13	0.6
			20	1	0.1	2	1.9	5	4.3	0	0.0	0	0.0	10	0.4
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 17: Tranquillity Sites, N60 Night-Time "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Without Airspace Change	N60 (night)	5	2	0.5	2	5.7	5	8.4	0	0.0	0	0.0	18	0.9
			10	2	0.4	2	2.4	5	6.1	0	0.0	0	0.0	15	0.6
			20	1	0.2	2	2.0	5	4.8	0	0.0	0	0.0	11	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 18: Tranquillity Sites, Overflight Night-Time, "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2023	Without Airspace Change	Overflights Night	5	1	0.1	2	3.4	7	8.8	0	0.0	0	0.0	47	1.9
			10	0	0.0	1	0.6	2	0.5	0	0.0	0	0.0	5	0.4
			20	0	0.0	1	0.4	2	0.2	0	0.0	0	0.0	4	0.2

Table 19: Tranquillity Sites, Overflight Night-Time, "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Without Airspace Change	Overflights Night	5	1	1.0	2	4.1	9	12.4	0	0.0	0	0.0	59	2.2
			10	0	0.0	1	0.7	2	0.6	0	0.0	0	0.0	7	0.4
			20	0	0.0	1	0.5	2	0.3	0	0.0	0	0.0	4	0.3

Table 20: Tranquillity Sites, Overflight Night-Time, "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Without Airspace Change	Overflights Night	5	1	1.0	2	4.8	14	18.8	0	0.0	0	0.0	71	2.8
			10	0	0.0	1	0.7	2	0.7	0	0.0	0	0.0	7	0.5
			20	0	0.0	1	0.5	2	0.4	0	0.0	0	0.0	5	0.4

2.8 Baseline Biodiversity Tables for LAeq, 16hr, LAeq, 8hr, N65, N60 and Day/Night Overflight contours

1. Data relating to biodiversity site within the LAeq, 16hr, LAeq, 8hr, N65, N60 and Day/Night overflight contours for the "without airspace change" baseline are provided below. The overflight Tables include additional data not shown in the main report (relating to Local nature Reserves, National Nature Reserves and SSSI).

Table 21: Biodiversity Sites in Relation to LAeq, 16hr, Daytime "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2023	Without Airspace Change	LAeq16hr	51	1	0.2	0	0.0	1	3.3	0	0.0	3	9.4	1	3.3
			54	1	0.0	0	0.0	1	0.9	0	0.0	3	2.4	1	0.9
			57	0	0.0	0	0.0	1	0.2	0	0.0	1	0.2	1	0.2
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 22: Biodiversity Sites in Relation to LAeq, 16hr, Daytime "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Without Airspace Change	LAeq16hr	51	1	0.3	0	0.0	1	4.0	0	0.0	3	16.4	1	4.0
			54	1	0.1	0	0.0	1	2.0	0	0.0	3	5.1	1	2.0
			57	1	0.0	0	0.0	1	0.5	0	0.0	2	0.8	1	0.5
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 23: Biodiversity Sites in Relation to LAeq, 16hr, Daytime "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	LAeq16hr	51	2	0.4	0	0.0	1	4.3	0	0.0	3	21.4	1	4.3
			54	1	0.1	0	0.0	1	2.9	0	0.0	3	7.3	1	2.9
			57	1	0.0	0	0.0	1	0.7	0	0.0	2	1.4	1	0.7
			60	0	0.0	0	0.0	1	0.0	0	0.0	1	0.0	1	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
				0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 24: Biodiversity Sites in Relation to LAeq, 8hr, Night-Time "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	LAeq8hr	45	1	0.2	0	0.0	1	3.4	0	0.0	3	17.2	1	3.5
			48	1	0.1	0	0.0	1	1.5	0	0.0	3	7.3	1	1.5
			51	1	0.0	0	0.0	1	0.8	0	0.0	3	2.4	1	0.8
			54	0	0.0	0	0.0	1	0.3	0	0.0	1	0.3	1	0.3
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 25: Biodiversity Sites in Relation to LAeq, 8hr, Night-Time "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Without Airspace Change	LAeq8hr	45	2	0.7	0	0.0	1	4.1	0	0.0	3	24.2	2	4.2
			48	1	0.2	0	0.0	1	2.8	0	0.0	3	9.5	1	2.8
			51	1	0.0	0	0.0	1	1.0	0	0.0	3	3.2	1	1.0
			54	0	0.0	0	0.0	1	0.4	0	0.0	2	0.5	1	0.4
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 26: Biodiversity Sites in Relation to LAeq, 8hr, Night-Time "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	LAeq8hr	45	2	1.0	0	0.0	1	4.4	0	0.0	3	30.0	3	4.6
			48	1	0.2	0	0.0	1	3.4	0	0.0	3	12.3	1	3.4
			51	1	0.1	0	0.0	1	1.2	0	0.0	3	4.5	1	1.2
			54	0	0.0	0	0.0	1	0.6	0	0.0	2	0.9	1	0.6
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 27: Biodiversity Sites in Relation to N65, Daytime "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	N65 (day)	5	2	0.9	0	0.0	3	5.8	0	0.0	5	51.4	11	6.2
			10	2	0.7	0	0.0	1	5.2	0	0.0	3	38.7	4	5.5
			20	2	0.5	0	0.0	1	4.5	0	0.0	3	25.7	3	4.6
			50	1	0.1	0	0.0	1	1.4	0	0.0	3	8.7	1	1.4
			100	1	0.0	0	0.0	1	1.0	0	0.0	3	3.0	1	1.0
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 28: Biodiversity Sites in Relation to N65, Daytime "Without Airspace Change" Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Without Airspace Change	N65 (day)	5	2	1.0	0	0.0	3	6.1	0	0.0	5	56.4	11	6.5
			10	2	0.8	0	0.0	1	5.3	0	0.0	3	43.8	5	5.7
			20	2	0.5	0	0.0	1	4.8	0	0.0	3	31.5	4	5.2
			50	2	0.2	0	0.0	1	3.8	0	0.0	3	15.9	1	3.8
			100	1	0.1	0	0.0	1	1.2	0	0.0	3	7.3	1	1.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 29: Biodiversity Sites in Relation to N65, Daytime "Without Airspace Change" Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Without Airspace Change	N65 (day)	5	2	1.1	0	0.0	3	6.3	0	0.0	5	60.6	12	6.7
			10	2	0.9	0	0.0	2	5.6	0	0.0	4	47.6	10	6.0
			20	2	0.6	0	0.0	1	5.0	0	0.0	3	35.2	4	5.4
			50	2	0.3	0	0.0	1	4.1	0	0.0	3	19.4	2	4.2
			100	1	0.1	0	0.0	1	1.3	0	0.0	3	8.1	1	1.3
			200	1	0.0	0	0.0	1	0.3	0	0.0	1	0.3	1	0.3

Table 30: Biodiversity Sites in Relation to N60, Night-Time "Without Airspace Change" Baseline, Current Day

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2023	Without Airspace Change	N60 (night)	5	2	1.8	0	0.0	1	5.0	0	0.0	3	45.5	7	5.4
			10	2	1.0	0	0.0	1	2.0	0	0.0	3	24.1	3	2.2
			20	1	0.2	0	0.0	1	1.8	0	0.0	3	18.9	1	1.8
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 31: Biodiversity Sites in Relation to N60, Night-Time “Without Airspace Change” Baseline, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Without Airspace Change	N60 (night)	5	2	1.8	0	0.0	1	5.4	0	0.0	3	55.1	8	5.8
			10	2	1.3	0	0.0	1	2.0	0	0.0	3	25.6	3	2.3
			20	2	0.4	0	0.0	1	1.9	0	0.0	3	20.9	1	1.9
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 32: Biodiversity Sites in Relation to N60, Night-Time “Without Airspace Change” Baseline, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Without Airspace Change	N60 (night)	5	2	1.8	0	0.0	1	5.6	0	0.0	3	62.6	8	6.0
			10	2	1.6	0	0.0	1	2.3	0	0.0	3	27.3	3	2.6
			20	2	0.8	0	0.0	1	1.9	0	0.0	3	22.2	2	1.9
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

3 Additional Figures and Tables for Option 1

3.1 LAeq Contours For Option 1

The main document presents data tables for LAeq Contours. The Figures below present the contours themselves.

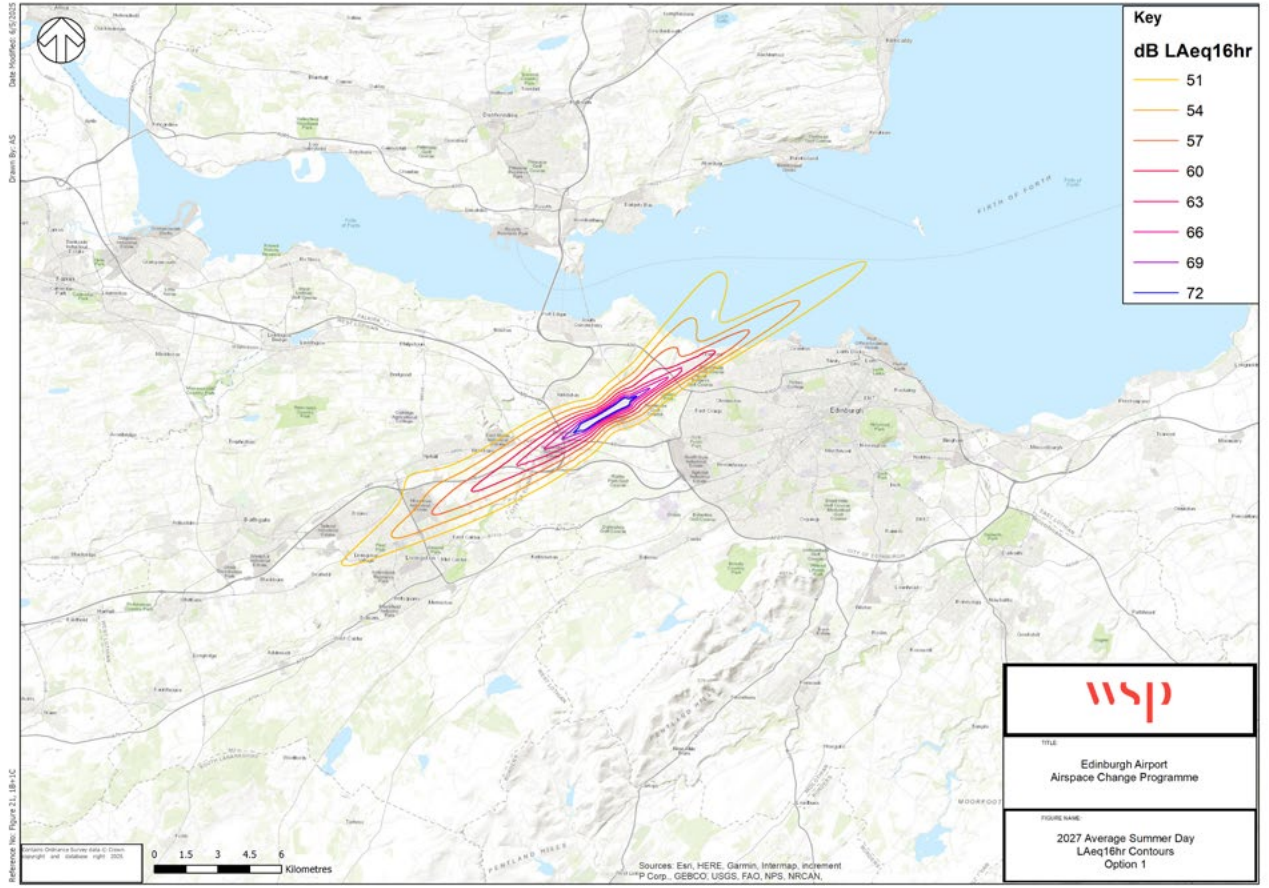


Figure 33: LAeq, 16 Hr, Daytime Option 1, 2027.

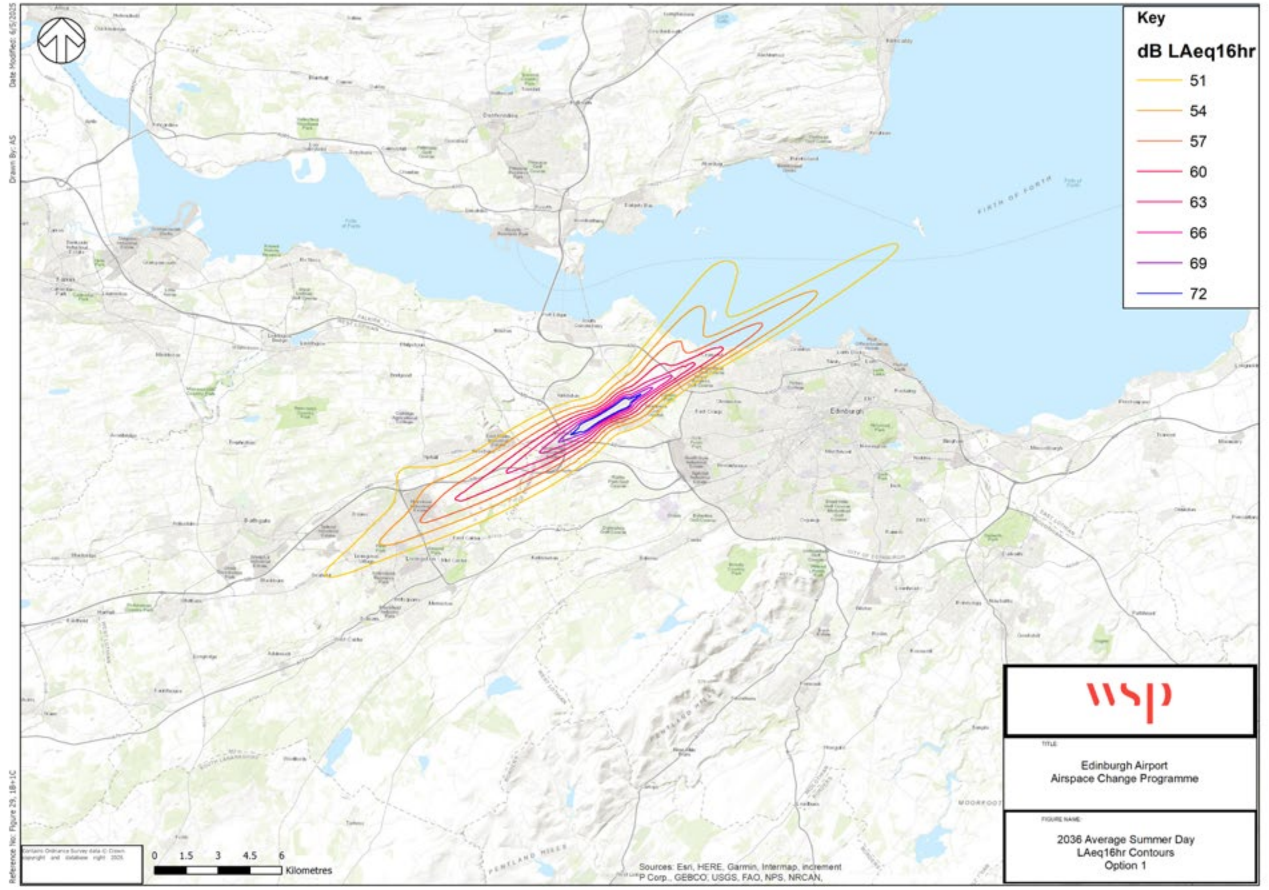


Figure 34: LAeq, 16 Hr, Daytime Option 1, 2036.

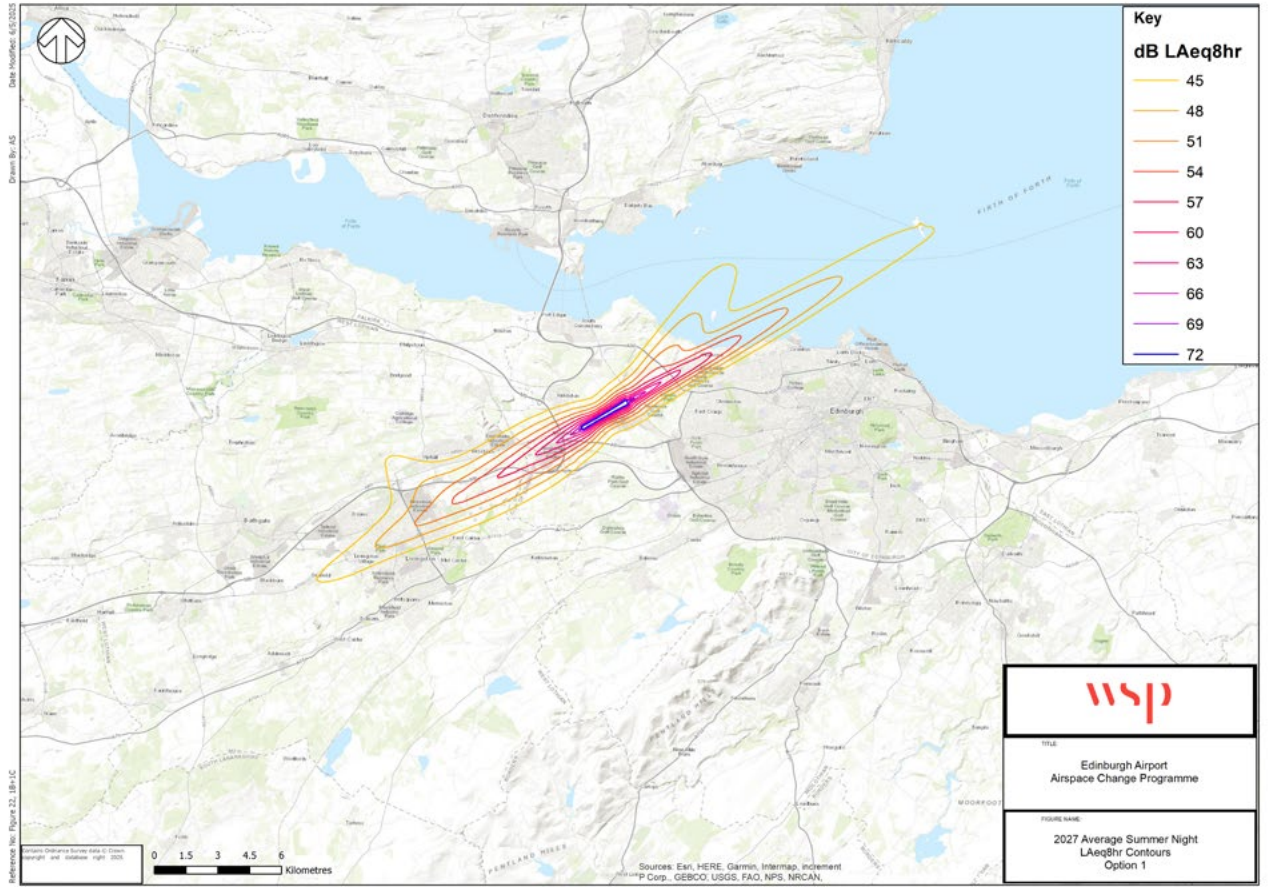


Figure 35: LAeq, 8 Hr, Night-Time Option 1, 2027.

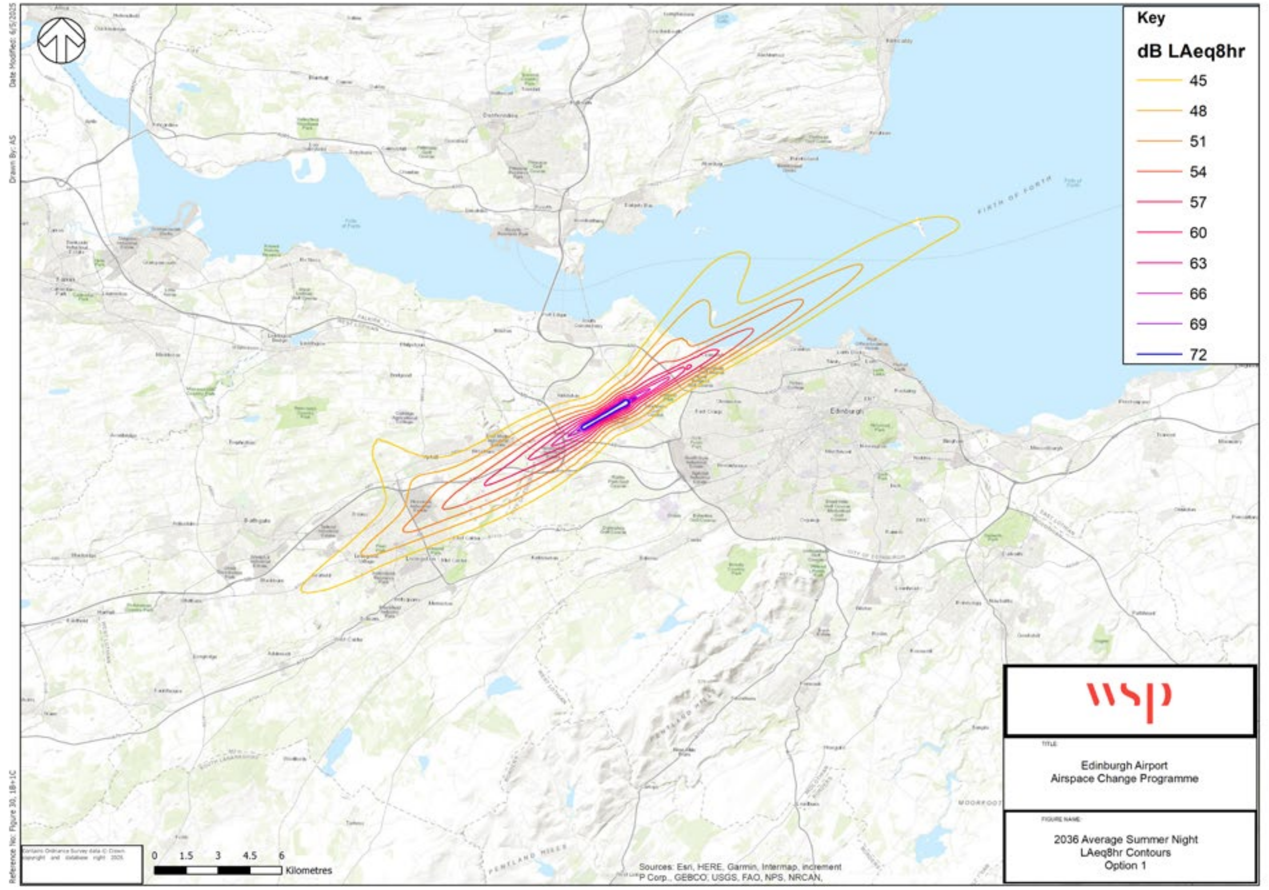


Figure 36: LAeq, 8 Hr, Night-Time Option 1, 2036.

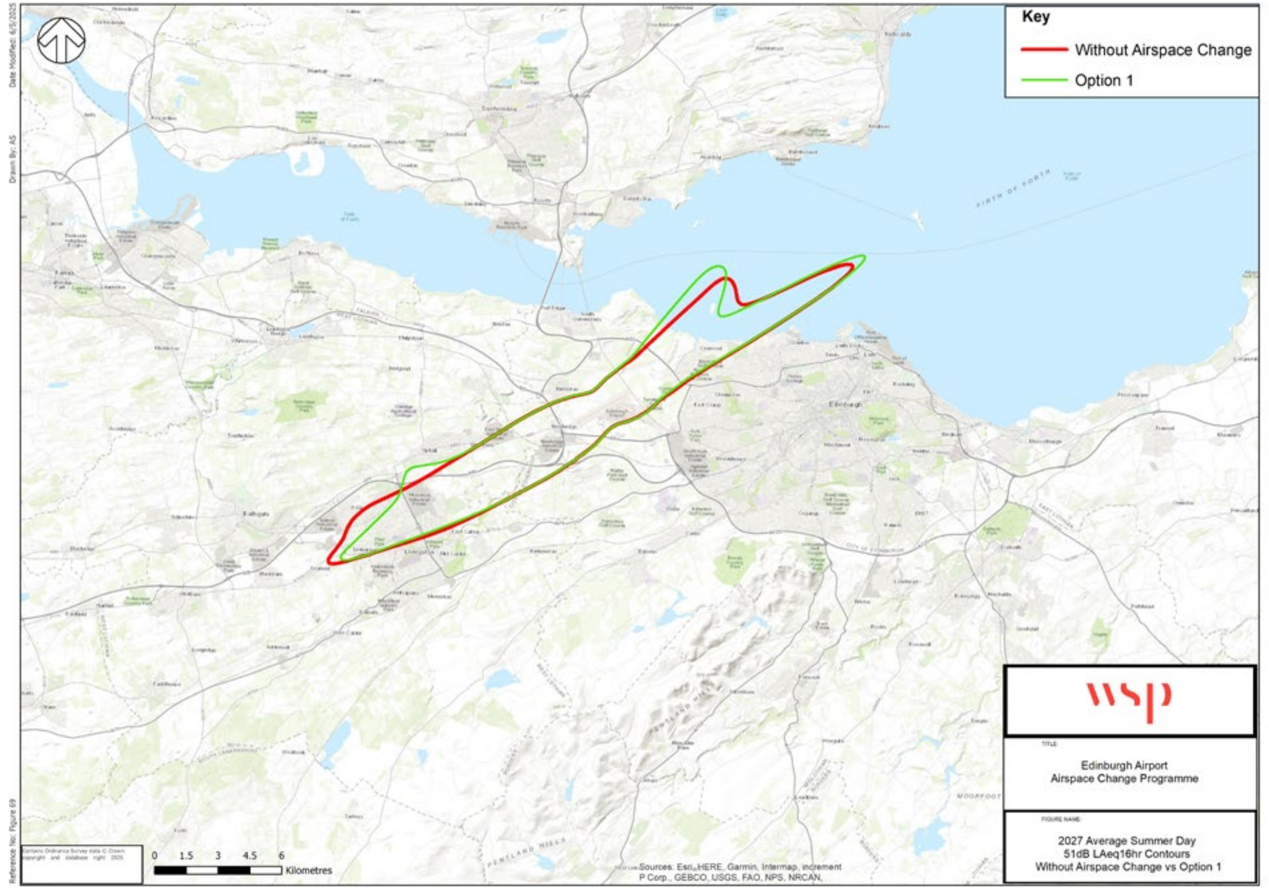


Figure 37: LAeq, 16 Hr, Day-Time 51dB Comparison Option 1 vs Baseline, 2027.

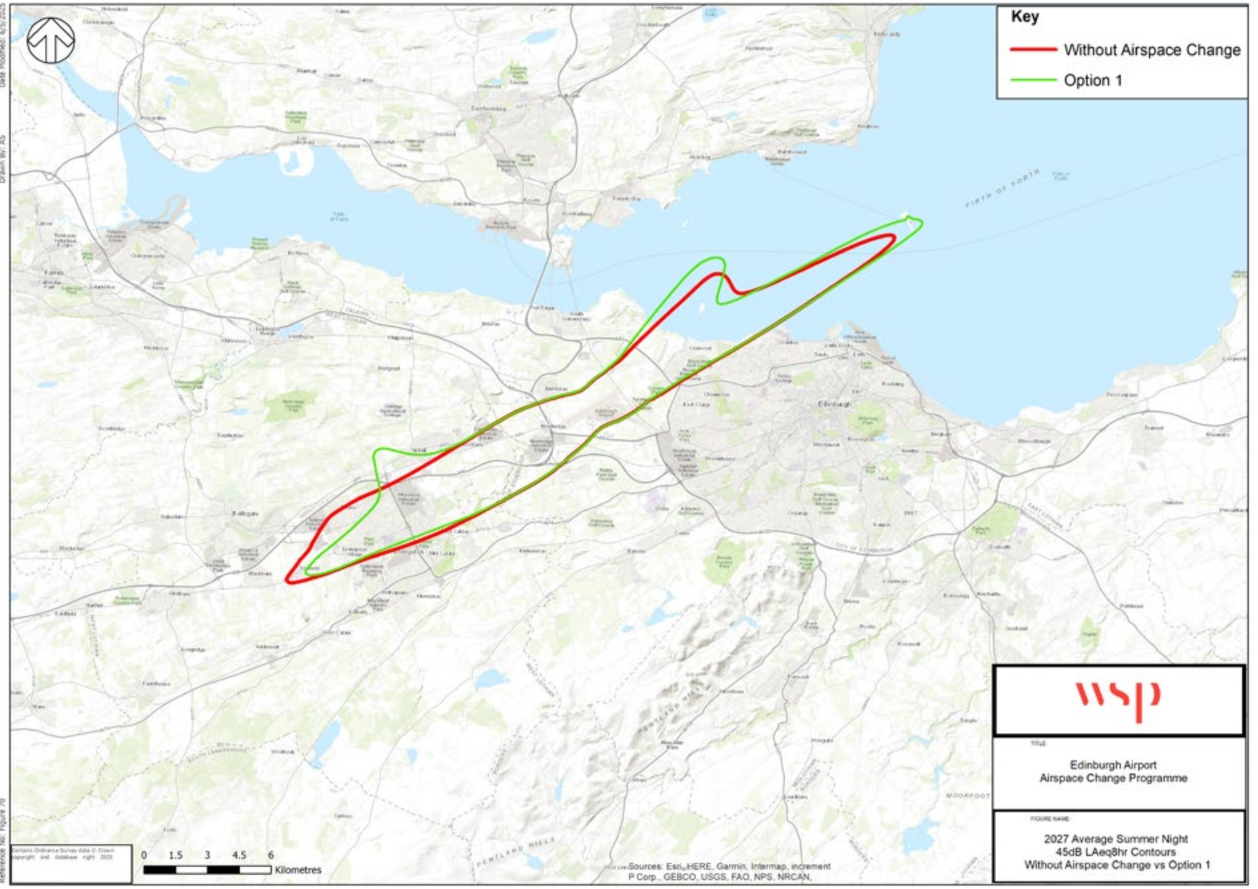


Figure 38: LAeq, 8 Hr, Night-Time 45dB Comparison Option 1 vs Baseline, 2027.

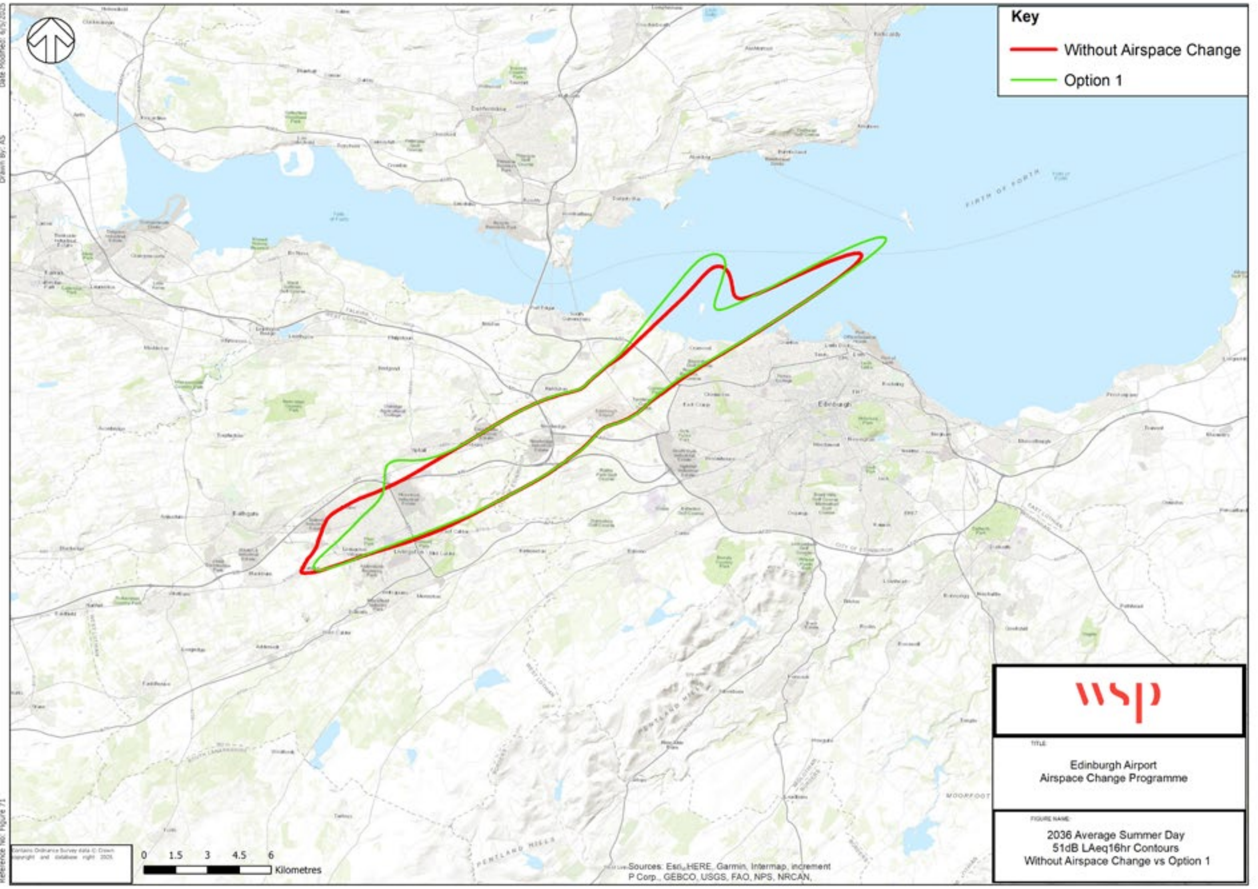


Figure 39: LAeq, 16 Hr, Day-Time 51dB Comparison Option 1 vs Baseline, 2036.

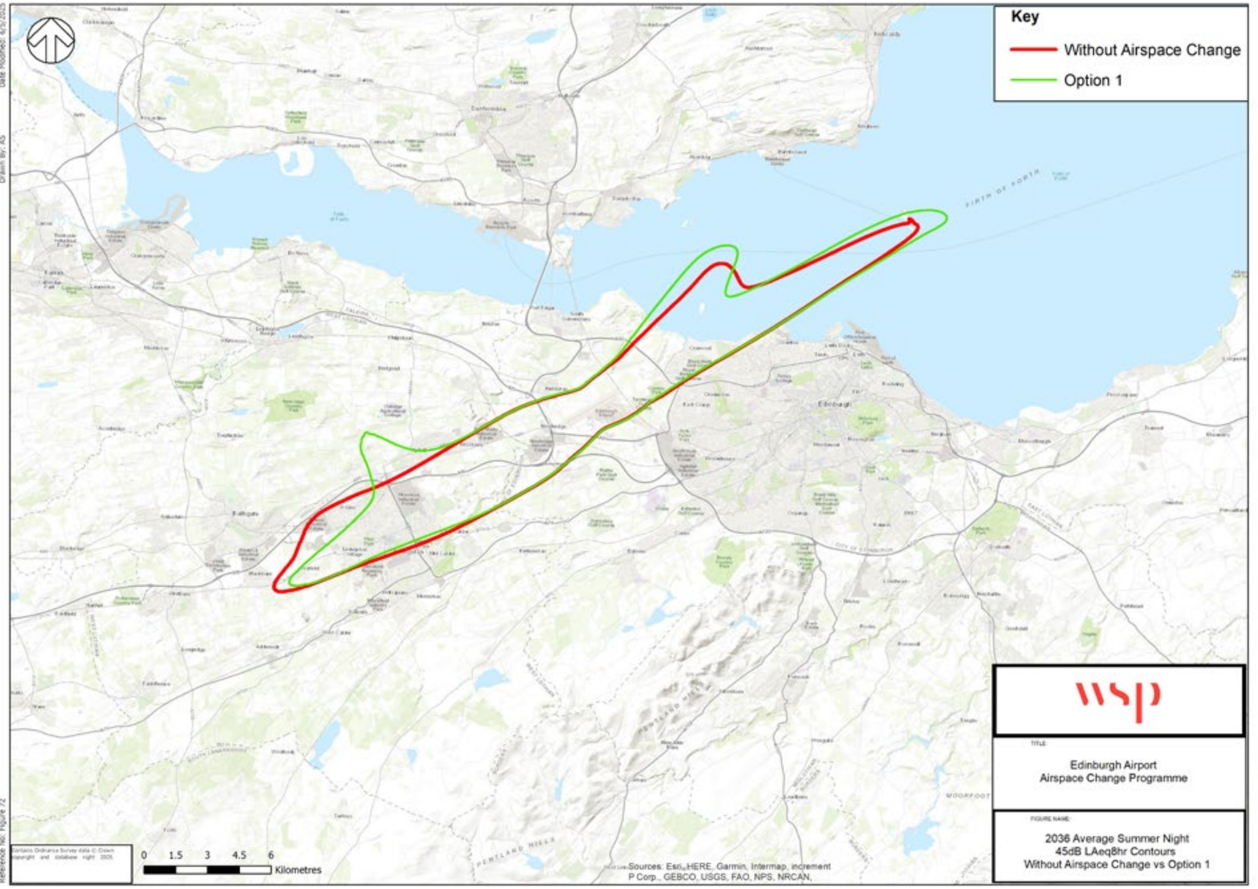


Figure 40: LAeq, 8 Hr, Night-Time 45dB Comparison Option 1 vs Baseline, 2036.

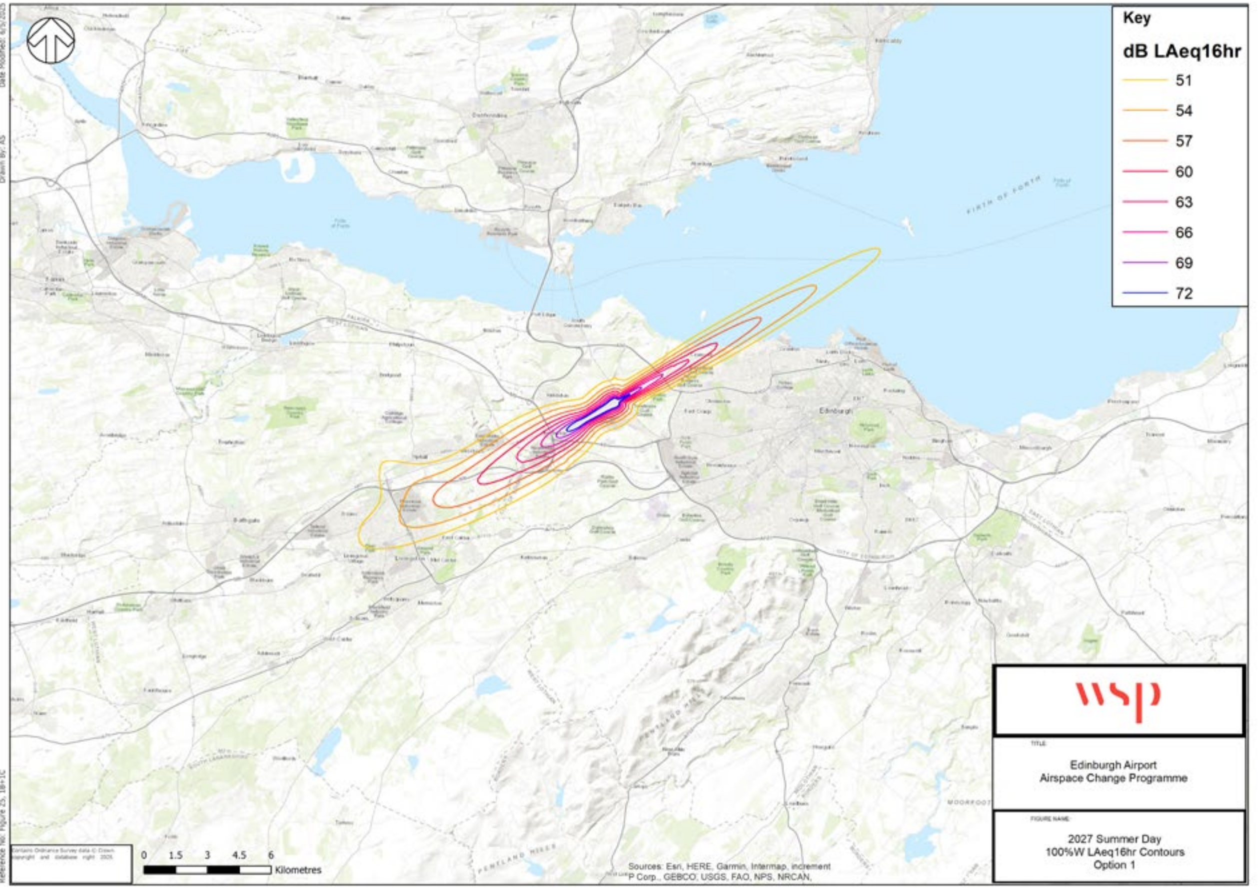


Figure 41: LAeq, 16 Hr, Day-Time 100% West Option 1, 2027.

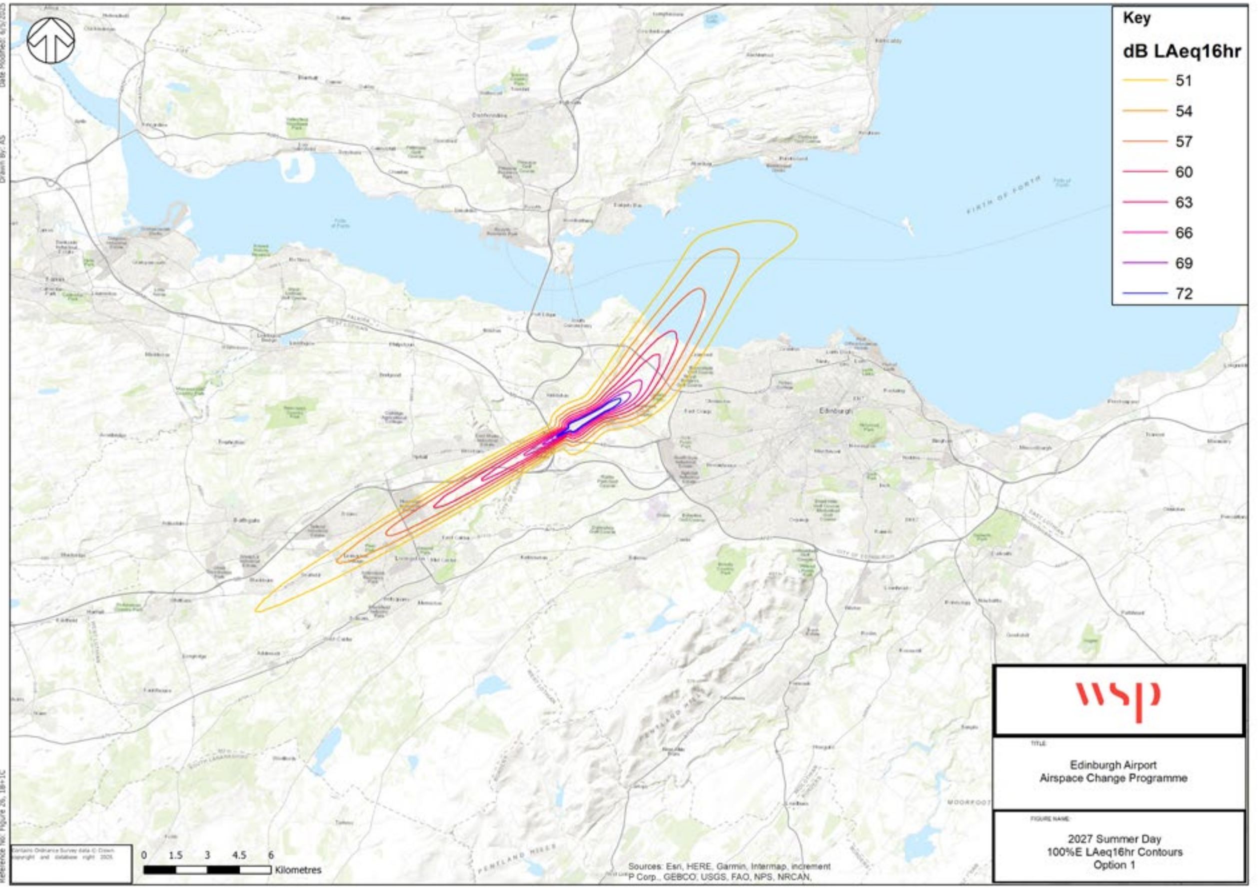


Figure 42: LAeq, 16 Hr, Day-Time 100% East Option 1, 2027.

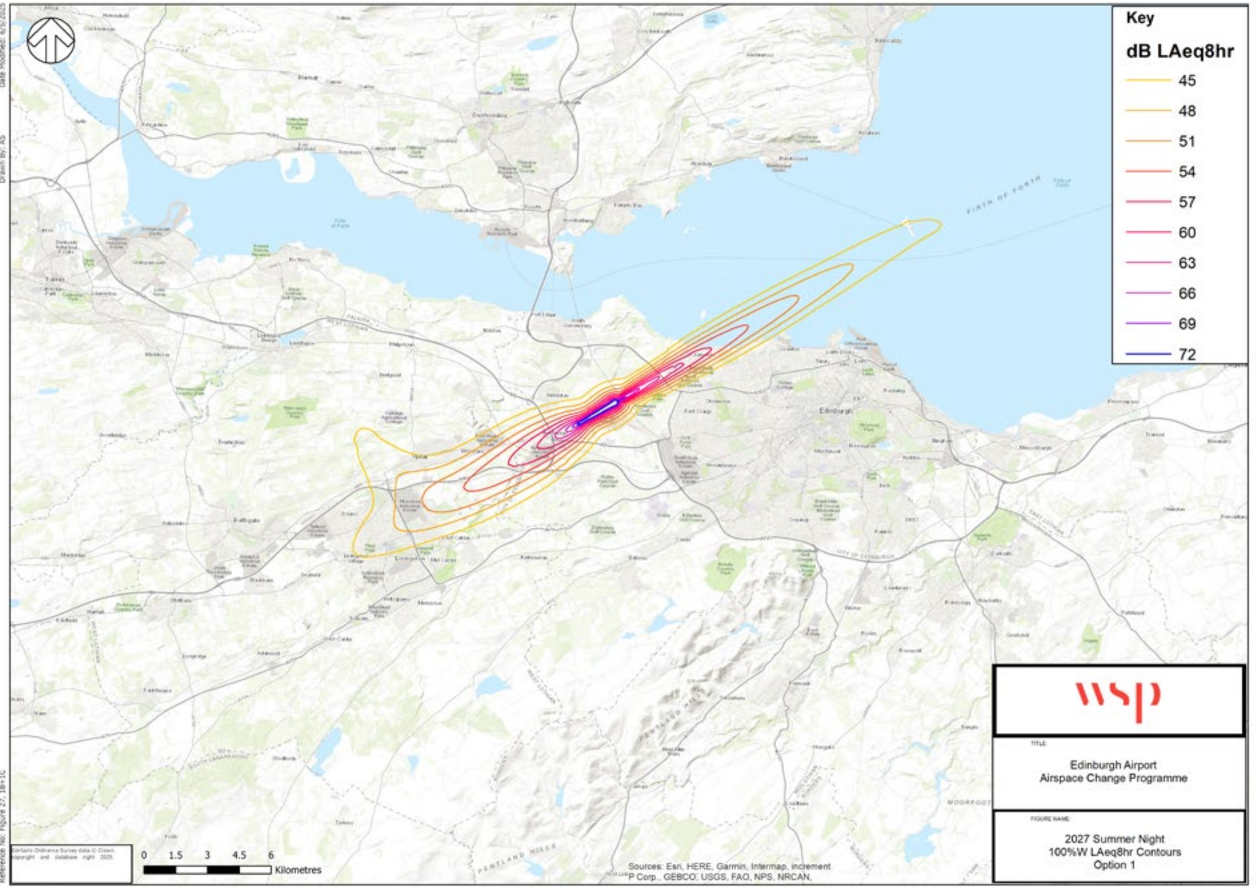


Figure 43: LAeq, 8 Hr, Night-Time 100% West Option 1, 2027.

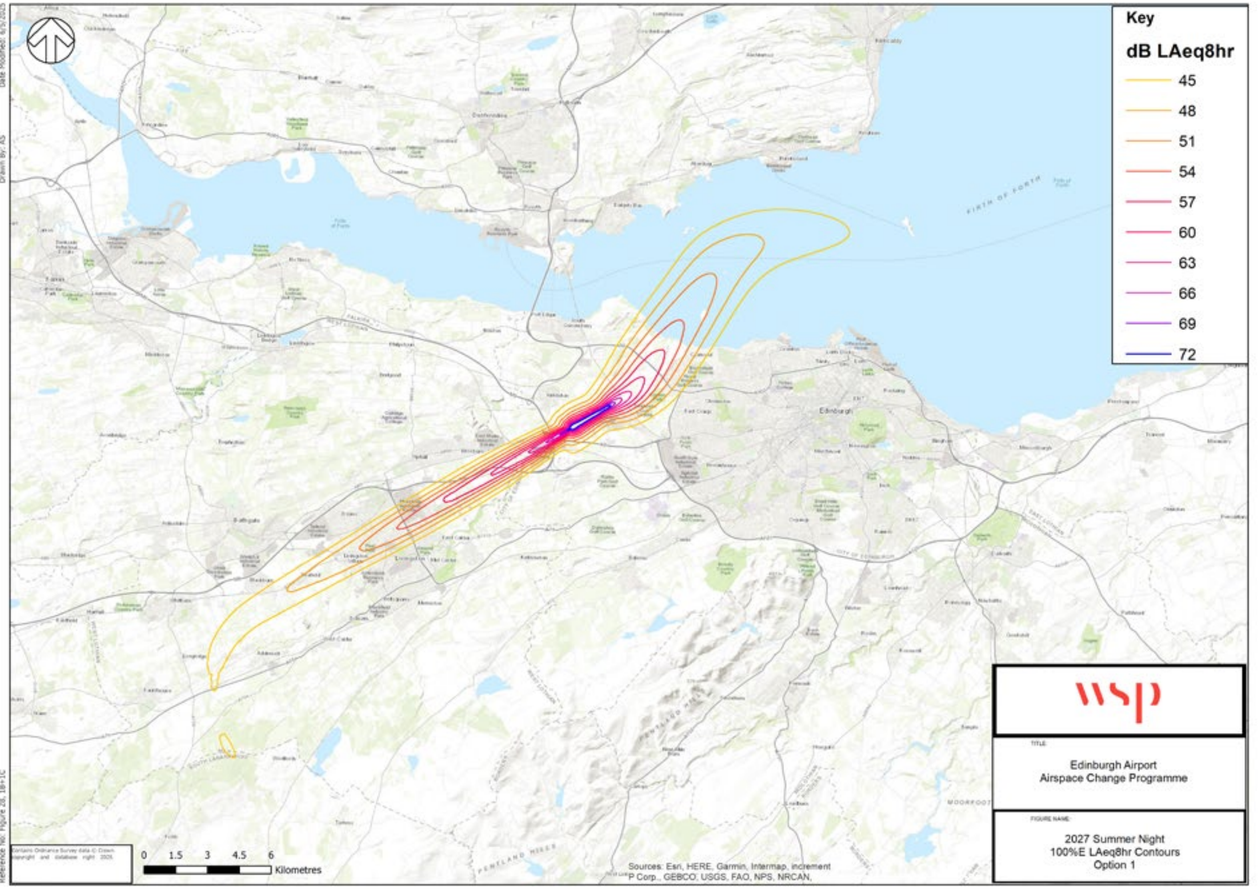


Figure 44: LAeq, 8 Hr, Night-Time 100% East Option 1, 2027.

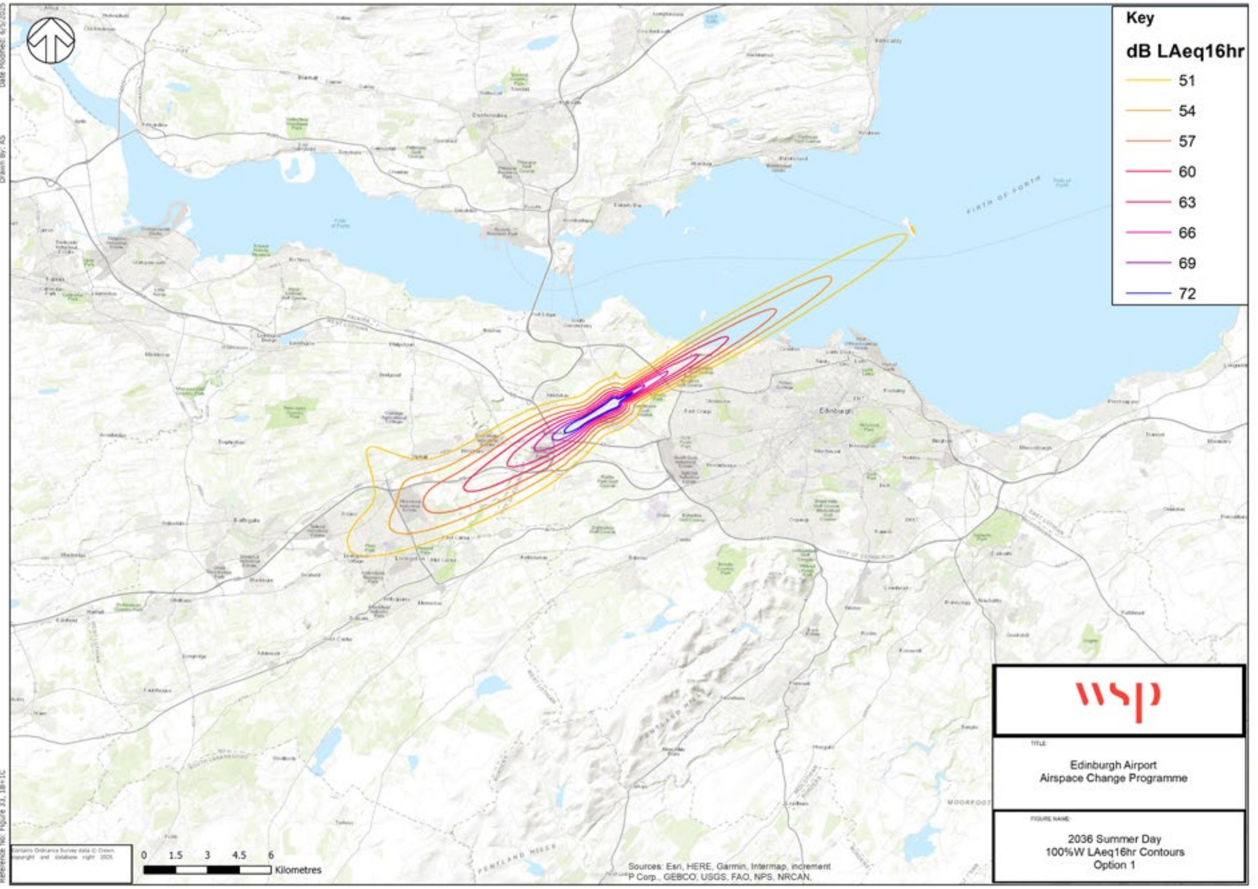


Figure 45: LAeq, 16 Hr, Day-Time 100% West Option 1, 2036.

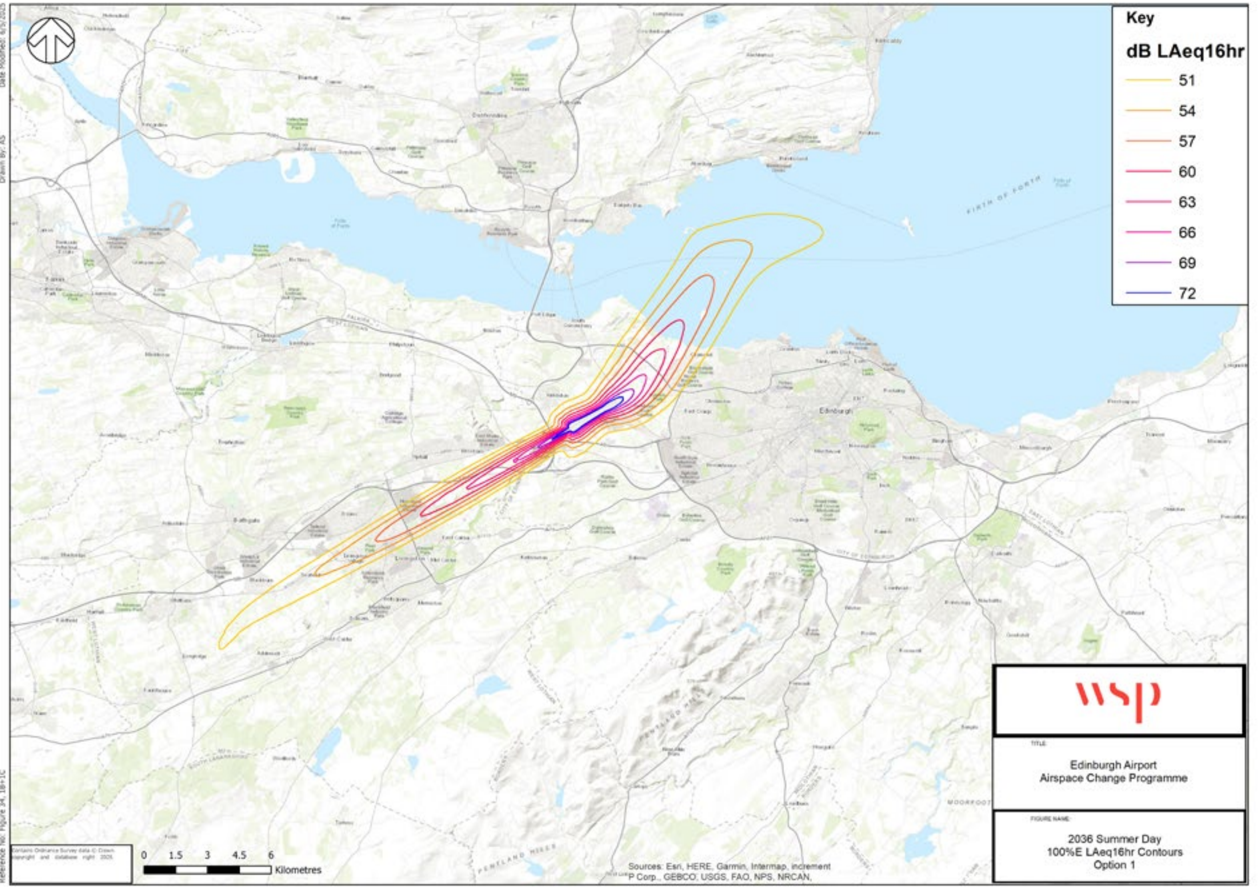


Figure 46: LAeq, 16 Hr, Day-Time 100% East Option 1, 2036.

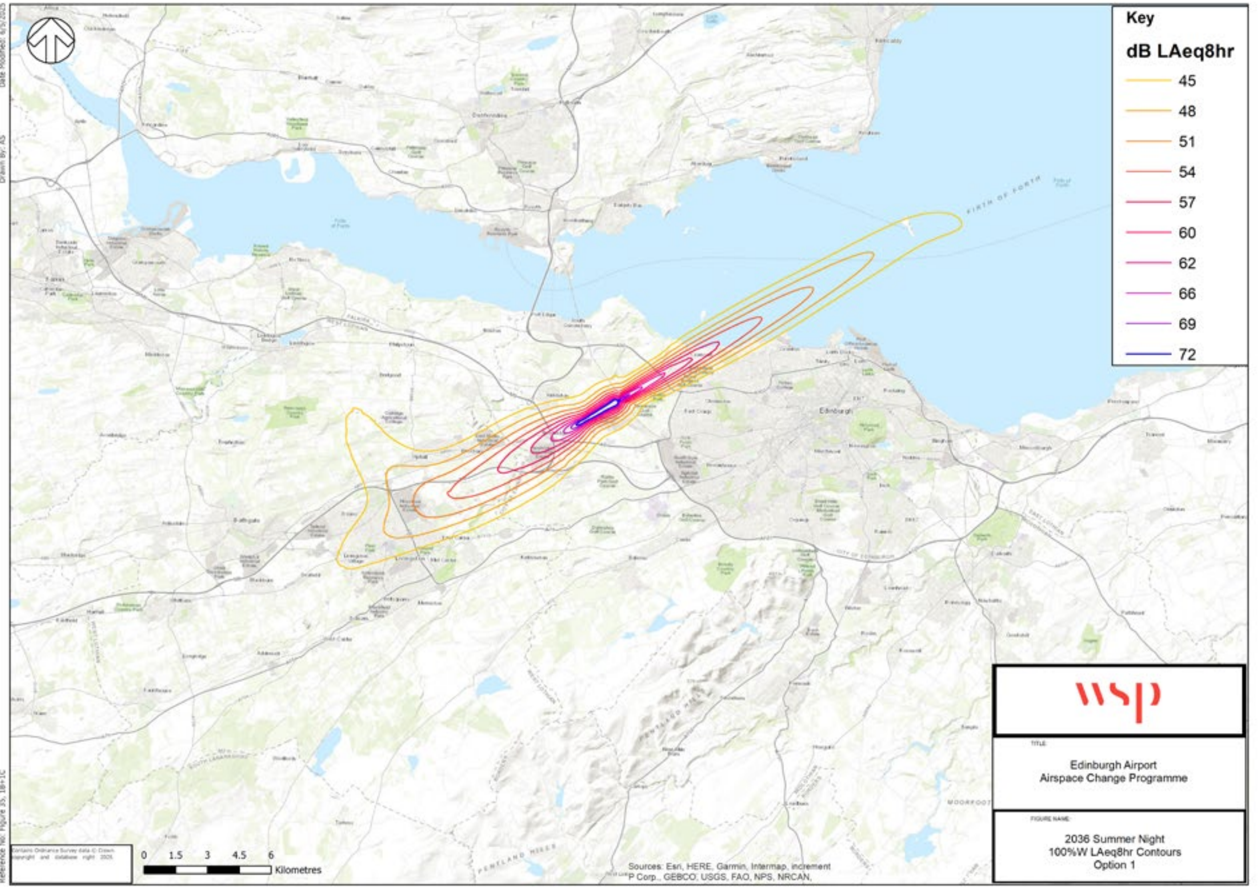


Figure 47: LAeq, 8 Hr, Night-Time 100% West Option 1, 2036.

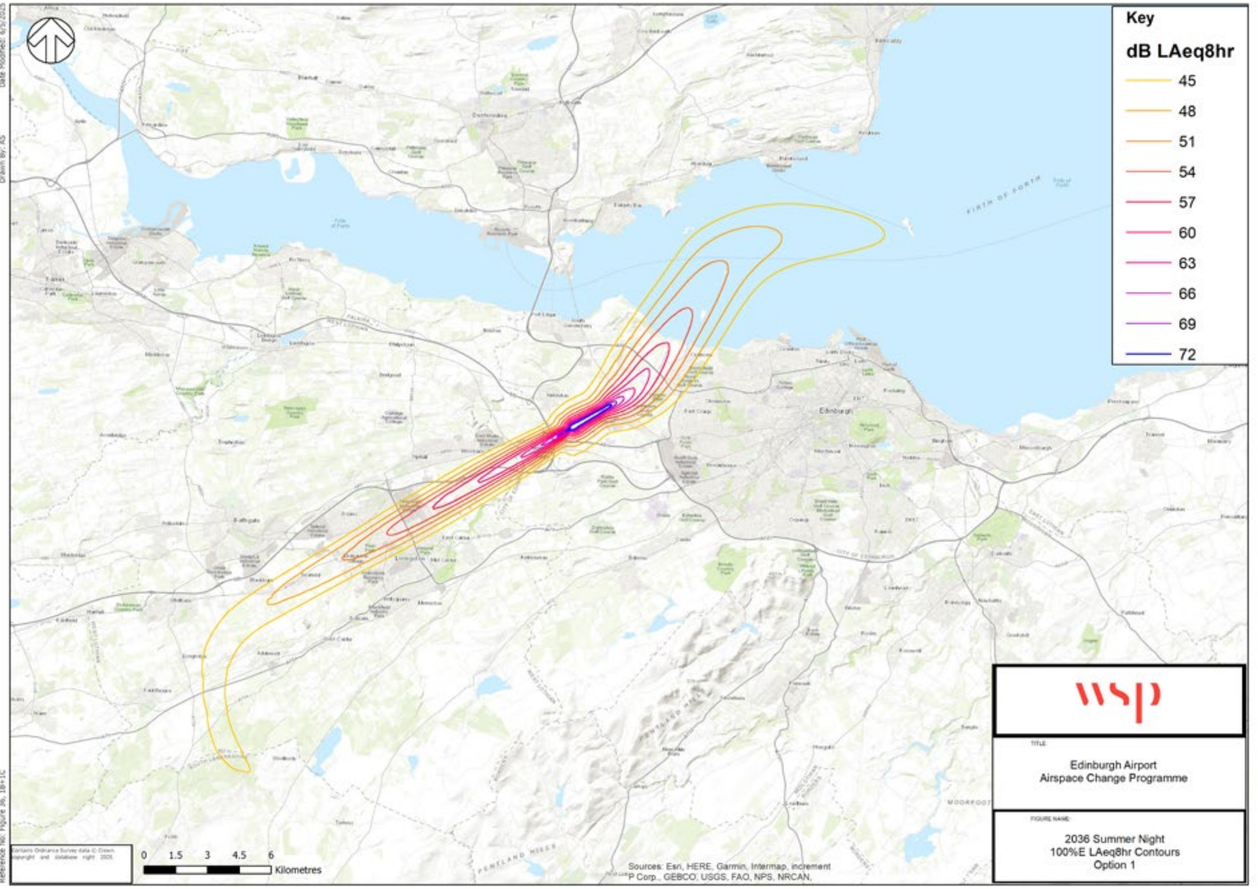


Figure 48: LAeq, 8 Hr, Night-Time 100% East Option 1, 2036.

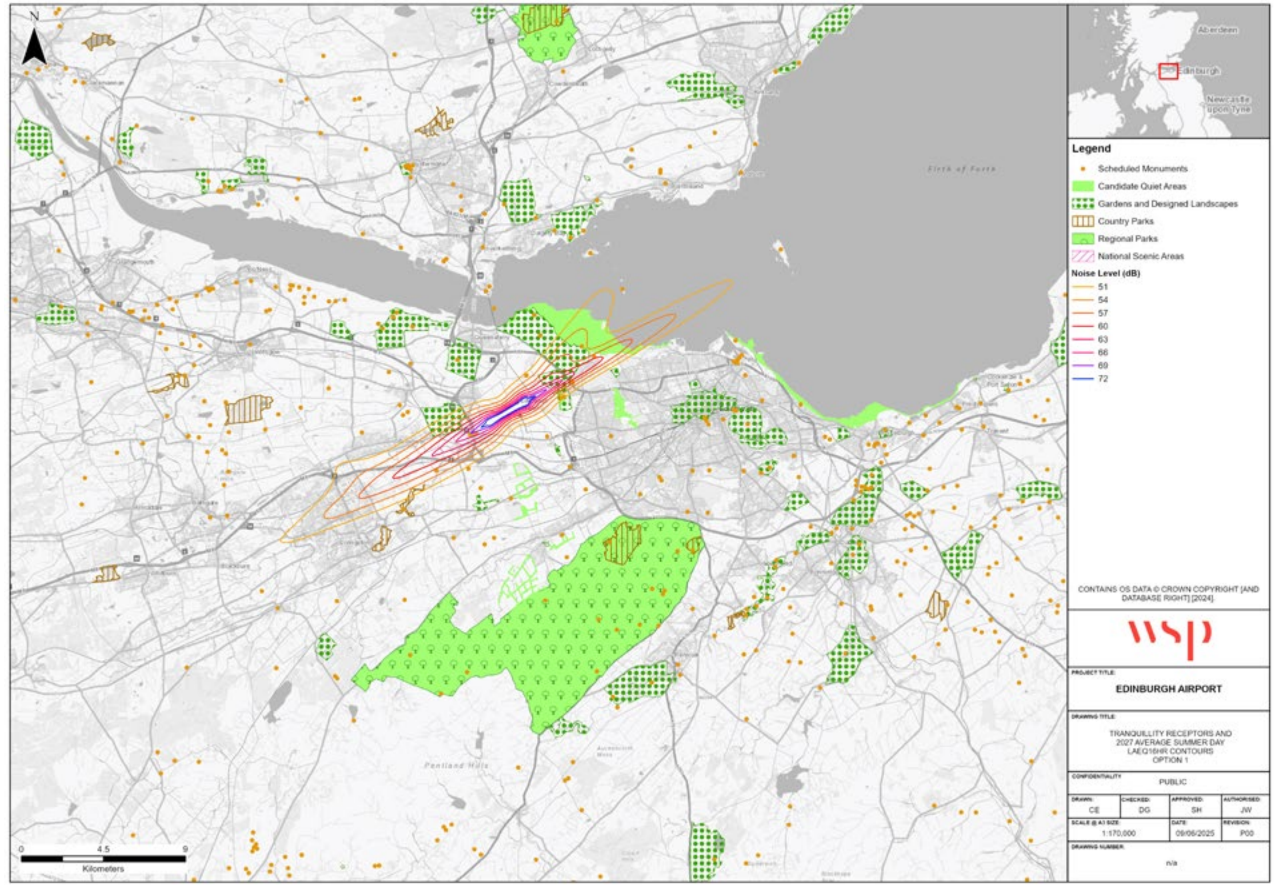


Figure 49: Tranquillity Receptors LAeq, 16 Hr, Day-Time Option 1, 2027.

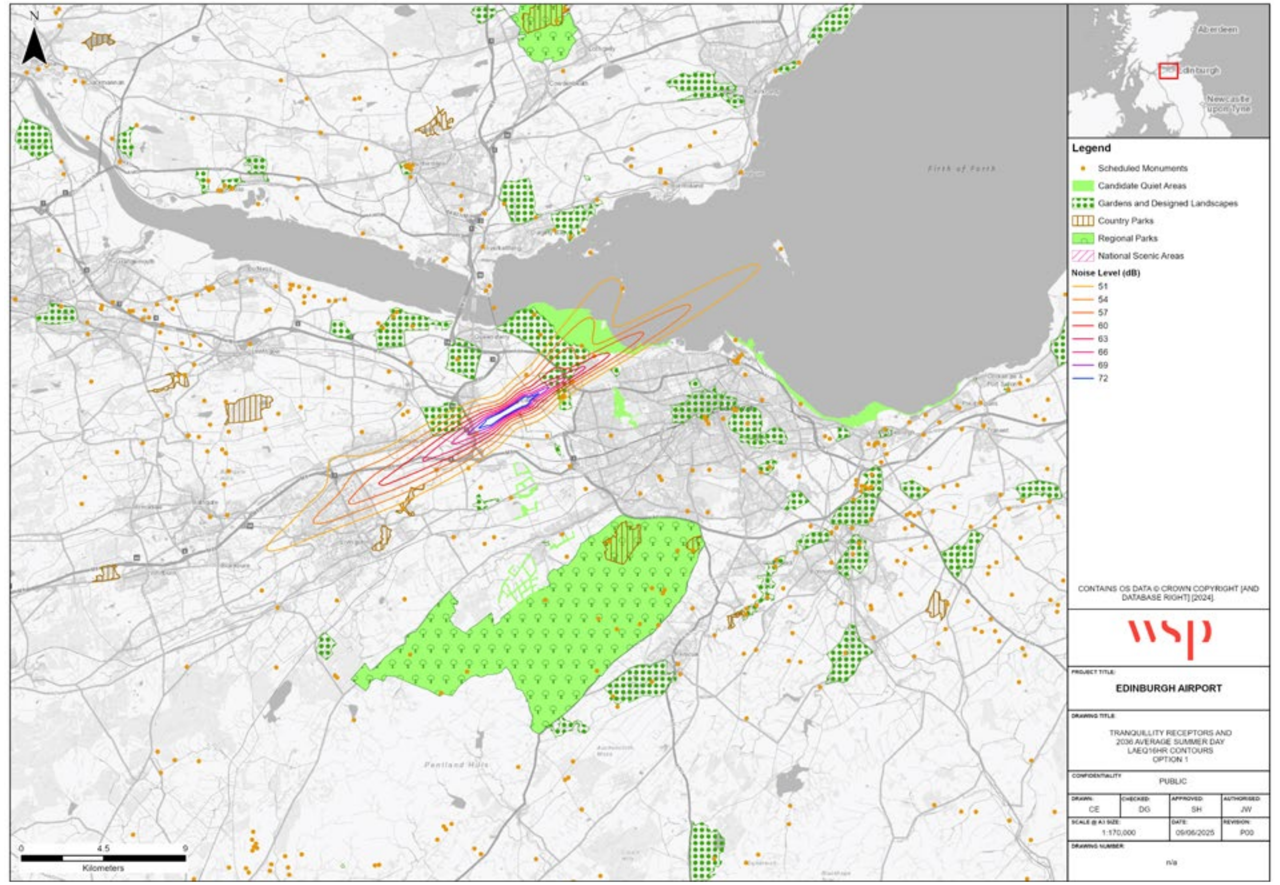


Figure 50: Tranquillity Receptors LAeq, 16 Hr, Day-Time Option 1, 2036.

3.2 Nx Contours for Option 1

Nx contours for Option 1 are provided below.

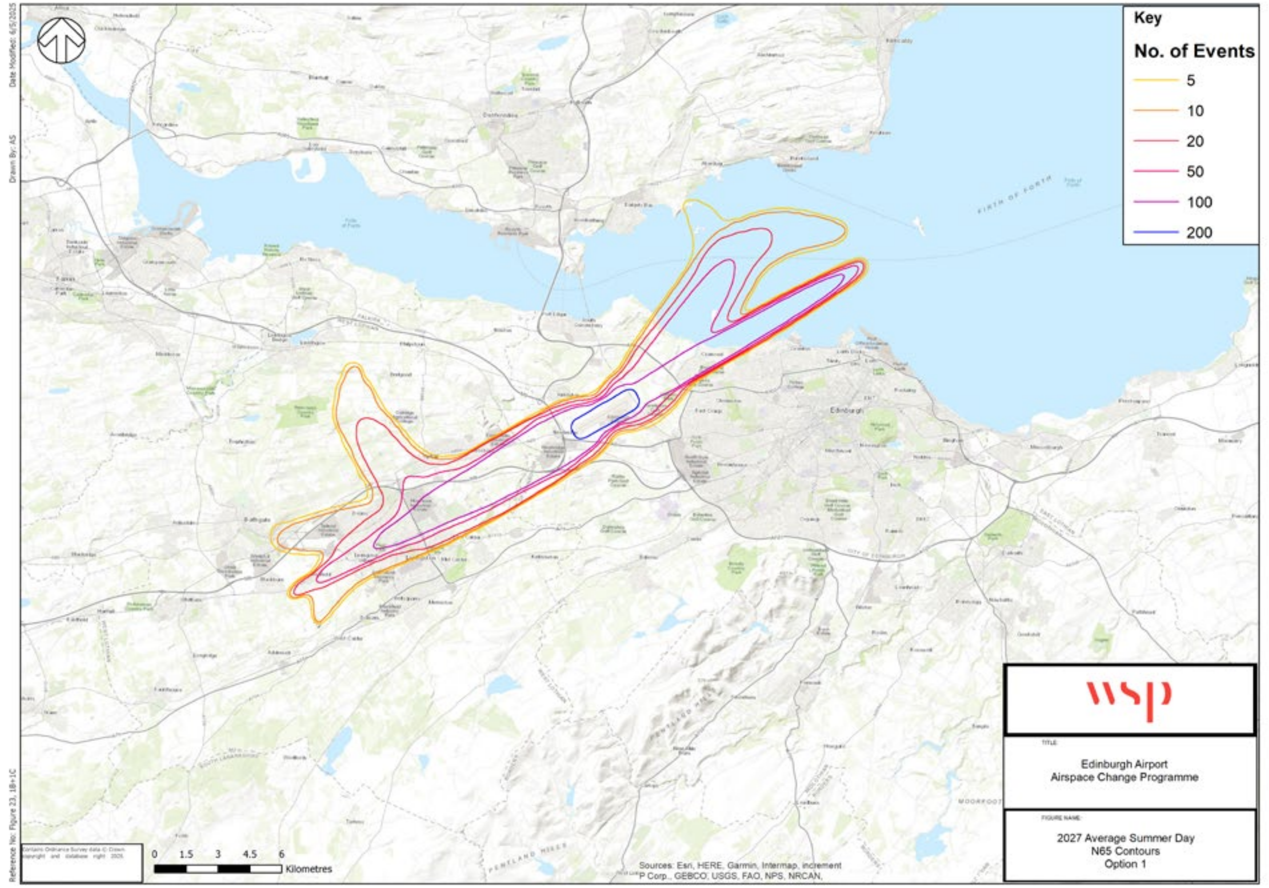


Figure 51: N65, Daytime Option 1, 2027.

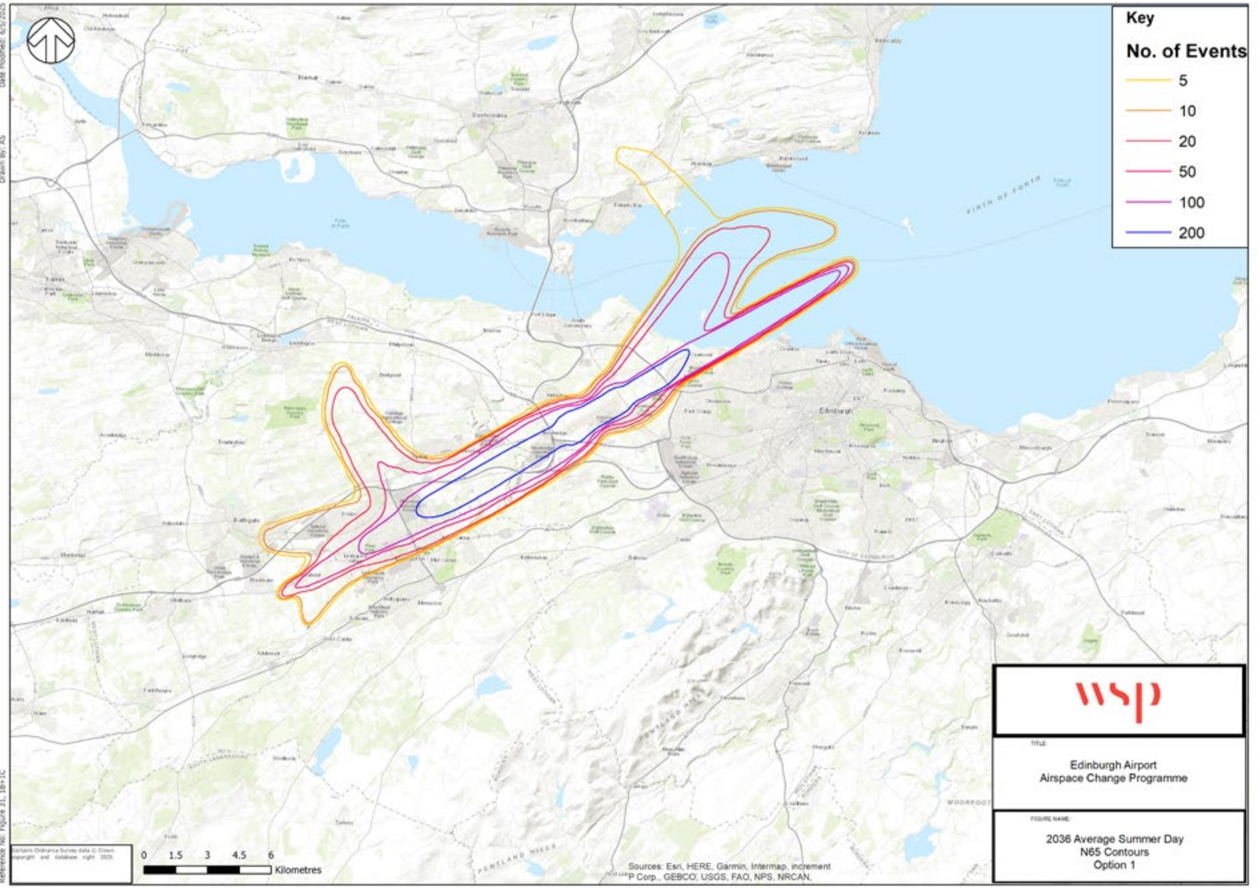


Figure 52: N65, Daytime Option 1, 2036.

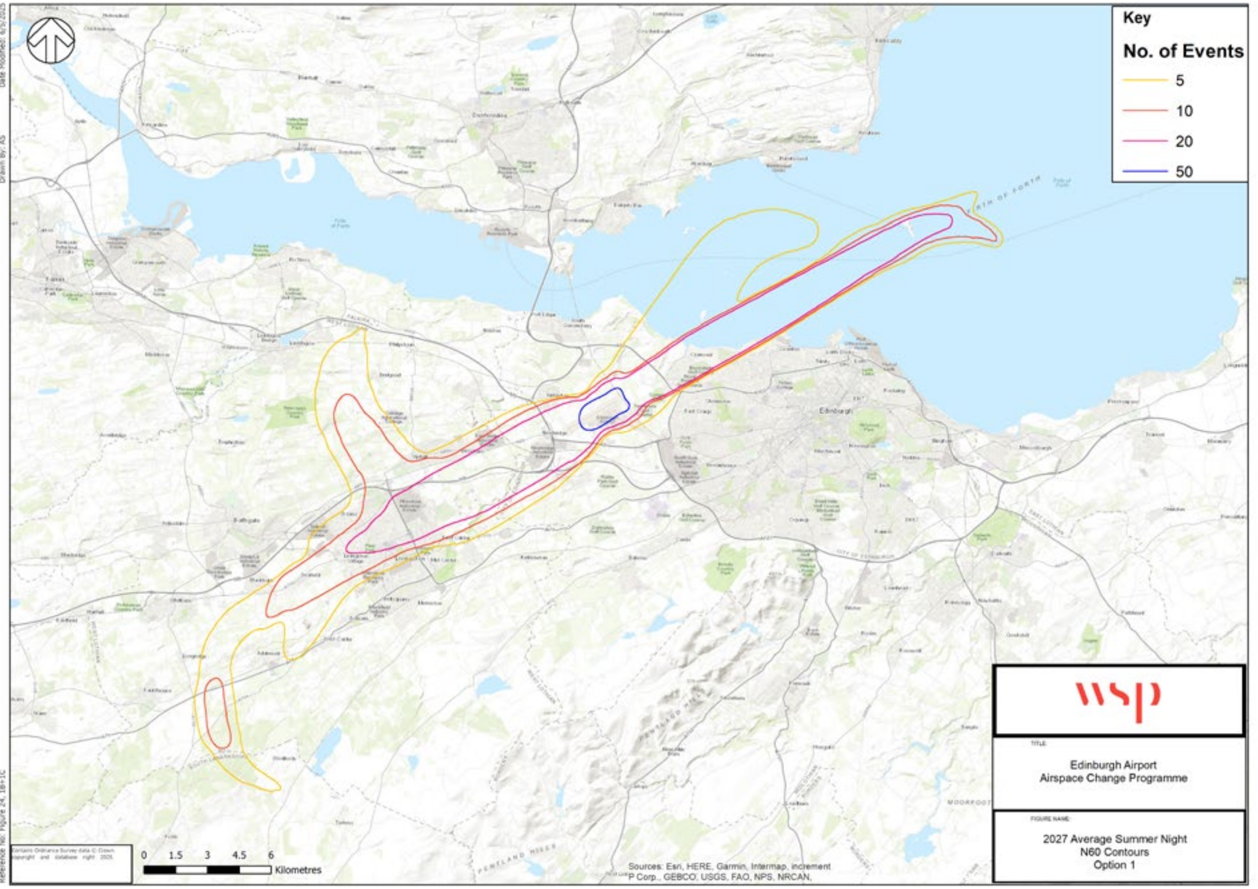


Figure 53: N60, Night-Time Option 1, 2027.

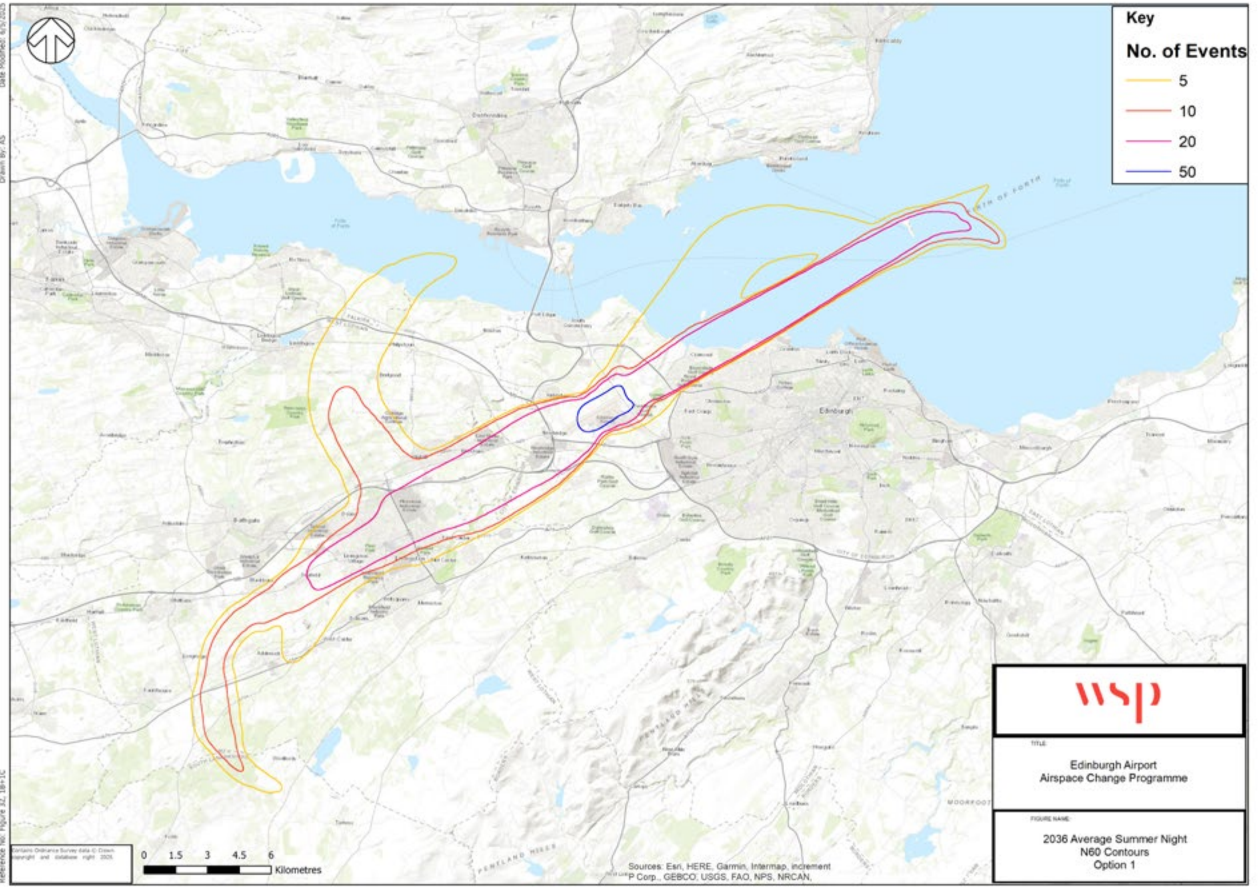


Figure 54: N60, Night-Time Option 1, 2036.

3.4 Overflight Contours for Option 1

2. Overflight contours for Option 1 are provided below.

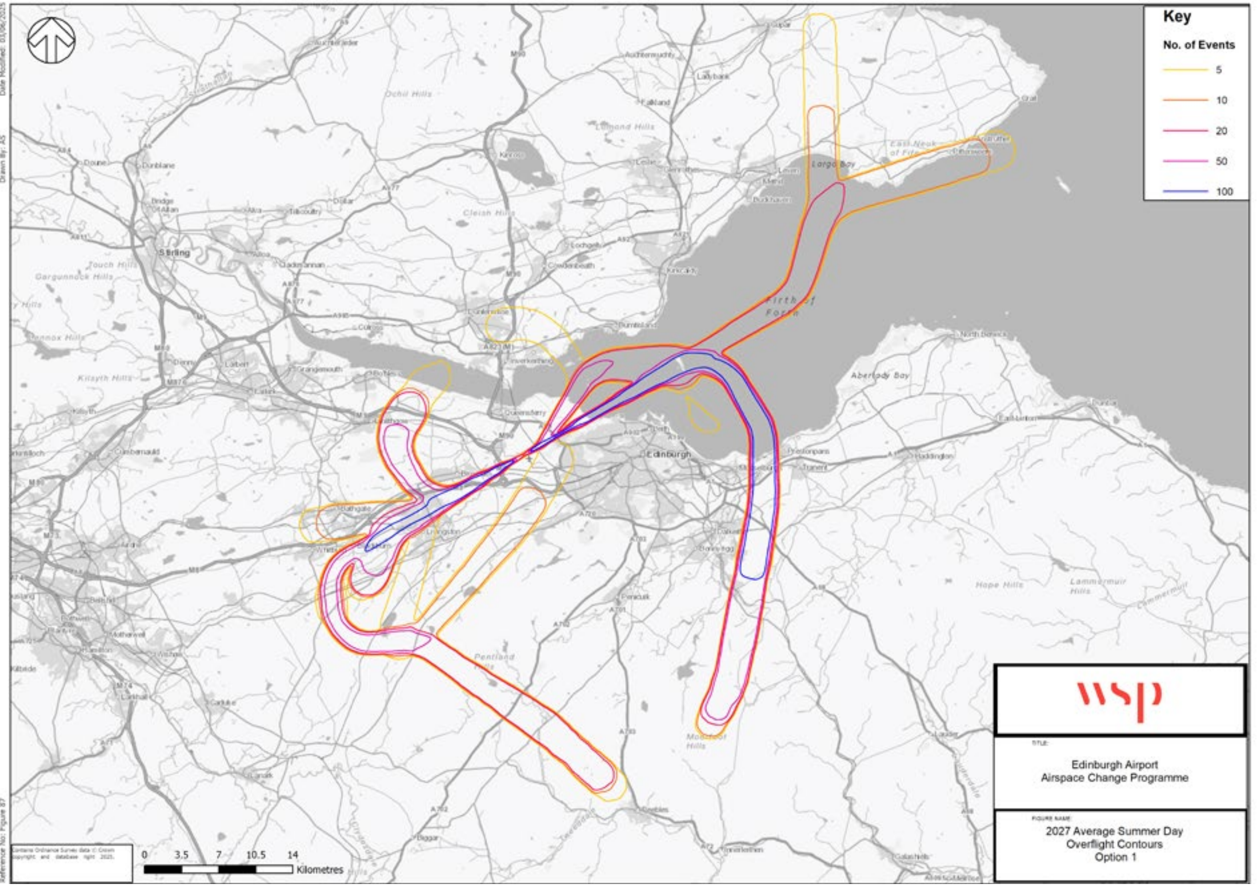


Figure 55: Overflight, Daytime Option 1, 2027.

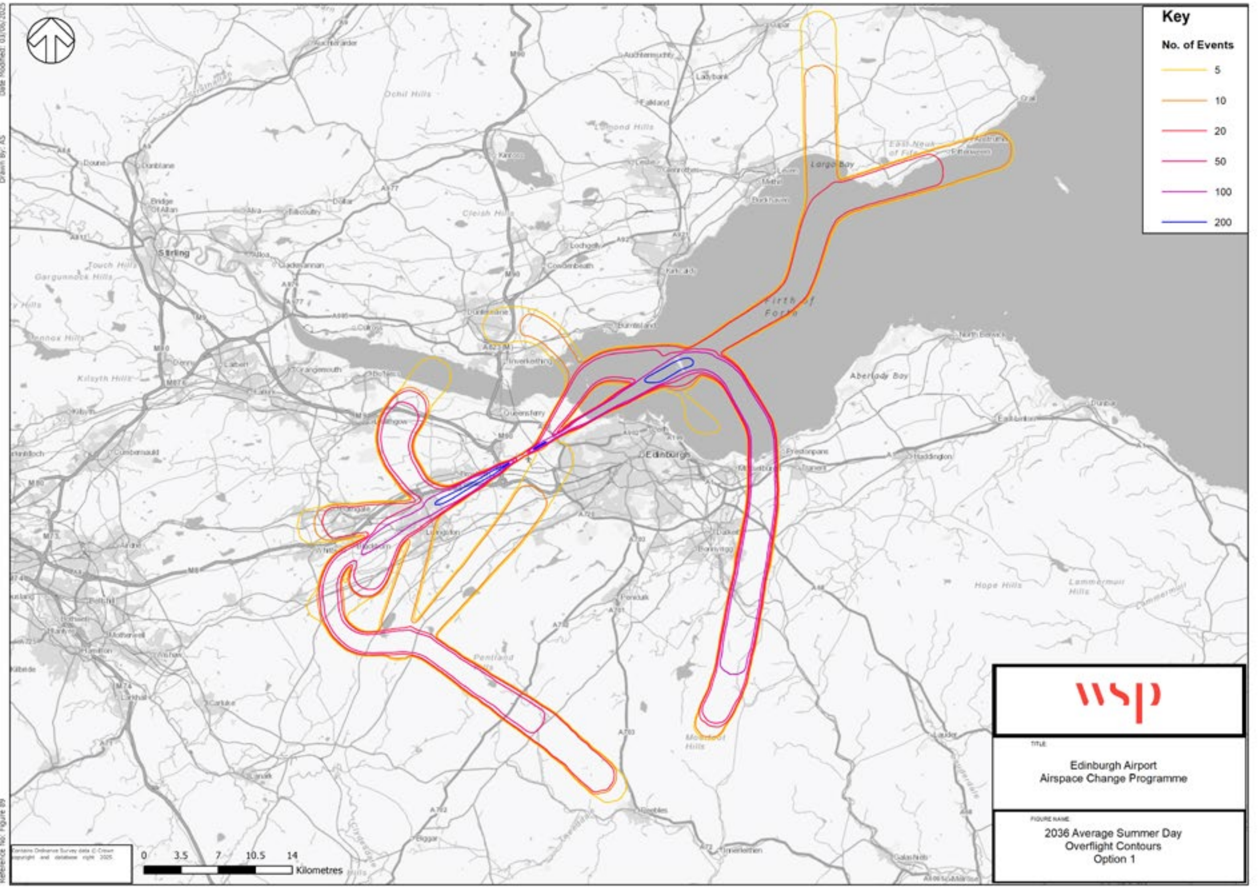


Figure 56: Overflight, Daytime Option 1, 2036.

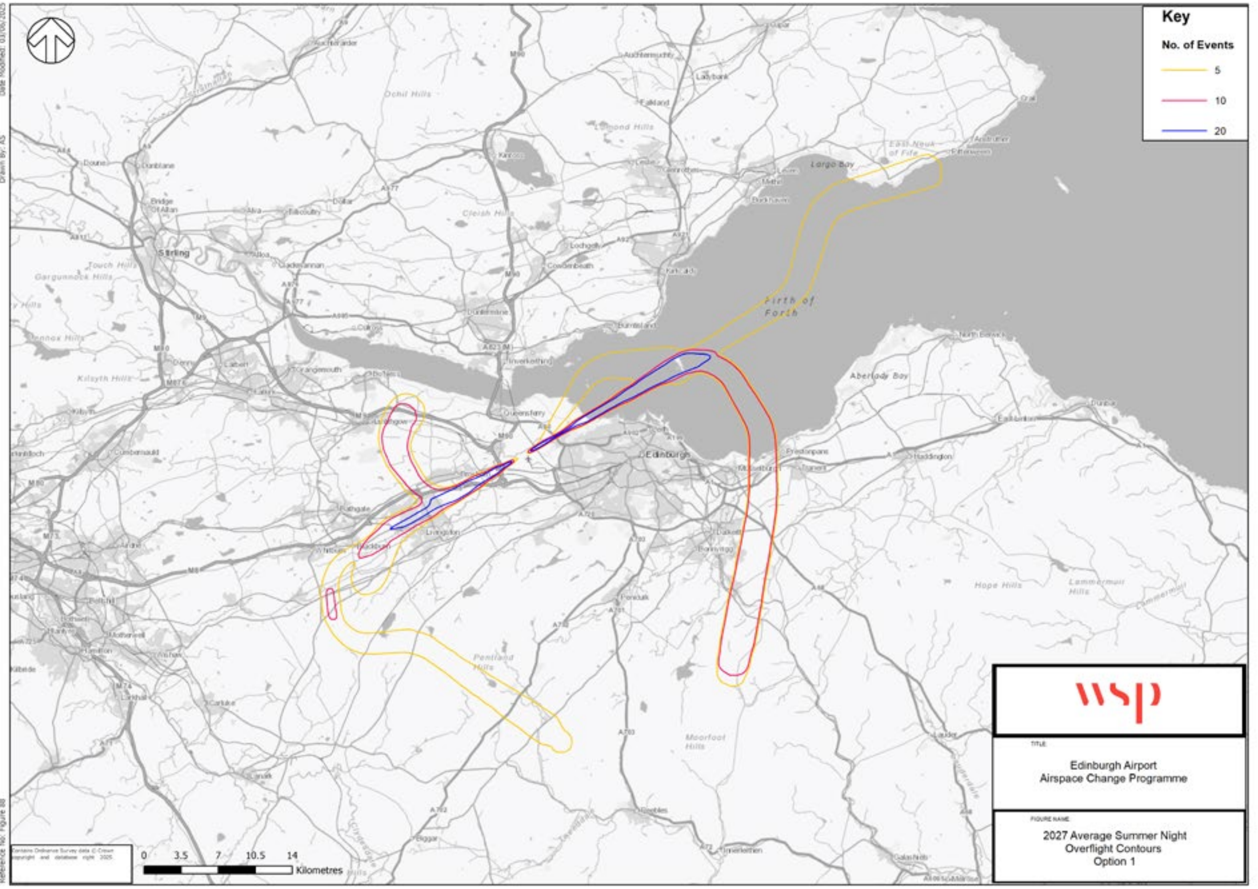


Figure 57: Overflight, Night-Time Option 1, 2027.

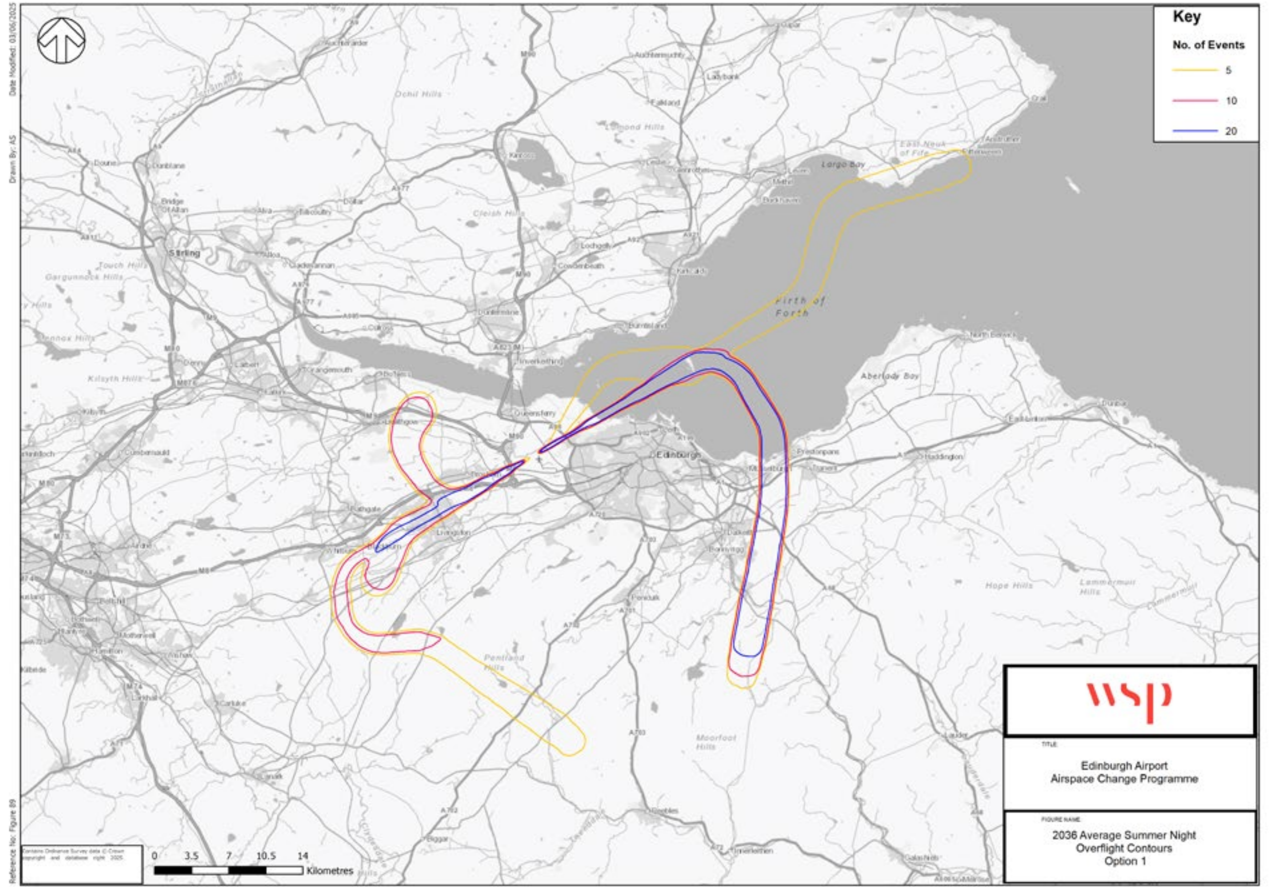


Figure 58: Overflight, Night-Time Option 1, 2036.

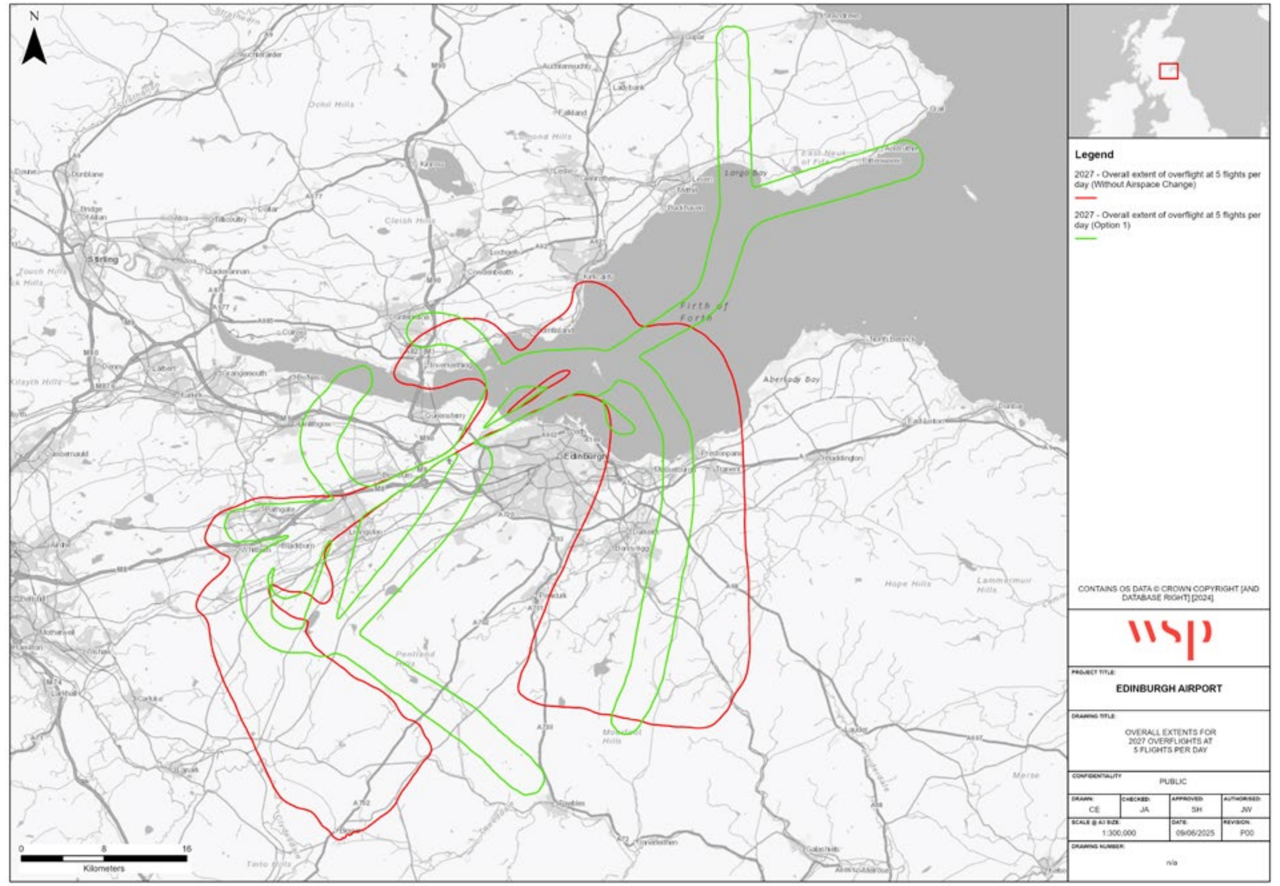


Figure 59:Overflight, Daytime 5 per day Comparison Option 1 vs Baseline, 2027.

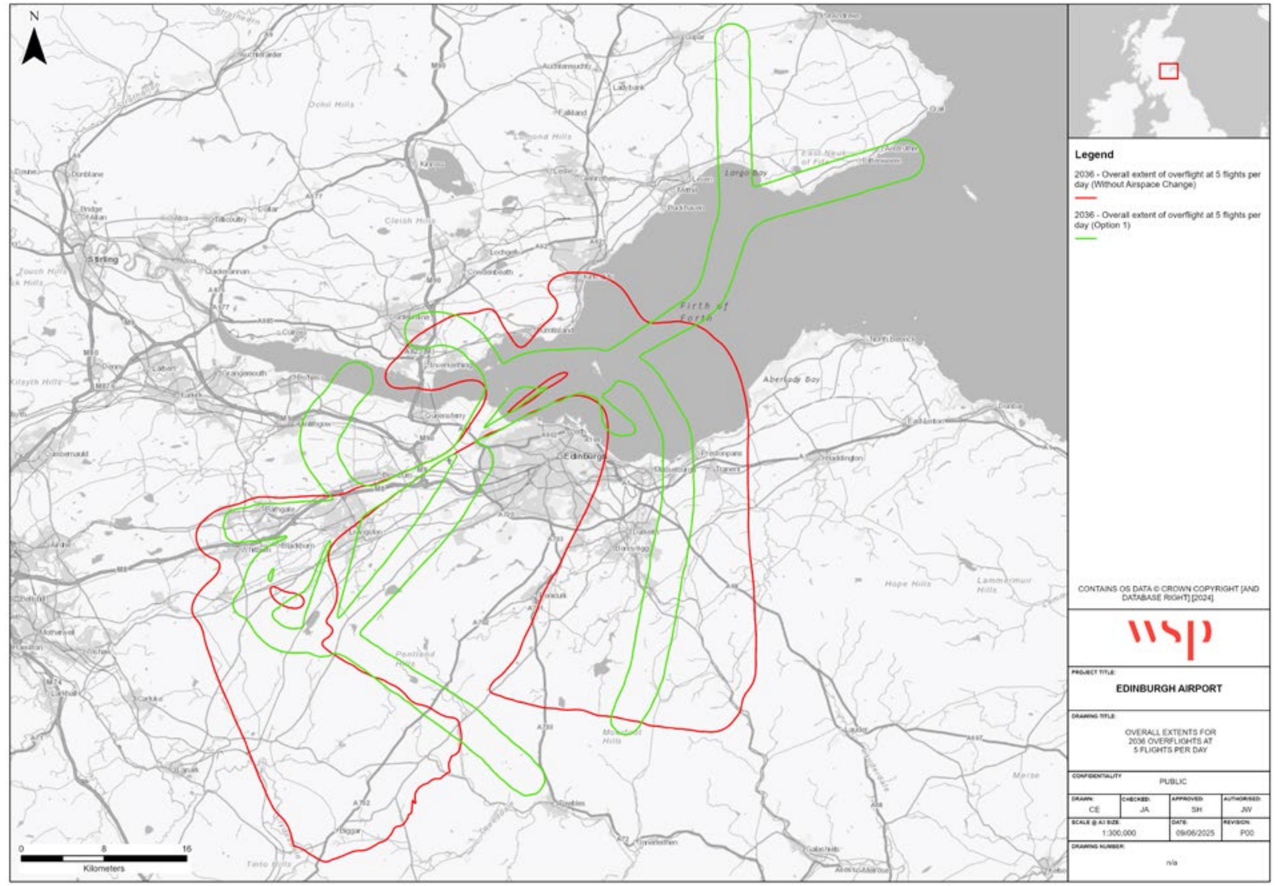


Figure 60:Overflight, Daytime 5 per day Comparison Option 1 vs Baseline, 2036.

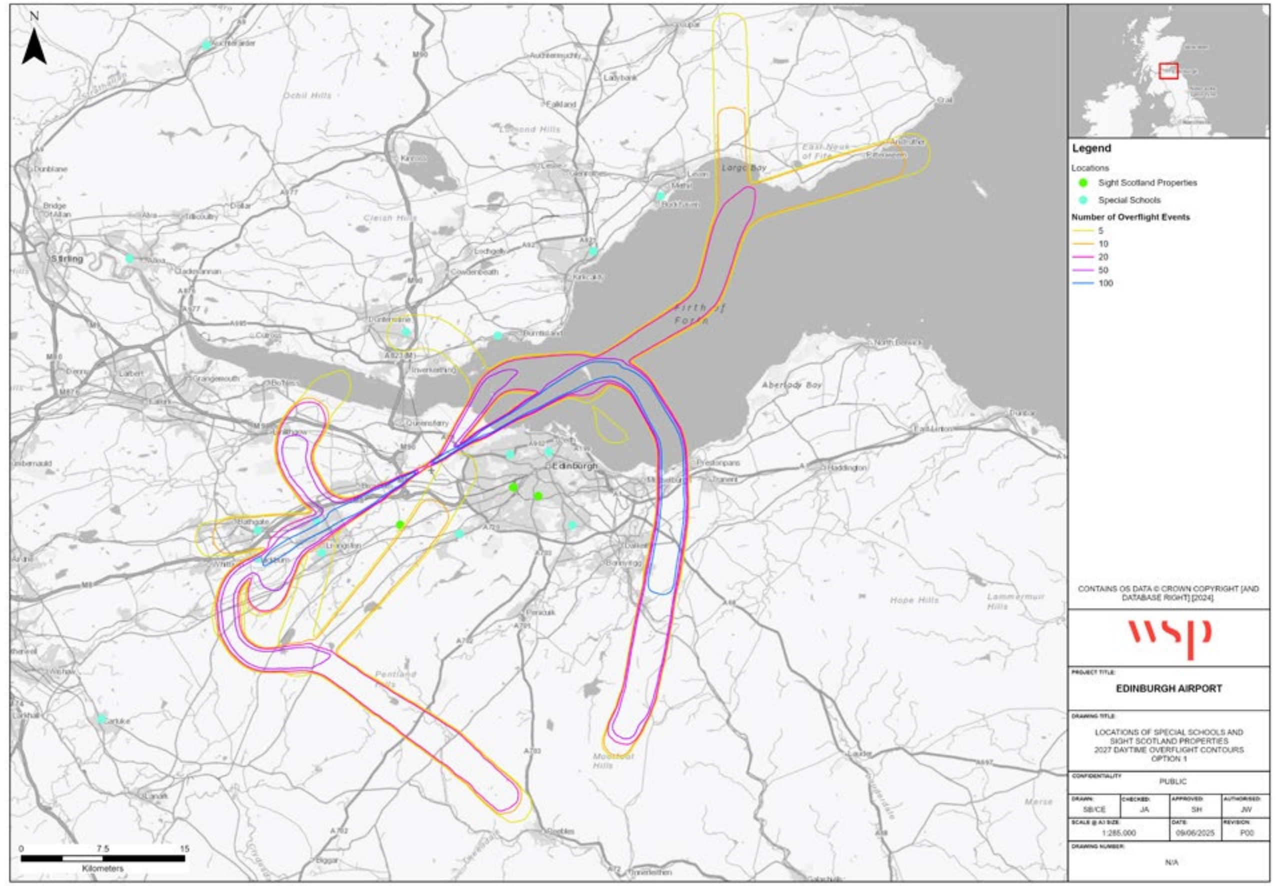


Figure 61: Special Schools and Sight Scotland Sites Overflight, Daytime Option 1, 2027.

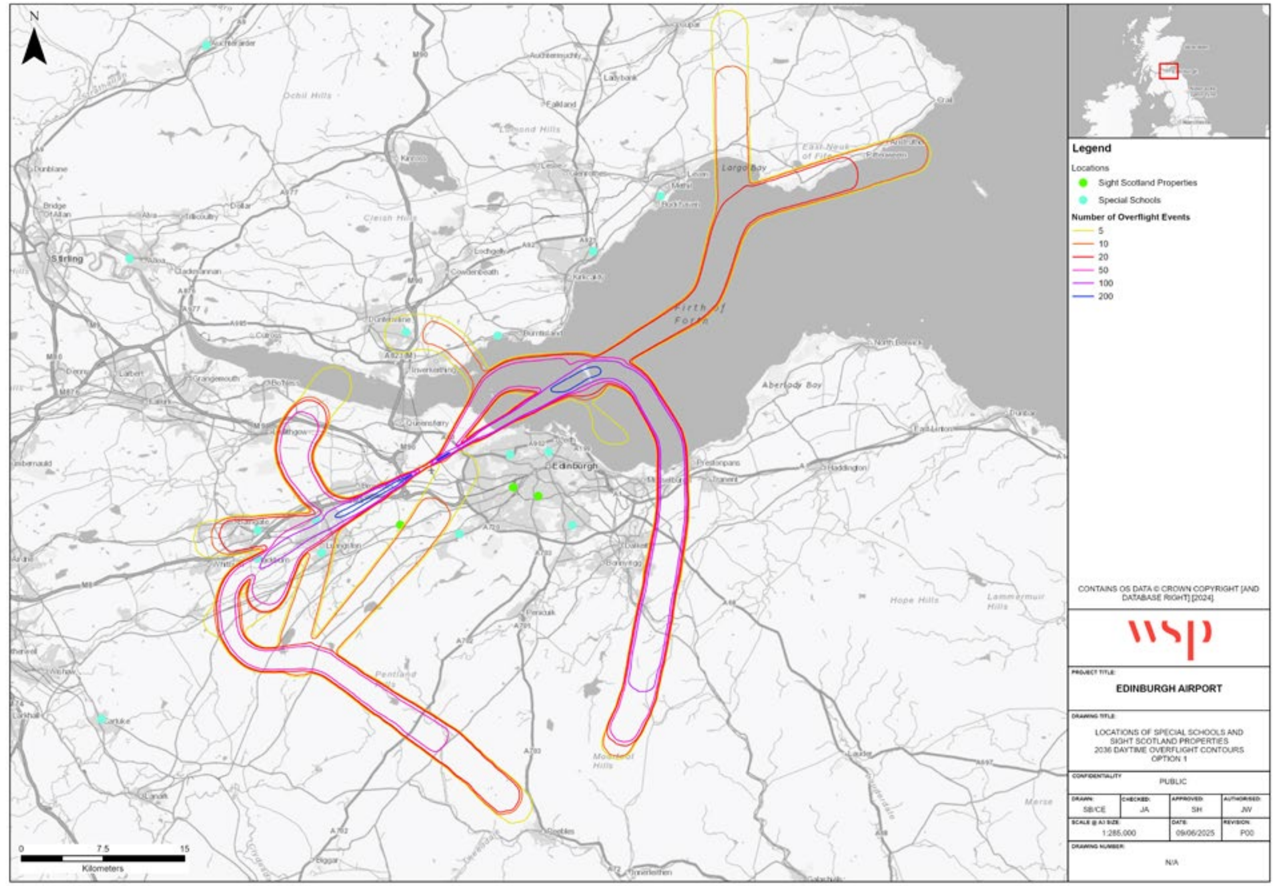


Figure 62: Special Schools and Sight Scotland Sites Overflight, Daytime Option 1, 2036.

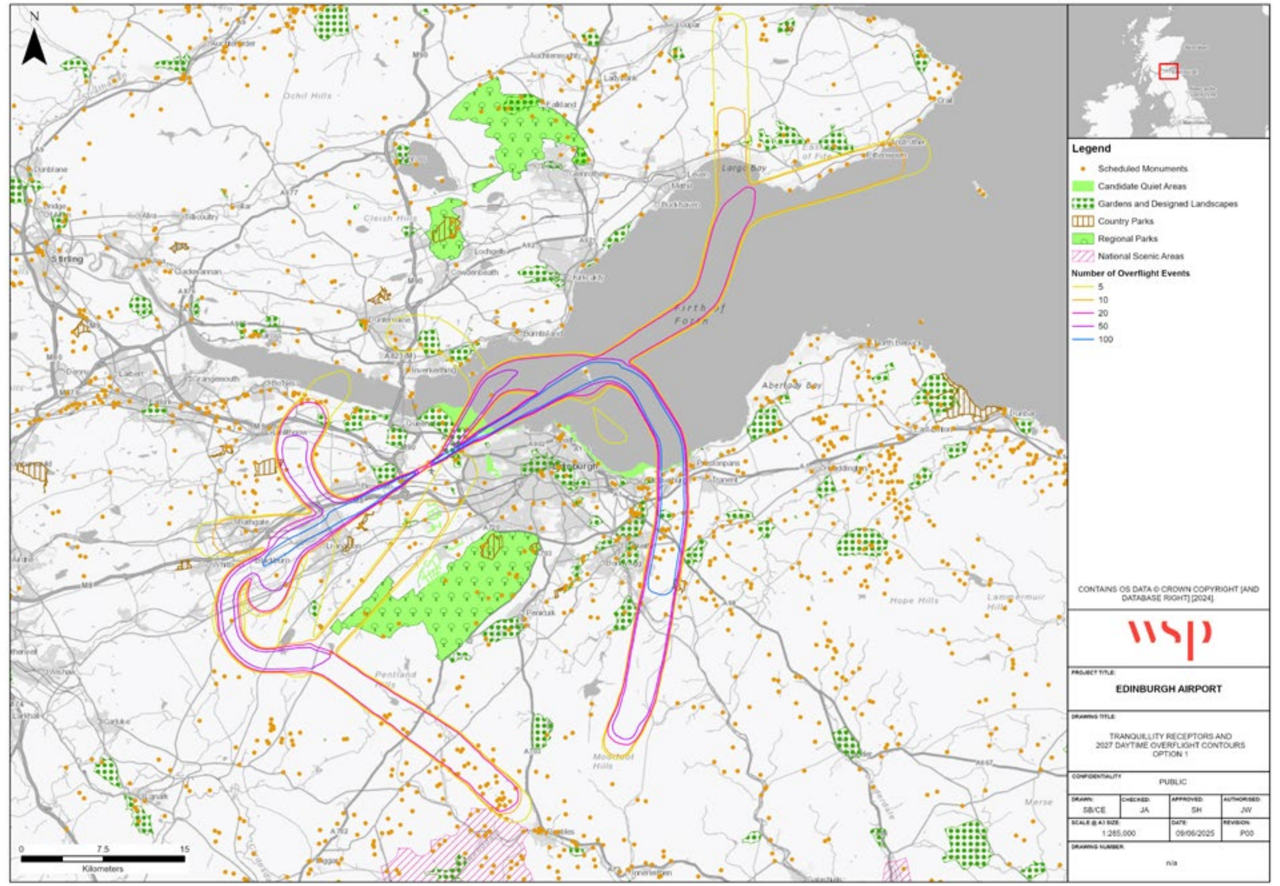


Figure 63: Tranquillity Receptors Overflight, Daytime Option 1, 2027.

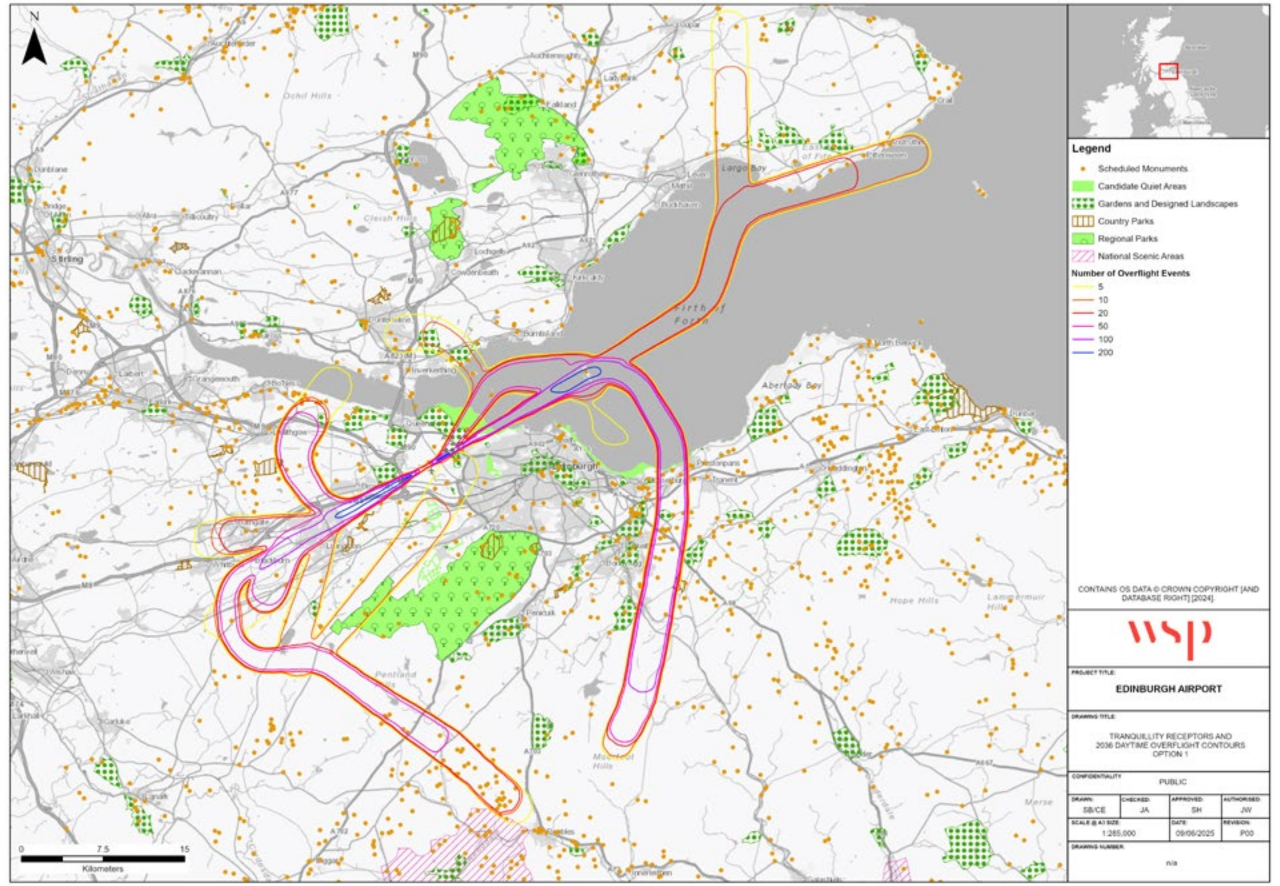


Figure 64: Tranquillity Receptors Overflight, Daytime Option 1, 2036.

3.5 Population and Noise Sensitive Sites in relation to LAeq 100% modes, Nx and Overflight contours for Option 1

Tables showing population and noise sensitive sites in relation to Laeq 100% modes Nx and Overflight contours for Option 1 are provided below. Tables for LAeq, 16hr, LAeq, 8hr can be found in Section 4 of the FOA.

Table 33: LAeq, 16 Hr, Day-Time 100% West Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 1	100% west LAeq 16hr	51	60.3	54,400	24,700	5	1	2	10	176
			54	36.1	11,400	5,300	3	0	1	2	129
			57	20.9	4,500	2,200	1	0	0	2	70
			60	11.2	2,900	1,400	1	0	0	1	37
			63	5.9	1,000	500	0	0	0	0	10
			66	3.0	200	100	0	0	0	0	1
			69	1.6	<100	<100	0	0	0	0	0

Table 34: LAeq, 16 Hr, Day-Time 100% West Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 1	100% west LAeq 16hr	51	70.6	65,400	29,600	7	1	3	13	187
			54	41.9	30,300	13,800	3	0	1	5	141
			57	24.7	5,900	2,800	1	0	0	2	82
			60	13.5	3,200	1,600	1	0	0	1	47
			63	7.1	1,800	900	1	0	0	1	16
			66	3.6	400	200	0	0	0	0	3
			69	1.9	100	<100	0	0	0	0	0

Table 35: LAeq, 16 Hr, Day-Time 100% East Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 1	100% east LAeq 16hr	51	63.2	28,500	13,000	7	1	2	8	145
			54	37.2	15,900	7,300	5	1	2	3	99
			57	21.6	4,400	2,000	0	0	0	2	37
			60	11.7	800	400	0	0	0	0	26
			63	6.2	400	200	0	0	0	0	15
			66	3.0	100	<100	0	0	0	0	2
			69	1.6	<100	<100	0	0	0	0	0

Table 36: LAeq, 16 Hr, Day-Time 100% East Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 1	100% east LAeq 16hr	51	74.6	30,700	14,000	7	1	4	9	169
			54	43.3	18,500	8,500	5	1	2	4	116
			57	25.4	6,800	3,100	0	0	0	3	45
			60	14.0	1,400	600	0	0	0	0	31
			63	7.5	500	200	0	0	0	0	19
			66	3.6	100	100	0	0	0	0	11
			69	1.9	100	<100	0	0	0	0	0

Table 37: LAeq, 8 Hr, Night-Time 100% West Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 1	100% west LAeq 8hr	45	77.7	64,300	29,100	7	1	3	13	202
			48	45.3	29,800	13,600	3	0	1	3	141
			51	26.9	6,100	2,900	1	0	0	2	101
			54	14.6	3,400	1,700	1	0	0	1	57
			57	7.5	2,600	1,300	1	0	0	1	27
			60	3.7	600	300	0	0	0	0	4
			63	1.9	<100	<100	0	0	0	0	0
			66	1.0	0	0	0	0	0	0	0

Table 38: LAeq, 8 Hr, Night-Time 100% West Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 1	100% west LAeq 8hr	45	90.6	81,200	36,800	10	1	6	18	235
			48	52.4	37,300	17,000	3	0	1	5	152
			51	31.3	9,500	4,500	1	0	0	2	112
			54	17.6	3,700	1,800	1	0	0	2	65
			57	9.1	2,800	1,400	1	0	0	1	35
			60	4.6	1,300	600	0	0	0	1	10
			63	2.3	100	<100	0	0	0	0	0
			66	1.1	0	0	0	0	0	0	0

Table 39: LAeq, 8 Hr, Night-Time 100% East Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 1	100% east LAeq 8hr	45	84.2	36,900	16,800	7	1	5	10	181
			48	47.7	22,400	10,200	5	1	2	6	115
			51	27.6	11,200	5,000	3	1	1	3	50
			54	15.4	2,800	1,300	0	0	0	1	32
			57	8.3	500	300	0	0	0	0	18
			60	3.9	200	100	0	0	0	0	9
			63	1.9	100	<100	0	0	0	0	0
			66	1.0	<100	<100	0	0	0	0	0

Table 40: LAeq, 8 Hr, Night-Time 100% East Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 1	100% east LAeq 8hr	45	101.5	47,300	21,600	7	1	5	12	189
			48	55.5	26,800	12,200	7	1	2	7	127
			51	32.4	14,300	6,500	5	1	2	3	70
			54	18.2	4,300	2,000	0	0	0	2	34
			57	9.9	700	300	0	0	0	0	21
			60	4.9	300	200	0	0	0	0	15
			63	2.3	100	<100	0	0	0	0	1
			66	1.2	<100	<100	0	0	0	0	0

Table 41: N65, Daytime Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	N65 (day)	5	132.6	94,400	42,700	8	1	270	8	24
			10	118.9	88,600	40,100	8	1	252	8	20
			20	87.5	68,000	30,800	7	1	204	2	15
			50	58.8	43,700	19,800	6	1	154	2	9
			100	36.4	18,900	8,700	5	1	127	2	5
			200	3.3	100	<100	0	0	0	0	0

Table 42: N65, Daytime Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	N65 (day)	5	141.9	95,700	43,300	8	1	285	8	24
			10	122.5	91,200	41,200	8	1	255	8	23
			20	95.6	71,400	32,300	7	1	231	4	16
			50	64.9	47,700	21,600	6	1	156	2	10
			100	39.6	22,100	10,100	6	1	129	2	5
			200	16.7	4,200	2,000	0	0	51	0	0

Table 43: N60, Night-Time Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	N60 (night)	5	177.4	110,000	49,700	11	1	315	11	23
			10	101.4	77,300	35,000	8	1	233	4	17
			20	62.1	44,800	20,300	6	1	161	2	8
			50	2.8	<100	<100	0	0	1	0	0

Table 44: N60, Night-Time Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	N60 (night)	5	210.5	117,800	53,200	11	1	355	12	25
			10	118.8	97,000	43,800	10	1	252	6	20
			20	73.3	55,400	25,200	7	1	203	3	10
			50	3.3	100	<100	0	0	6	0	0

Table 45: Overflight Daytime, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Overflights Day	5	779.1	285,300	130,400	22	4	1638	23	66
			10	548.6	150,800	68,200	15	2	1189	16	42
			20	385.0	102,300	46,100	12	1	303	11	24
			50	193.0	77,000	34,700	10	1	196	7	13
			100	74.1	31,800	14,400	6	1	64	1	5

Table 46: Overflight Daytime, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Overflights Day	5	797.4	293,000	134,000	23	4	1651	23	66
			10	633.3	174,300	78,900	18	2	1333	20	49
			20	439.8	134,500	60,600	14	1	655	16	34
			50	270.0	86,100	38,800	11	1	256	8	16
			100	107.2	40,200	18,200	9	1	104	2	7
			200	7.0	1,000	400	0	0	6	0	0

Table 47: Overflight Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 1	Overflights Night	5	372.0	100,400	45,300	13	1	627	8	21
			10	148.2	64,600	29,100	10	1	183	3	12
			20	23.5	10,100	4,500	3	0	10	1	3

Table 48: Overflight Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 1	Overflights Night	5	393.6	105,000	47,500	13	1	826	8	24
			10	191.0	80,700	36,300	11	1	219	8	16
			20	99.6	38,300	17,300	7	1	103	1	7

3.6 Tranquillity Sites in relation to LAeq, 8 Hr, Nx and Overflight contours for Option 1

3. Tables showing tranquillity sites in relation to LAeq 8Hr, Nx and Night Time Overflight contours for Option 1 are provided below. LAeq 16Hr and Daytime Overflight Comparison tables can be found in the main report along with LAeq 16Hr absolute data.

Table 49: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Comparison LAeq8hr	45	0	-0.1	0	1.1	0	0.4	0	0.0	0	0.0	2	0.2
			48	0	0.0	0	0.2	0	0.4	0	0.0	0	0.0	0	0.0
			51	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	0.0
			54	0	0.0	-1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 50: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison LAeq8hr	45	0	0.0	0	1.1	0	0.4	0	0.0	0	0.0	-1	0.2
			48	0	0.0	0	0.7	0	0.4	0	0.0	0	0.0	-2	-0.1
			51	0	0.0	0	-0.2	0	0.3	0	0.0	0	0.0	-1	0.0
			54	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 51: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	LAeq8hr	45	1	0.2	2	5.3	5	6.8	0	0.0	0	0.0	14	0.5
			48	1	0.0	2	3.0	4	5.3	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	0.9	4	3.4	0	0.0	0	0.0	6	0.2
			54	0	0.0	1	0.4	3	1.7	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	0.8	0	0.0	0	0.0	5	0.0
			60	0	0.0	0	0.0	2	0.4	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 52: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	LAeq8hr	45	1	0.3	2	5.6	5	7.3	0	0.0	0	0.0	14	0.6
			48	1	0.1	2	4.1	4	5.7	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	1.0	4	4.1	0	0.0	0	0.0	6	0.2
			54	0	0.0	2	0.5	3	2.0	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	1.0	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 53: Tranquillity Sites in Relation to N65, Daytime, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Comparison N65 (day)	5	0	0.0	0	0.5	0	-1.6	0	0.0	0	0.0	0	0.1
			10	0	0.0	0	0.7	0	0.5	0	0.0	0	0.0	2	0.1
			20	0	0.0	0	0.8	0	0.3	0	0.0	0	0.0	0	0.0
			50	0	-0.1	0	0.7	0	0.4	0	0.0	0	0.0	-1	-0.1
			100	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0	0	0.0
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 54: Tranquillity Sites in Relation to N65, Daytime, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison N65 (day)	5	0	-0.1	0	0.5	-1	0.3	0	0.0	0	0.0	1	0.2
			10	0	0.0	0	0.7	-1	0.1	0	0.0	0	0.0	1	0.0
			20	0	0.0	0	0.8	0	0.4	0	0.0	0	0.0	0	0.0
			50	0	0.0	0	0.8	0	0.4	0	0.0	0	0.0	0	0.0
			100	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	-1	0.0
			200	0	0.0	-1	-0.3	0	-0.1	0	0.0	0	0.0	-1	0.0

Table 55: Tranquillity Sites in Relation to N65, Daytime, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	N65 (day)	5	1	0.3	2	6.2	5	8.2	0	0.0	0	0.0	19	0.6
			10	1	0.3	2	6.1	4	7.7	0	0.0	0	0.0	17	0.4
			20	1	0.3	2	5.7	4	7.0	0	0.0	0	0.0	12	0.3
			50	1	0.0	2	4.6	4	5.9	0	0.0	0	0.0	10	0.2
			100	1	0.0	2	1.1	4	3.0	0	0.0	0	0.0	6	0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 56: Tranquillity Sites in Relation to N65, Daytime, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	N65 (day)	5	1	0.3	2	6.3	6	10.4	0	0.0	0	0.0	20	0.7
			10	1	0.3	2	6.2	4	7.8	0	0.0	0	0.0	17	0.4
			20	1	0.3	2	5.9	4	7.2	0	0.0	0	0.0	14	0.3
			50	1	0.1	2	5.0	4	6.3	0	0.0	0	0.0	12	0.3
			100	1	0.0	2	1.2	4	3.3	0	0.0	0	0.0	6	0.2
			200	0	0.0	1	0.0	4	1.7	0	0.0	0	0.0	4	0.1

Table 57: Tranquillity Sites in Relation to N60, Night-Time, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Comparison N60 (night)	5	0	0.0	0	0.7	0	0.5	0	0.0	0	0.0	1	0.2
			10	0	0.0	0	0.0	0	0.1	0	0.0	0	0.0	2	0.0
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.1
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 58: Tranquillity Sites in Relation to N60, Night-Time, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Comparison N60 (night)	5	1	0.3	0	0.6	1	1.1	0	0.0	0	0.0	6	0.1
			10	-1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 59: Tranquillity Sites in Relation to N60, Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	N60 (night)	5	2	0.5	2	6.2	5	8.7	0	0.0	0	0.0	19	0.9
			10	1	0.3	2	2.1	5	5.5	0	0.0	0	0.0	15	0.6
			20	1	0.1	2	1.9	5	4.3	0	0.0	0	0.0	10	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 60: Tranquillity Sites in Relation to N60, Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	N60 (night)	5	3	0.8	2	6.3	6	9.5	0	0.0	0	0.0	24	1.0
			10	1	0.4	2	2.4	5	6.1	0	0.0	0	0.0	16	0.6
			20	1	0.2	2	2.0	5	4.8	0	0.0	0	0.0	12	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 61: Tranquillity Sites in Relation to Overflight Daytime, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Overflights Day	5	5	9.9	7	5.8	15	13.8	0	0.0	1	0.3	107	2.2
			10	3	8.0	6	5.6	10	6.0	0	0.0	0	0.0	75	1.7
			20	2	0.5	2	4.7	7	5.4	0	0.0	0	0.0	58	1.4
			50	1	0.1	2	2.8	4	3.2	0	0.0	0	0.0	30	1.0
			100	1	0.0	2	0.6	3	1.3	0	0.0	0	0.0	22	0.7

Note that comparison tables for tranquillity sites in the daytime are in Section 4 of the FOA.

Table 62: Tranquillity Sites in Relation to Overflight Daytime, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Overflights Day	5	5	10.0	7	5.8	15	14.0	0	0.0	1	0.4	107	2.2
			10	3	8.3	6	5.6	13	10.8	0	0.0	0	0.0	84	2.0
			20	2	0.5	2	4.8	7	5.5	0	0.0	0	0.0	65	1.5
			50	2	0.2	2	4.4	5	4.4	0	0.0	0	0.0	37	1.2
			100	1	0.0	2	0.7	4	1.4	0	0.0	0	0.0	23	0.8
			200	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	3	0.3

Note that comparison tables for tranquillity sites in the daytime are in Section 4 of the FOA.

Table 63: Tranquillity Sites in Relation to Overflight Night-Time Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Comparison Overflight Night	5	1	-0.5	0	0.4	-3	-7.3	0	0.0	0	0.0	-13	-0.9
			10	2	0.2	1	0.1	3	1.1	0	0.0	0	0.0	20	0.5
			20	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.1

Table 64: Tranquillity Sites in Relation to Overflight Night-Time, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Comparison Overflight Night	5	1	-0.5	0	-0.2	-7	-13.5	0	0.0	0	0.0	-24	-1.5
			10	2	0.3	1	0.1	4	1.3	0	0.0	0	0.0	21	0.6
			20	1	0.0	1	0.1	2	1.0	0	0.0	0	0.0	18	0.4

Table 65: Tranquillity Sites in Relation to Overflight Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Overflight Night	5	2	0.5	2	4.5	6	5.1	0	0.0	0	0.0	46	1.3
			10	2	0.2	2	0.8	5	1.7	0	0.0	0	0.0	27	0.9
			20	0	0.0	1	0.5	2	0.2	0	0.0	0	0.0	4	0.4

Table 66: Tranquillity Sites in Relation to Overflight Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Overflight Night	5	2	0.5	2	4.6	7	5.3	0	0.0	0	0.0	47	1.3
			10	2	0.3	2	0.8	6	2.0	0	0.0	0	0.0	28	1.1
			20	1	0.0	2	0.6	4	1.4	0	0.0	0	0.0	23	0.8

3.7 Biodiversity Sites in relation to LAeq, Nx and Overflight contours for Option 1

4. Tables showing biodiversity sites in relation to LAeq, Nx and Overflight contours for Option 1 are provided below. Comparison tables for overflights can be found in Section 4 of the FOA.

Table 67: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Comparison LAeq16hr	51	0	-0.1	0	0.0	0	1.0	0	0.0	0	1.5	0	1.0
			54	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			57	-1	0.0	0	0.0	0	0.0	0	0.0	0	-0.1	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 68: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Comparison LAeq16hr	51	-1	-0.1	0	0.0	0	1.0	0	0.0	0	3.3	1	1.0
			54	0	0.0	0	0.0	0	0.2	0	0.0	0	0.1	0	0.2
			57	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.2	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 69: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	LAeq16hr	51	1	0.2	0	0.0	1	5.0	0	0.0	3	17.9	1	5.0
			54	1	0.1	0	0.0	1	1.9	0	0.0	3	5.0	1	1.9
			57	0	0.0	0	0.0	1	0.5	0	0.0	2	0.7	1	0.5
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 70: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	LAeq16hr	51	1	0.3	0	0.0	1	5.3	0	0.0	3	24.7	2	5.3
			54	1	0.1	0	0.0	1	3.1	0	0.0	3	7.4	1	3.1
			57	1	0.0	0	0.0	1	0.6	0	0.0	2	1.2	1	0.6
			60	0	0.0	0	0.0	1	0.0	0	0.0	1	0.0	1	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 71: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Comparison LAeq8hr	45	-1	-0.4	0	0.0	0	1.1	0	0.0	0	5.3	0	1.0
			48	0	-0.1	0	0.0	0	0.1	0	0.0	0	0.3	0	0.1
			51	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			54	0	0.0	0	0.0	0	0.0	0	0.0	0	-0.1	0	0.0
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 72: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Comparison LAeq8hr	45	0	-0.6	0	0.0	0	1.1	0	0.0	0	8.2	0	0.9
			48	0	0.0	0	0.0	0	0.7	0	0.0	0	1.0	0	0.7
			51	0	-0.1	0	0.0	0	-0.2	0	0.0	0	-0.1	0	-0.2
			54	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 73: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	LAeq8hr	45	1	0.3	0	0.0	1	5.2	0	0.0	3	29.5	2	5.2
			48	1	0.1	0	0.0	1	2.9	0	0.0	3	9.8	1	2.9
			51	1	0.0	0	0.0	1	0.9	0	0.0	3	3.1	1	0.9
			54	0	0.0	0	0.0	1	0.4	0	0.0	2	0.4	1	0.4
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 74: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	LAeq8hr	45	2	0.4	0	0.0	1	5.5	0	0.0	3	38.2	3	5.5
			48	1	0.2	0	0.0	1	4.1	0	0.0	3	13.3	1	4.1
			51	1	0.0	0	0.0	1	1.0	0	0.0	3	4.4	1	1.0
			54	0	0.0	0	0.0	1	0.5	0	0.0	2	0.8	1	0.5
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 75: Biodiversity Sites in Relation to N65, Daytime, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Comparison N65 (day)	5	0	-0.4	0	0.0	0	0.1	0	0.0	0	-0.9	-1	0.1
			10	0	-0.3	0	0.0	0	0.7	0	0.0	0	4.6	-1	0.7
			20	0	-0.1	0	0.0	0	0.8	0	0.0	0	1.3	-1	0.5
			50	-1	0.0	0	0.0	0	0.8	0	0.0	0	2.3	0	0.8
			100	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.4	0	-0.1
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 76: Biodiversity Sites in Relation to N65, Daytime, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison N65 (day)	5	0	-0.4	0	0.0	0	0.1	0	0.0	0	-2.6	-1	0.2
			10	0	-0.4	0	0.0	-1	0.5	0	0.0	-1	2.3	-6	0.4
			20	0	-0.2	0	0.0	0	0.8	0	0.0	0	1.9	-1	0.5
			50	0	-0.1	0	0.0	0	0.8	0	0.0	0	1.6	1	0.8
			100	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.3	0	-0.1
			200	0	0.0	0	0.0	-1	-0.3	0	0.0	-1	-0.3	-1	-0.3

Table 77: Biodiversity Sites in Relation to N65, Daytime, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	N65 (day)	5	2	0.6	0	0.0	3	6.2	0	0.0	5	55.5	10	6.6
			10	2	0.5	0	0.0	1	6.0	0	0.0	3	48.4	4	6.4
			20	2	0.4	0	0.0	1	5.6	0	0.0	3	32.8	3	5.7
			50	1	0.2	0	0.0	1	4.6	0	0.0	3	18.2	1	4.6
			100	1	0.1	0	0.0	1	1.1	0	0.0	3	6.9	1	1.1
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 78: Biodiversity Sites in Relation to N65, Daytime, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	N65 (day)	5	2	0.7	0	0.0	3	6.4	0	0.0	5	58.0	11	6.9
			10	2	0.5	0	0.0	1	6.1	0	0.0	3	49.9	4	6.4
			20	2	0.4	0	0.0	1	5.8	0	0.0	3	37.1	3	5.9
			50	2	0.2	0	0.0	1	4.9	0	0.0	3	21.0	3	5.0
			100	1	0.1	0	0.0	1	1.2	0	0.0	3	7.8	1	1.2
			200	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 79: Biodiversity Sites in Relation to N60, Night-Time, Option 1 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Comparison N60 (night)	5	0	-0.6	0	0.0	0	0.6	0	0.0	0	13.4	-3	0.4
			10	0	-0.5	0	0.0	0	0.1	0	0.0	0	1.9	-1	-0.2
			20	-1	-0.2	0	0.0	0	0.0	0	0.0	0	0.6	0	0.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 80: Biodiversity Sites in Relation to N60, Night-Time, Option 1 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Comparison N60 (night)	5	0	-0.5	0	0.0	1	2.0	0	0.0	1	19.5	-1	1.9
			10	0	-0.7	0	0.0	0	0.1	0	0.0	0	1.9	-1	-0.2
			20	0	-0.5	0	0.0	0	0.1	0	0.0	0	1.2	-1	0.1
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 81: Biodiversity Sites in Relation to N60, Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	N60 (night)	5	2	1.2	0	0.0	1	6.0	0	0.0	3	68.5	5	6.2
			10	2	0.8	0	0.0	1	2.1	0	0.0	3	27.5	2	2.1
			20	1	0.2	0	0.0	1	1.9	0	0.0	3	21.5	1	1.9
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 82: Biodiversity Sites in Relation to N60, Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	N60 (night)	5	2	1.3	0	0.0	2	7.6	0	0.0	4	82.1	7	7.9
			10	2	0.9	0	0.0	1	2.4	0	0.0	3	29.2	2	2.4
			20	2	0.3	0	0.0	1	2.0	0	0.0	3	23.4	1	2.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 83: Biodiversity Sites in Relation to Overflight Daytime, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 1	Overflights Day	5	2	1.7	0	0.0	8	9.3	3	15.0	12	235.6	38	36.2
			10	1	1.2	0	0.0	5	6.3	3	13.9	9	202.7	23	30.0
			20	1	0.6	0	0.0	4	5.3	3	10.6	6	149.0	16	22.5
			50	1	0.4	0	0.0	3	2.8	2	6.9	5	59.8	8	13.3
			100	1	0.1	0	0.0	2	0.6	0	0.0	4	33.1	2	0.6

Table 84: Biodiversity Sites in Relation to Overflight Daytime, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 1	Overflights Day	5	2	1.8	0	0.0	8	9.5	3	15.2	12	241.4	39	36.7
			10	1	1.3	0	0.0	7	6.7	3	14.2	11	217.7	34	31.7
			20	1	0.9	0	0.0	5	5.5	3	11.1	9	172.4	22	25.4
			50	1	0.4	0	0.0	4	5.0	3	8.9	6	93.6	13	19.4
			100	1	0.1	0	0.0	3	0.7	1	0.0	5	37.1	4	0.7
			200	0	0.0	0	0.0	0	0.0	0	0.0	1	3.9	0	0.0

Table 85: Biodiversity Sites in Relation to Overflight Night-Time, Option 1, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 1	Overflight Night	5	1	0.5	0	0.0	5	5.3	3	1.0	9	164.5	20	14.0
			10	1	0.3	0	0.0	3	0.8	1	0.1	5	43.1	4	0.9
			20	0	0.0	0	0.0	1	0.5	0	0.0	3	13.9	1	0.5

Table 86: Biodiversity Sites in Relation to Overflight Night-Time, Option 1, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 1	Overflight Night	5	1	0.5	0	0.0	5	5.5	3	1.1	9	174.4	21	14.8
			10	1	0.4	0	0.0	3	0.9	1	0.1	5	45.4	7	4.3
			20	1	0.1	0	0.0	3	0.7	0	0.0	5	36.1	3	0.7

4 Additional Figures and Tables for Option 2

4.1 LAeq Contours For Option 2

The main document presents data tables for LAeq Contours. The Figures below present the contours themselves.

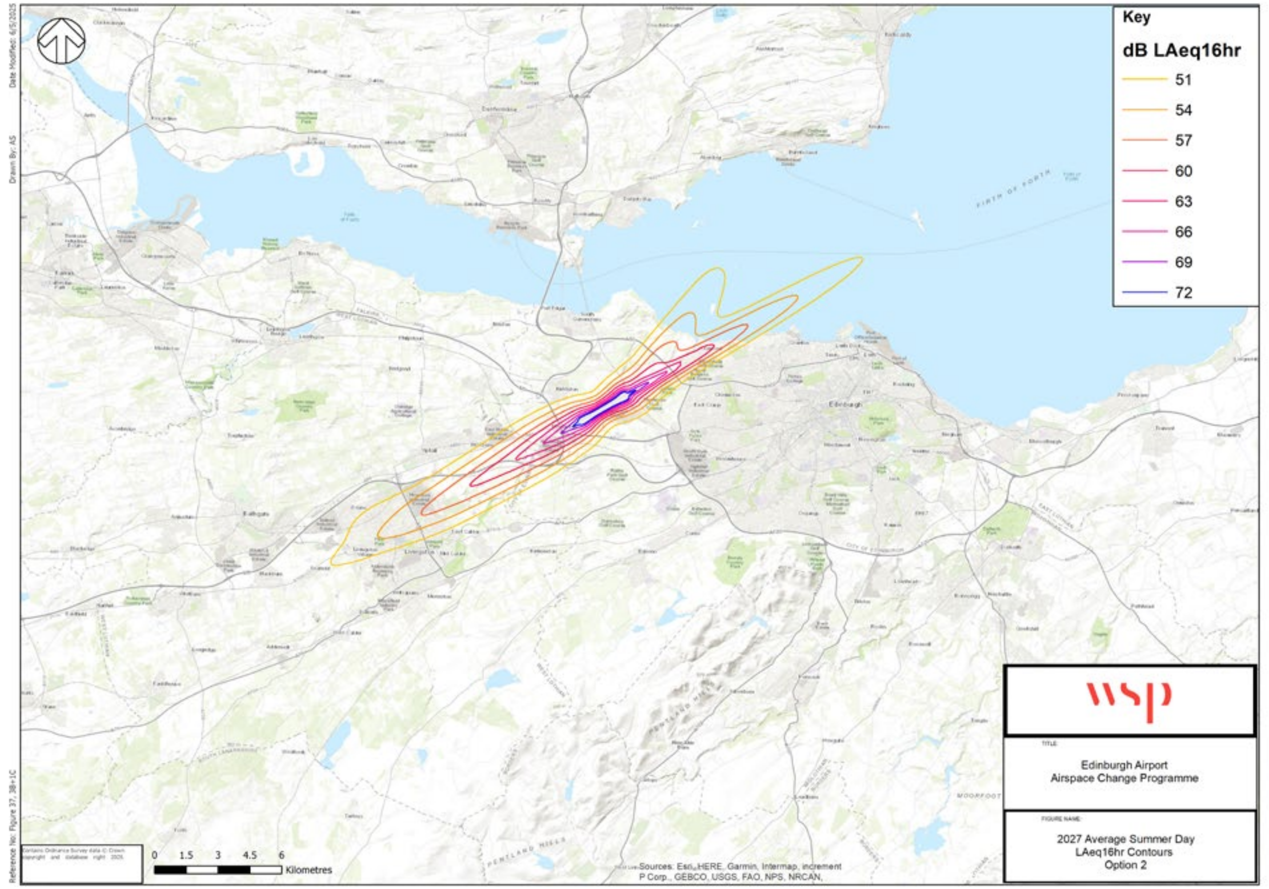


Figure 65: LAeq, 16 Hr, Daytime Option 2, 2027.

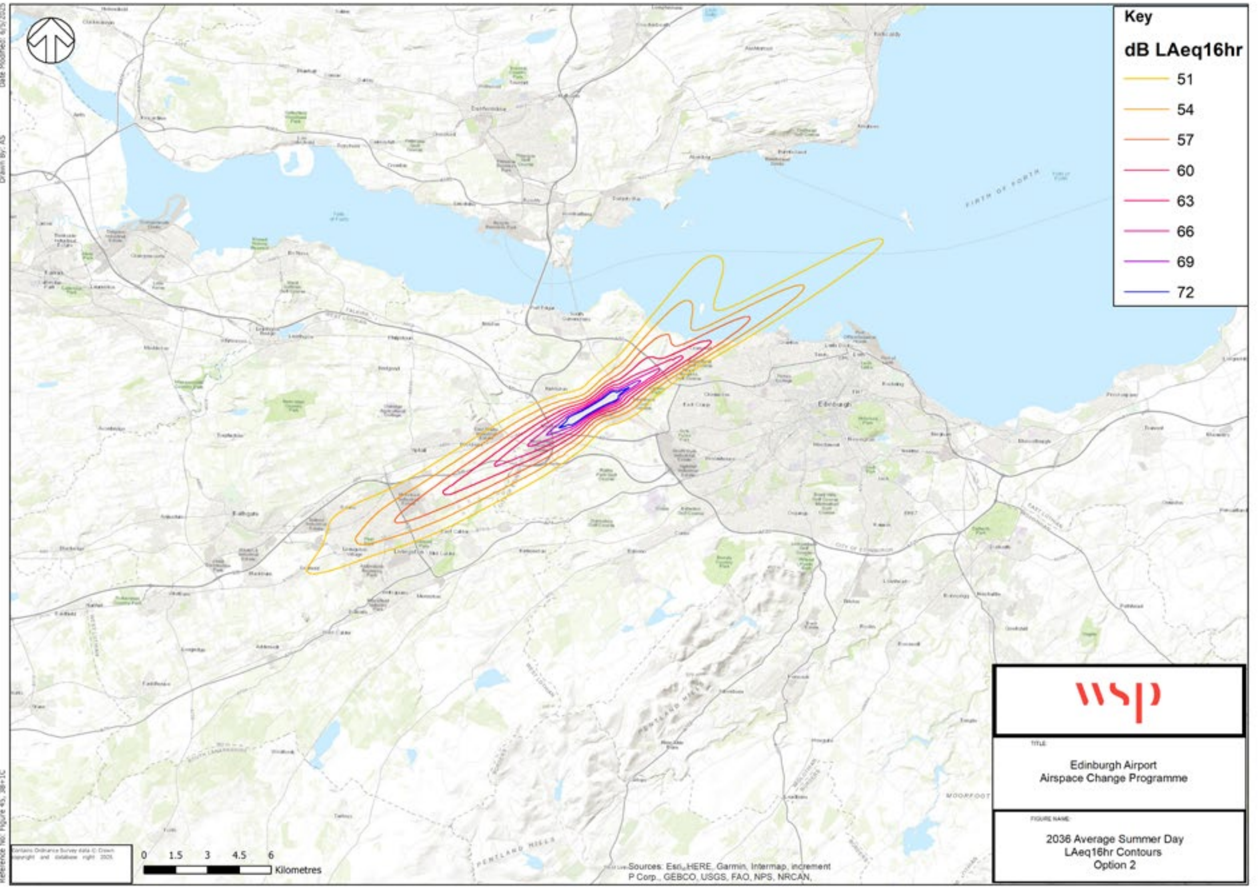


Figure 66: LAeq, 16 Hr, Daytime Option 2, 2036.

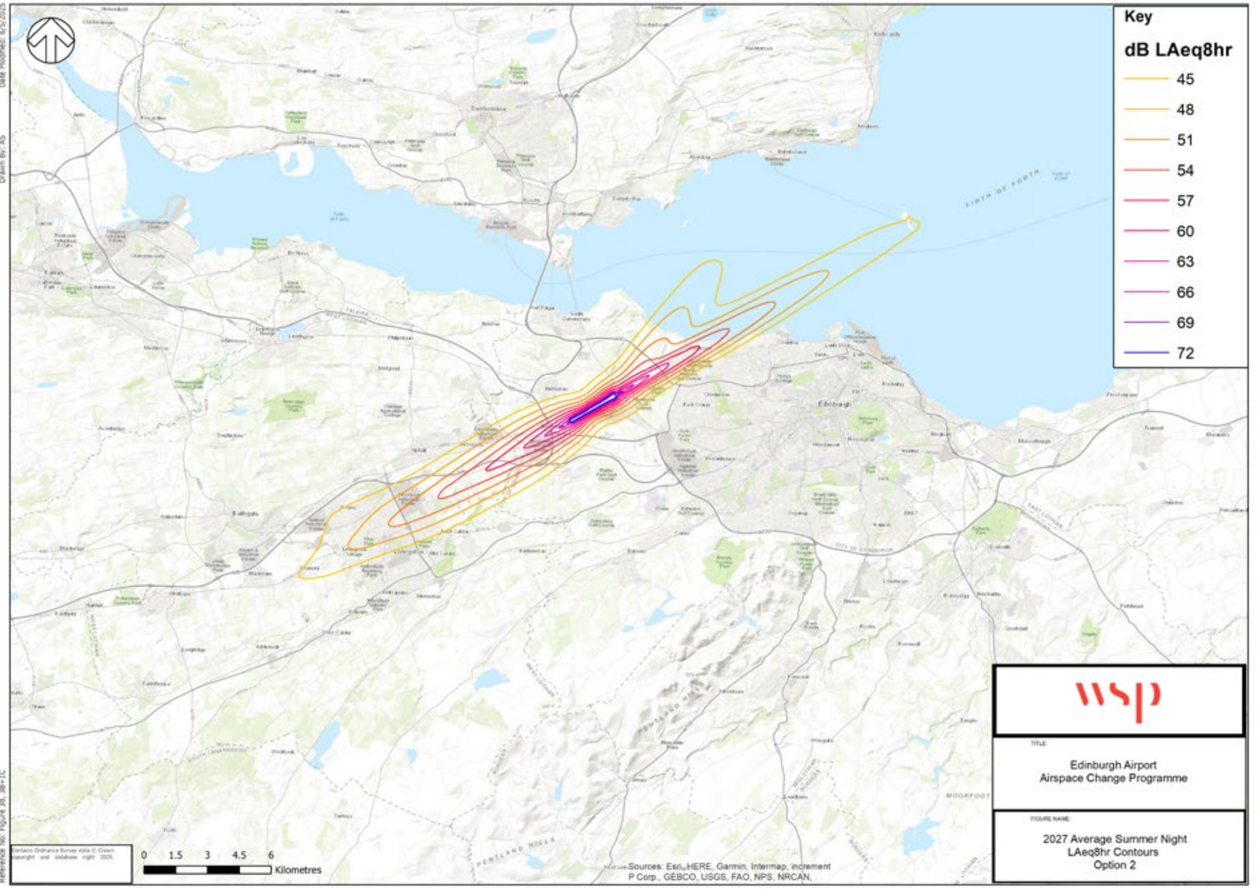


Figure 67: LAeq, 8 Hr, Night-Time Option 2, 2027.

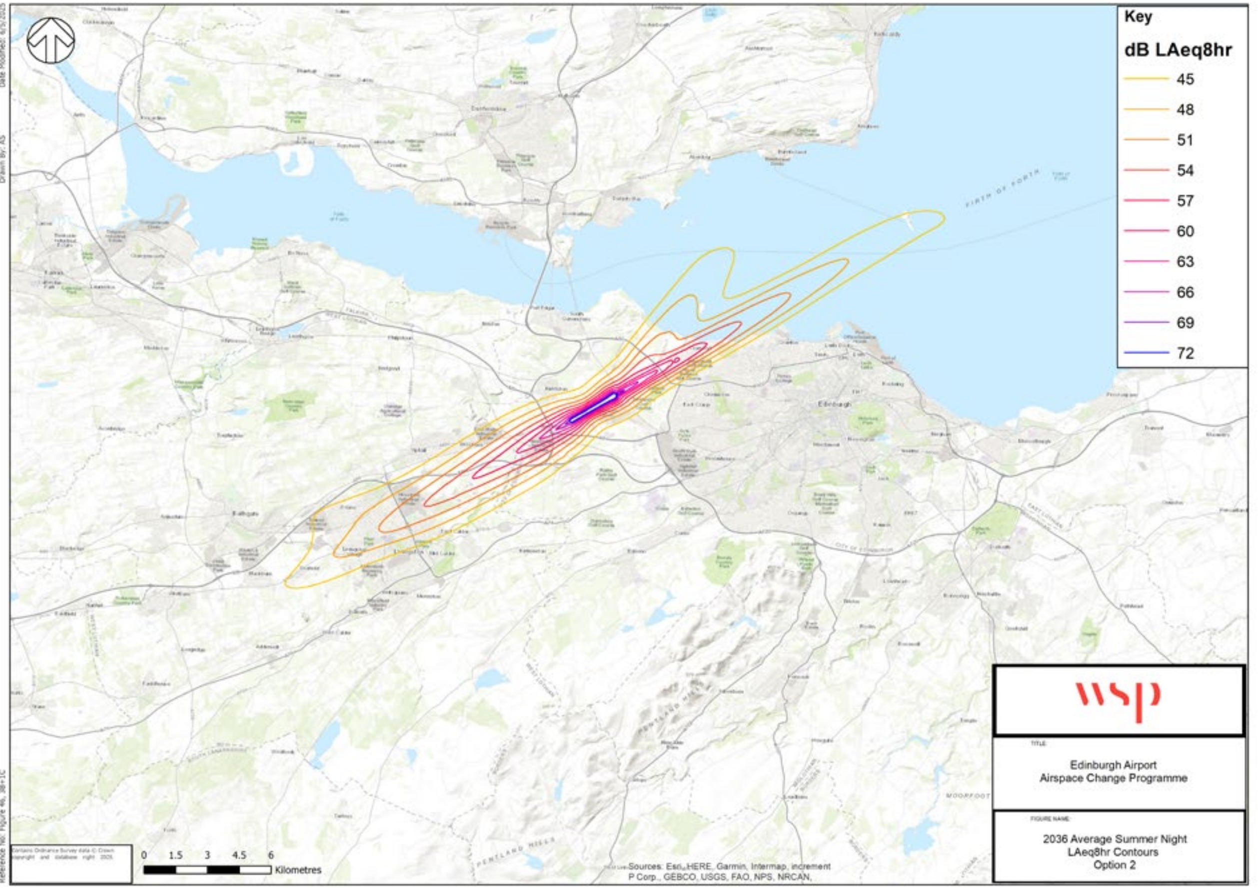


Figure 68: LAeq, 8 Hr, Night-Time Option 2, 2036.

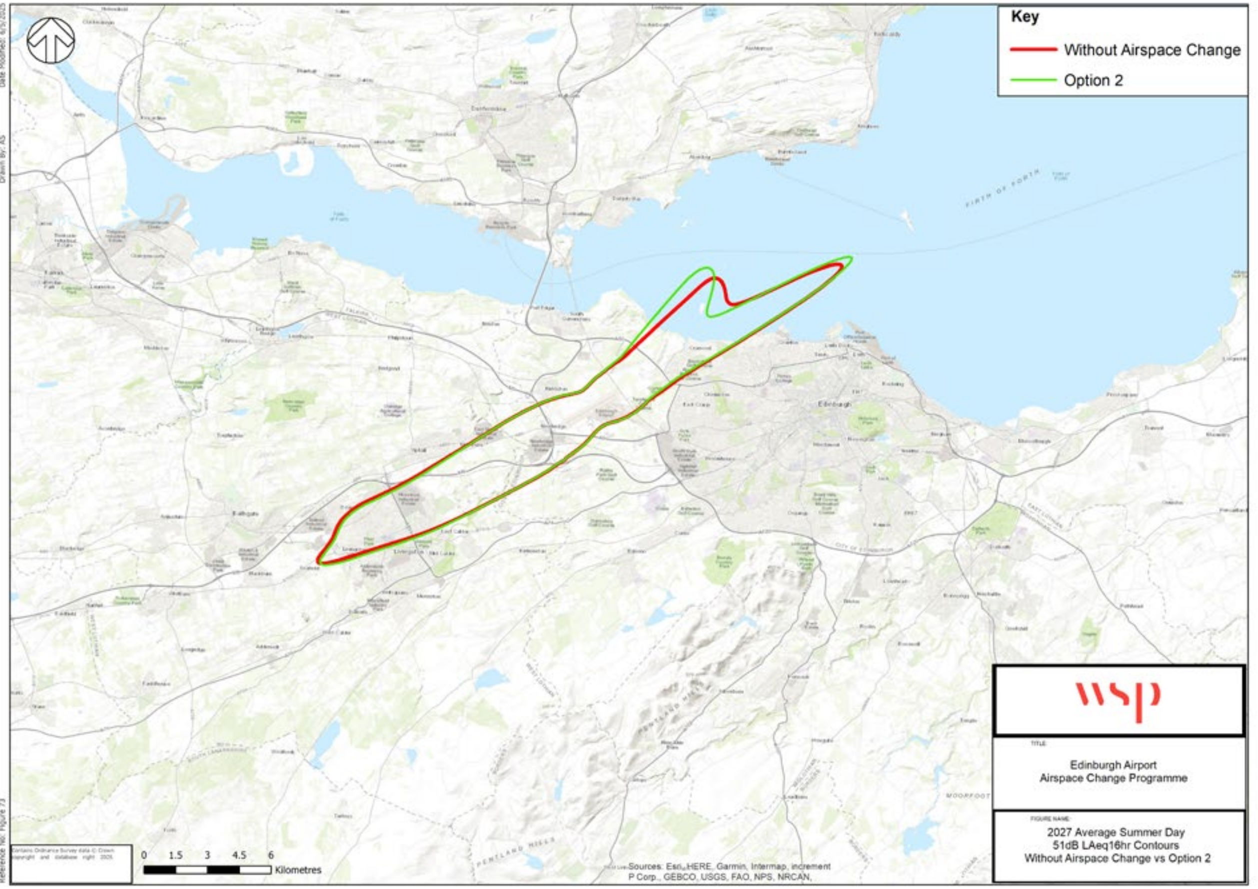


Figure 69: LAeq, 16 Hr, Day-Time 51dB Comparison Option 2 vs Baseline, 2027.

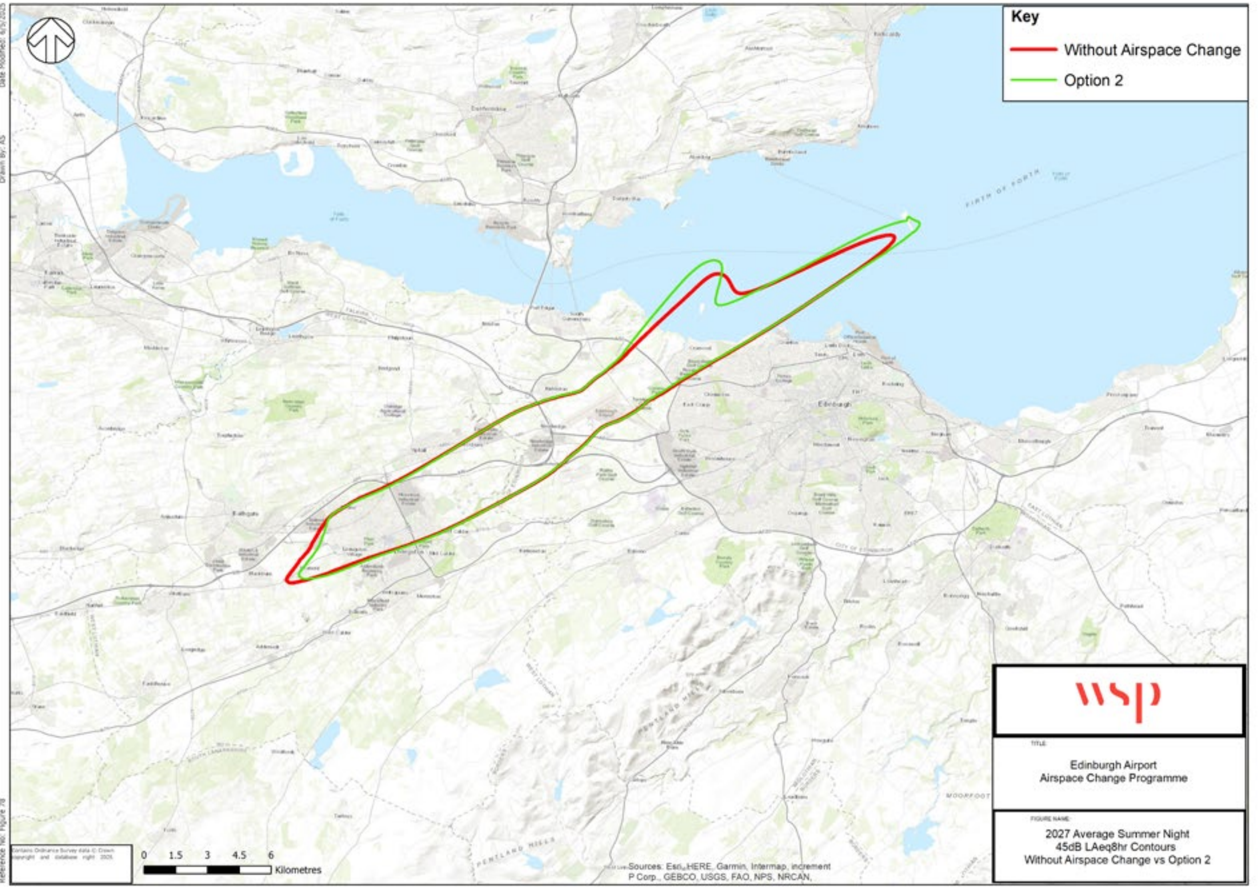


Figure 70: LAeq, 8 Hr, Night-Time 45dB Comparison Option 2 vs Baseline, 2027.

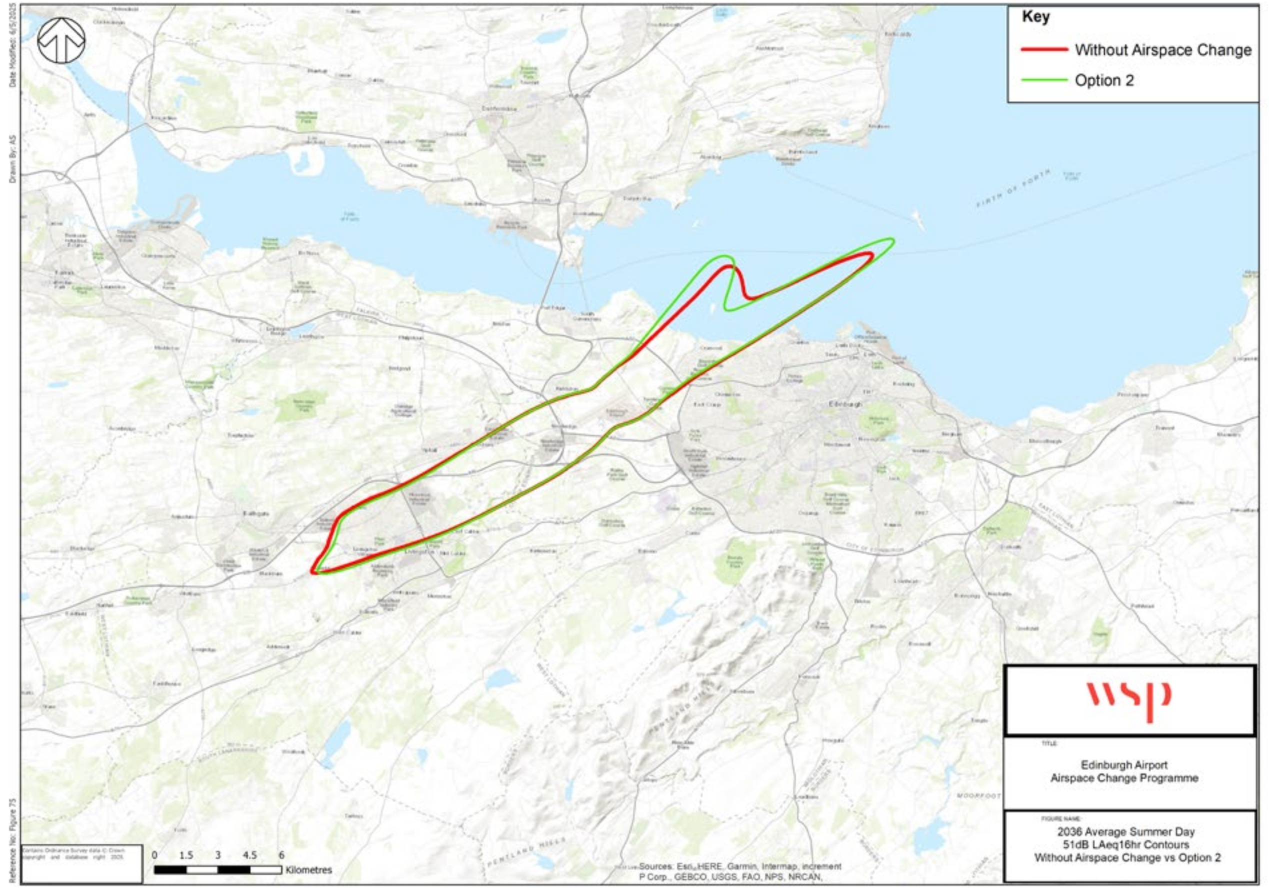


Figure 71: LAeq, 16 Hr, Day-Time 51dB Comparison Option 2 vs Baseline, 2036.

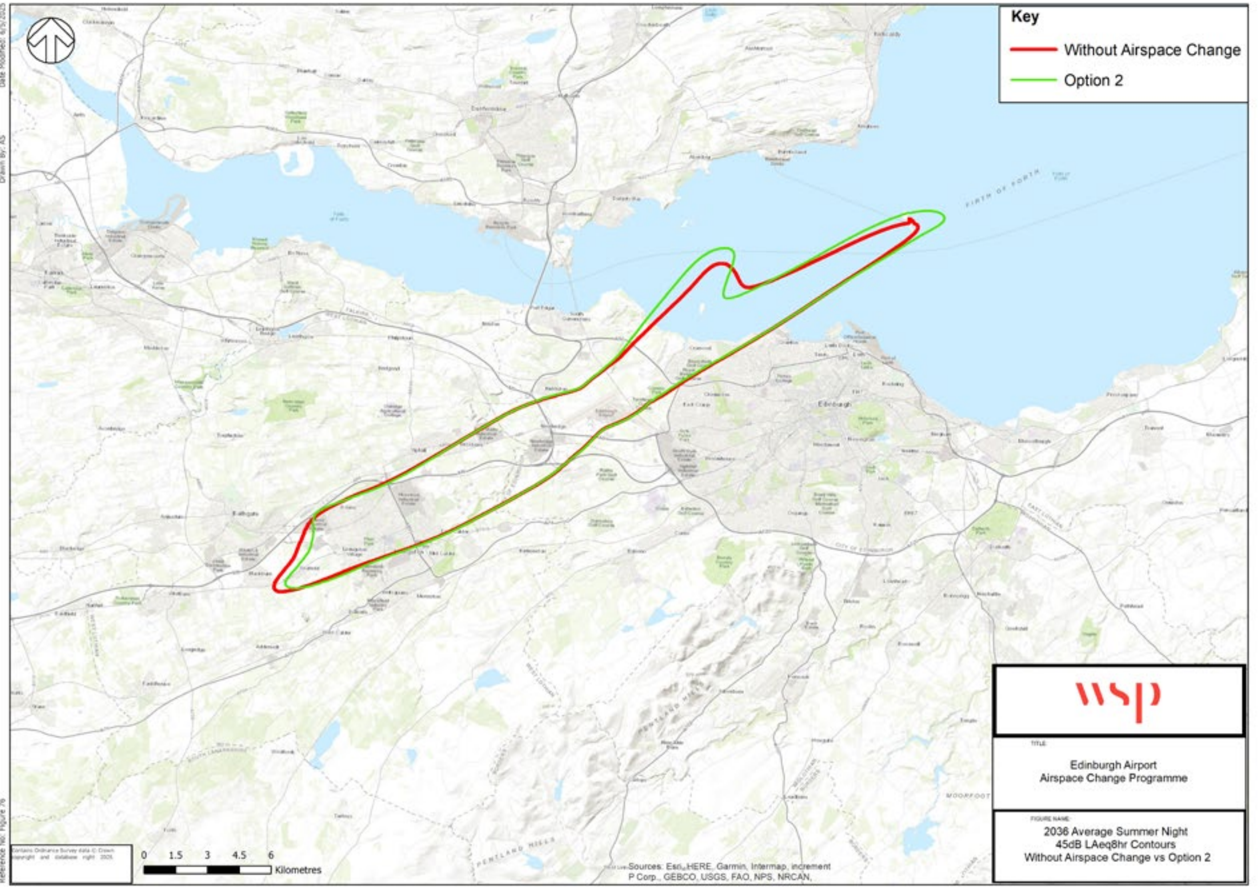


Figure 72: LAeq, 8 Hr, Night-Time 45dB Comparison Option 2 vs Baseline, 2036.

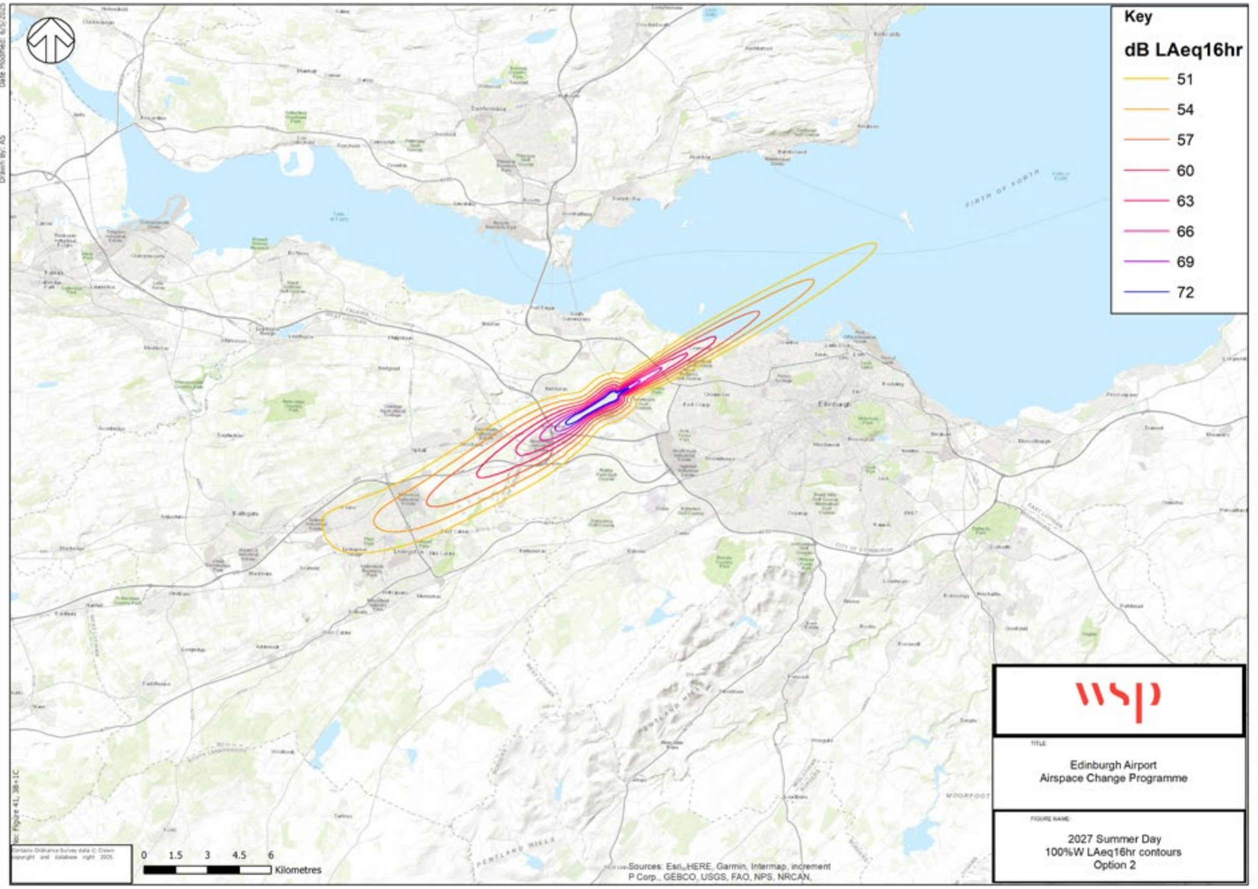


Figure 73: LAeq, 16 Hr, Day-Time 100% West Option 2, 2027.

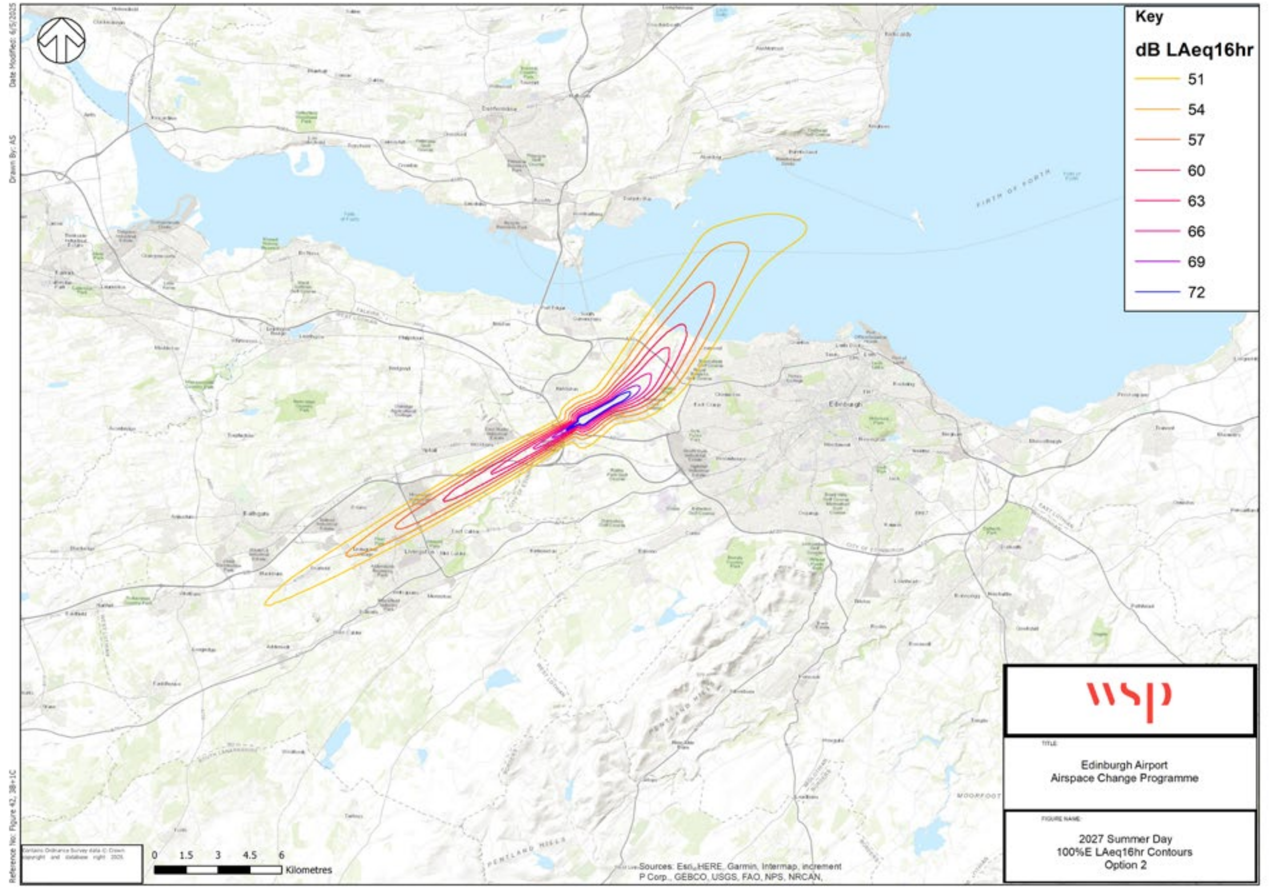


Figure 74: LAeq, 16 Hr, Day-Time 100% East Option 2, 2027.

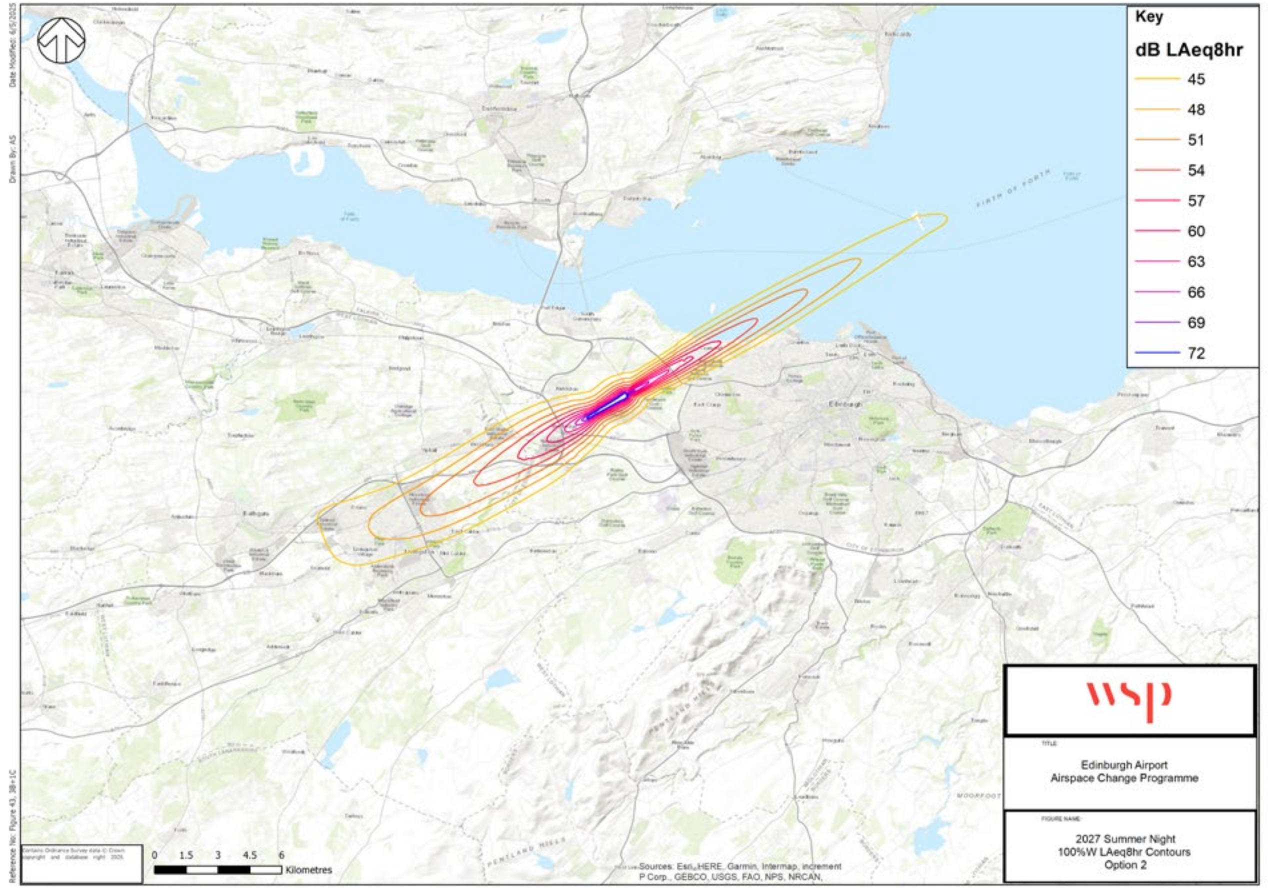


Figure 75: LAeq, 8 Hr, Night-Time 100% West Option 2, 2027.

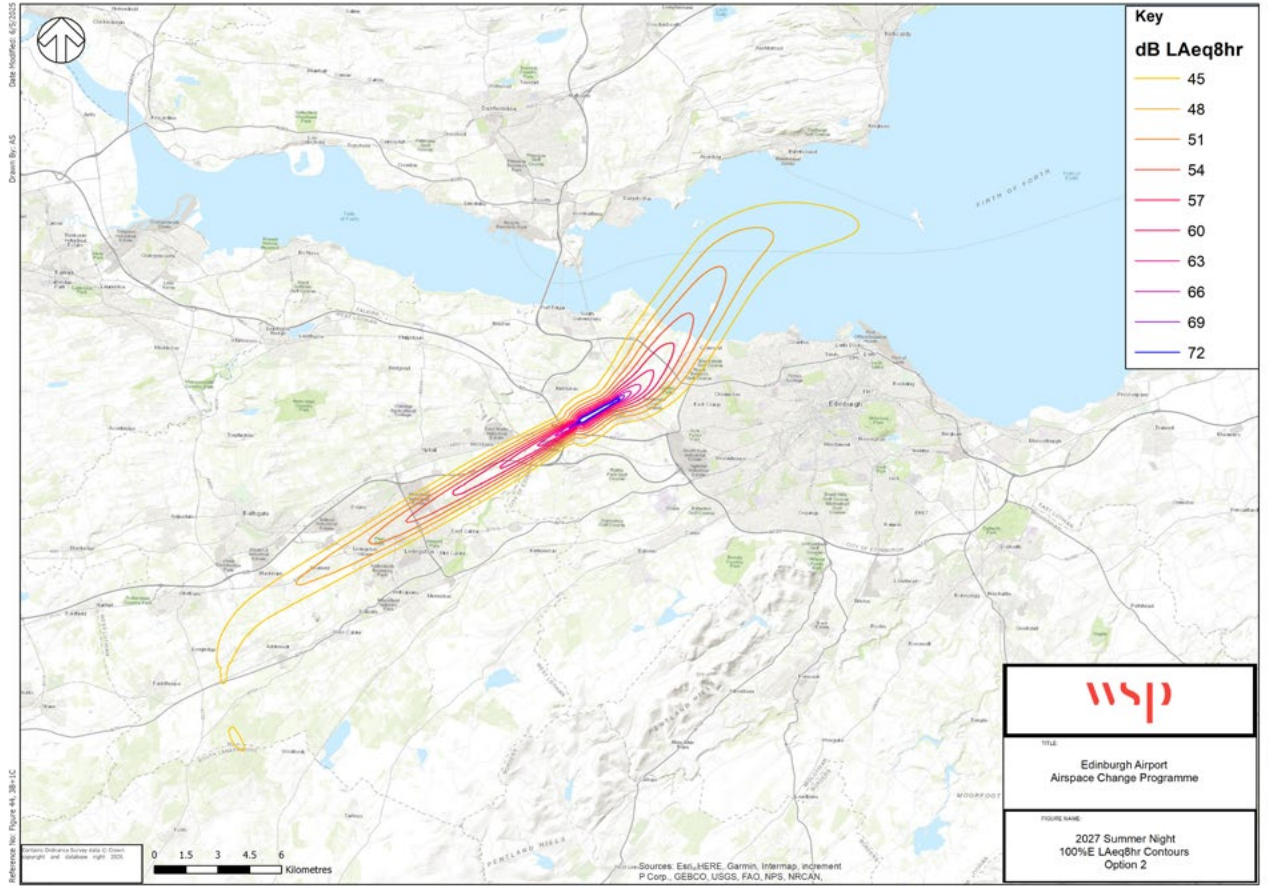


Figure 76: LAeq, 8 Hr, Night-Time 100% East Option 2, 2027.

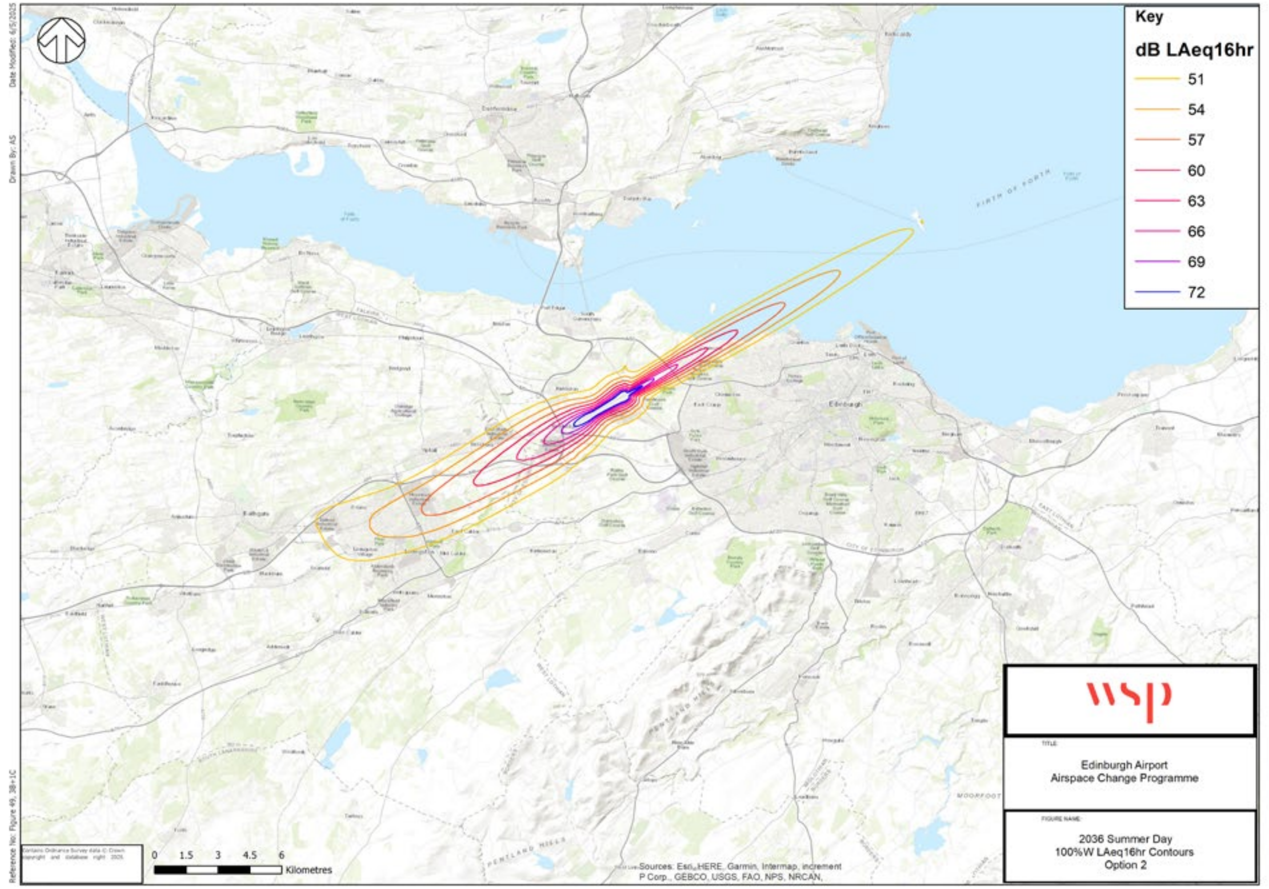


Figure 77: LAeq, 16 Hr, Day-Time 100% West Option 2, 2036.

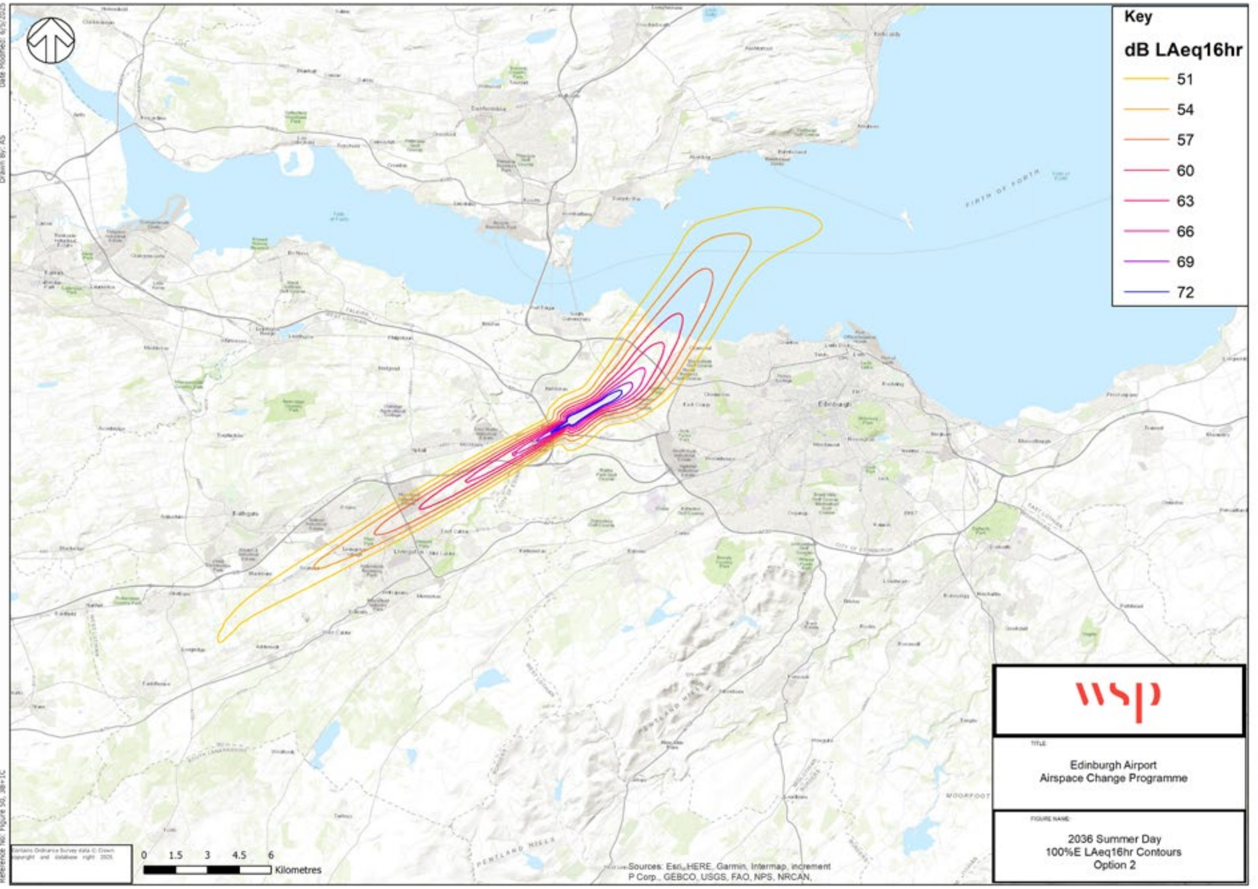


Figure 78: LAeq, 16 Hr, Day-Time 100% East Option 2, 2036.

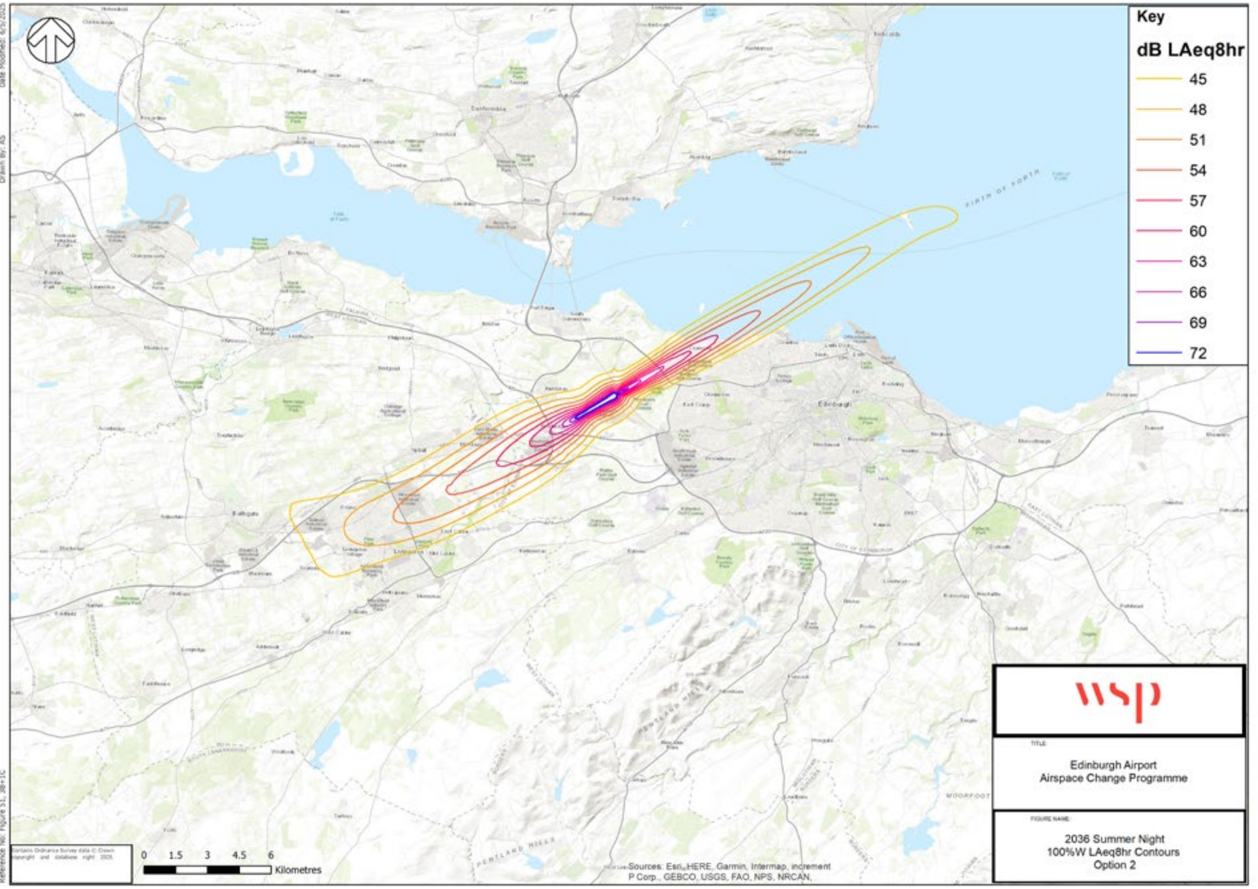


Figure 79: LAeq, 8 Hr, Night-Time 100% West Option 2, 2036.

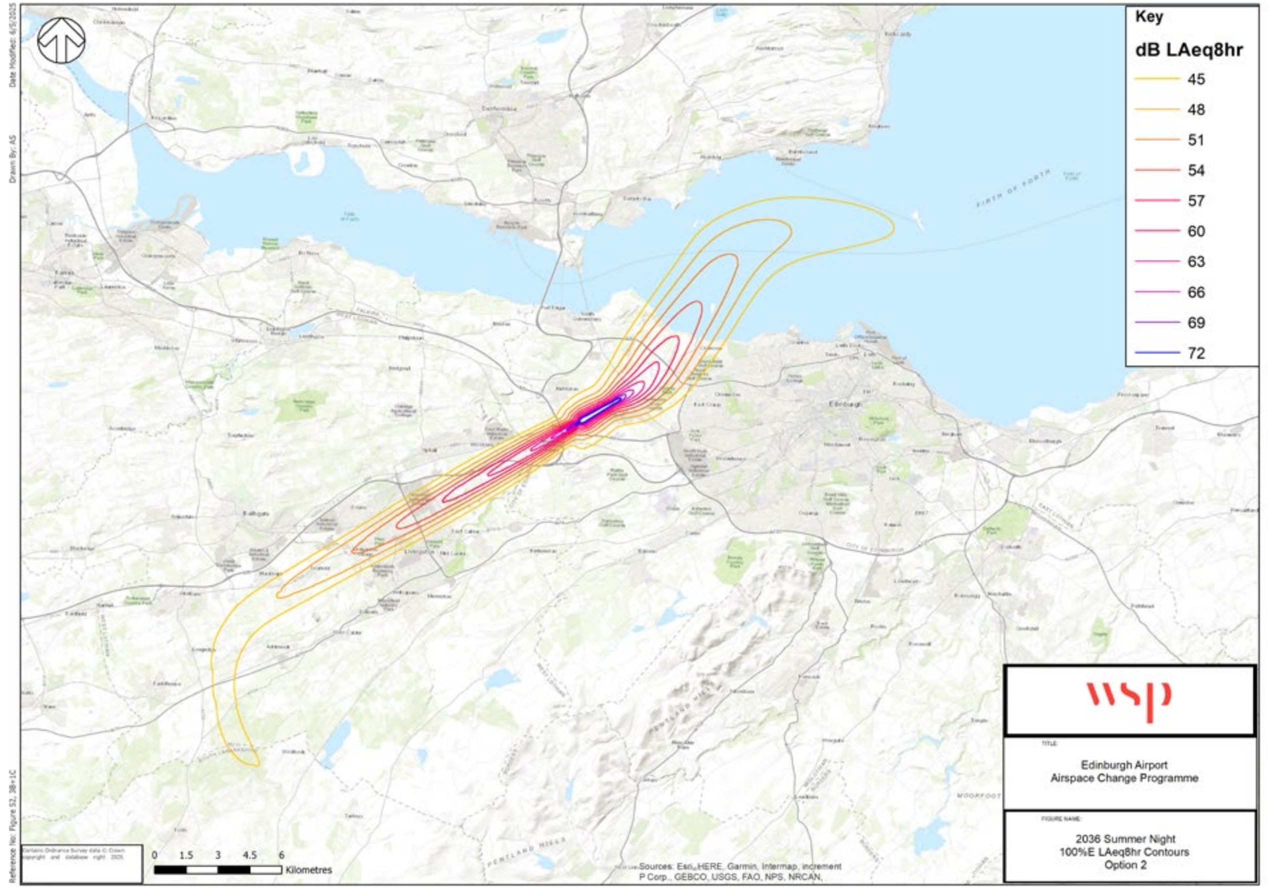


Figure 80: LAeq, 8 Hr, Night-Time 100% East Option 2, 2036.

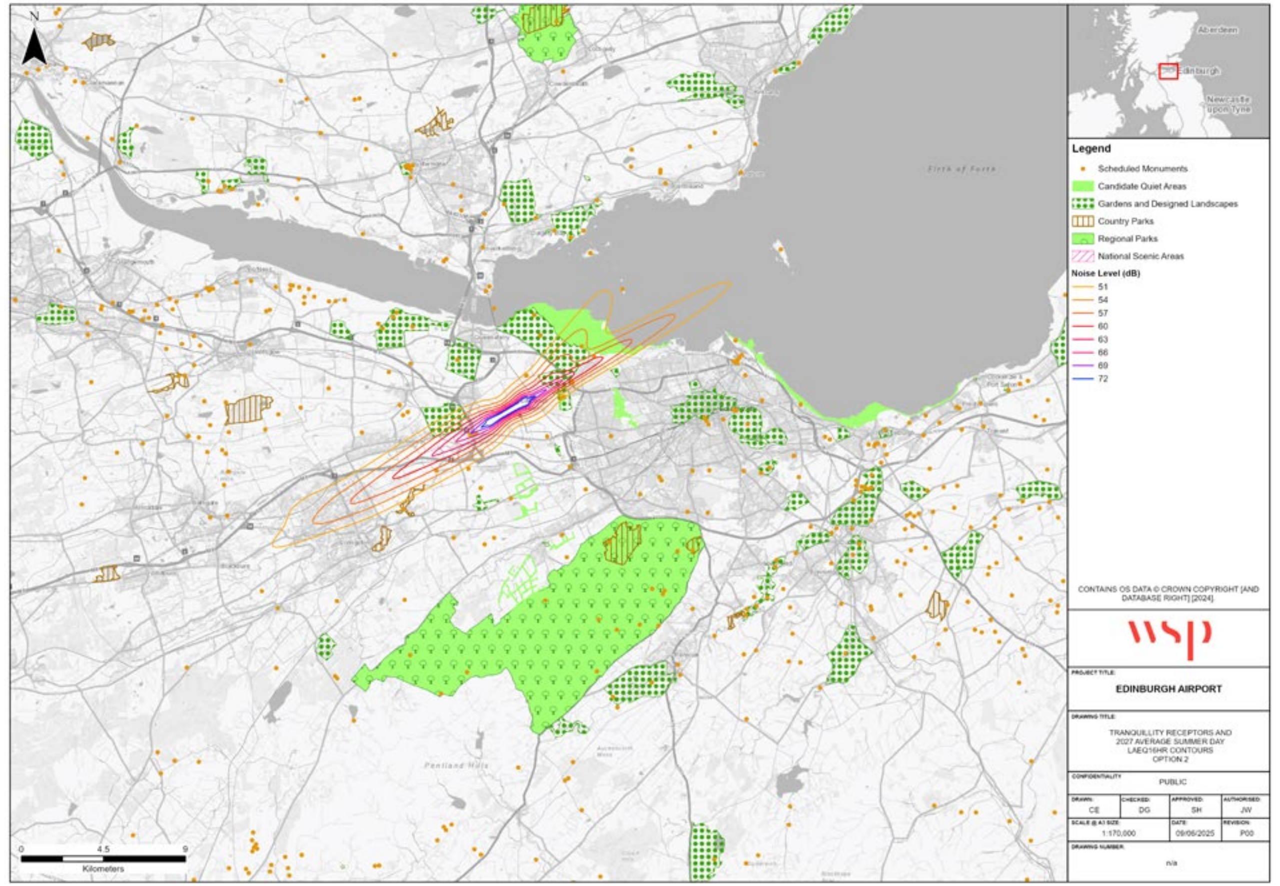


Figure 81: Tranquillity Receptors LAeq, 16 Hr, Day-Time Option 2, 2027.

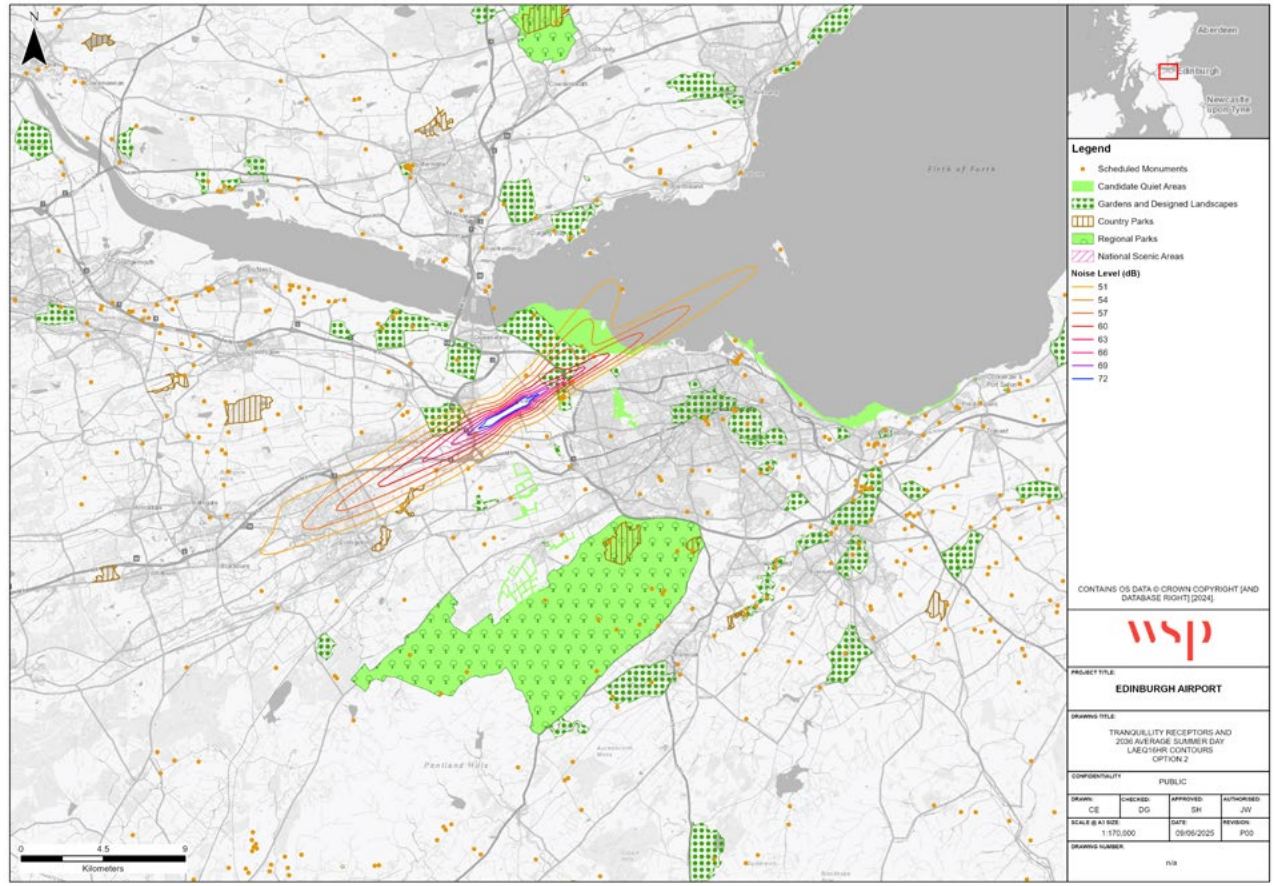


Figure 82: Tranquillity Receptors LAeq, 16 Hr, Day-Time Option 2, 2036.

4.2 Nx Contours for Option 2

5. Nx contours for Option 2 are provided below.

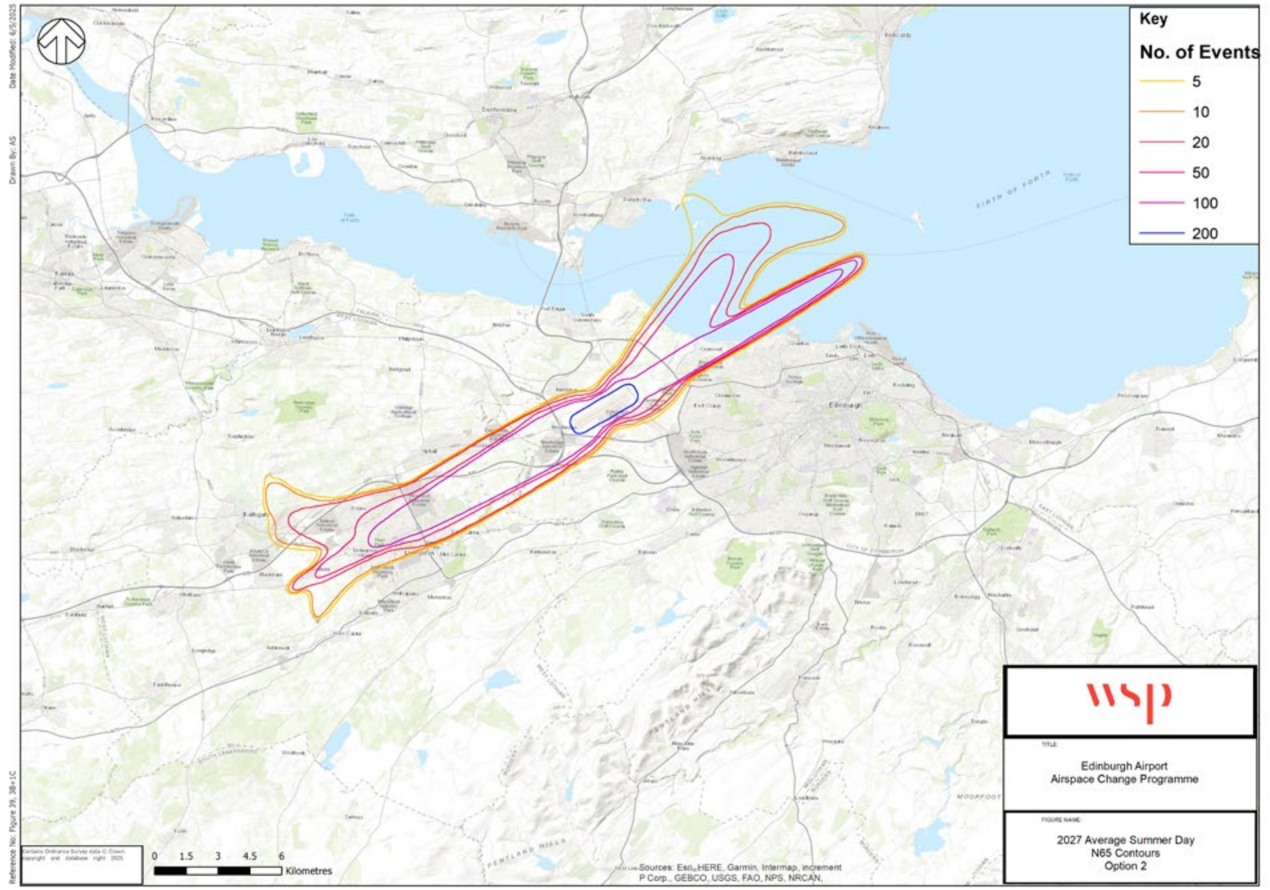


Figure 83: N65, Daytime Option 2, 2027.

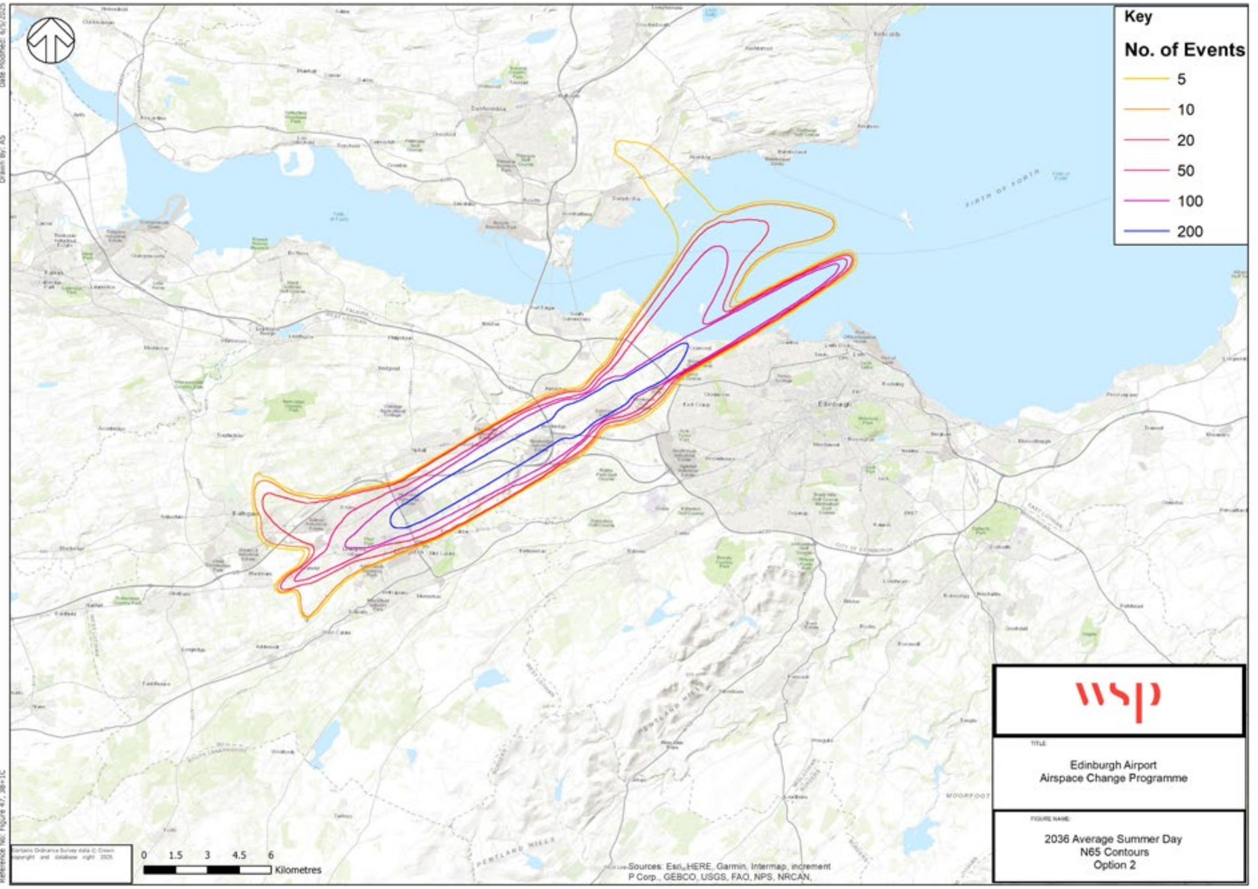


Figure 84: N65, Daytime Option 2, 2036.

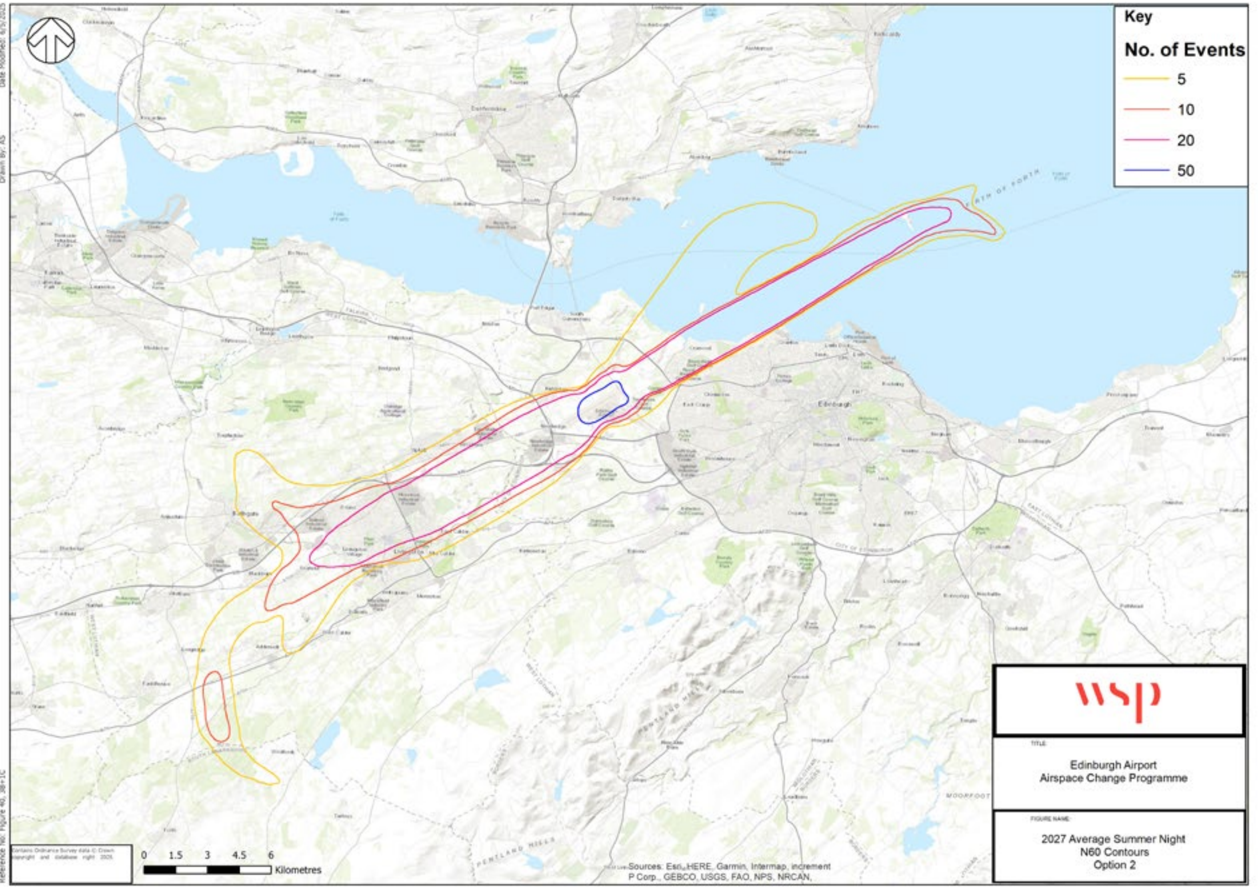


Figure 85: N60, Night-Time Option 2, 2027.

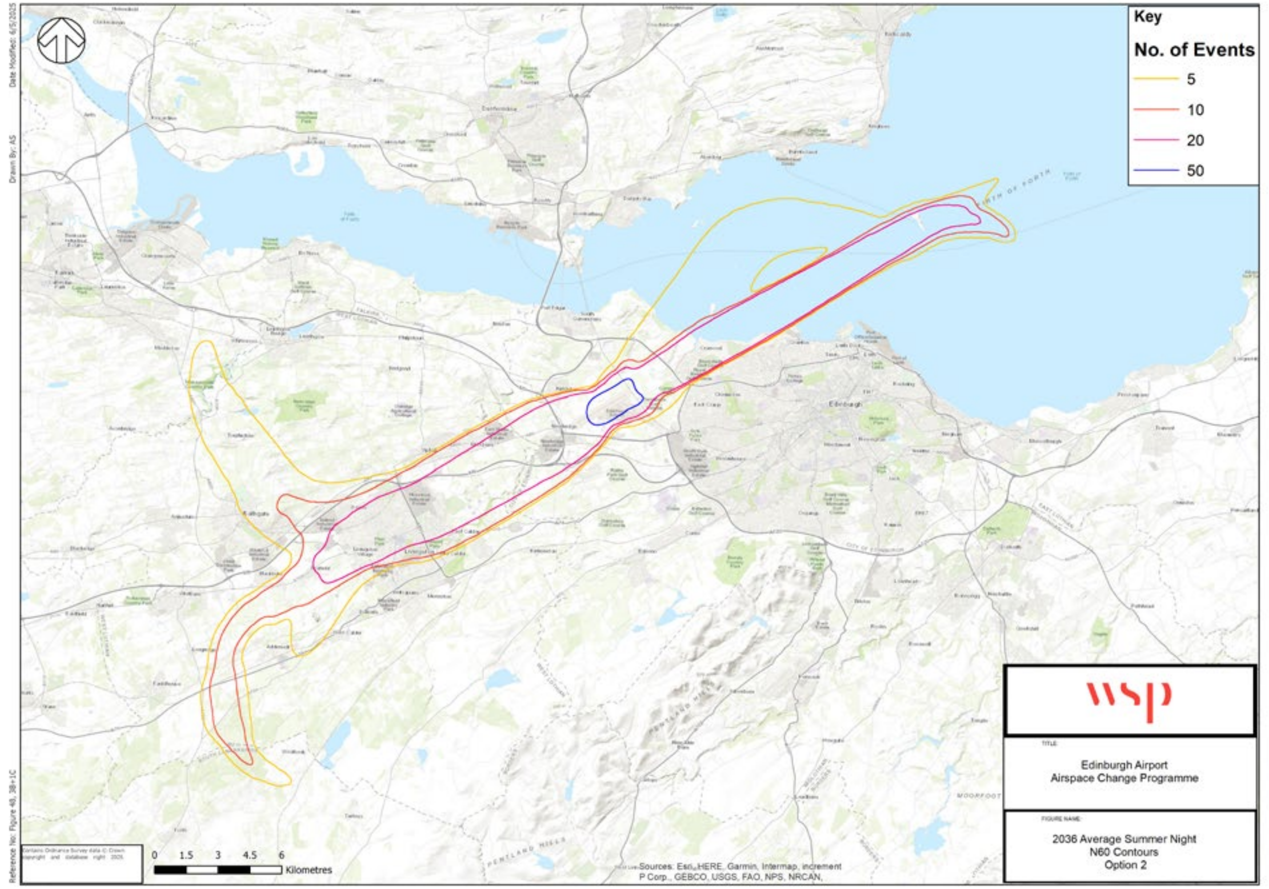


Figure 86: N60, Night-Time Option 2, 2036.

4.3 Overflight Contours for Option 2

6. Overflight contours for Option 2 are provided below.

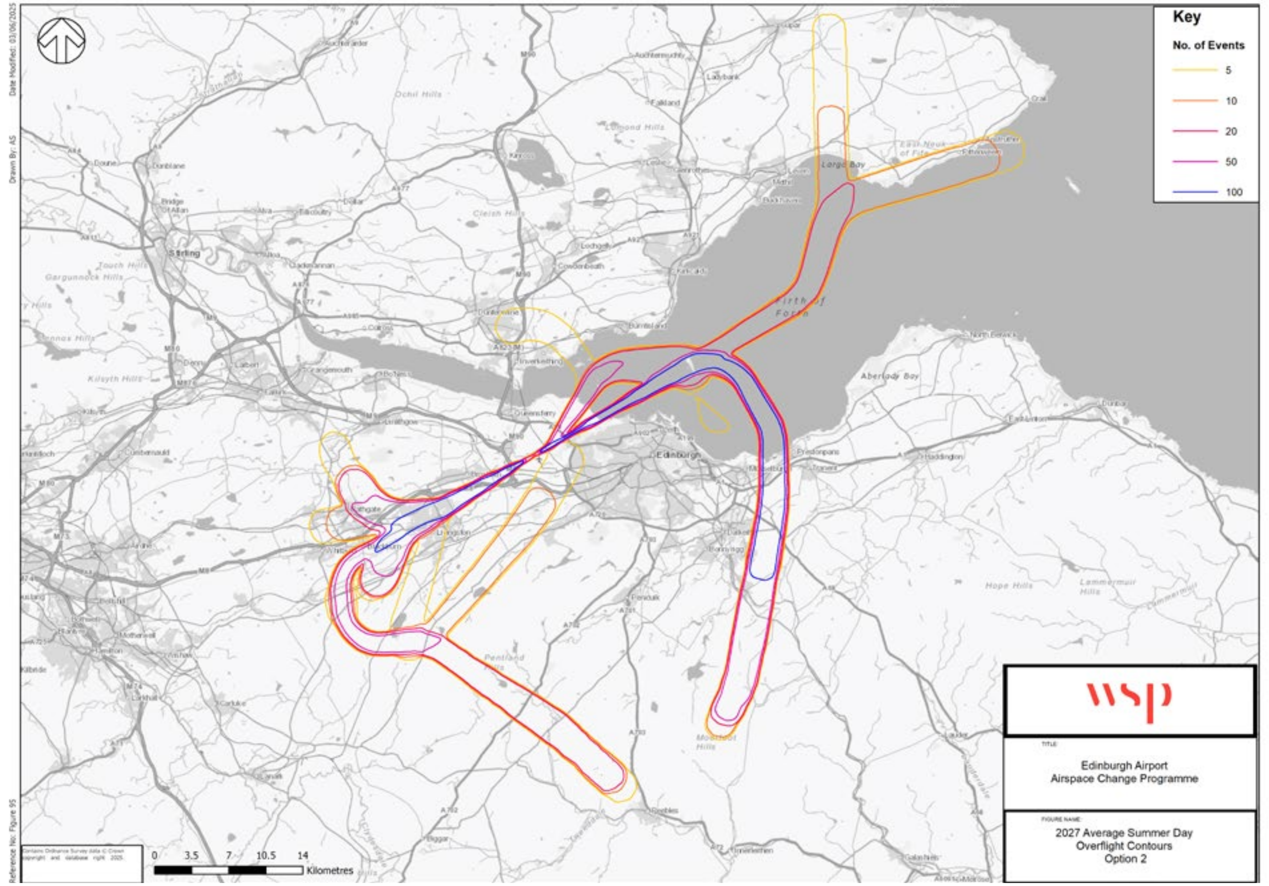


Figure 87: Overflight, Daytime Option 2, 2027.

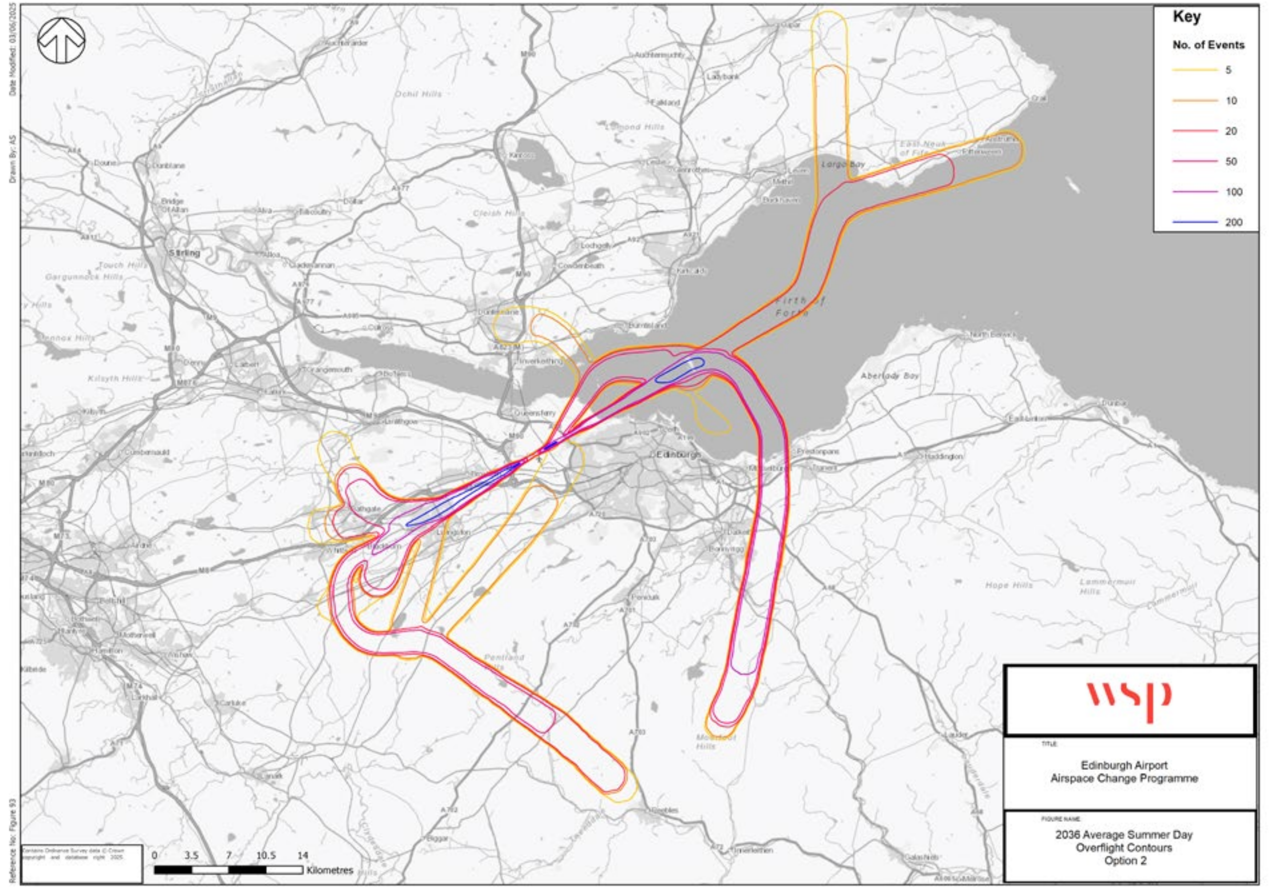


Figure 88: Overflight, Daytime Option 2, 2036.

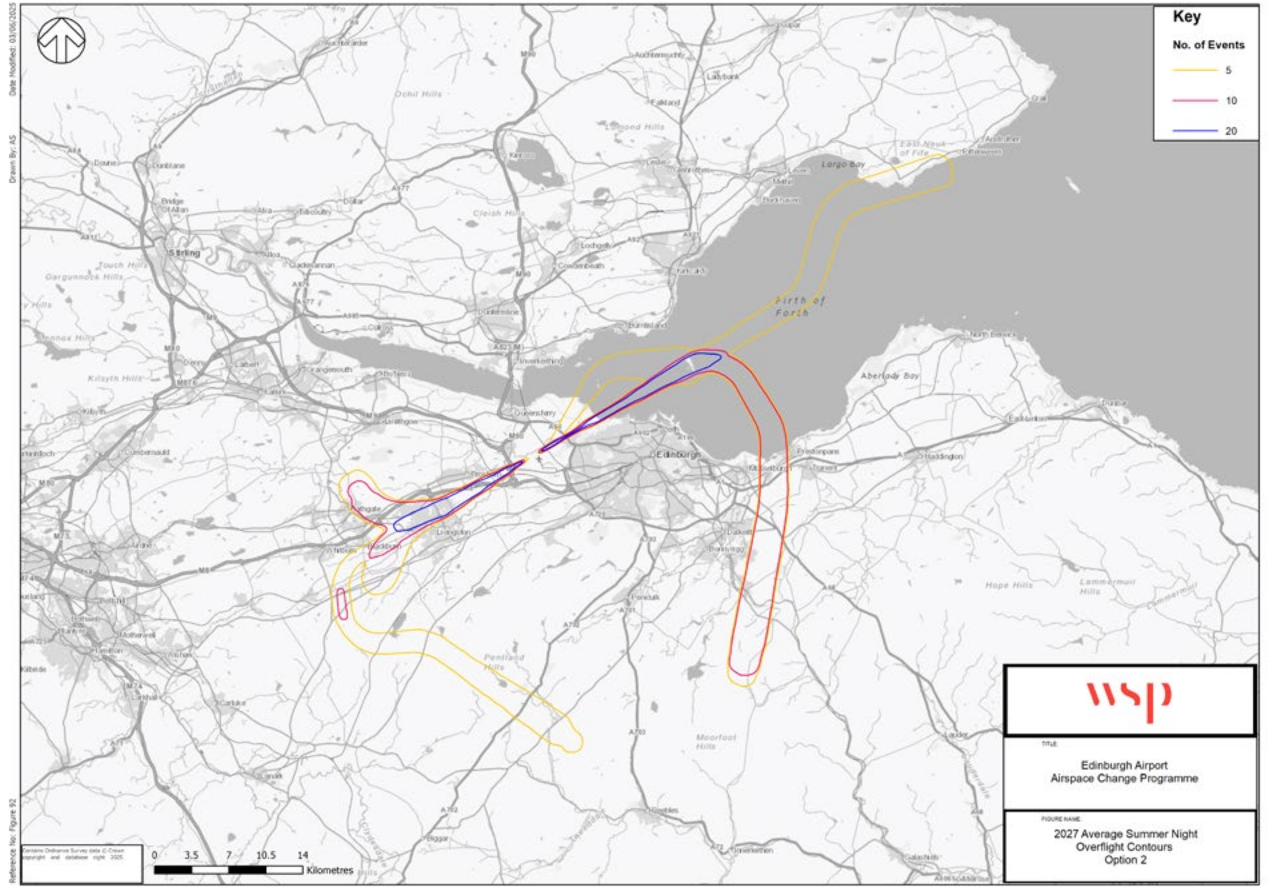


Figure 89: Overflight, Night-Time Option 2, 2027.

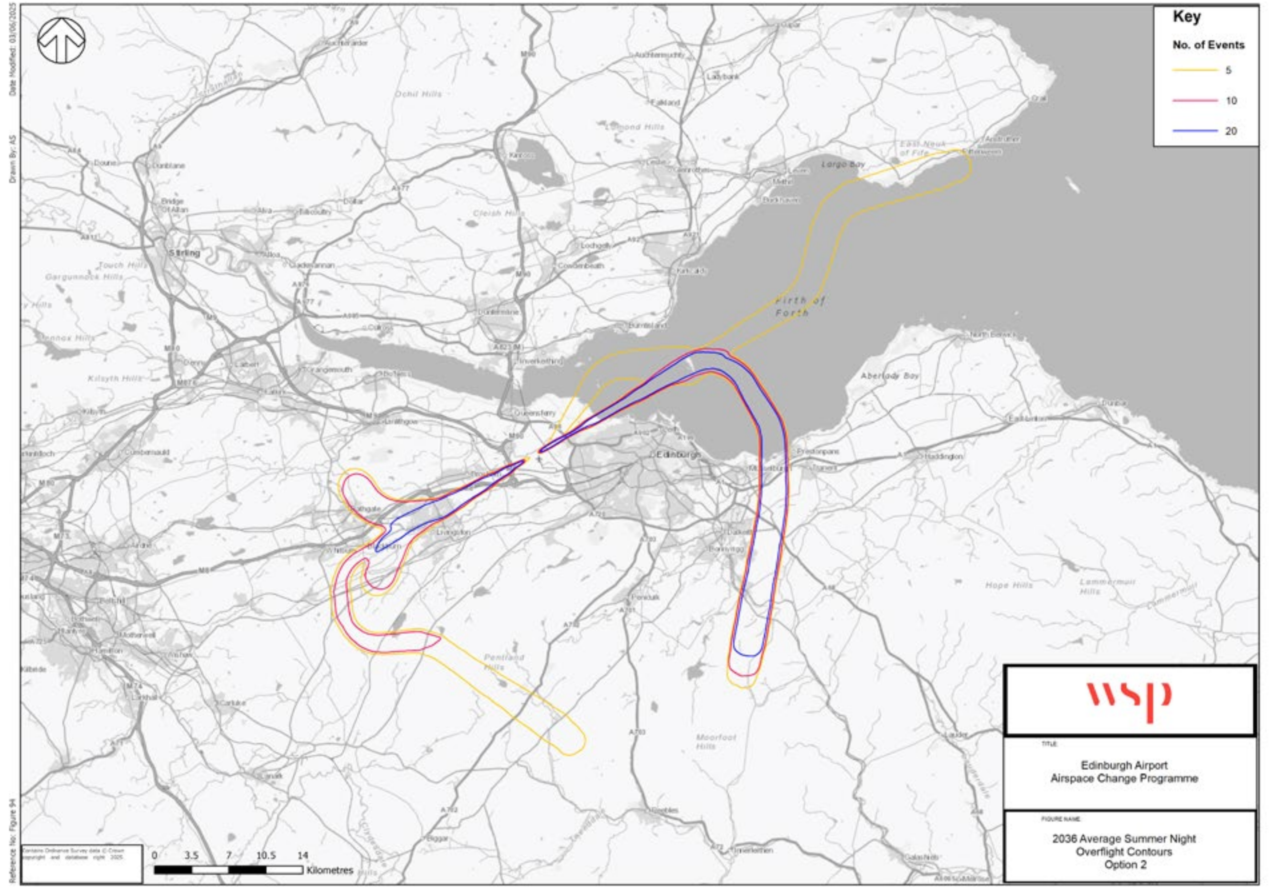


Figure 90: Overflight, Night-Time Option 2, 2036.

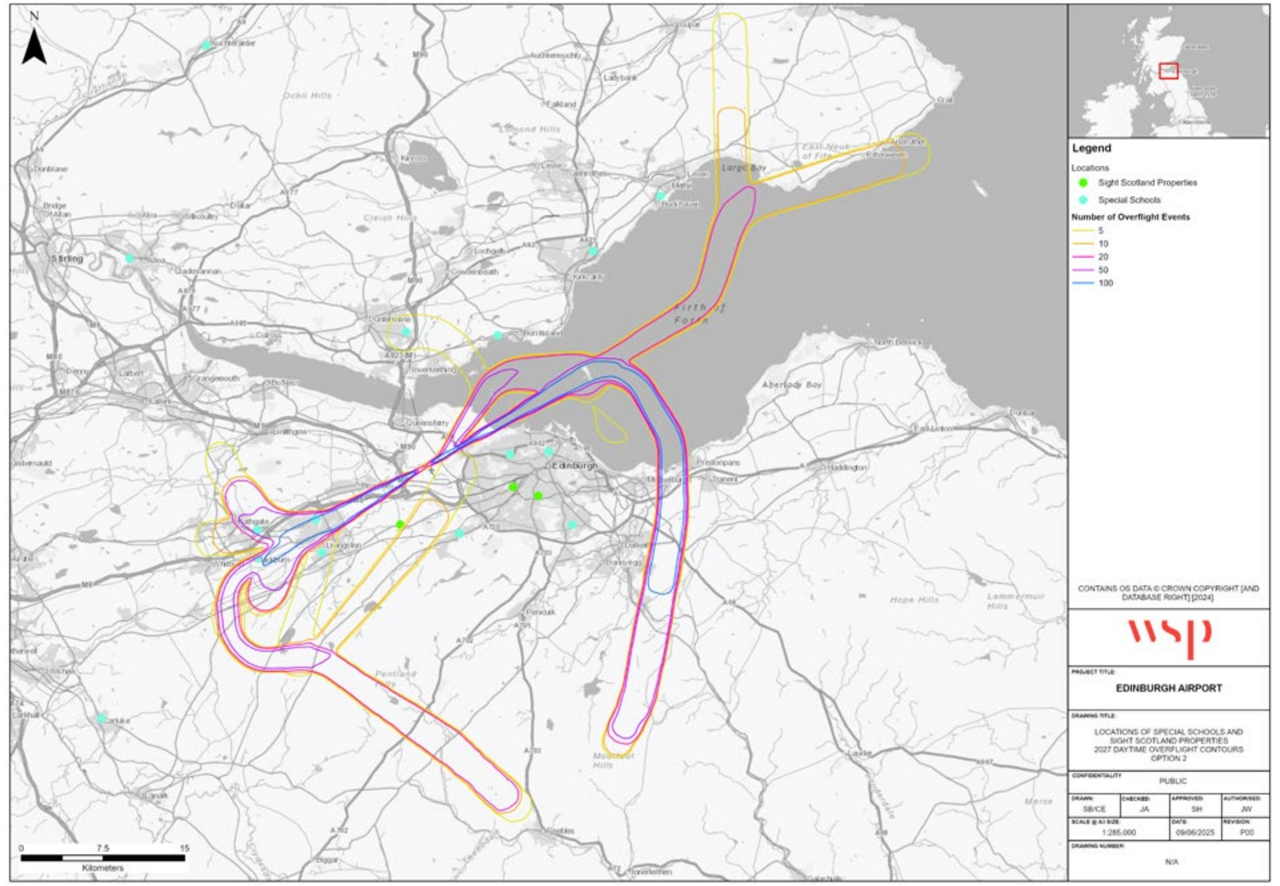


Figure 91: Special Schools and Sight Scotland Sites Overflight, Daytime Option 2, 2027.

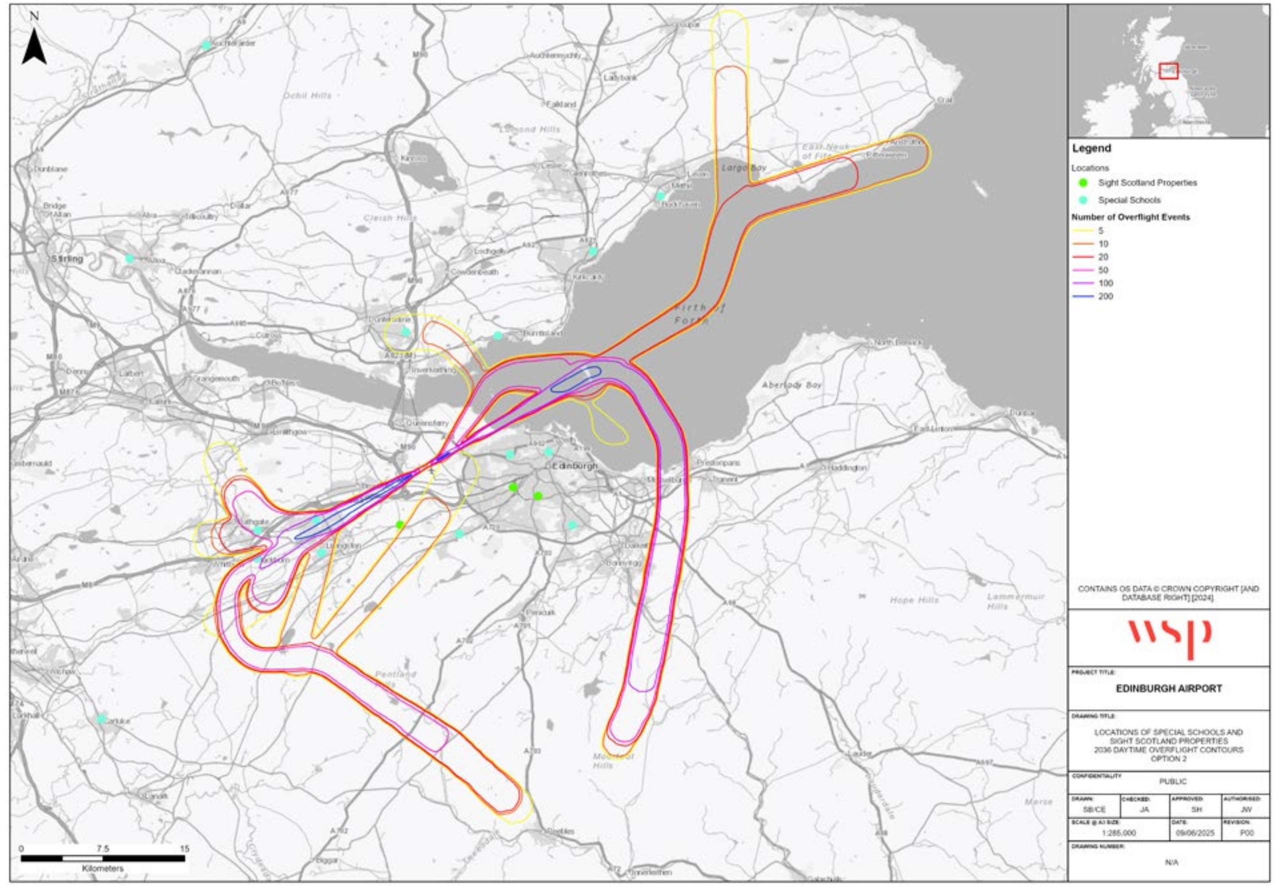


Figure 92: Special Schools and Sight Scotland Sites Overflight, Daytime Option 2, 2036.

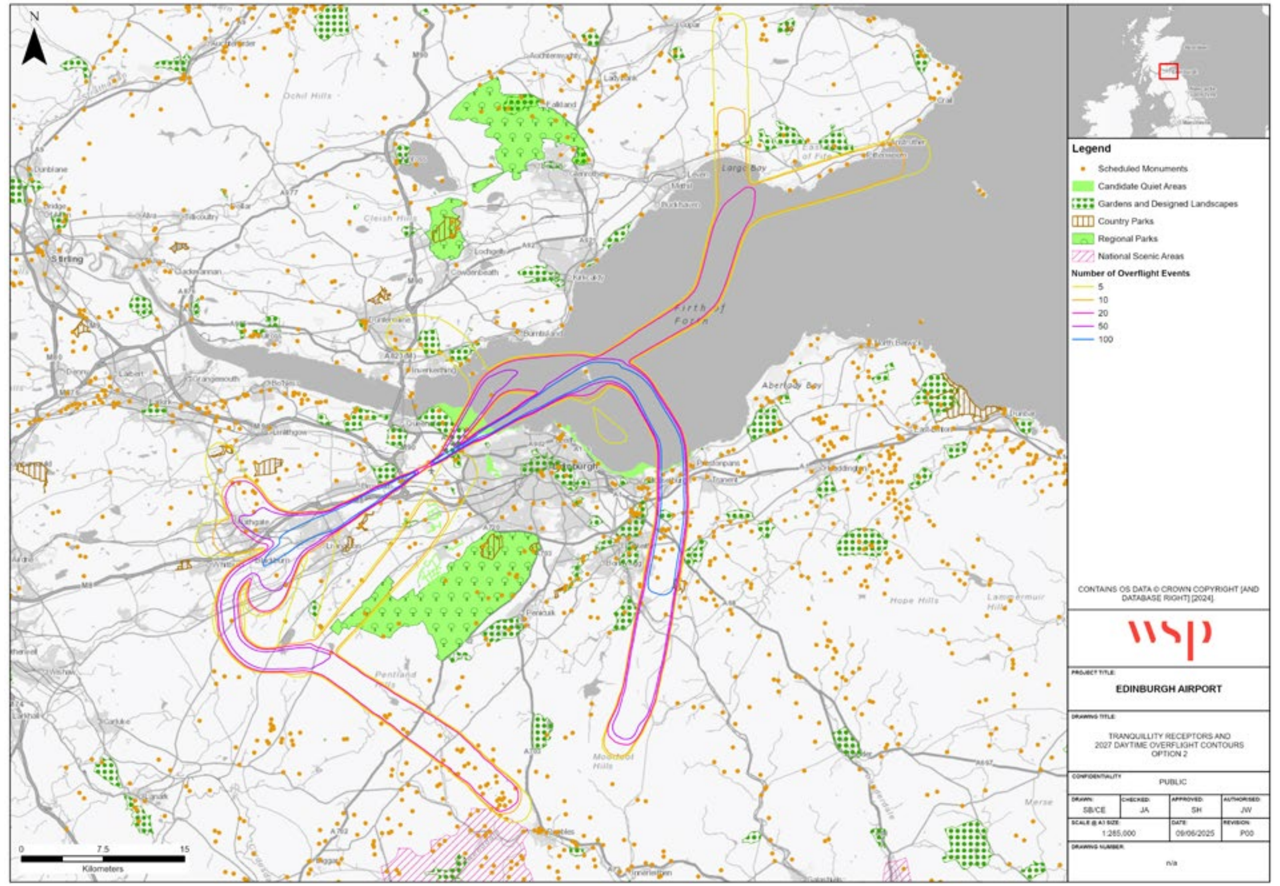


Figure 93: Tranquillity Receptors Overflight, Daytime Option 2, 2027.

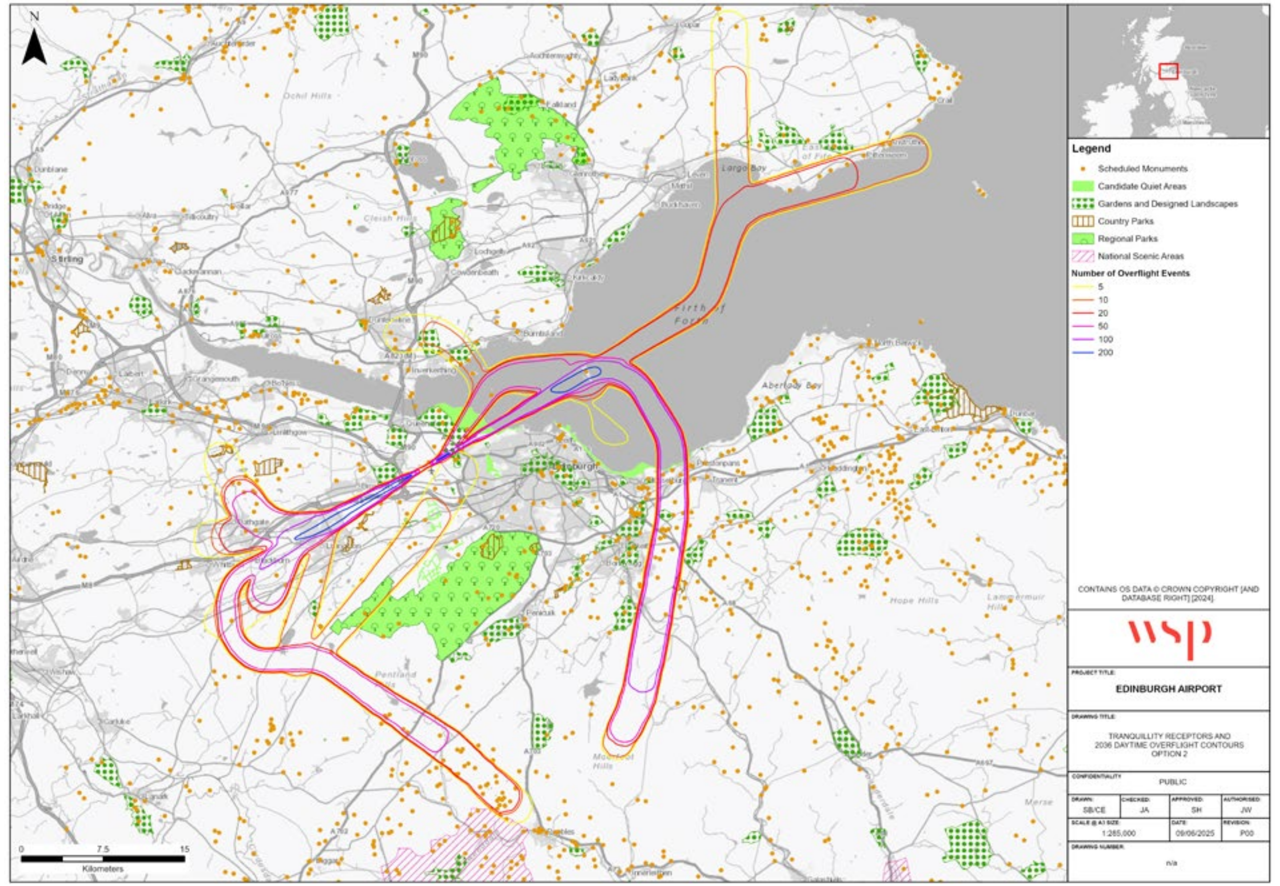


Figure 94: Tranquillity Receptors Overflight, Daytime Option 2, 2036.

4.4 Population and Noise Sensitive Sites in relation to LAeq100% modes, Nx and Overflight contours for Option 2

7. Tables showing population and noise sensitive sites in relation to LAeq 100% modes, Nx and Overflight contours for Option 2 are provided below. Comparison tables can be found in the main report along with absolute data for LAeq.

Table 87: LAeq, 16 Hr, Day-Time 100% West Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 2	100% west LAeq 16hr	51	62.9	68,000	30,800	6	1	5	18	175
			54	37.6	32,700	14,900	4	0	1	6	133
			57	21.2	5,100	2,500	1	0	0	2	70
			60	11.2	2,900	1,400	1	0	0	1	37
			63	5.9	1,000	500	0	0	0	0	10
			66	3.0	200	100	0	0	0	0	1
			69	1.6	<100	<100	0	0	0	0	0

Table 88: LAeq, 16 Hr, Day-Time 100% West Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 2	100% west LAeq 16hr	51	72.9	73,200	33,100	7	1	6	18	203
			54	43.7	42,400	19,200	5	1	2	9	145
			57	25.3	6,600	3,100	1	0	0	2	82
			60	13.5	3,200	1,600	1	0	0	1	46
			63	7.1	1,800	900	1	0	0	1	16
			66	3.6	400	200	0	0	0	0	3
			69	1.9	100	<100	0	0	0	0	0

Table 89: LAeq, 16 Hr, Day-Time 100% East Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 2	100% east LAeq 16hr	51	63.2	28,500	13,000	7	1	2	8	145
			54	37.2	15,900	7,300	5	1	2	3	99
			57	21.6	4,400	2,000	0	0	0	2	37
			60	11.7	800	400	0	0	0	0	26
			63	6.2	400	200	0	0	0	0	15
			66	3.0	100	<100	0	0	0	0	2
			69	1.6	<100	<100	0	0	0	0	0

Table 90: LAeq, 16 Hr, Day-Time 100% East Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 2	100% east LAeq 16hr	51	74.6	30,700	14,000	7	1	4	9	169
			54	43.3	18,500	8,500	5	1	2	4	116
			57	25.4	6,800	3,100	0	0	0	3	45
			60	14.0	1,400	600	0	0	0	0	31
			63	7.5	500	200	0	0	0	0	19
			66	3.6	100	100	0	0	0	0	11
			69	1.9	100	<100	0	0	0	0	0

Table 91: LAeq, 8 Hr, Night-Time 100% West Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 2	100% west LAeq 8hr	45	79.2	79,000	35,800	7	1	6	19	212
			48	47.1	43,900	19,900	5	1	2	9	146
			51	27.6	6,900	3,300	1	0	0	2	101
			54	14.6	3,400	1,700	1	0	0	1	57
			57	7.5	2,600	1,300	1	0	0	1	27
			60	3.7	600	300	0	0	0	0	4
			63	1.9	<100	<100	0	0	0	0	0
			66	1.0	0	0	0	0	0	0	0

Table 92: LAeq, 8 Hr, Night-Time 100% West Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 2	100% west LAeq 8hr	51	91.3	83,400	37,700	8	1	6	21	226
			54	54.5	53,900	24,400	6	1	3	12	152
			57	32.4	9,900	4,600	3	0	1	2	112
			60	17.6	3,700	1,800	1	0	0	2	65
			63	9.0	2,800	1,400	1	0	0	1	35
			63	4.6	1,300	600	0	0	0	1	10
			66	2.3	100	<100	0	0	0	0	0
			69	1.1	0	0	0	0	0	0	0

Table 93: LAeq, 8 Hr, Night-Time 100% East Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 2	100% east LAeq 8hr	45	84.2	36,900	16,800	7	1	5	10	181
			48	47.7	22,400	10,200	5	1	2	6	115
			51	27.6	11,200	5,000	3	1	1	3	50
			54	15.4	2,800	1,300	0	0	0	1	32
			57	8.3	500	300	0	0	0	0	18
			60	3.9	200	100	0	0	0	0	9
			63	1.9	100	<100	0	0	0	0	0
			66	1.0	<100	<100	0	0	0	0	0

Table 94: LAeq, 8 Hr, Night-Time 100% East Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 2	100% east LAeq 8hr	45	101.5	47,300	21,600	7	1	5	12	189
			48	55.5	26,800	12,200	7	1	2	7	127
			51	32.4	14,300	6,500	5	1	2	3	70
			54	18.2	4,300	2,000	0	0	0	2	34
			57	9.9	700	300	0	0	0	0	21
			60	4.9	300	200	0	0	0	0	15
			63	2.3	100	<100	0	0	0	0	1
			66	1.2	<100	<100	0	0	0	0	0

Table 95: N65, Daytime Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	N65 (day)	5	120.3	86,600	39,200	7	1	247	7	22
			10	108.7	83,500	37,800	7	1	232	7	22
			20	86.0	72,500	32,800	7	1	198	6	19
			50	59.3	51,000	23,100	6	1	156	2	12
			100	37.5	21,300	9,800	6	1	127	2	5
			200	3.3	100	<100	0	0	0	0	0

Table 96: N65, Daytime Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	N65 (day)	5	129.2	87,600	39,700	7	1	262	7	22
			10	111.6	84,500	38,200	7	1	232	7	22
			20	92.1	76,200	34,500	7	1	221	7	21
			50	65.2	57,600	26,000	6	1	157	3	14
			100	40.7	26,100	11,900	6	1	132	2	7
			200	18.4	7,500	3,400	2	0	51	1	2

Table 97: N60, Night-Time Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	N60 (night)	5	173.3	113,900	51,500	11	1	298	11	26
			10	98.5	83,300	37,700	7	1	227	6	19
			20	68.0	58,600	26,500	7	1	185	3	12
			50	2.8	<100	<100	0	0	1	0	0

Table 98: N60, Night-Time Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	N60 (night)	5	203.9	124,300	56,200	11	1	323	14	28
			10	117.1	101,100	45,700	10	1	256	8	23
			20	76.7	66,400	30,100	7	1	203	6	17
			50	3.3	100	<100	0	0	6	0	0

Table 99: Overflight Daytime, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Overflights Day	5	755.8	274,600	125,600	22	3	1598	23	64
			10	527.3	145,600	65,900	15	1	1147	16	41
			20	375.2	111,800	50,300	12	1	274	16	30
			50	191.3	90,900	40,900	10	1	182	11	22
			100	78.1	43,900	19,800	8	1	67	2	6

Table 100: Overflight Daytime, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Overflights Day	5	772.8	281,900	129,000	23	3	1610	23	64
			10	611.2	168,400	76,200	18	1	1290	20	48
			20	420.9	130,500	58,800	14	1	618	16	34
			50	264.0	98,400	44,300	11	1	237	14	25
			100	111.0	53,400	24,100	9	1	107	3	12
			200	9.8	8,600	3,900	1	1	7	1	3

Table 101: Overflight Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 2	Overflights Night	5	363.2	112,500	50,800	13	1	592	15	29
			10	144.7	80,400	36,200	10	1	166	7	22
			20	28.4	21,900	9,900	6	1	11	2	4

Table 102: Overflight Night-Time, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km^2)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 2	Overflights Night	5	384.2	116,400	52,600	13	1	793	16	31
			10	184.8	95,500	43,000	11	1	196	12	25
			20	104.2	52,500	23,600	9	1	106	2	9

4.5 Tranquillity Sites in relation to LAeq, 8 Hr, Nx and Overflight contours for Option 2

8. Tables showing tranquillity sites in relation to LAeq 8Hr, Nx and Overflight contours for Option 2 are provided below. Comparison tables for LAeq 16Hr and Daytime Overflights can be found in the main report along with absolute data for LAeq 16Hr.

Table 103: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison LAeq8hr	45	0	0.0	0	1.1	0	0.4	0	0.0	0	0.0	1	0.2
			48	0	0.0	0	0.1	0	0.4	0	0.0	0	0.0	0	0.0
			51	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	0.0
			54	0	0.0	-1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 104: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison LAeq8hr	45	0	0.0	0	1.0	0	0.4	0	0.0	0	0.0	0	0.2
			48	0	0.0	0	0.6	0	0.4	0	0.0	0	0.0	-2	-0.1
			51	0	0.0	0	-0.2	0	0.3	0	0.0	0	0.0	-1	0.0
			54	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 105: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	LAeq8hr	45	1	0.3	2	5.3	5	6.8	0	0.0	0	0.0	13	0.5
			48	1	0.0	2	2.9	4	5.3	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	0.9	4	3.4	0	0.0	0	0.0	6	0.2
			54	0	0.0	1	0.4	3	1.7	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	0.8	0	0.0	0	0.0	5	0.0
			60	0	0.0	0	0.0	2	0.4	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 106: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2023	Option 2	LAeq8hr	45	1	0.3	2	5.5	5	7.3	0	0.0	0	0.0	15	0.6
			48	1	0.1	2	4.0	4	5.7	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	1.0	4	4.1	0	0.0	0	0.0	6	0.2
			54	0	0.0	2	0.5	3	2.0	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	1.0	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 107: Tranquillity Sites in Relation to N65, Daytime, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison N65 (day)	5	0	0.0	0	0.5	0	-1.6	0	0.0	0	0.0	0	0.1
			10	0	0.0	0	0.7	0	0.5	0	0.0	0	0.0	1	0.1
			20	0	0.0	0	0.8	0	0.3	0	0.0	0	0.0	0	0.0
			50	0	-0.1	0	0.7	0	0.4	0	0.0	0	0.0	-1	-0.1
			100	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0	0	0.0
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 108: Tranquillity Sites in Relation to N65, Daytime, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison N65 (day)	5	0	-0.1	0	0.5	-1	0.3	0	0.0	0	0.0	2	0.1
			10	0	0.0	0	0.7	-1	0.1	0	0.0	0	0.0	0	0.0
			20	0	0.0	0	0.8	0	0.4	0	0.0	0	0.0	-1	0.0
			50	0	0.0	0	0.8	0	0.4	0	0.0	0	0.0	0	0.0
			100	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	-1	0.0
			200	0	0.0	-1	-0.3	0	-0.1	0	0.0	0	0.0	-1	0.0

Table 109: Tranquillity Sites in Relation to N65, Daytime, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	N65 (day)	5	1	0.3	2	6.2	5	8.2	0	0.0	0	0.0	19	0.6
			10	1	0.3	2	6.1	4	7.7	0	0.0	0	0.0	16	0.4
			20	1	0.3	2	5.7	4	7.0	0	0.0	0	0.0	12	0.3
			50	1	0.0	2	4.6	4	5.9	0	0.0	0	0.0	10	0.2
			100	1	0.0	2	1.1	4	3.0	0	0.0	0	0.0	6	0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 110: Tranquillity Sites in Relation to N65, Daytime, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	N65 (day)	5	1	0.3	2	6.3	6	10.4	0	0.0	0	0.0	21	0.6
			10	1	0.3	2	6.2	4	7.8	0	0.0	0	0.0	16	0.4
			20	1	0.3	2	5.9	4	7.2	0	0.0	0	0.0	13	0.3
			50	1	0.1	2	5.0	4	6.3	0	0.0	0	0.0	12	0.3
			100	1	0.0	2	1.2	4	3.3	0	0.0	0	0.0	6	0.2
			200	0	0.0	1	0.0	4	1.7	0	0.0	0	0.0	4	0.1

Table 111: Tranquillity Sites in Relation to N60, Night-Time, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	Comparison N60 (night)	5	0	0.0	0	0.7	0	0.5	0	0.0	0	0.0	4	0.2
			10	0	0.0	0	0.0	0	0.1	0	0.0	0	0.0	1	0.0
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.1
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 112: Tranquillity Sites in Relation to N60, Night-Time, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	Comparison N60 (night)	5	1	0.4	0	0.6	0	0.5	0	0.0	0	0.0	12	0.1
			10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 113: Tranquillity Sites in Relation to N60, Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	N60 (night)	5	2	0.5	2	6.2	5	8.7	0	0.0	0	0.0	22	0.9
			10	1	0.3	2	2.1	5	5.5	0	0.0	0	0.0	14	0.6
			20	1	0.1	2	1.9	5	4.3	0	0.0	0	0.0	10	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 114: Tranquillity Sites in Relation to N60, Night-Time, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	N60 (night)	5	3	0.9	2	6.3	5	8.9	0	0.0	0	0.0	30	1.0
			10	2	0.4	2	2.4	5	6.1	0	0.0	0	0.0	15	0.6
			20	1	0.2	2	2.0	5	4.8	0	0.0	0	0.0	12	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 115: Tranquillity Sites in Relation to Overflight Daytime, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	Overflights Day	5	5	10.2	7	5.8	14	12.9	0	0.0	1	0.3	110	2.2
			10	2	7.7	6	5.6	9	5.3	0	0.0	0	0.0	77	1.7
			20	1	0.3	2	4.7	6	4.8	0	0.0	0	0.0	63	1.4
			50	1	0.1	2	2.8	4	3.2	0	0.0	0	0.0	30	1.0
			100	1	0.0	2	0.6	3	1.3	0	0.0	0	0.0	22	0.7

Note that comparison tables for tranquillity sites in the daytime are in Section 4 of the FOA.

Table 116: Tranquillity Sites in Relation to Overflight Daytime, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	Overflights Day	5	5	10.4	7	5.8	14	13.2	0	0.0	1	0.4	111	2.2
			10	2	8.0	6	5.6	12	10.0	0	0.0	0	0.0	85	1.9
			20	1	0.3	2	4.8	6	4.8	0	0.0	0	0.0	69	1.5
			50	1	0.2	2	4.4	5	4.4	0	0.0	0	0.0	41	1.1
			100	1	0.0	2	0.7	4	1.4	0	0.0	0	0.0	23	0.8
			200	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	3	0.3

Note that comparison tables for tranquillity sites in the daytime are in Section 4 of the FOA.

Table 117: Tranquillity Sites in Relation to Overflight Night-Time Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	Comparison Overflight Night	5	0	-0.7	0	0.4	-4	-7.9	0	0.0	0	0.0	-8	-0.9
			10	1	0.2	1	0.1	3	1.1	0	0.0	0	0.0	21	0.4
			20	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.1

Table 118: Tranquillity Sites in Relation to Overflight Night-Time, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	Comparison Overflight Night	5	0	-0.6	0	-0.2	-8	-14.1	0	0.0	0	0.0	-19	-1.5
			10	1	0.2	1	0.1	3	1.0	0	0.0	0	0.0	25	0.6
			20	1	0.0	1	0.1	2	1.0	0	0.0	0	0.0	18	0.4

Table 119: Tranquillity Sites in Relation to Overflight Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Overflight Night	5	1	0.3	2	4.5	5	4.5	0	0.0	0	0.0	51	1.3
			10	1	0.2	2	0.8	5	1.7	0	0.0	0	0.0	28	0.8
			20	0	0.0	1	0.5	2	0.2	0	0.0	0	0.0	4	0.4

Table 120: Tranquillity Sites in Relation to Overflight Night-Time, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Overflight Night	5	1	0.4	2	4.6	6	4.7	0	0.0	0	0.0	52	1.3
			10	1	0.2	2	0.8	5	1.7	0	0.0	0	0.0	32	1.1
			20	1	0.0	2	0.6	4	1.4	0	0.0	0	0.0	23	0.8

4.6 Biodiversity Sites in relation to LAeq, Nx and Overflight contours for Option 2

9. Tables showing biodiversity sites in relation to LAeq, Nx and Overflight contours for Option 2 are provided below. The comparison tables for Overflights can be found in Section 4 of the FOA.

Table 121: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison LAeq16hr	51	0	-0.1	0	0.0	0	0.9	0	0.0	0	0.9	0	0.9
			54	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.2	0	-0.1
			57	-1	0.0	0	0.0	0	0.0	0	0.0	0	-0.1	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 122: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison LAeq16hr	51	-1	-0.1	0	0.0	0	1.0	0	0.0	0	2.4	0	1.0
			54	0	0.0	0	0.0	0	0.1	0	0.0	0	0.0	0	0.1
			57	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.2	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 123: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	LAeq16hr	51	1	0.2	0	0.0	1	4.9	0	0.0	3	17.3	1	4.9
			54	1	0.1	0	0.0	1	1.9	0	0.0	3	4.9	1	1.9
			57	0	0.0	0	0.0	1	0.5	0	0.0	2	0.7	1	0.5
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 124: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	LAeq16hr	51	1	0.3	0	0.0	1	5.3	0	0.0	3	23.8	1	5.3
			54	1	0.1	0	0.0	1	3.0	0	0.0	3	7.3	1	3.0
			57	1	0.0	0	0.0	1	0.6	0	0.0	2	1.2	1	0.6
			60	0	0.0	0	0.0	1	0.0	0	0.0	1	0.0	1	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 125: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison LAeq8hr	45	0	-0.4	0	0.0	0	1.1	0	0.0	0	3.9	-1	1.0
			48	0	-0.1	0	0.0	0	0.1	0	0.0	0	0.1	0	0.1
			51	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			54	0	0.0	0	0.0	0	0.0	0	0.0	0	-0.1	0	0.0
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 126: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison LAeq8hr	45	0	-0.4	0	0.0	0	1.0	0	0.0	0	6.3	1	0.9
			48	0	0.0	0	0.0	0	0.6	0	0.0	0	0.6	0	0.6
			51	0	-0.1	0	0.0	0	-0.2	0	0.0	0	-0.1	0	-0.2
			54	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 127: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	LAeq8hr	45	2	0.3	0	0.0	1	5.2	0	0.0	3	28.1	1	5.2
			48	1	0.1	0	0.0	1	2.9	0	0.0	3	9.6	1	2.9
			51	1	0.0	0	0.0	1	0.9	0	0.0	3	3.1	1	0.9
			54	0	0.0	0	0.0	1	0.4	0	0.0	2	0.4	1	0.4
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 128: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 2, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	LAeq8hr	45	2	0.6	0	0.0	1	5.4	0	0.0	3	36.3	4	5.5
			48	1	0.2	0	0.0	1	4.0	0	0.0	3	12.9	1	4.0
			51	1	0.0	0	0.0	1	1.0	0	0.0	3	4.4	1	1.0
			54	0	0.0	0	0.0	1	0.5	0	0.0	2	0.8	1	0.5
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 129: Biodiversity Sites in Relation to N65, Daytime, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Comparison N65 (day)	5	0	-0.4	0	0.0	0	0.1	0	0.0	0	-0.9	3	0.2
			10	0	-0.3	0	0.0	0	0.7	0	0.0	0	4.6	1	0.8
			20	0	-0.1	0	0.0	0	0.8	0	0.0	0	1.3	0	0.7
			50	-1	0.0	0	0.0	0	0.8	0	0.0	0	2.3	0	0.8
			100	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.4	0	-0.1
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 130: Biodiversity Sites in Relation to N65, Daytime, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Comparison N65 (day)	5	0	-0.4	0	0.0	0	0.1	0	0.0	0	-2.6	3	0.3
			10	0	-0.4	0	0.0	-1	0.5	0	0.0	-1	2.3	-4	0.5
			20	0	-0.2	0	0.0	0	0.8	0	0.0	0	1.9	1	0.8
			50	0	-0.1	0	0.0	0	0.8	0	0.0	0	1.6	1	0.8
			100	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.3	0	-0.1
			200	0	0.0	0	0.0	-1	-0.3	0	0.0	-1	-0.3	-1	-0.3

Table 131: Biodiversity Sites in Relation to N65, Daytime, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	N65 (day)	5	2	0.6	0	0.0	3	6.2	0	0.0	5	55.5	14	6.7
			10	2	0.5	0	0.0	1	6.0	0	0.0	3	48.4	6	6.5
			20	2	0.4	0	0.0	1	5.6	0	0.0	3	32.8	4	5.9
			50	1	0.2	0	0.0	1	4.6	0	0.0	3	18.2	1	4.6
			100	1	0.1	0	0.0	1	1.1	0	0.0	3	6.9	1	1.1
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 132: Biodiversity Sites in Relation to N65, Daytime, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	N65 (day)	5	2	0.7	0	0.0	3	6.4	0	0.0	5	58.0	15	7.0
			10	2	0.5	0	0.0	1	6.1	0	0.0	3	49.9	6	6.5
			20	2	0.4	0	0.0	1	5.8	0	0.0	3	37.1	5	6.2
			50	2	0.2	0	0.0	1	4.9	0	0.0	3	21.0	3	5.0
			100	1	0.1	0	0.0	1	1.2	0	0.0	3	7.8	1	1.2
			200	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 133: Biodiversity Sites in Relation to N60, Night-Time, Option 2 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	Comparison N60 (night)	5	0	-0.5	0	0.0	0	0.6	0	0.0	0	13.5	2	0.8
			10	0	-0.4	0	0.0	0	0.1	0	0.0	0	1.9	0	0.0
			20	0	-0.2	0	0.0	0	0.0	0	0.0	0	0.6	0	0.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 134: Biodiversity Sites in Relation to N60, Night-Time, Option 2 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	Comparison N60 (night)	5	0	-0.4	0	0.0	0	0.5	0	0.0	0	18.1	3	0.7
			10	0	-0.6	0	0.0	0	0.1	0	0.0	0	1.9	2	0.1
			20	0	-0.4	0	0.0	0	0.1	0	0.0	0	1.2	0	0.1
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 135: Biodiversity Sites in Relation to N60, Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	N60 (night)	5	2	1.3	0	0.0	1	6.0	0	0.0	3	68.6	10	6.6
			10	2	0.9	0	0.0	1	2.1	0	0.0	3	27.5	3	2.3
			20	2	0.2	0	0.0	1	1.9	0	0.0	3	21.5	1	1.9
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 136: Biodiversity Sites in Relation to N60, Night-Time, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	N60 (night)	5	2	1.4	0	0.0	1	6.1	0	0.0	3	80.7	11	6.7
			10	2	1.0	0	0.0	1	2.4	0	0.0	3	29.2	5	2.7
			20	2	0.4	0	0.0	1	2.0	0	0.0	3	23.4	2	2.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 137: Biodiversity Sites in Relation to Overflight Daytime, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 2	Overflights Day	5	2	1.7	0	0.0	7	7.2	3	15.0	11	233.5	40	34.3
			10	1	1.2	0	0.0	5	6.3	3	13.9	9	202.7	26	30.1
			20	1	0.7	0	0.0	4	5.3	3	10.6	6	149.0	20	22.8
			50	1	0.4	0	0.0	3	2.8	2	6.9	5	59.8	11	13.6
			100	1	0.1	0	0.0	2	0.6	0	0.0	4	33.1	2	0.6

Table 138: Biodiversity Sites in Relation to Overflight Daytime, Option 2, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 2	Overflights Day	5	2	1.8	0	0.0	7	7.3	3	15.2	11	239.2	42	34.7
			10	1	1.3	0	0.0	7	6.7	3	14.2	11	217.7	36	31.8
			20	1	0.9	0	0.0	5	5.5	3	11.1	9	172.4	25	25.5
			50	1	0.5	0	0.0	4	5.0	3	8.9	6	93.6	18	19.9
			100	1	0.2	0	0.0	3	0.7	1	0.0	5	37.1	5	0.7
			200	0	0.0	0	0.0	0	0.0	0	0.0	1	3.9	0	0.0

Table 139: Biodiversity Sites in Relation to Overflight Night-Time, Option 2, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 2	Overflight Night	5	1	0.5	0	0.0	5	5.3	3	1.0	9	164.5	25	14.5
			10	1	0.3	0	0.0	3	0.8	1	0.1	5	43.1	9	1.4
			20	0	0.0	0	0.0	1	0.5	0	0.0	3	13.9	1	0.5

Table 140: Biodiversity Sites in Relation to Overflight Night-Time, Option 2 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 2	Overflight Night	5	1	0.5	0	0.0	5	5.5	3	1.1	9	174.4	26	15.2
			10	1	0.4	0	0.0	3	0.9	1	0.1	5	45.4	12	4.8
			20	1	0.1	0	0.0	3	0.7	0	0.0	5	36.1	3	0.7

5 Additional Figures and Tables for Option 3

5.1 LAeq Contours For Option 3

10. The main document presents data tables for LAeq Contours. The Figures below present the contours themselves.

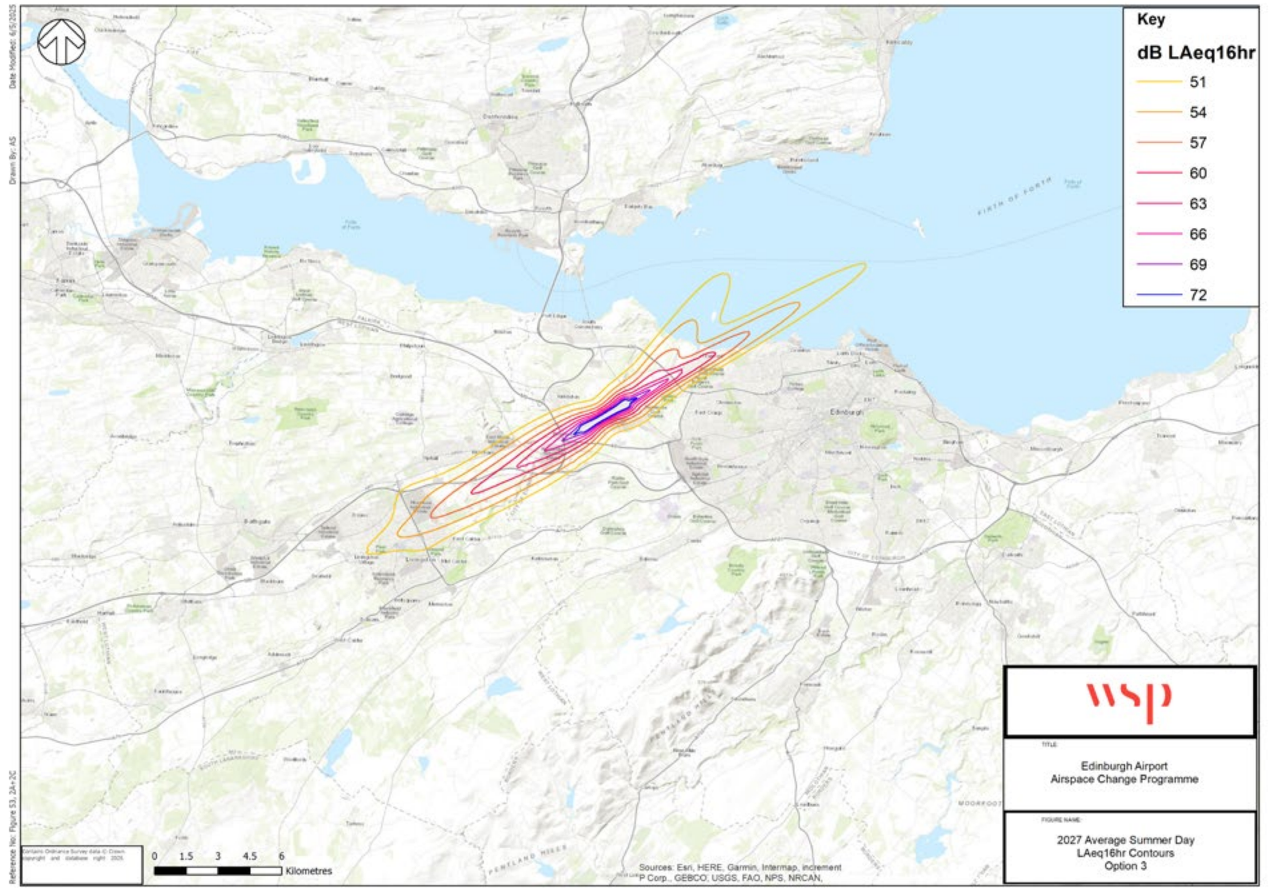


Figure 95: LAeq, 16 Hr, Daytime Option 3, 2027.

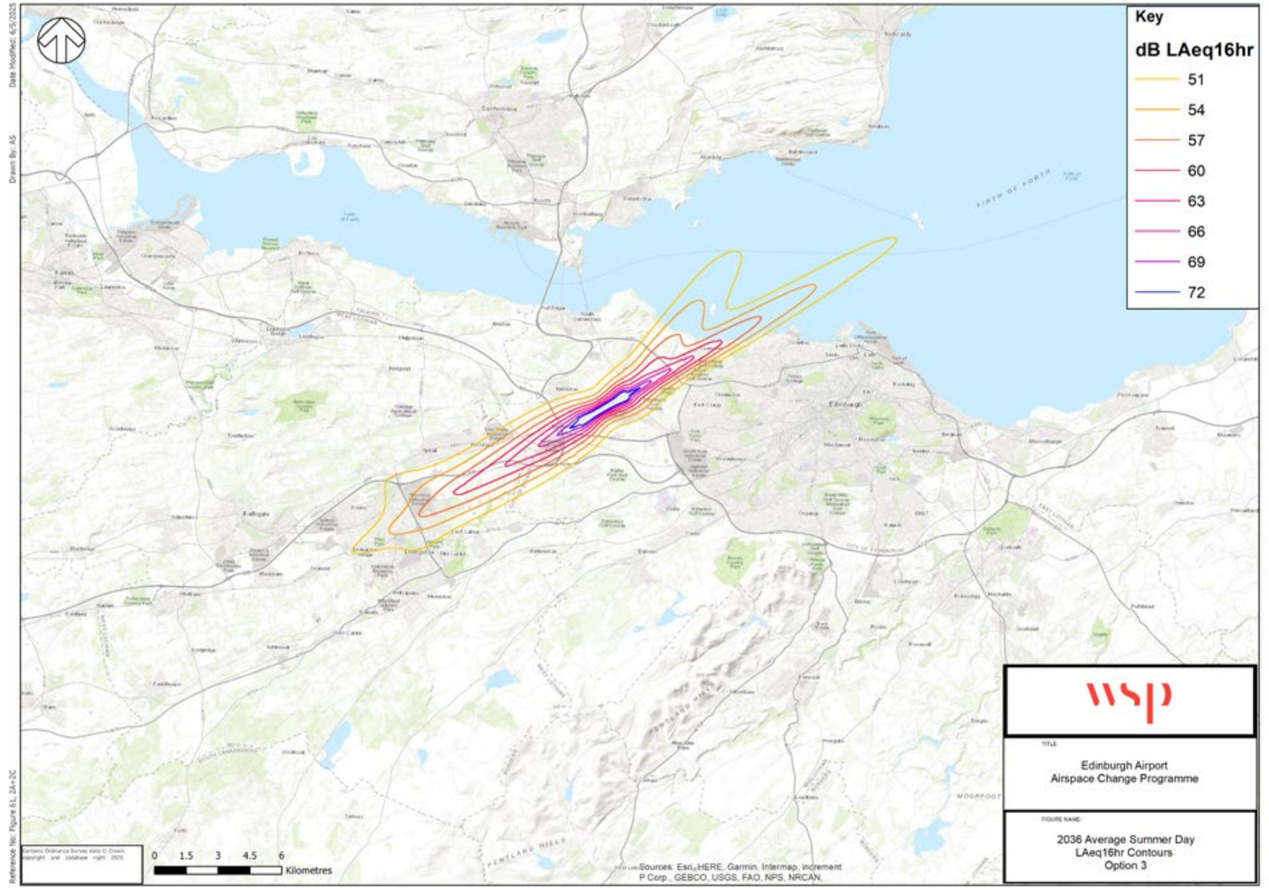


Figure 96: LAeq, 16 Hr, Daytime Option 3, 2036.

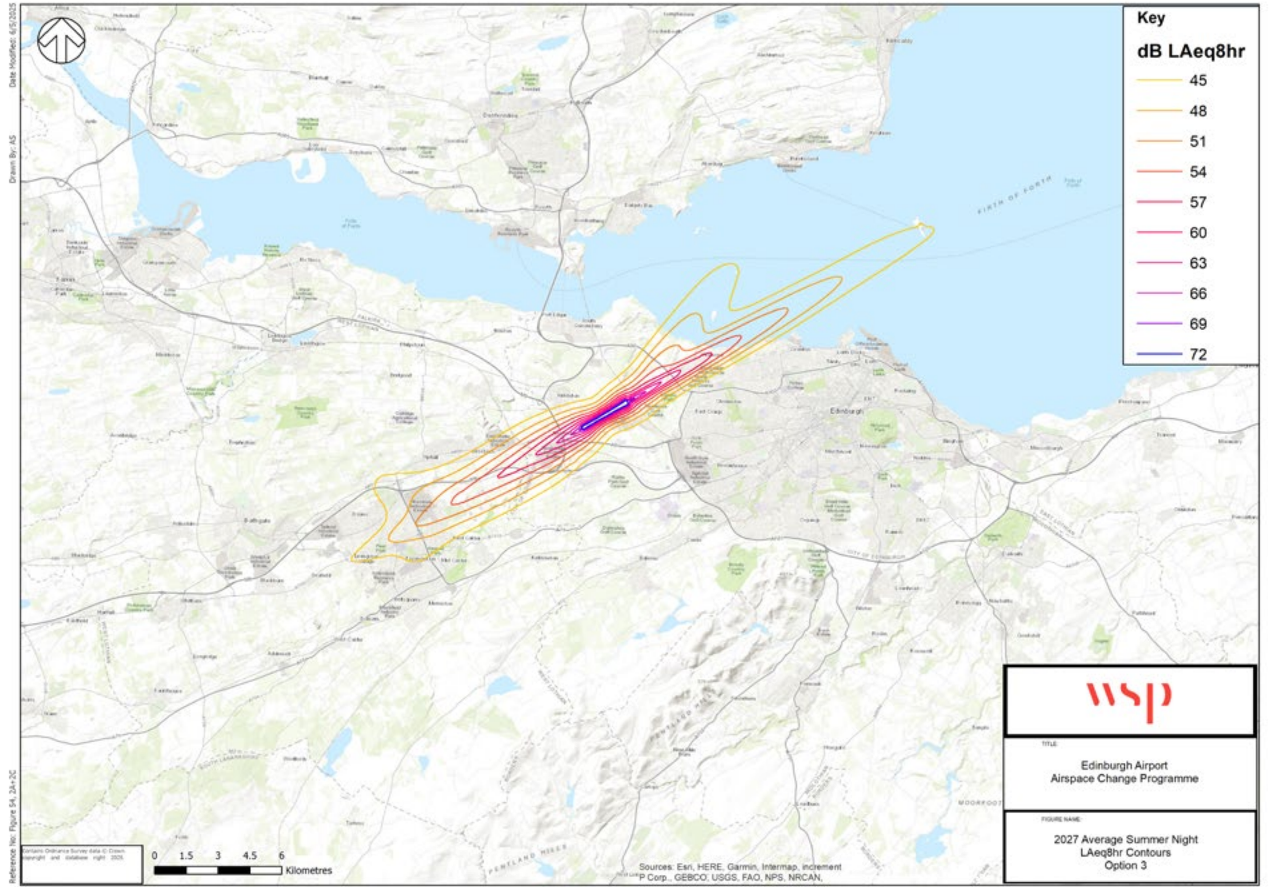


Figure 97: LAeq, 8 Hr, Night-Time Option 3, 2027.

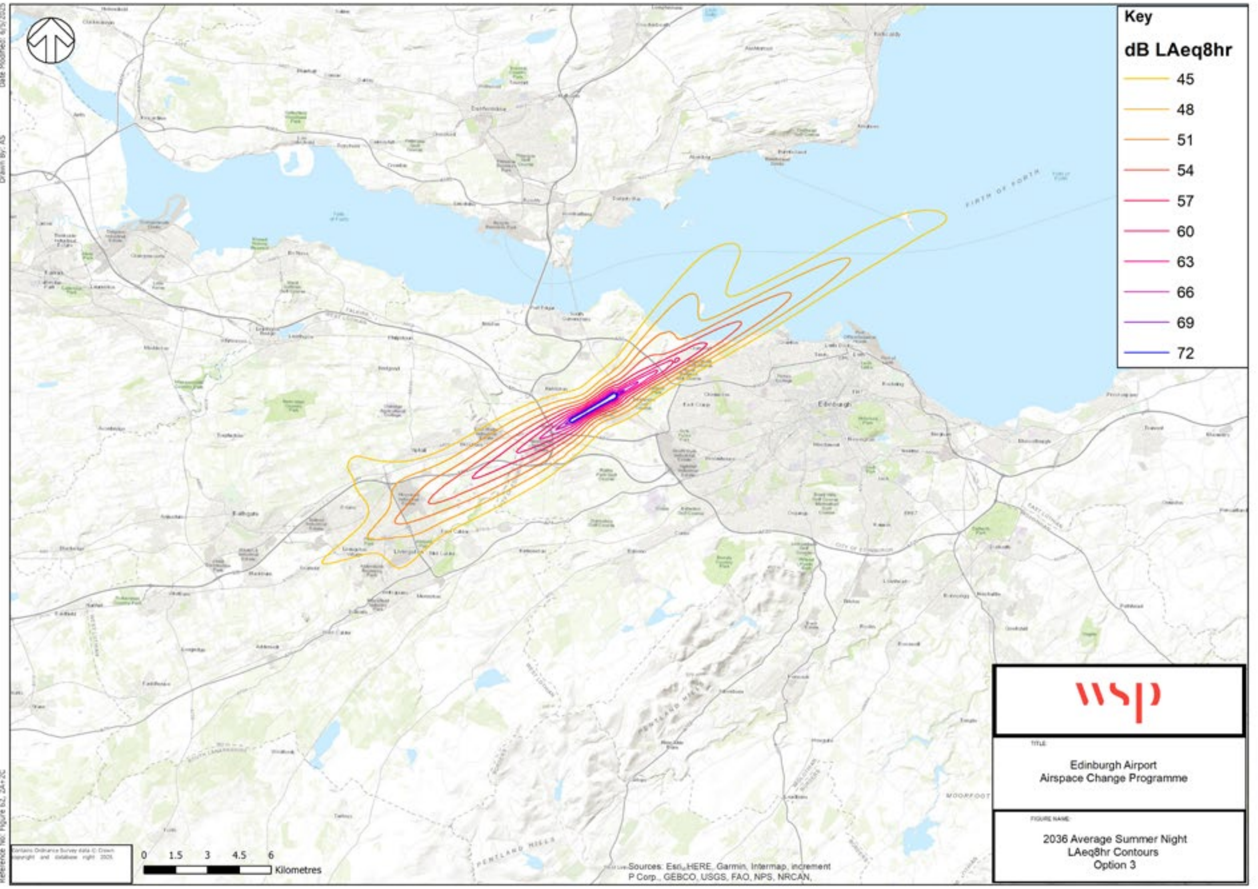


Figure 98: LAeq, 8 Hr, Night-Time Option 3, 2036.

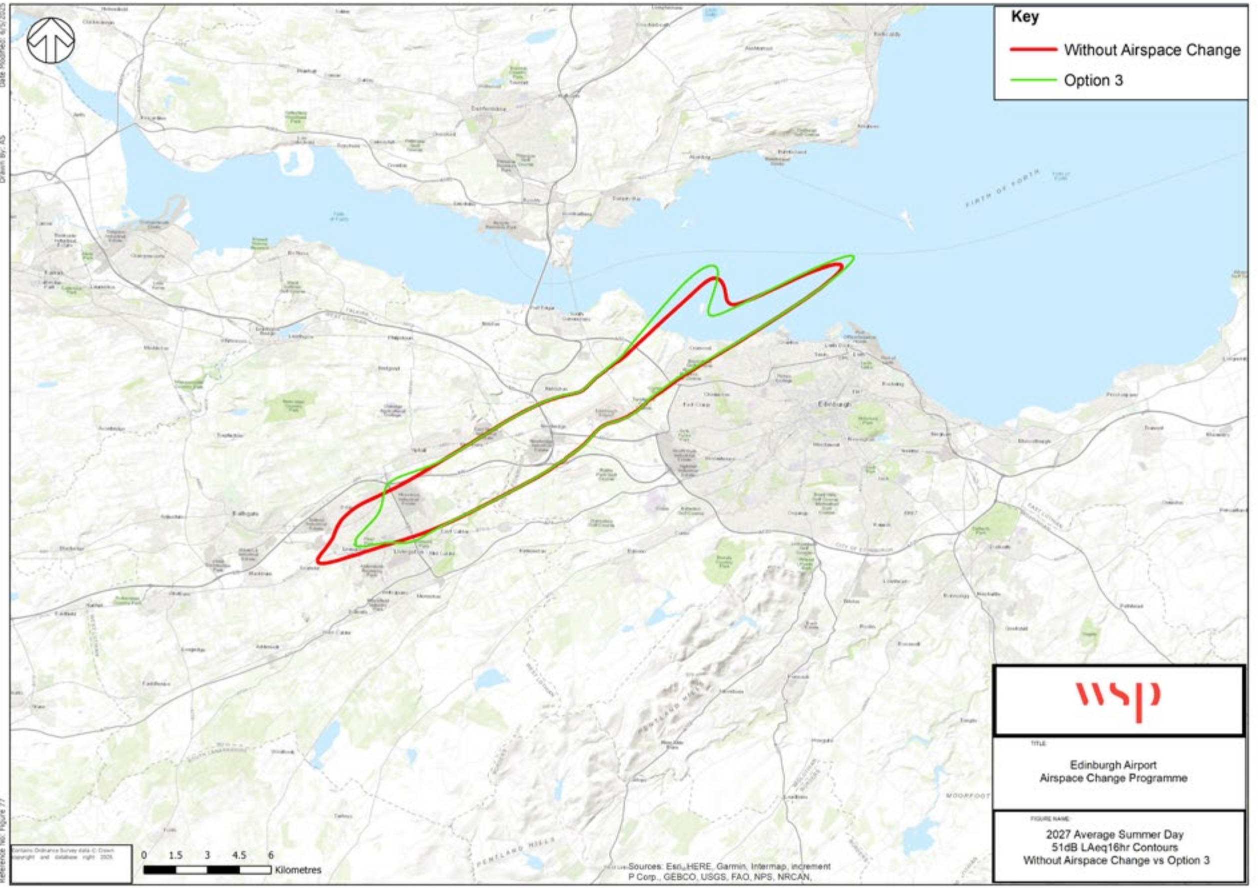


Figure 99: LAeq, 16 Hr, Day-Time 51dB Comparison Option 3 vs Baseline, 2027.

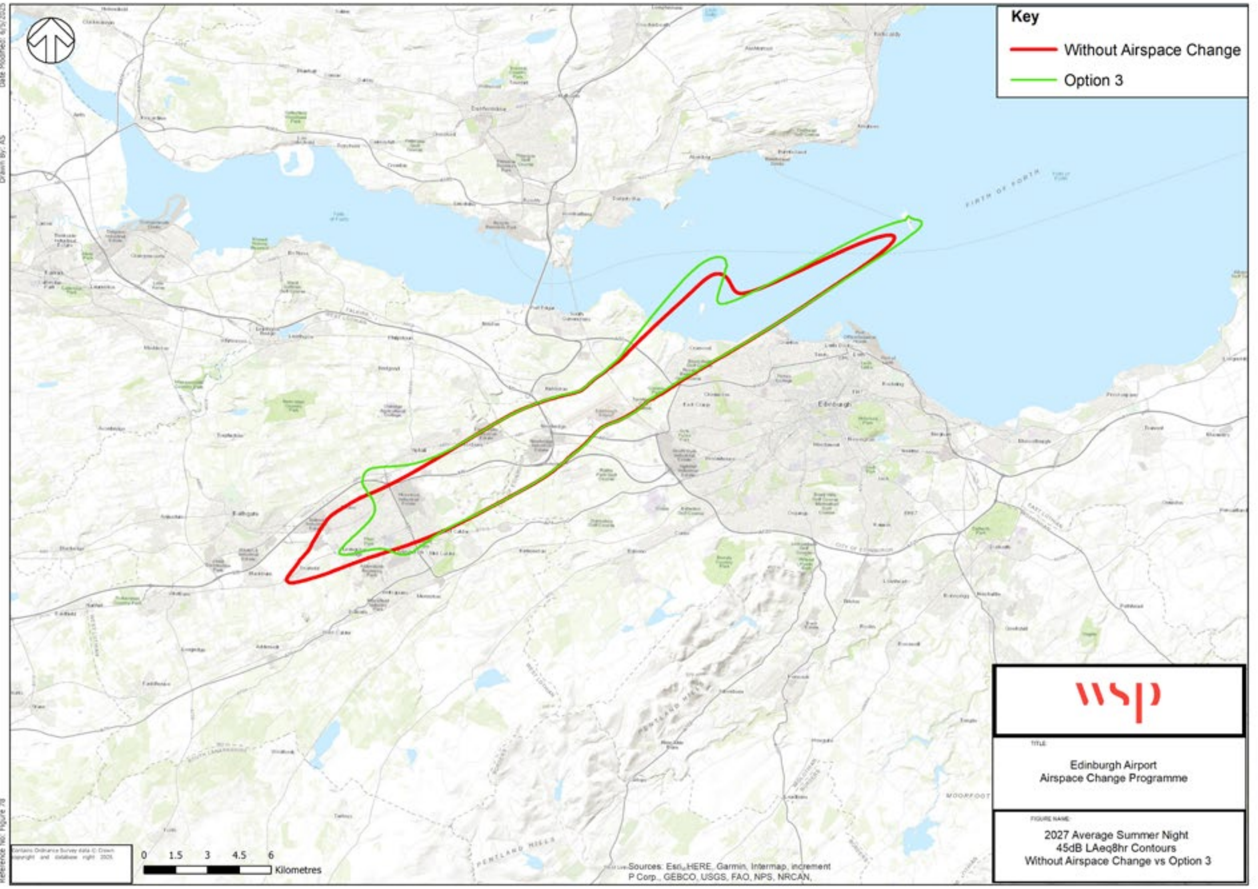


Figure 100: LAeq, 8 Hr, Night-Time 45dB Comparison Option 3 vs Baseline, 2027.

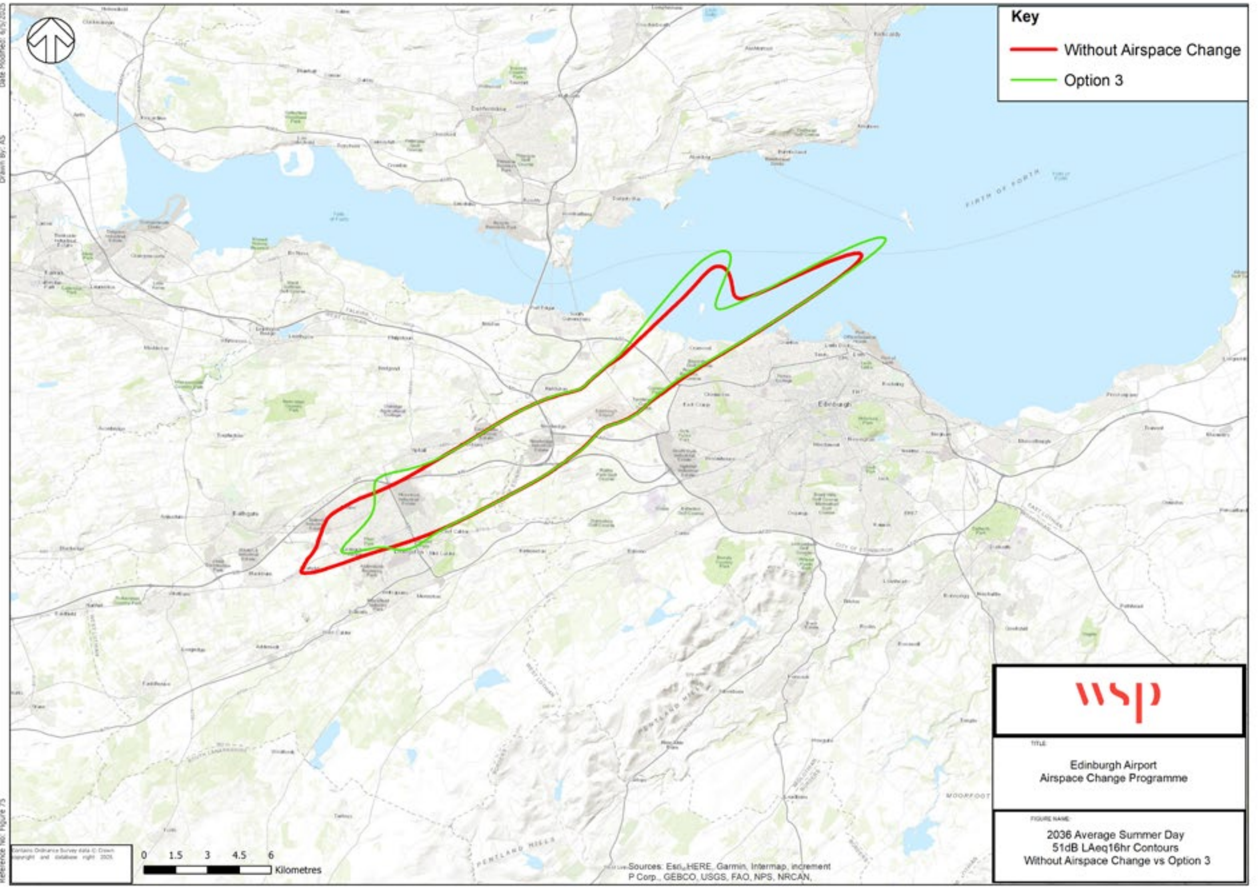


Figure 101: LAeq, 16 Hr, Day-Time 51dB Comparison Option 3 vs Baseline, 2036.

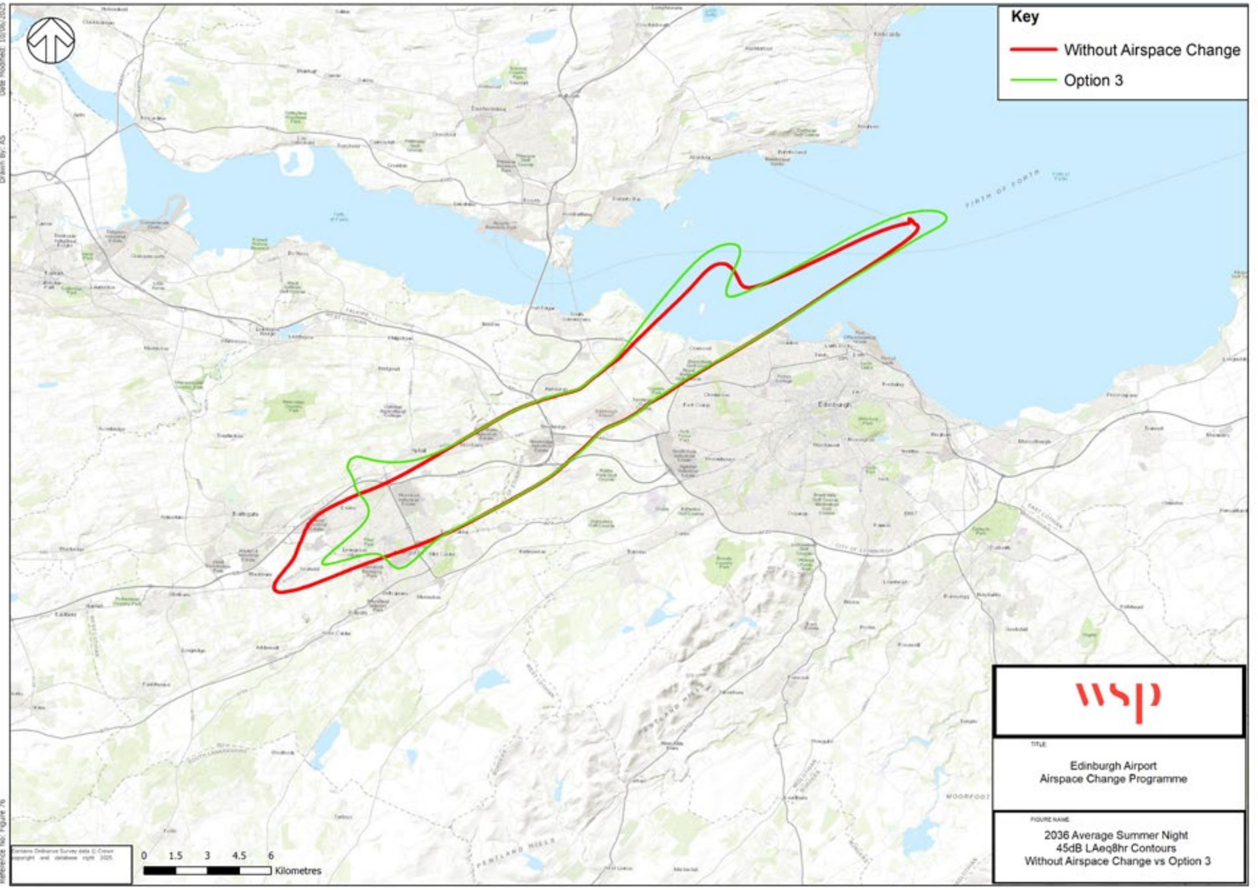


Figure 102: LAeq, 8 Hr, Night-Time 45dB Comparison Option 3 vs Baseline, 2036.

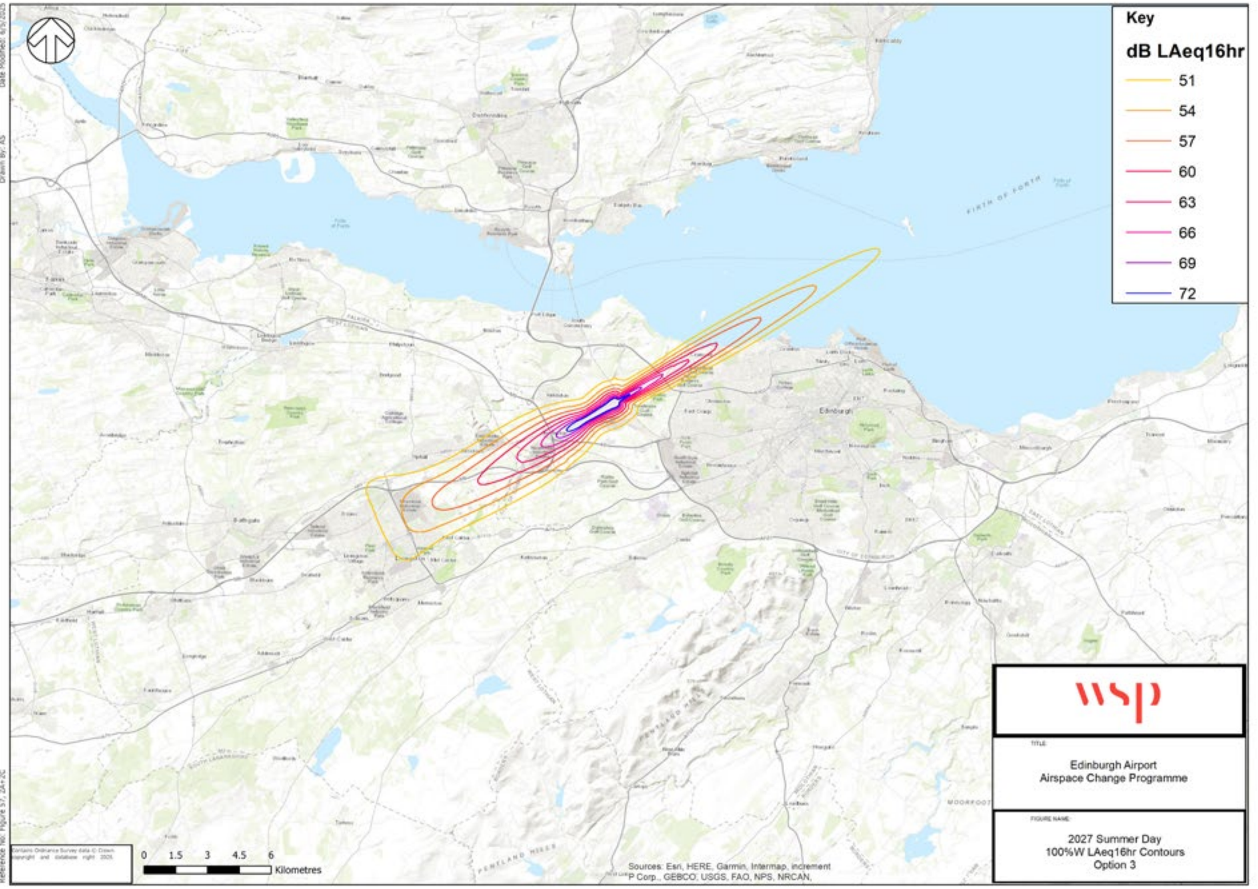


Figure 103: LAeq, 16 Hr, Day-Time 100% West Option 3, 2027.

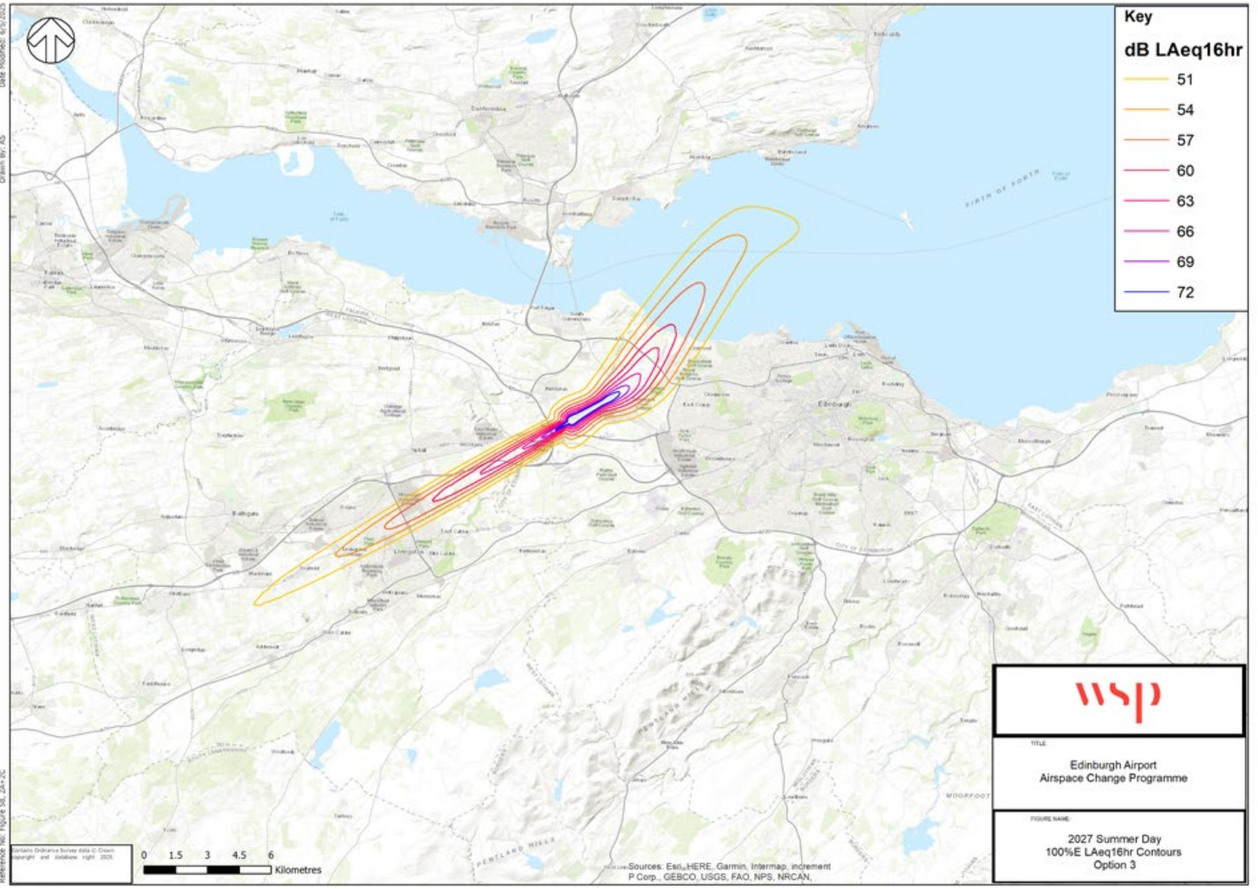


Figure 104: LAeq, 16 Hr, Day-Time 100% East Option 3, 2027.

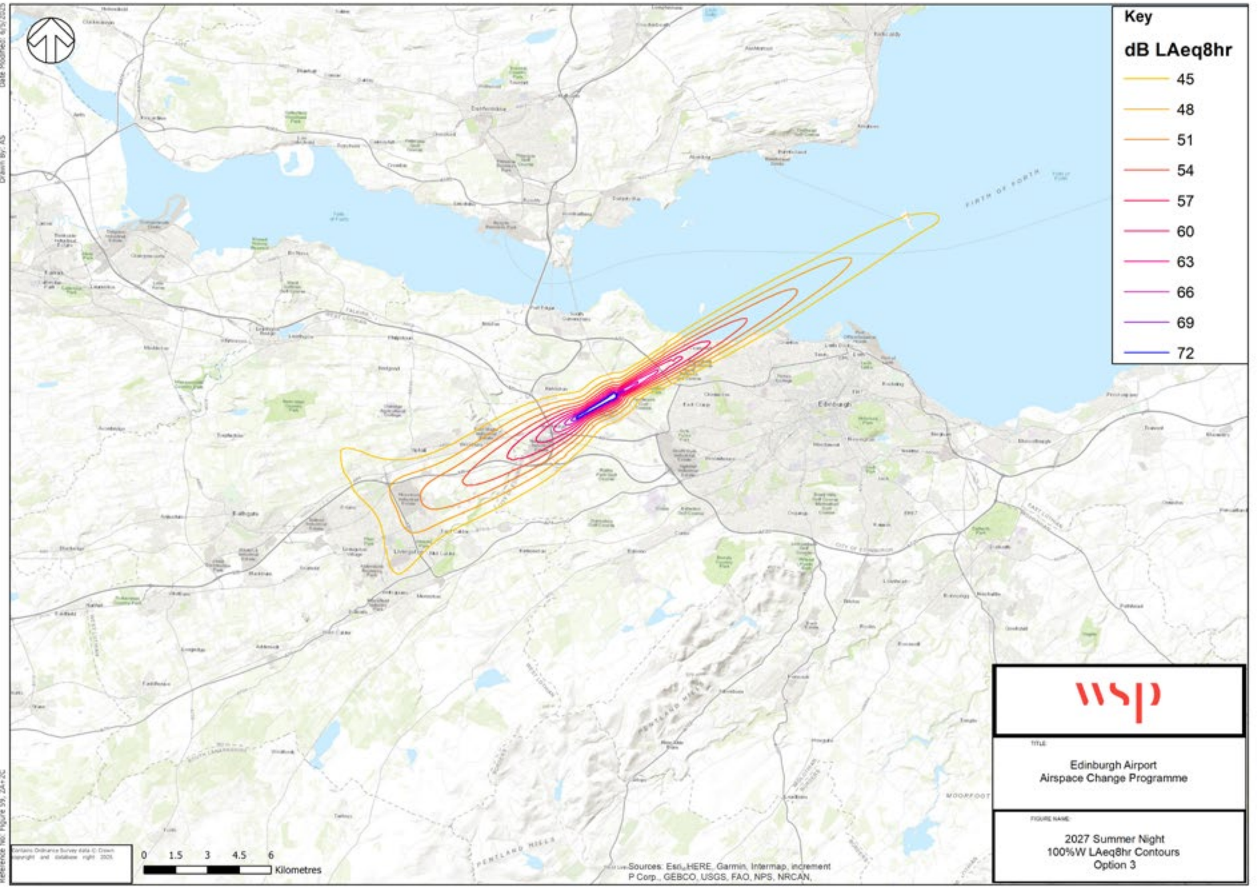


Figure 105: LAeq, 8 Hr, Night-Time 100% West Option 3, 2027.

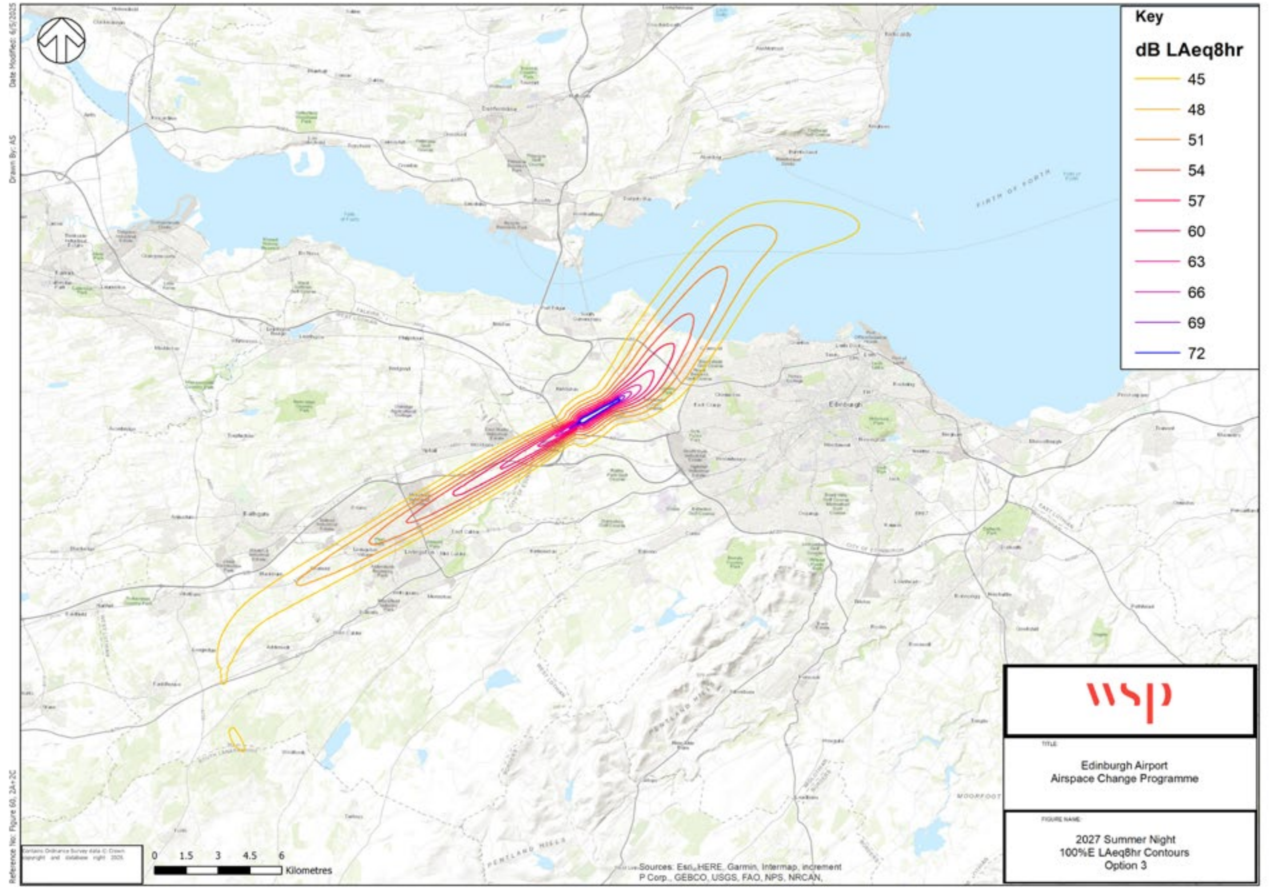


Figure 106: LAeq, 8 Hr, Night-Time 100% East Option 3, 2027.

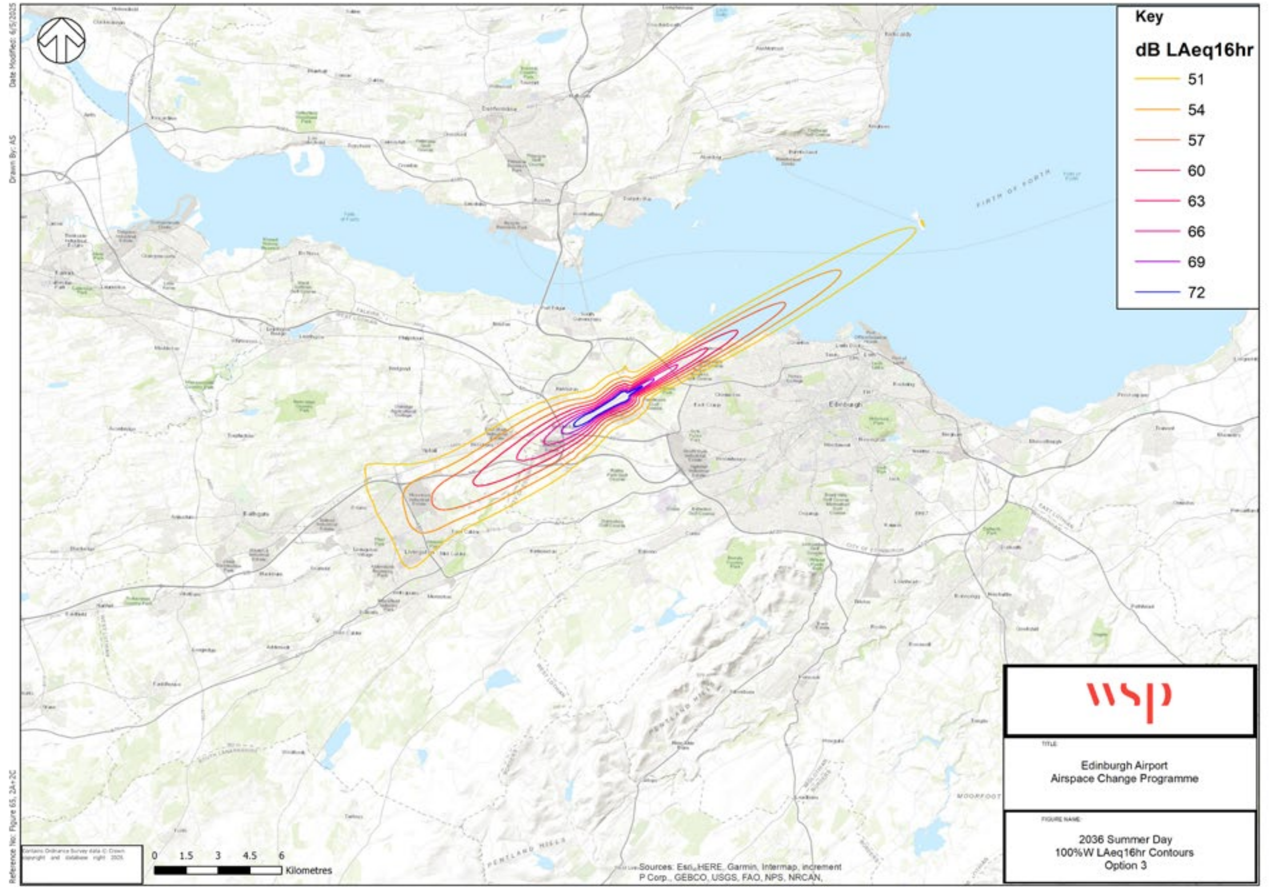


Figure 107: LAeq, 16 Hr, Day-Time 100% West Option 3, 2036.

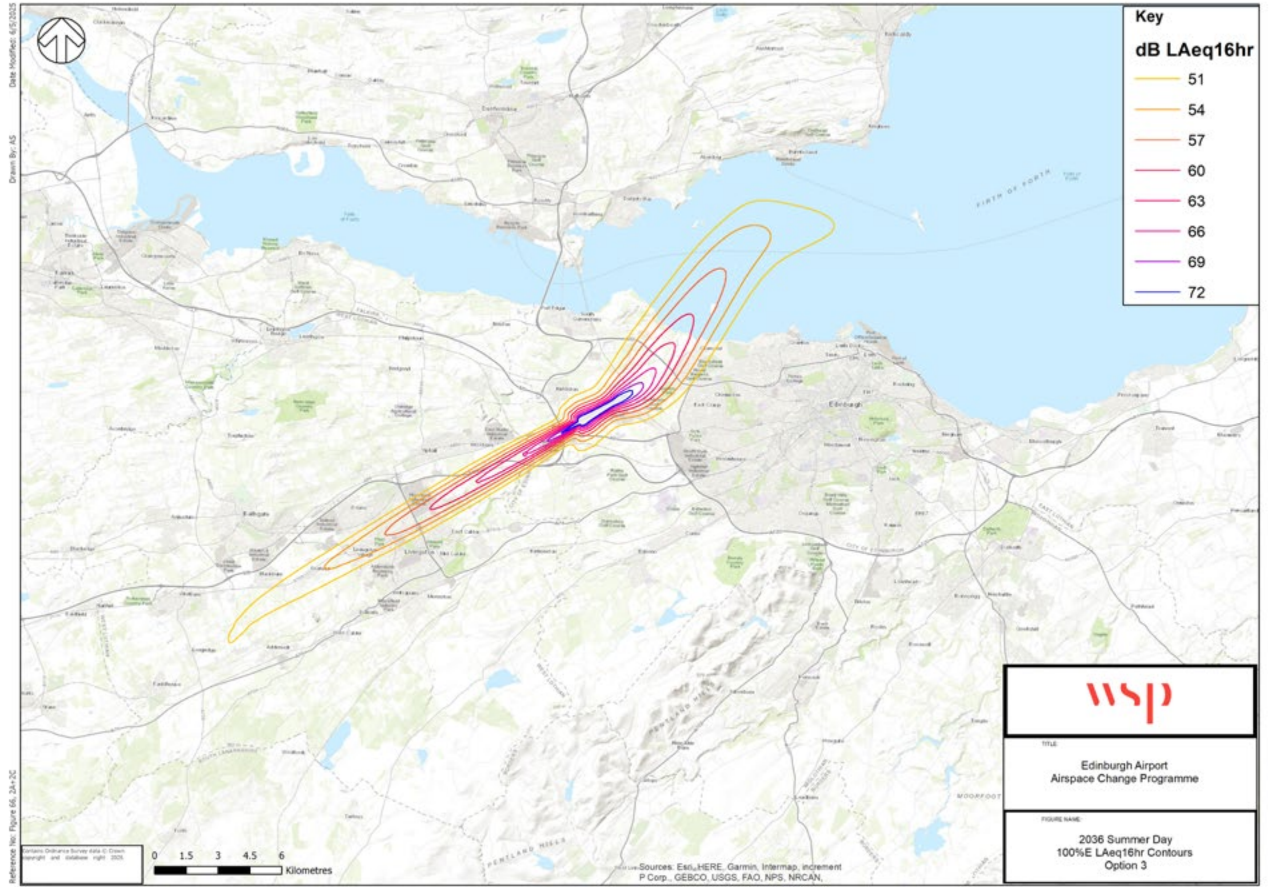


Figure 108: LAeq, 16 Hr, Day-Time 100% East Option 3, 2036.

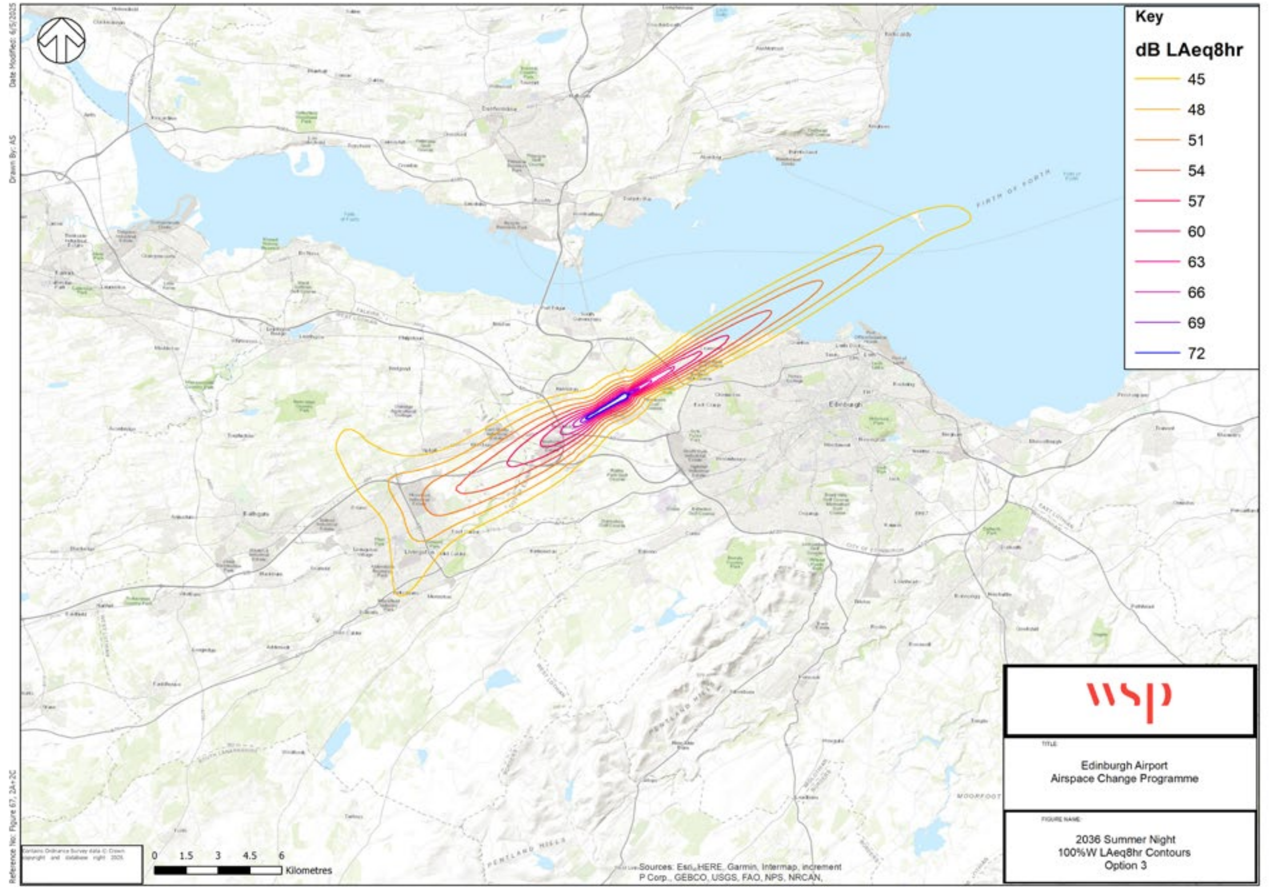


Figure 109: LAeq, 8 Hr, Night-Time 100% West Option 3, 2036.

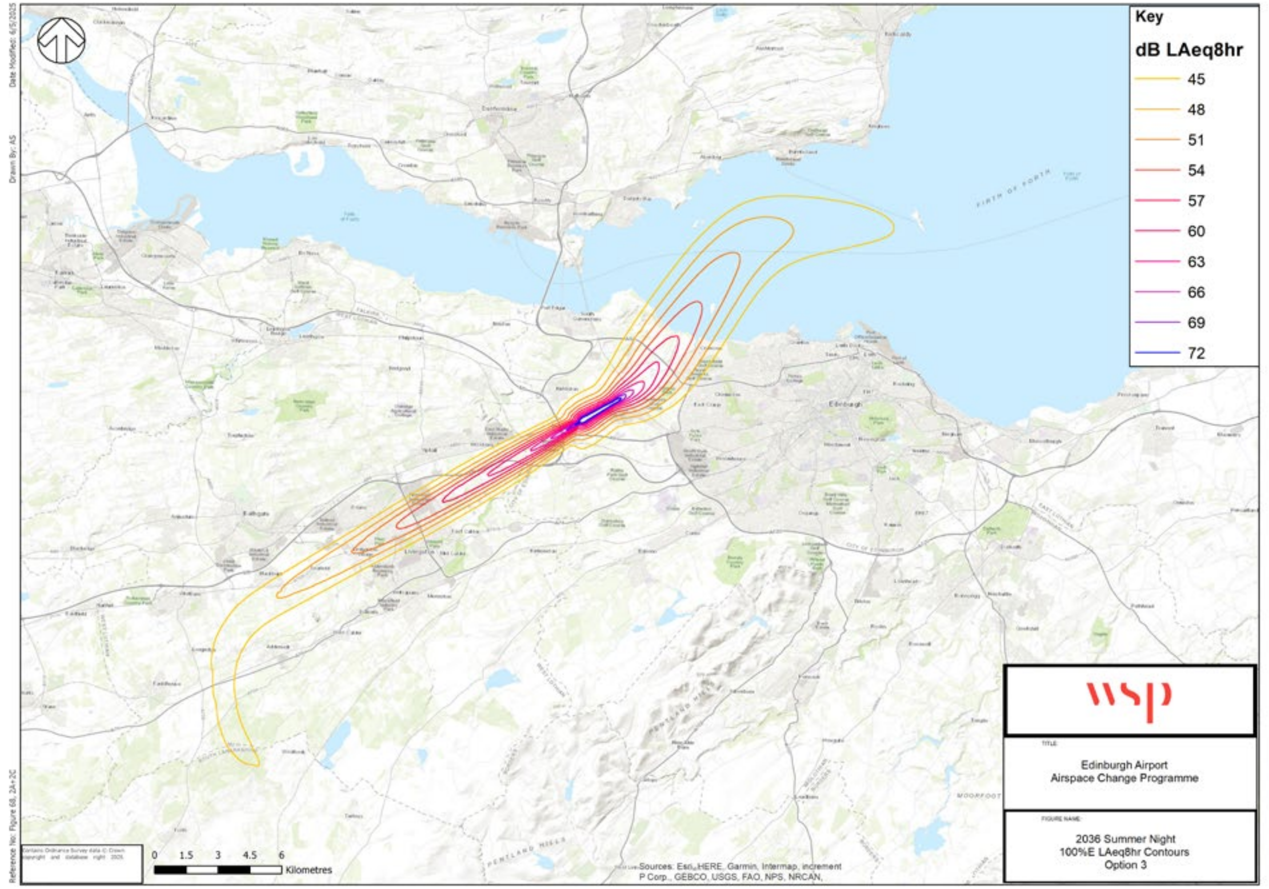


Figure 110: LAeq, 8 Hr, Night-Time 100% East Option 3, 2036.

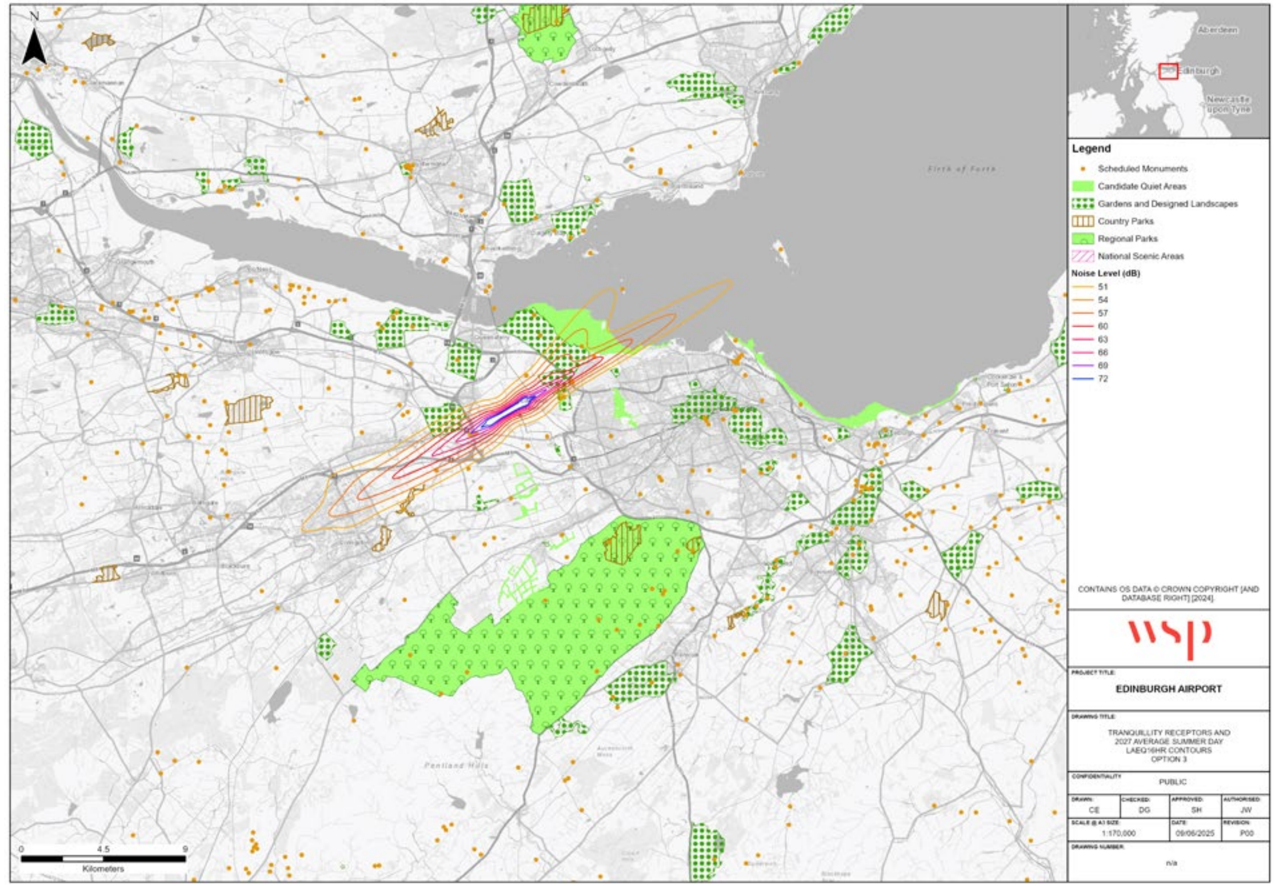


Figure 111: Tranquillity Receptors LAeq, 16 Hr, Day-Time Option 3, 2027.

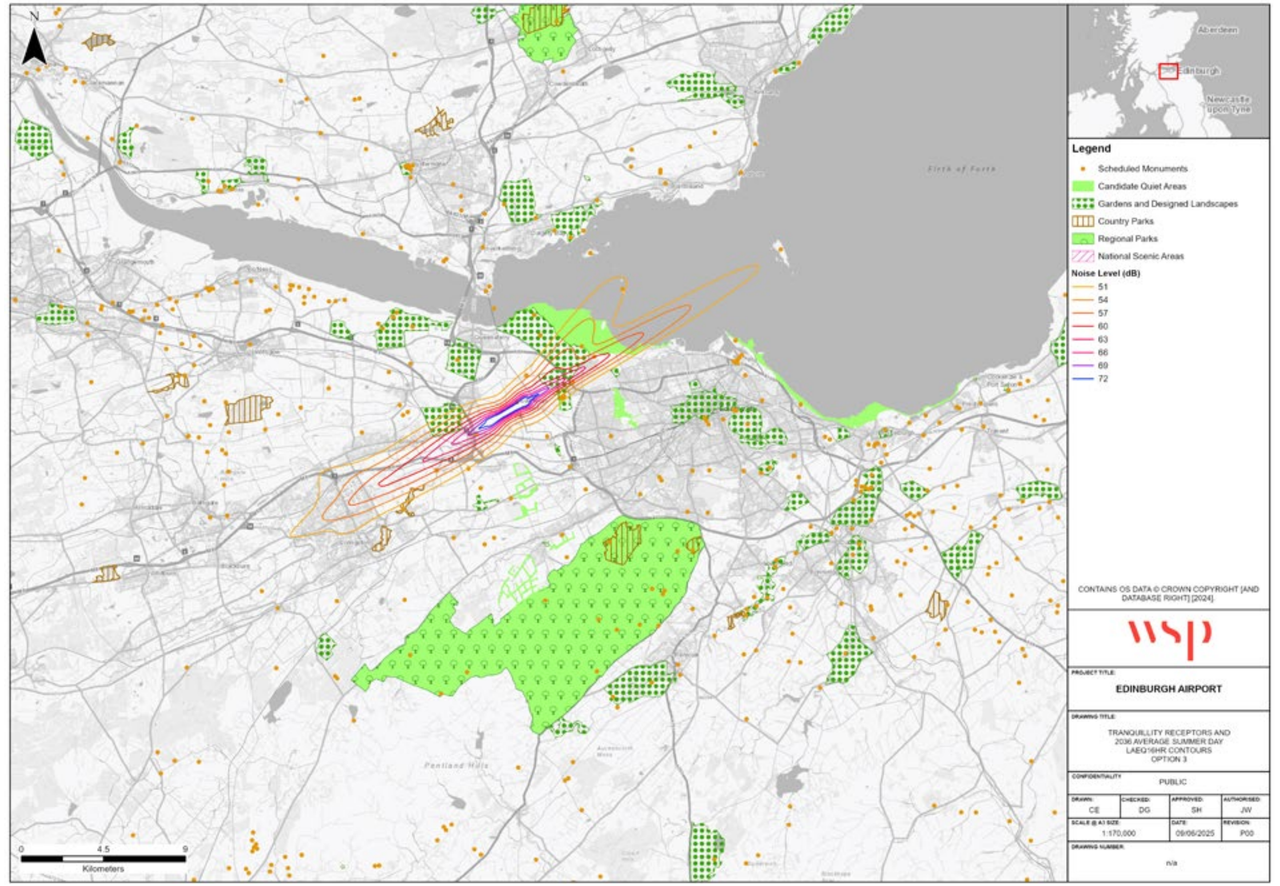


Figure 112: Tranquillity Receptors LAeq, 16 Hr, Day-Time Option 3, 2036.

5.2 Nx Contours for Option 3

11. Nx contours for Option 3 are provided below.

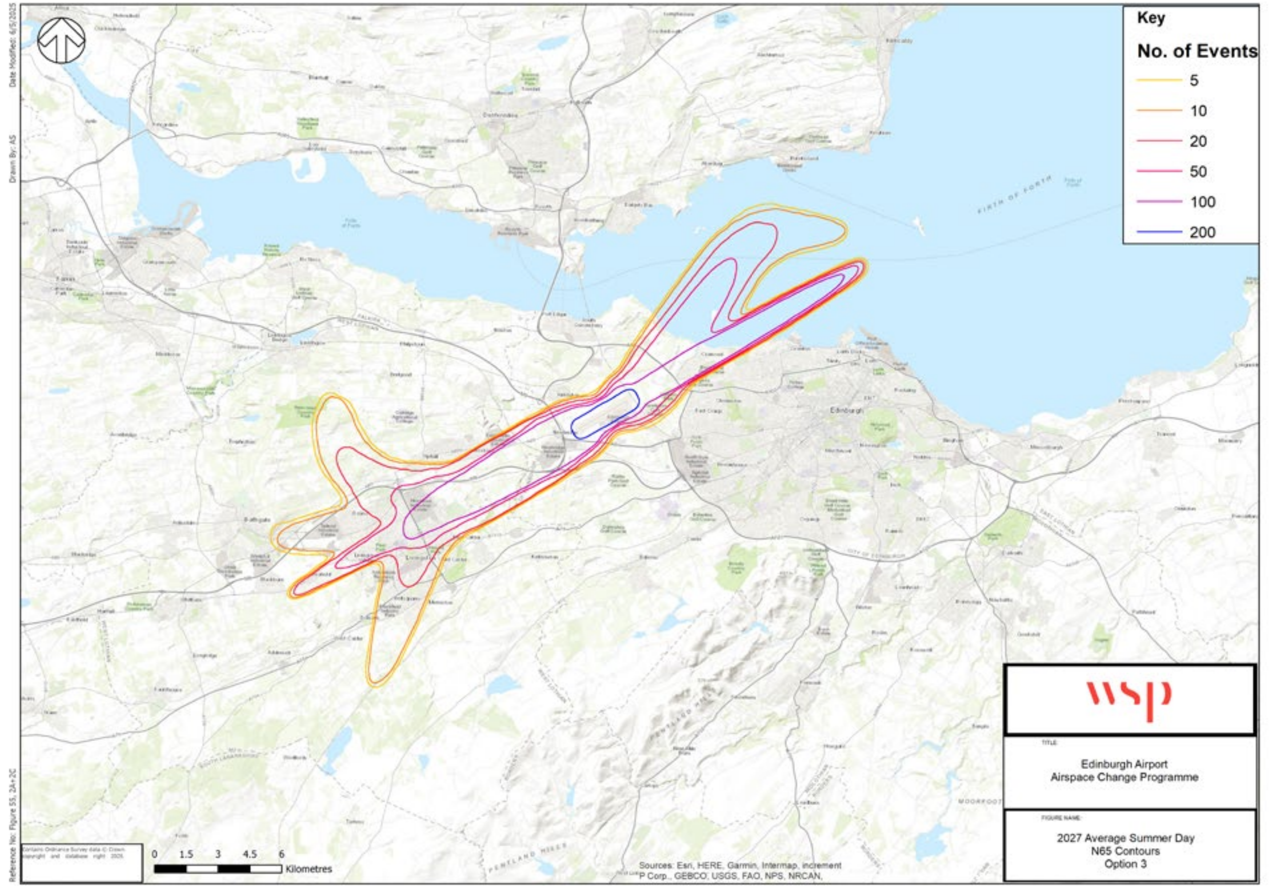


Figure 113: N65, Daytime Option 3, 2027.

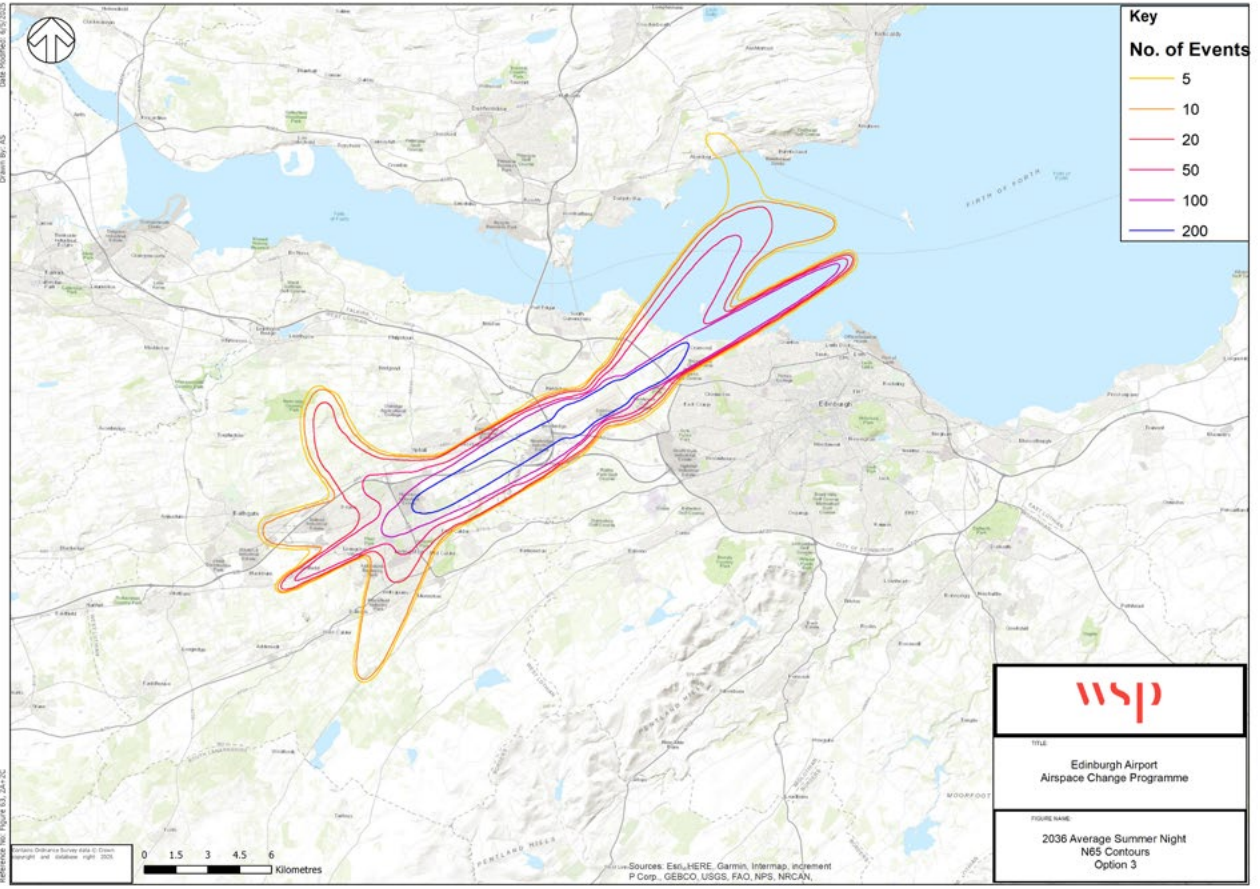


Figure 114: N65, Daytime Option 3, 2036.

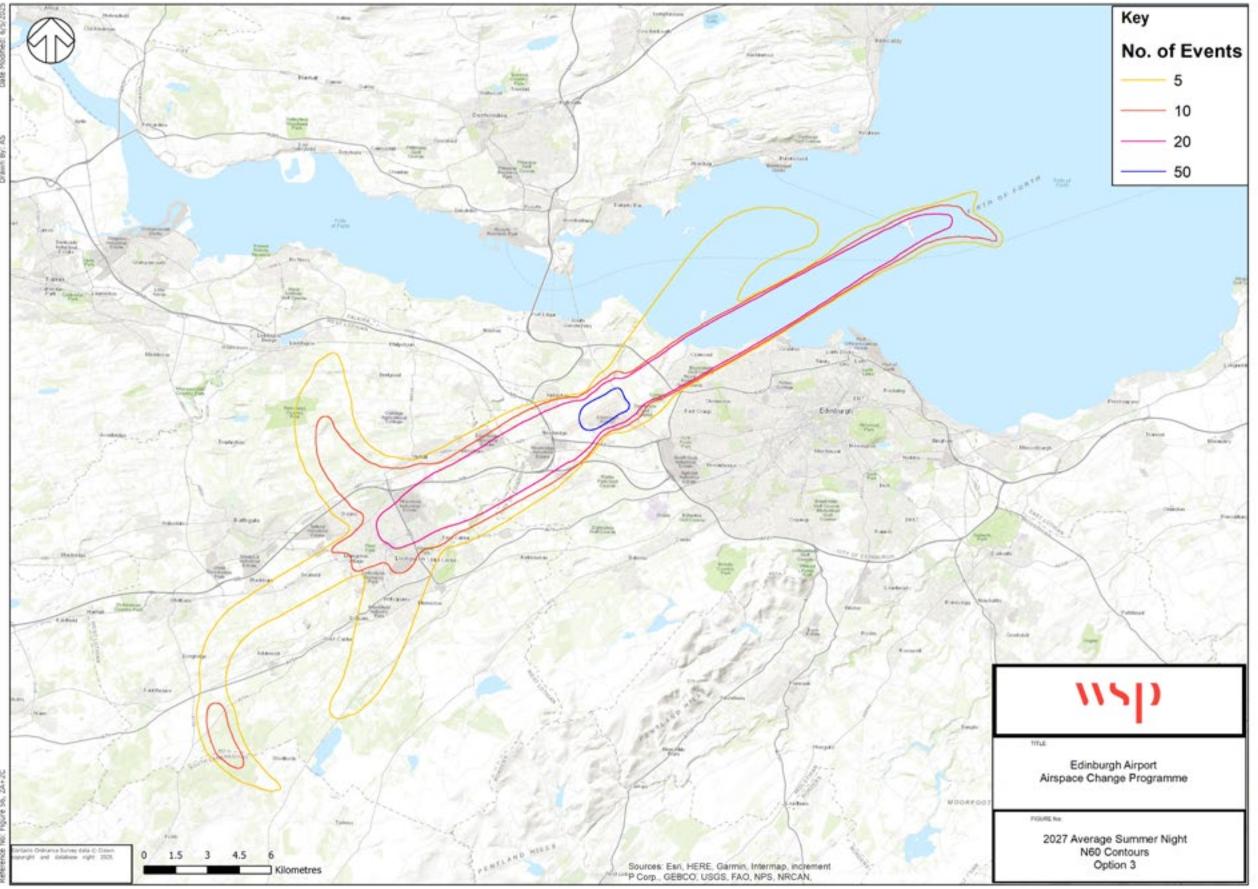


Figure 115: N60, Night-Time Option 3, 2027.

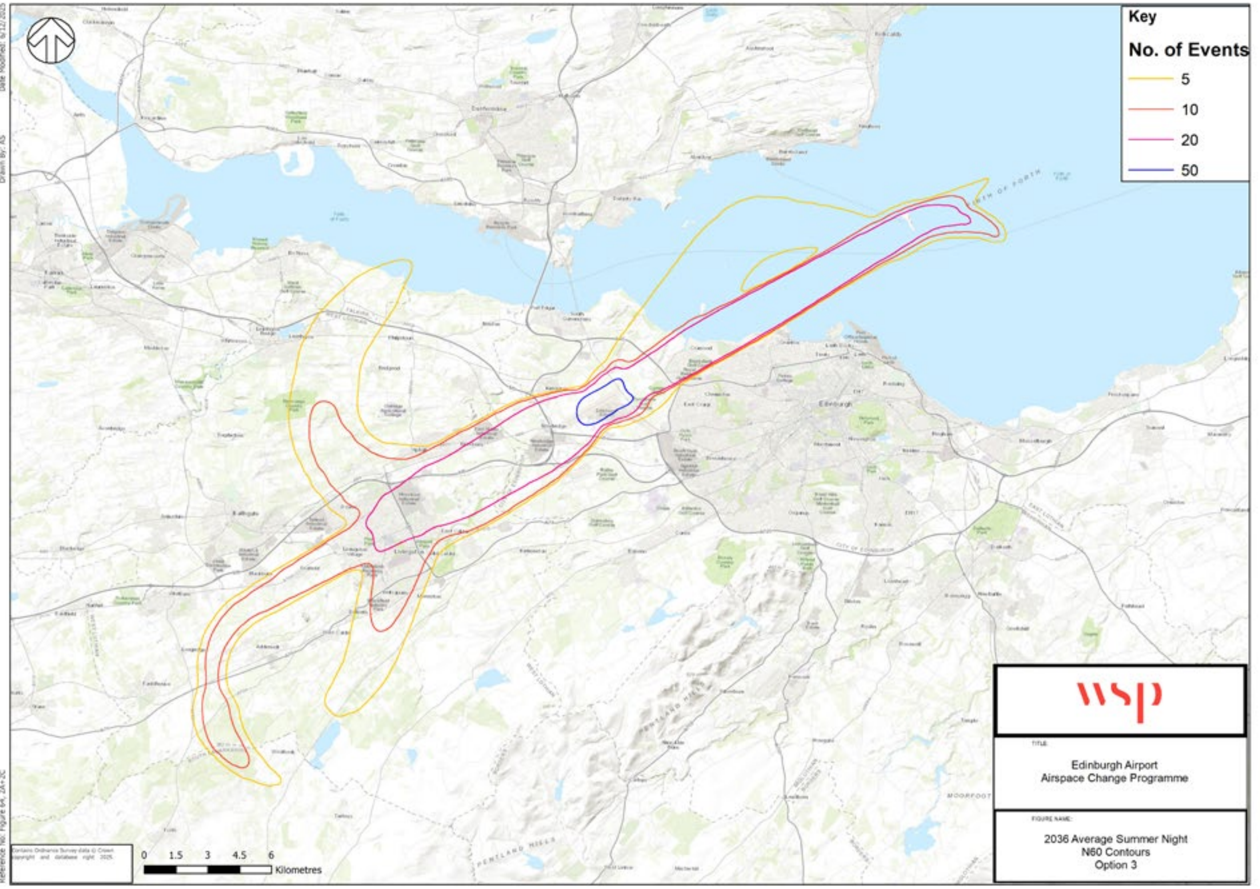


Figure 116: N60, Night-Time Option 3, 2036.

5.3 Overflight Contours for Option 3

12. Overflight contours for Option 3 are provided below.

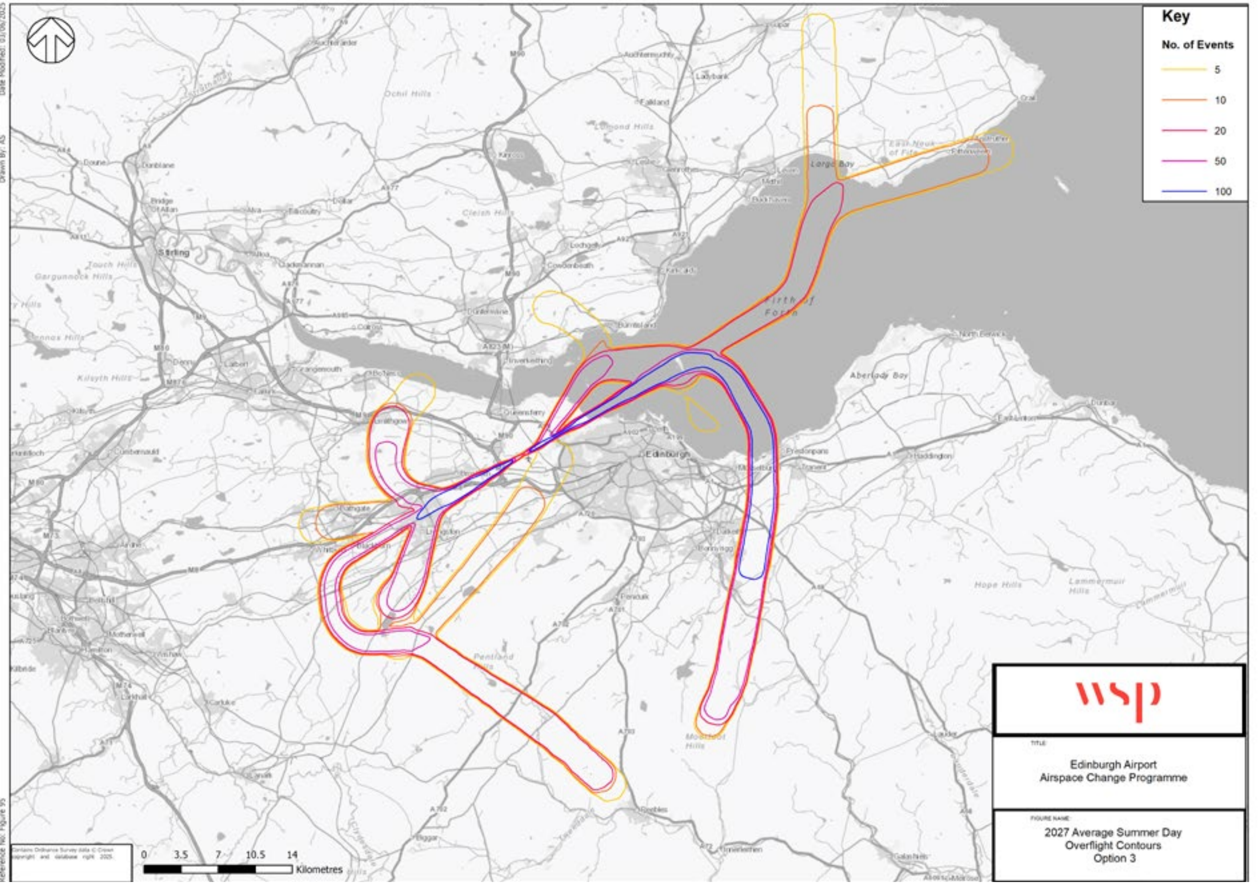


Figure 117: Overflight, Daytime Option 3, 2027.

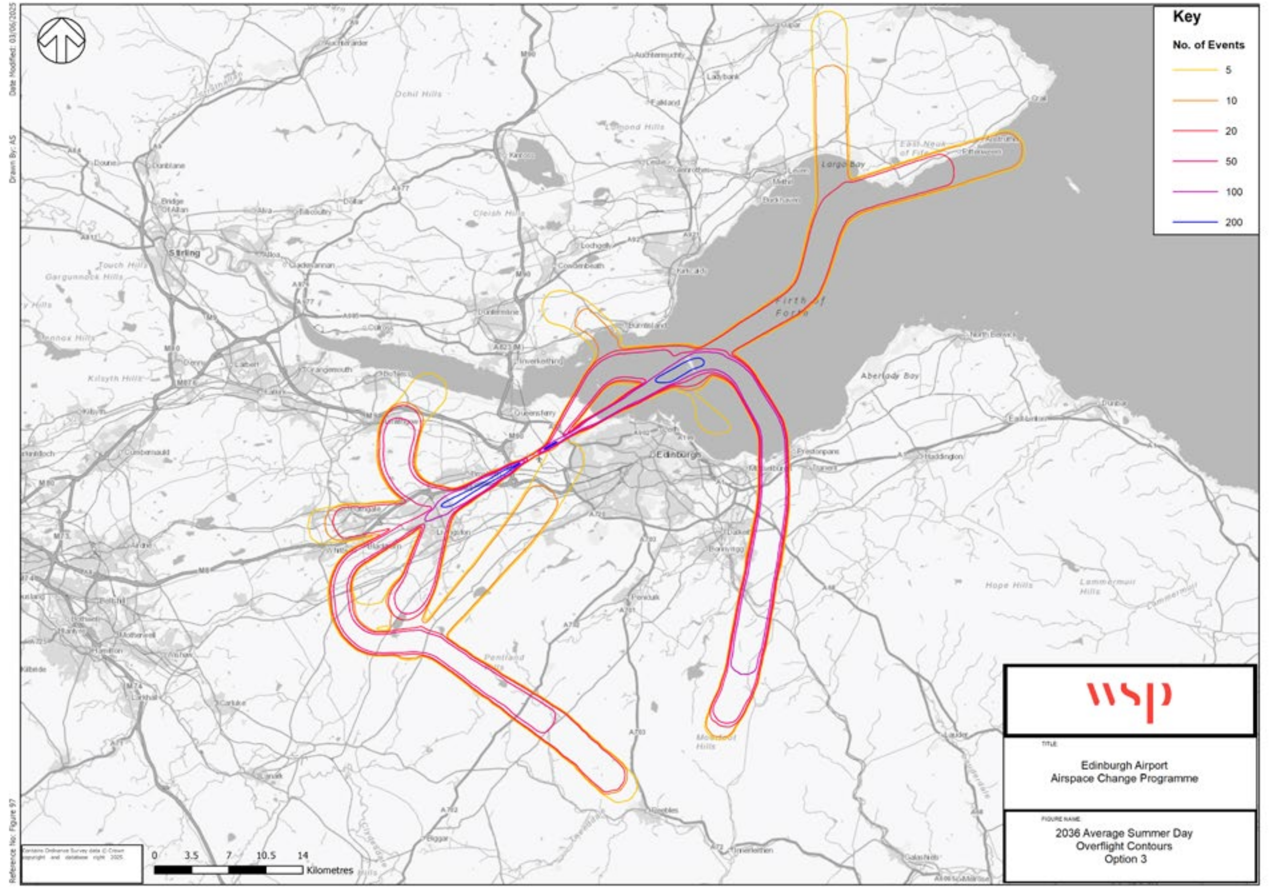


Figure 118: Overflight, Daytime Option 3, 2036.

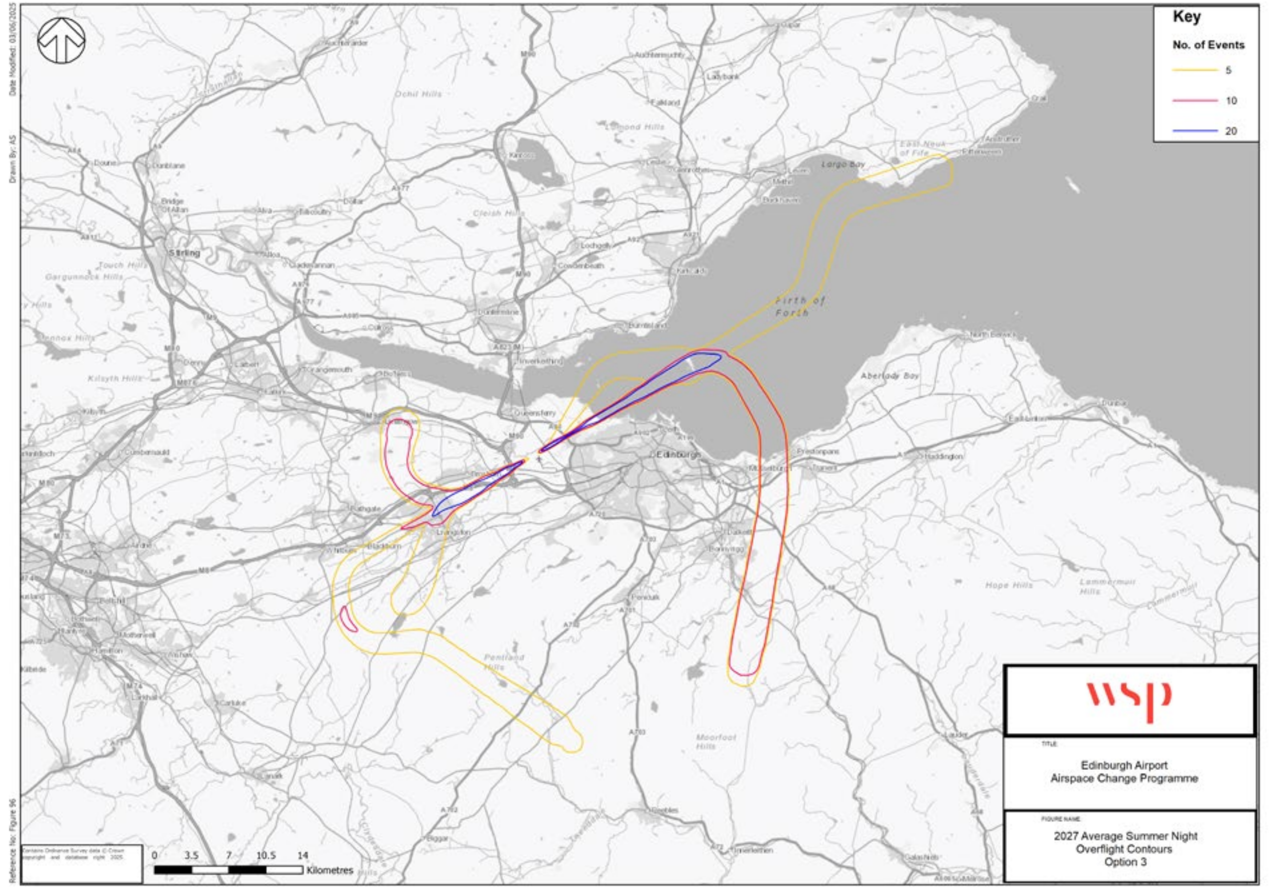


Figure 119: Overflight, Night-Time Option 3, 2027.

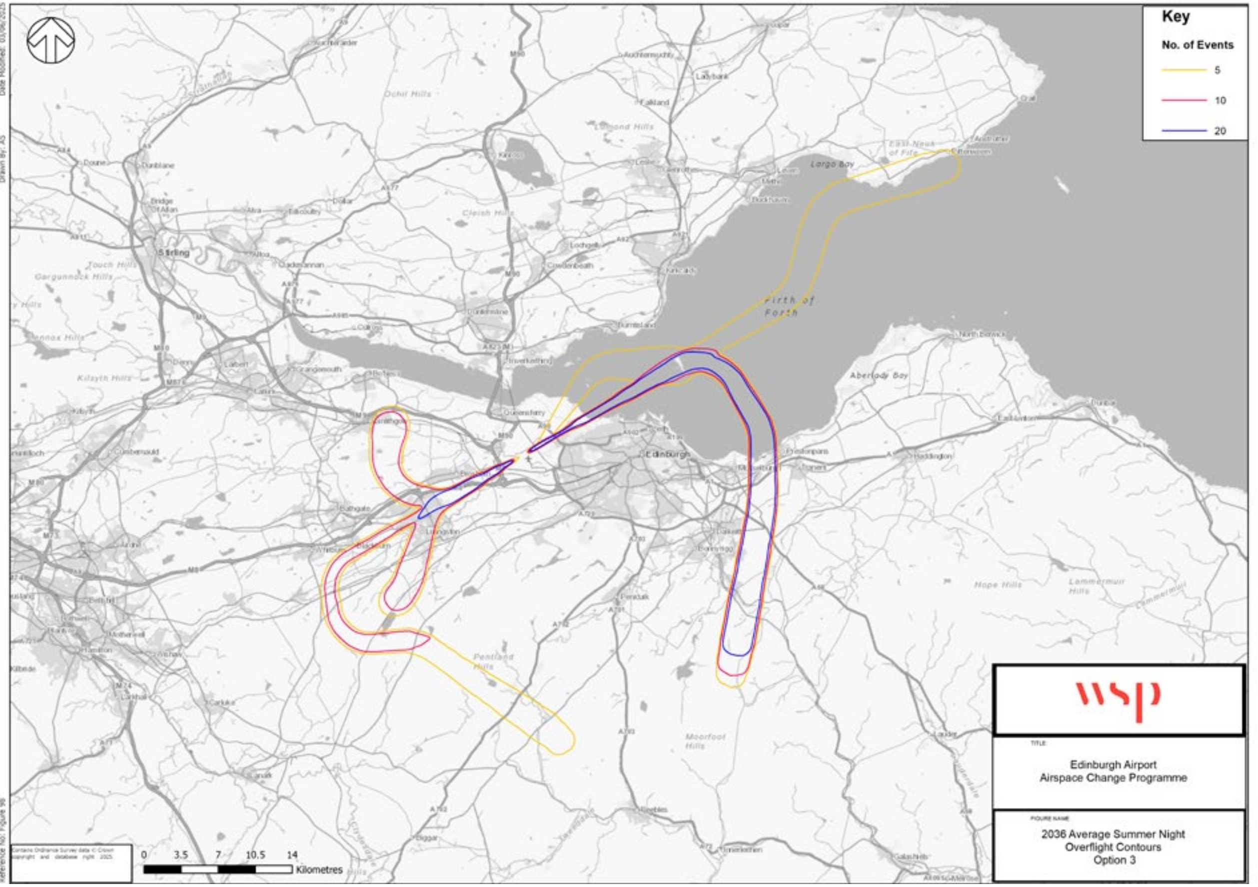


Figure 120: Overflight, Night-Time Option 3, 2036.

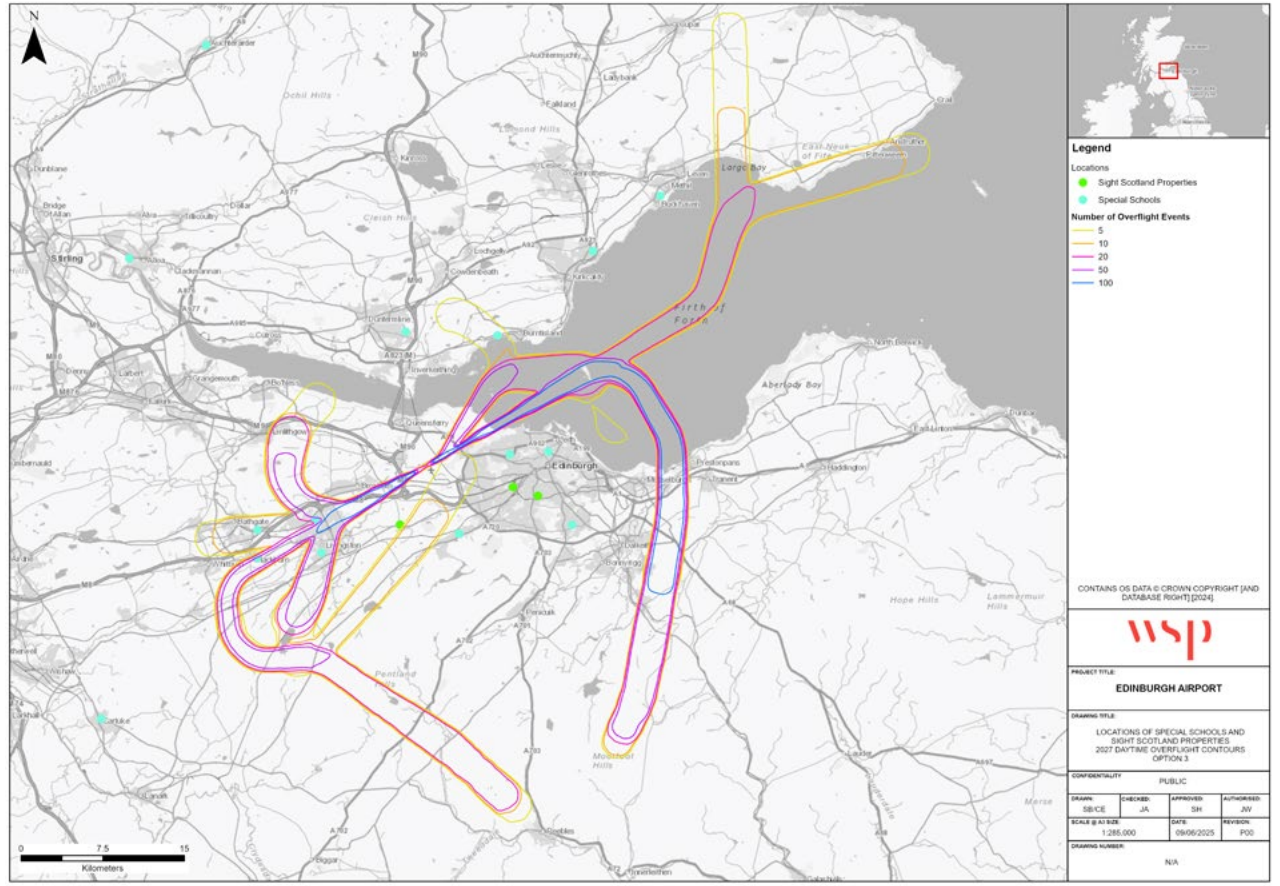


Figure 121: Special Schools and Sight Scotland Sites Overflight, Daytime Option 3, 2027.

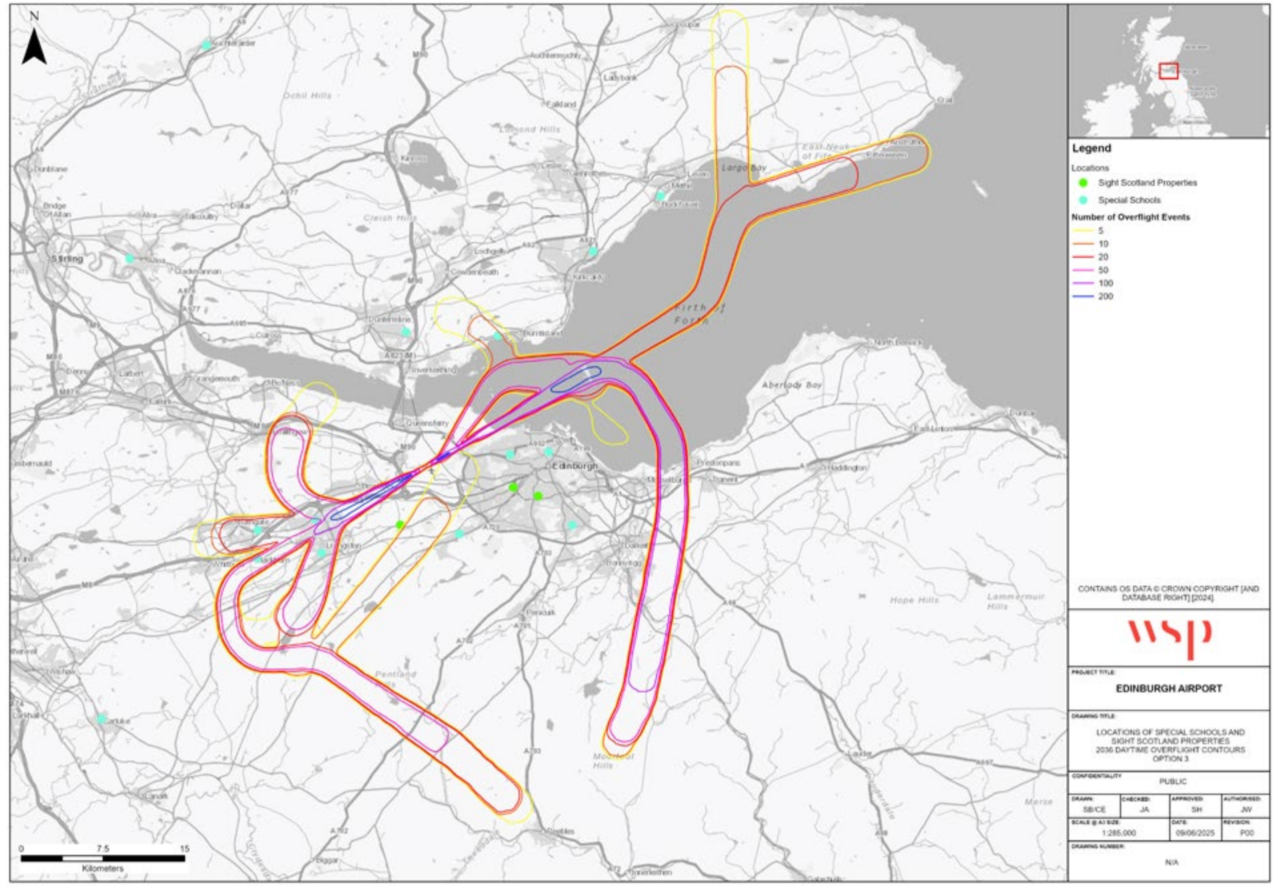


Figure 122: Special Schools and Sight Scotland Sites Overflight, Daytime Option 3, 2036.

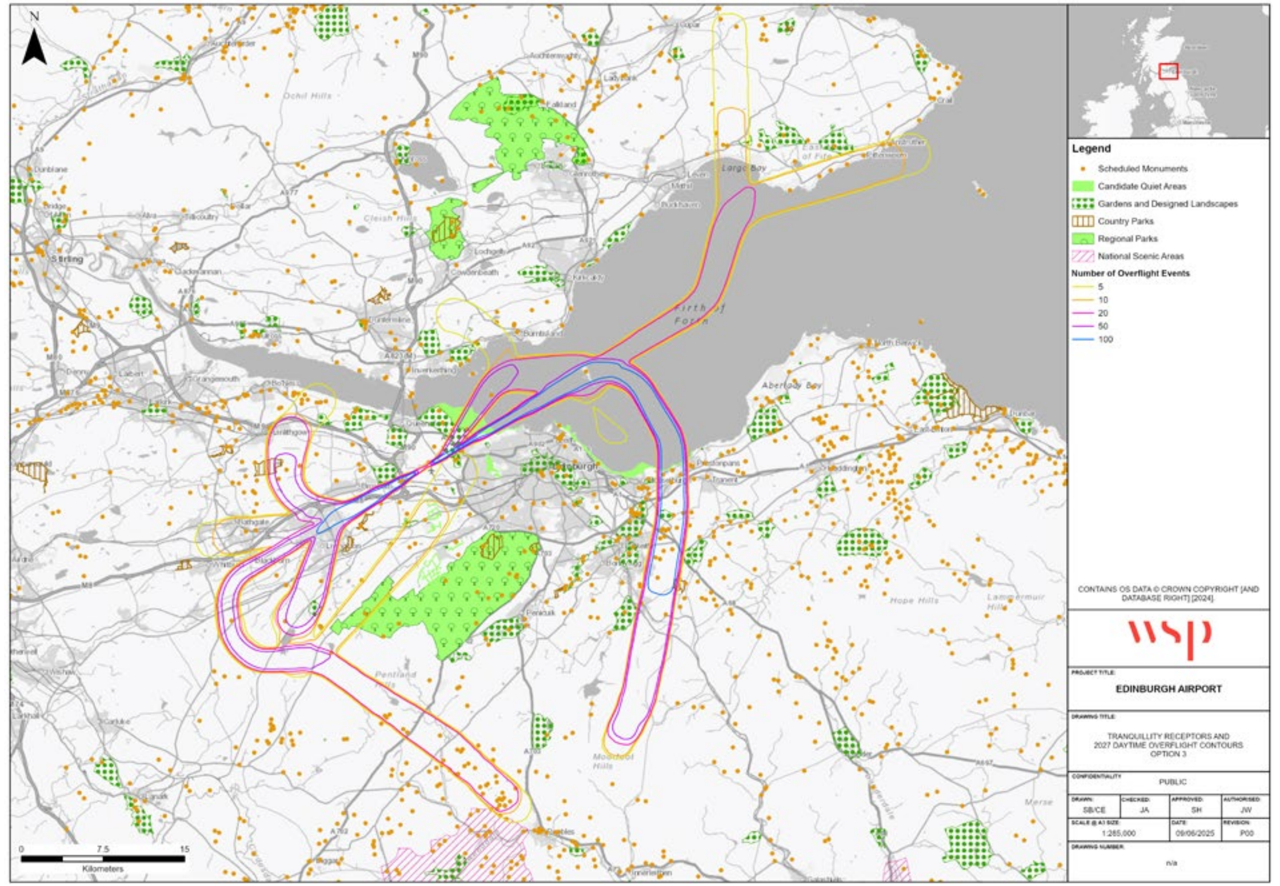


Figure 123: Tranquillity Receptors Overflight, Daytime Option 3, 2027.

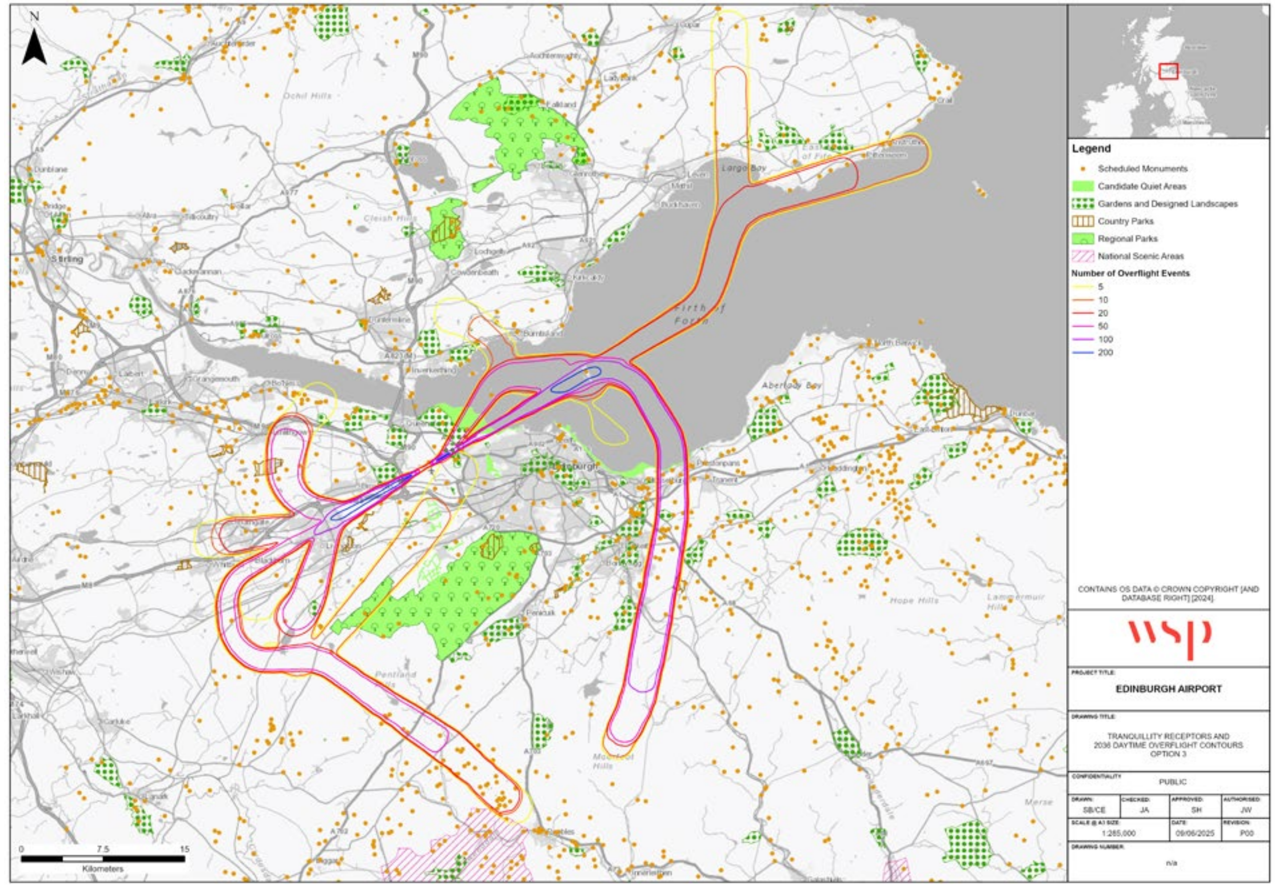


Figure 124: Tranquillity Receptors Overflight, Daytime Option 3, 2036.

5.4 Population and Noise Sensitive Sites in relation to LAeq100% modes Nx and Overflight contours for Option 3

13. Tables showing population and noise sensitive sites in relation to LAeq 100% modes, Nx and Overflight contours for Option 3 are provided below. Comparison tables can be found in Section 4 of the FOA.

Table 141: LAeq, 16 Hr, Day-Time 100% West Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 3	100% west LAeq 16hr	51	59.6	50,800	23,100	4	0	1	10	175
			54	36.1	12,200	5,700	3	0	1	2	129
			57	21.0	4,500	2,200	1	0	0	2	70
			60	11.2	2,900	1,400	1	0	0	1	37
			63	5.9	1,000	500	0	0	0	0	10
			66	3.0	200	100	0	0	0	0	1
			69	1.6	<100	<100	0	0	0	0	0

Table 142: LAeq, 16 Hr, Day-Time 100% West Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 3	100% west LAeq 16hr	51	69.5	62,300	28,300	5	1	3	15	191
			54	41.7	31,500	14,300	3	0	1	4	141
			57	24.8	6,400	3,000	1	0	0	2	82
			60	13.5	3,200	1,600	1	0	0	1	47
			63	7.1	1,800	900	1	0	0	1	16
			66	3.6	400	200	0	0	0	0	2
			69	1.9	100	<100	0	0	0	0	0

Table 143: LAeq, 16 Hr, Day-Time 100% East Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 3	100% east LAeq 16hr	51	64.0	28,500	13,000	7	1	2	8	145
			54	37.9	15,900	7,300	5	1	2	3	99
			57	21.6	4,400	2,000	0	0	0	2	37
			60	11.7	800	400	0	0	0	0	26
			63	6.2	400	200	0	0	0	0	15
			66	3.0	100	<100	0	0	0	0	2
			69	1.6	<100	<100	0	0	0	0	0

Table 144: LAeq, 16 Hr, Day-Time 100% East Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 3	100% east LAeq 16hr	51	75.3	30,700	14,000	7	1	4	9	169
			54	44.2	18,500	8,500	5	1	2	4	116
			57	25.5	6,800	3,100	0	0	0	3	45
			60	14.0	1,400	600	0	0	0	0	31
			63	7.5	500	200	0	0	0	0	19
			66	3.6	100	100	0	0	0	0	11
			69	1.9	100	<100	0	0	0	0	0

Table 145: LAeq, 8 Hr, NightTime 100% West Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 3	100% west LAeq 8hr	45	78.3	74,300	33,600	7	1	6	19	207
			48	46.7	43,300	19,600	5	1	2	9	145
			51	27.3	7,000	3,300	1	0	0	2	100
			54	14.5	3,400	1,700	1	0	0	1	57
			57	7.4	2,600	1,300	1	0	0	1	23
			60	3.7	600	300	0	0	0	0	4
			63	1.9	<100	<100	0	0	0	0	0
			66	1.0	0	0	0	0	0	0	0

Table 146: LAeq, 8 Hr, NightTime 100% West Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Area (km^2)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 3	100% west LAeq 8hr	45	90.0	79,200	35,900	8	1	4	18	229
			48	52.1	39,300	17,900	3	0	1	9	150
			51	31.4	9,500	4,400	2	0	0	2	113
			54	17.7	3,700	1,800	1	0	0	2	66
			57	9.1	2,800	1,400	1	0	0	1	35
			60	4.6	1,300	600	0	0	0	1	10
			63	2.3	100	<100	0	0	0	0	0
			66	1.1	0	0	0	0	0	0	0

Table 147: LAeq, 8 Hr, NightTime 100% East Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2027	Option 3	100% east LAeq 8hr	45	84.5	36,900	16,800	7	1	5	10	181
			48	48.1	22,400	10,200	5	1	2	6	115
			51	27.6	11,200	5,000	3	1	1	3	50
			54	15.4	2,800	1,300	0	0	0	1	32
			57	8.3	500	300	0	0	0	0	18
			60	3.9	200	100	0	0	0	0	9
			63	1.9	100	<100	0	0	0	0	0
			66	1.0	<100	<100	0	0	0	0	0

Table 148: LAeq, 8 Hr, Night-Time 100% East Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Area (km²)	Total population	Total households	Number of care homes	Number of hospitals	Number of places of worship	Number of schools	Number of listed buildings
2036	Option 3	100% east LAeq 8hr	45	101.8	47,300	21,600	7	1	5	12	189
			48	55.9	26,900	12,300	7	1	2	7	127
			51	32.5	14,300	6,500	5	1	2	3	70
			54	18.2	4,300	2,000	0	0	0	2	34
			57	9.9	700	300	0	0	0	0	21
			60	4.9	300	200	0	0	0	0	15
			63	2.3	100	<100	0	0	0	0	1
			66	1.2	<100	<100	0	0	0	0	0

Table 149: N65, Daytime Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	N65 (day)	5	137.9	104,100	47,100	11	1	275	8	29
			10	126.0	98,300	44,400	10	1	256	7	26
			20	87.8	70,600	31,900	8	1	214	4	17
			50	58.0	44,500	20,200	6	1	156	2	11
			100	35.1	12,100	5,600	3	0	126	1	4
			200	3.3	100	<100	0	0	0	0	0

Table 150: N65, Daytime Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	N65 (day)	5	145.4	105,500	47,700	11	1	280	8	29
			10	129.7	100,700	45,500	10	1	263	8	28
			20	97.0	74,600	33,800	8	1	224	4	19
			50	66.1	50,100	22,700	7	1	159	2	12
			100	38.3	18,000	8,300	3	0	128	1	4
			200	17.0	4,400	2,100	0	0	51	0	0

Table 151: N60, Night-Time Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	N60 (night)	5	186.4	121,400	54,900	14	1	322	9	28
			10	94.4	71,400	32,400	8	1	242	4	15
			20	60.4	39,500	18,000	3	0	165	1	7
			50	2.8	<100	<100	0	0	1	0	0

Table 152: N60, Night-Time Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	N60 (night)	5	219.5	130,500	58,900	14	2	378	12	29
			10	123.2	103,400	46,700	12	1	266	7	26
			20	67.7	48,300	21,900	5	1	182	2	11
			50	3.3	100	<100	0	0	6	0	0

Table 153: Overflight Daytime, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Overflights Day	5	771.2	259,600	118,100	22	4	1698	24	66
			10	589.4	177,000	80,000	19	2	1264	20	51
			20	390.3	102,000	46,000	13	2	320	8	27
			50	201.0	78,000	35,100	12	1	190	5	18
			100	68.8	24,200	11,000	3	0	59	0	3

Table 154: Overflight Daytime, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Overflights Day	5	786.4	263,400	119,900	23	4	1719	24	66
			10	630.9	183,400	83,000	19	2	1374	21	52
			20	448.4	141,300	63,700	15	2	683	15	38
			50	274.1	85,000	38,300	12	2	247	5	20
			100	100.5	32,700	14,800	6	0	98	1	5
			200	7.3	1,400	600	0	0	6	0	0

Table 155: Overflight Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2027	Option 3	Overflights Night	5	375.7	100,600	45,400	14	2	649	6	24
			10	138.6	58,500	26,400	8	2	174	2	13
			20	22.0	4,400	2,000	1	0	9	0	0

Table 156: Overflight Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Area (km²)	Total population	Total households	Number of carehomes	Number of hospitals	Number of listed buildings	Number of places of worship	Number of schools
2036	Option 3	Overflights Night	5	397.9	104,200	47,100	14	2	860	8	30
			10	192.7	84,000	37,800	11	2	233	5	19
			20	94.3	30,100	13,600	4	0	100	0	5

5.5 Tranquillity Sites in relation to LAeq, 8 Hr, Nx and Overflight contours for Option 3

14. Tables showing tranquillity sites in relation to LAeq, Nx and Overflight contours for Option 3 are provided below. Comparison tables for LAeq 16Hr and Daytime Overflights can be found in the main report along with absolute data for LAeq 16Hr.

Table 157: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison LAeq8hr	45	0	0.0	0	1.1	0	0.4	0	0.0	0	0.0	2	0.2
			48	0	0.0	0	0.2	0	0.4	0	0.0	0	0.0	0	0.0
			51	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	0	0.0
			54	0	0.0	-1	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 158: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison LAeq8hr	45	0	0.0	0	1.1	0	0.4	0	0.0	0	0.0	-1	0.2
			48	0	0.0	0	0.7	0	0.4	0	0.0	0	0.0	-2	-0.1
			51	0	0.0	0	-0.2	0	0.3	0	0.0	0	0.0	-1	0.0
			54	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0	0	0.0
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 159: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	LAeq8hr	45	1	0.3	2	5.3	5	6.8	0	0.0	0	0.0	14	0.5
			48	1	0.0	2	3.0	4	5.3	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	0.9	4	3.4	0	0.0	0	0.0	6	0.2
			54	0	0.0	1	0.4	3	1.7	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	0.8	0	0.0	0	0.0	5	0.0
			60	0	0.0	0	0.0	2	0.4	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 160: Tranquillity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	LAeq8hr	45	1	0.3	2	5.6	5	7.3	0	0.0	0	0.0	14	0.6
			48	1	0.1	2	4.1	4	5.7	0	0.0	0	0.0	8	0.2
			51	0	0.0	2	1.0	4	4.1	0	0.0	0	0.0	6	0.2
			54	0	0.0	2	0.5	3	2.0	0	0.0	0	0.0	5	0.1
			57	0	0.0	0	0.0	3	1.0	0	0.0	0	0.0	5	0.1
			60	0	0.0	0	0.0	2	0.5	0	0.0	0	0.0	3	0.0
			63	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	2	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 161: Tranquillity Sites in Relation to N65, Daytime, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison N65 (day)	5	1	0.5	0	0.5	0	-1.7	0	0.0	0	0.0	-2	-0.2
			10	1	0.2	0	0.7	1	0.5	0	0.0	0	0.0	2	0.0
			20	0	0.0	0	0.8	0	0.3	0	0.0	0	0.0	0	0.0
			50	0	-0.1	0	0.7	0	0.4	0	0.0	0	0.0	0	-0.1
			100	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.0	0	0.0
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 162: Tranquillity Sites in Relation to N65, Daytime, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison N65 (day)	5	1	0.4	0	0.5	-2	-1.8	0	0.0	0	0.0	-1	-0.2
			10	1	0.3	0	0.7	0	0.1	0	0.0	0	0.0	1	-0.1
			20	0	0.0	0	0.8	0	0.4	0	0.0	0	0.0	0	0.0
			50	0	0.0	0	0.8	0	0.4	0	0.0	0	0.0	0	0.0
			100	0	0.0	0	-0.1	0	0.1	0	0.0	0	0.0	-1	0.0
			200	0	0.0	-1	-0.3	0	-0.1	0	0.0	0	0.0	-1	0.0

Table 163: Tranquillity Sites in Relation to N65, Daytime, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	N65 (day)	5	2	0.8	2	6.2	5	8.1	0	0.0	0	0.0	17	0.3
			10	2	0.5	2	6.1	5	7.7	0	0.0	0	0.0	17	0.3
			20	1	0.3	2	5.7	4	7.0	0	0.0	0	0.0	12	0.3
			50	1	0.0	2	4.6	4	5.9	0	0.0	0	0.0	11	0.2
			100	1	0.0	2	1.1	4	3.0	0	0.0	0	0.0	6	0.2
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 164: Tranquillity Sites in Relation to N65, Daytime, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	N65 (day)	5	2	0.8	2	6.3	5	8.3	0	0.0	0	0.0	18	0.3
			10	2	0.6	2	6.2	5	7.8	0	0.0	0	0.0	17	0.3
			20	1	0.3	2	5.9	4	7.2	0	0.0	0	0.0	14	0.3
			50	1	0.1	2	5.0	4	6.3	0	0.0	0	0.0	12	0.3
			100	1	0.0	2	1.2	4	3.3	0	0.0	0	0.0	6	0.2
			200	0	0.0	1	0.0	4	1.7	0	0.0	0	0.0	4	0.1

Table 165: Tranquillity Sites in Relation to N60, Night-Time, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison N60 (night)	5	1	1.0	0	0.7	1	0.9	0	0.0	0	0.0	2	0.0
			10	0	0.0	0	0.0	0	0.1	0	0.0	0	0.0	2	0.0
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.1
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 166: Tranquillity Sites in Relation to N60, Night-Time, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison N60 (night)	5	1	1.5	0	0.6	2	1.3	0	0.0	0	0.0	7	-0.1
			10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0
			20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 167: Tranquillity Sites in Relation to N60, Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	N60 (night)	5	3	1.5	2	6.2	6	9.1	0	0.0	0	0.0	20	0.7
			10	1	0.3	2	2.1	5	5.5	0	0.0	0	0.0	15	0.6
			20	1	0.1	2	1.9	5	4.3	0	0.0	0	0.0	10	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 168: Tranquillity Sites in Relation to N60, Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	N60 (night)	5	3	2.0	2	6.3	7	9.7	0	0.0	0	0.0	25	0.8
			10	2	0.4	2	2.4	5	6.1	0	0.0	0	0.0	17	0.6
			20	1	0.2	2	2.0	5	4.8	0	0.0	0	0.0	12	0.5
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0

Table 169: Tranquillity Sites in Relation to Overflight Daytime, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Overflights Day	5	5	11.3	7	5.8	15	8.4	0	0.0	1	0.3	102	2.3
			10	3	9.3	6	5.6	10	6.2	0	0.0	0	0.0	75	1.9
			20	2	1.7	2	4.7	7	5.7	0	0.0	0	0.0	59	1.3
			50	2	0.7	2	2.8	5	4.0	0	0.0	0	0.0	31	0.8
			100	1	0.0	2	0.6	3	1.3	0	0.0	0	0.0	22	0.7

Note that comparison tables for tranquillity sites in the daytime are in Section 4 of the FOA.

Table 170: Tranquillity Sites in Relation to Overflight Daytime, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Overflights Day	5	5	11.4	7	5.8	15	8.6	0	0.0	1	0.4	103	2.3
			10	3	9.6	6	5.6	11	6.4	0	0.0	0	0.0	78	1.9
			20	2	1.8	2	4.8	7	5.8	0	0.0	0	0.0	65	1.4
			50	2	1.1	2	4.4	6	5.3	0	0.0	0	0.0	38	1.0
			100	1	0.0	2	0.7	4	1.4	0	0.0	0	0.0	23	0.8
			200	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	3	0.3

Note that comparison tables for tranquillity sites in the daytime are in Section 4 of the FOA.

Table 171: Tranquillity Sites in Relation to Overflight Night-Time Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison Overflight Night	5	1	0.6	0	0.4	-3	-6.9	0	0.0	0	0.0	-11	-1.0
			10	2	0.9	1	0.1	3	1.1	0	0.0	0	0.0	19	0.4
			20	0	0.0	0	0.0	0	-0.1	0	0.0	0	0.0	0	0.1

Table 172: Tranquillity Sites in Relation to Overflight Night-Time, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison Overflight Night	5	1	0.7	0	-0.2	-7	-13.2	0	0.0	0	0.0	-23	-1.6
			10	2	1.2	1	0.1	4	1.7	0	0.0	0	0.0	22	0.4
			20	1	0.0	1	0.1	2	1.0	0	0.0	0	0.0	18	0.4

Table 173: Tranquillity Sites in Relation to Overflight Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Overflight Night	5	2	1.6	2	4.5	6	5.5	0	0.0	0	0.0	48	1.2
			10	2	0.9	2	0.8	5	1.7	0	0.0	0	0.0	26	0.8
			20	0	0.0	1	0.5	2	0.2	0	0.0	0	0.0	4	0.4

Table 174: Tranquillity Sites in Relation to Overflight Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Country Parks		CQA		Gardens and Designated Landscapes		National Parks		NSA		SAMs	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Overflight Night	5	2	1.7	2	4.6	7	5.6	0	0.0	0	0.0	48	1.2
			10	2	1.2	2	0.8	6	2.4	0	0.0	0	0.0	29	0.9
			20	1	0.0	2	0.6	4	1.4	0	0.0	0	0.0	23	0.8

5.6 Biodiversity Sites in relation to LAeq, Nx and Overflight contours for Option 3

15. Tables showing biodiversity sites in relation to LAeq, Nx and Overflight contours for Option 3 are provided below. Comparison tables for Overflights can be found in Section 4 of the FOA.

Table 175: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison LAeq16hr	51	0	-0.1	0	0.0	0	1.0	0	0.0	0	1.7	0	1.0
			54	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			57	-1	0.0	0	0.0	0	0.0	0	0.0	0	-0.1	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 176: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison LAeq16hr	51	-1	-0.1	0	0.0	0	1.0	0	0.0	0	3.8	2	1.0
			54	0	0.0	0	0.0	0	0.2	0	0.0	0	0.1	0	0.2
			57	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.2	0	-0.1
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 177: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	LAeq16hr	51	1	0.2	0	0.0	1	5.0	0	0.0	3	18.1	1	5.0
			54	1	0.1	0	0.0	1	1.9	0	0.0	3	5.0	1	1.9
			57	0	0.0	0	0.0	1	0.5	0	0.0	2	0.7	1	0.5
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 178: Biodiversity Sites in Relation to LAeq, 16 Hr, Day-Time, Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	LAeq16hr	51	1	0.3	0	0.0	1	5.3	0	0.0	3	25.2	3	5.3
			54	1	0.1	0	0.0	1	3.1	0	0.0	3	7.4	1	3.1
			57	1	0.0	0	0.0	1	0.6	0	0.0	2	1.2	1	0.6
			60	0	0.0	0	0.0	1	0.0	0	0.0	1	0.0	1	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			69	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 179: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	Comparison LAeq8hr	45	-1	-0.4	0	0.0	0	1.1	0	0.0	0	5.3	0	1.0
			48	0	-0.1	0	0.0	0	0.1	0	0.0	0	0.3	0	0.1
			51	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			54	0	0.0	0	0.0	0	0.0	0	0.0	0	-0.1	0	0.0
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 180: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	Comparison LAeq8hr	45	-1	-0.6	0	0.0	0	1.1	0	0.0	0	8.4	0	0.9
			48	0	0.0	0	0.0	0	0.7	0	0.0	0	1.0	0	0.7
			51	0	-0.1	0	0.0	0	-0.2	0	0.0	0	-0.1	0	-0.2
			54	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.1	0	-0.1
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 181: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	LAeq8hr	45	1	0.3	0	0.0	1	5.2	0	0.0	3	29.5	2	5.2
			48	1	0.1	0	0.0	1	2.9	0	0.0	3	9.8	1	2.9
			51	1	0.0	0	0.0	1	0.9	0	0.0	3	3.1	1	0.9
			54	0	0.0	0	0.0	1	0.4	0	0.0	2	0.4	1	0.4
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 182: Biodiversity Sites in Relation to LAeq, 8 Hr, Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (dB)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	LAeq8hr	45	1	0.4	0	0.0	1	5.5	0	0.0	3	38.4	3	5.5
			48	1	0.2	0	0.0	1	4.1	0	0.0	3	13.3	1	4.1
			51	1	0.0	0	0.0	1	1.0	0	0.0	3	4.4	1	1.0
			54	0	0.0	0	0.0	1	0.5	0	0.0	2	0.8	1	0.5
			57	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			60	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			63	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
			66	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 183: Biodiversity Sites in Relation to N65, Daytime, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	Comparison N65 (day)	5	0	-0.5	0	0.0	-2	0.0	0	0.0	-2	-3.4	-6	0.0
			10	0	-0.4	0	0.0	0	0.7	0	0.0	0	4.7	0	0.7
			20	0	-0.1	0	0.0	0	0.8	0	0.0	0	2.4	-1	0.5
			50	-1	0.0	0	0.0	0	0.8	0	0.0	0	2.5	1	0.8
			100	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.4	0	-0.1
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 184: Biodiversity Sites in Relation to N65, Daytime, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	Comparison N65 (day)	5	0	-0.5	0	0.0	-2	-0.2	0	0.0	-2	-3.4	-7	-0.1
			10	0	-0.4	0	0.0	-1	0.5	0	0.0	-1	2.3	-5	0.4
			20	0	-0.2	0	0.0	0	0.8	0	0.0	0	4.6	-1	0.4
			50	-1	-0.1	0	0.0	0	0.8	0	0.0	0	3.2	1	0.8
			100	0	0.0	0	0.0	0	-0.1	0	0.0	0	-0.3	0	-0.1
			200	0	0.0	0	0.0	-1	-0.3	0	0.0	-1	-0.3	-1	-0.3

Table 185: Biodiversity Sites in Relation to N65, Daytime, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	N65 (day)	5	2	0.5	0	0.0	1	6.1	0	0.0	3	53.0	5	6.5
			10	2	0.4	0	0.0	1	6.0	0	0.0	3	48.5	5	6.4
			20	2	0.4	0	0.0	1	5.6	0	0.0	3	33.9	3	5.7
			50	1	0.2	0	0.0	1	4.6	0	0.0	3	18.4	2	4.6
			100	1	0.1	0	0.0	1	1.1	0	0.0	3	6.9	1	1.1
			200	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 186: Biodiversity Sites in Relation to N65, Daytime, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	N65 (day)	5	2	0.6	0	0.0	1	6.1	0	0.0	3	57.2	5	6.6
			10	2	0.5	0	0.0	1	6.1	0	0.0	3	49.9	5	6.4
			20	2	0.4	0	0.0	1	5.8	0	0.0	3	39.8	3	5.8
			50	1	0.2	0	0.0	1	4.9	0	0.0	3	22.6	3	5.0
			100	1	0.1	0	0.0	1	1.2	0	0.0	3	7.8	1	1.2
			200	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 187: Biodiversity Sites in Relation to N60, Night-Time, Option 3 vs Baseline, Comparison Table for 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Comparison N60 (night)	5	0	-0.8	0	0.0	0	0.6	0	0.0	0	13.7	-3	0.4
			10	-1	-1.0	0	0.0	0	0.1	0	0.0	0	1.9	-1	-0.2
			20	-1	-0.2	0	0.0	0	0.0	0	0.0	0	0.6	0	0.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 188: Biodiversity Sites in Relation to N60, Night-Time, Option 3 vs Baseline, Comparison Table for 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Comparison N60 (night)	5	0	-0.7	0	0.0	1	1.2	0	0.0	1	18.8	-1	1.0
			10	0	-0.9	0	0.0	0	0.1	0	0.0	0	1.9	-1	-0.2
			20	-1	-0.6	0	0.0	0	0.1	0	0.0	0	1.2	-1	0.1
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 189: Biodiversity Sites in Relation to N60, Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	N60 (night)	5	2	1.0	0	0.0	1	6.0	0	0.0	3	68.8	5	6.2
			10	1	0.3	0	0.0	1	2.1	0	0.0	3	27.5	2	2.1
			20	1	0.2	0	0.0	1	1.9	0	0.0	3	21.5	1	1.9
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 190: Biodiversity Sites in Relation to N60, Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	N60 (night)	5	2	1.1	0	0.0	2	6.8	0	0.0	4	81.4	7	7.0
			10	2	0.7	0	0.0	1	2.4	0	0.0	3	29.2	2	2.4
			20	1	0.2	0	0.0	1	2.0	0	0.0	3	23.4	1	2.0
			50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 191: Biodiversity Sites in Relation to Overflight Daytime, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2027	Option 3	Overflights Day	5	3	2.0	0	0.0	7	8.5	3	15.0	11	234.1	34	35.4
			10	1	1.1	0	0.0	5	6.3	3	13.9	9	203.5	25	30.6
			20	1	0.3	0	0.0	4	5.3	3	10.6	6	149.0	15	22.5
			50	1	0.0	0	0.0	3	2.8	2	6.9	5	62.4	9	13.4
			100	0	0.0	0	0.0	2	0.6	0	0.0	4	33.1	2	0.6

Table 192: Biodiversity Sites in Relation to Overflight Daytime, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)	Total	Area (km²)
2036	Option 3	Overflights Day	5	3	2.0	0	0.0	7	8.7	3	15.2	11	239.7	35	35.9
			10	2	1.2	0	0.0	5	6.4	3	14.2	9	217.7	28	31.4
			20	1	0.6	0	0.0	5	5.5	3	11.1	9	172.3	22	25.6
			50	1	0.1	0	0.0	4	4.9	3	8.9	6	93.8	12	19.5
			100	0	0.0	0	0.0	3	0.7	1	0.0	5	37.1	4	0.7
			200	0	0.0	0	0.0	0	0.0	0	0.0	1	3.9	0	0.0

Table 193: Biodiversity Sites in Relation to Overflight Night-Time, Option 3, 2027

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2027	Option 3	Overflight Night	5	1	0.2	0	0.0	5	5.3	3	1.0	9	164.6	20	14.2
			10	0	0.0	0	0.0	3	0.8	1	0.1	5	43.1	4	0.9
			20	0	0.0	0	0.0	1	0.5	0	0.0	3	13.9	1	0.5

Table 194: Biodiversity Sites in Relation to Overflight Night-Time, Option 3, 2036

Year	Scenario	Metric	Contour (Flights per Day)	Local Nature Reserves		National Nature Reserves		RAMSAR		SAC		SPA		SSSI	
				Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)	Total	Area (km^2)
2036	Option 3	Overflight Night	5	1	0.2	0	0.0	5	5.5	3	1.1	9	174.4	21	14.9
			10	1	0.0	0	0.0	3	0.9	1	0.1	5	45.4	7	4.5
			20	0	0.0	0	0.0	3	0.7	0	0.0	5	36.1	3	0.7

6. Tranquillity Receptors for All Options

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Aberdour Castle	Y			Y
Aberdour Lodge, standing stone 110m SW of	Y	Y	Y	
Almondell, footbridge & aqueduct		Y	Y	Y
Ardross Castle		Y	Y	Y
Back Braes, enclosure	Y			
Balbougie, enclosed settlement 310m NNE of	Y	Y	Y	
Barrow, 55m E of 20 David Herkes Way, Gowkshill	Y			
Bathgate Castle	Y	Y	Y	Y
Beech Knowe, enclosure, Remote	Y			
Birsley Brae, medieval coal mine	Y			
Bizzyberry Hill, fort & Wallace's Well	Y			
Black Meldon, fort		Y	Y	Y
Black Meldon, settlement and scooped homestead 550m E of		Y	Y	Y
Blackness Castle		Y		Y
Blackness House, enclosure 50m SSE of		Y		Y
Blyth Hill, fort	Y			
Blyth, cairn 1050m NNW of	Y			
Braefoot Point, battery	Y	Y	Y	
Broomy Knowes, cairn S of		Y		Y
Brownsbank, enclosure 300m SE of Stirkfield Farm	Y			
Brunstane, moated site 50m NNE of	Y			
Brunstane, enclosure 250m E of	Y			
Burngrange, long cairn 800m N of	Y			
Burnshot, settlement & field system 443m NW of		Y		Y
Cairn and hill fort, White Meldon		Y	Y	Y

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Cairnpapple Hill, prehistoric ceremonial complex			Y	
Cairns Castle		Y	Y	Y
Calla Doone, hut-circle 500m ESE of	Y			
Calla, broch 650m S of	Y			
Camilty Hill, enclosure, Harburn		Y	Y	Y
Camilty Hill, Roman fortlet, Castle Greg		Y	Y	Y
Cammo Canal		Y	Y	Y
Cammo, standing stone		Y	Y	Y
Camp Wood, fort	Y	Y	Y	Y
Capielaw, enclosed settlement	Y			
Carnwath Golf Course, motte	Y			
Carriden House, Roman fort, annexe and settlement				Y
Carrington Barns, enclosure 500m SE of	Y			
Castle Hill, fort 550m WSW of Candybank	Y			
Castle Steads, pit alignment 150m NE of	Y			
Castlesteads Park, ring ditches	Y			
Castlethorn, fort and standing stones 500m ESE of Torphichen Mains			Y	
Catherine Lodge, Roman settlement & field system 205m NNW to 585m SE of	Y			
Catstane, inscribed stone and long cist cemetery 690m E of Carlowrie	Y	Y	Y	Y
Chalkieside Quarry, enclosure	Y	Y	Y	Y
Chalkieside, enclosure 400m SSW of	Y	Y	Y	Y
Chalkieside, enclosure 600m SW of	Y	Y	Y	Y
Chalkieside, enclosure 500m SW of	Y	Y	Y	Y
Charles Hill, Monks' Cave storehouse, military camp and battery	Y	Y	Y	
Choir of St Nicholas' Collegiate Church, Dalkeith	Y			
Cleugh House, bell pits and inclined plane 130m SSW of	Y			
Cockpen, old parish church	Y			
Corsehope Rings, fort	Y			
Corston Hill, cairn		Y	Y	Y
Cousland Castle, tower and house 75m ESE of Chapeldyke	Y	Y	Y	Y
Couthally Castle, Carnwath	Y			
Craigiehall, hut-circle 630m ESE of	Y			
Craigpark Quarry, enclosure 450m W of		Y	Y	Y
Cramond Island, First World War and Second World War defences	Y	Y	Y	Y
Cramond, Roman fort & civil settlement	Y	Y	Y	Y
Crichton Castle	Y			
Crichton Mains, souterrain 1280m E of	Y			
Crosswood, cairn 750m SE of		Y	Y	Y
Dalmahoy Hill, fort		Y	Y	Y
Dalmahoy, cross slab, St Mary's Church		Y	Y	Y
Dodridge Law, fort	Y			
Downing Point, battery and camp 100m S of 22 The Inches	Y			
Drum Maw, settlement 780m SE of		Y	Y	Y
Dunsyre Hill, cairn	Y			
Dunsyre Hill, field systems	Y			
Earlsferry, chapel		Y	Y	Y
Easter Cowden, enclosure 200m E of	Y	Y	Y	Y
Easter Cowden, enclosures	Y	Y	Y	Y
Easter Gormyre, refuge stone, 475m ENE of			Y	
Easter Norton, standing stone 280m WSW of		Y	Y	Y

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Easter Pitcorthie, standing stone, Standing Stone Walk, Dunfermline		Y	Y	
Easter Toftcombs, fort 820m NW of	Y			
Eastfield, enclosures and pit alignments, Old Craighall	Y			
Elginhaugh, Roman camp, native fort and palisaded enclosure 600m NE of	Y			
Elginhaugh, Roman fort, annexe and bathhouse 200m NE of	Y			
Elphinstone Tower, enclosure and ring ditch 600m W of	Y	Y	Y	Y
Elphinstone Tower, towerhouse	Y			
Enclosed settlement 210m NW of Hardengreen Roundabout	Y			
Enclosed settlement and pit alignment, 65m E of 53/54 The Crescent, Gowkshill	Y			
Enclosed settlement, 480m SE of Stonefieldhill Farm	Y			
Eskgrove, Roman civil settlement 40 m N of	Y			
Ewe Hill, barrows 750m NE of Biggarshiels Farm	Y			
Falla Luggie Tower, towerhouse	Y			
Five Sisters, shale bing SE of Mid Breich	Y	Y	Y	Y
Fordel Mains, fort 350m SW of	Y	Y	Y	Y
Frostineb, enclosure 600m E of	Y			
Fuffet Wood, enclosure and cropmarks 100m E of	Y	Y	Y	Y
Gala Braes, standing stone	Y		Y	
Gillespie Moat, motte, Parkmanse Garden	Y			
Glenkevock, enclosure 400m NW of	Y			
Gogar Mains, fort, palisaded enclosure and field system 850m SSE of		Y	Y	Y
Green Knowe, cairn NE of		Y	Y	Y
Green Knowe, platform settlement		Y	Y	Y
Greenaton Farm, enclosed settlement 250m WNW of	Y			

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Greendykes, enclosure 200m W of	Y			
Greens Moor, long cairn, cairns and field system NW of Kersewell Mains	Y			
Halltree Rings, settlement, Chapel Hill	Y			
Hardgatehead, Roman road and turnpike road 600m SW of		Y	Y	Y
Hare Law, cairn 730m SSE of Wester Yardhouses	Y			
Harehope Rings, fort, Harehope Hill		Y	Y	Y
Harehope, cairn 1510m ESE of		Y	Y	Y
Harehope, earthwork 550m NNE of		Y	Y	Y
Harehope, earthwork SW of		Y	Y	Y
Harehope, palisaded settlement 730m NNE of		Y	Y	Y
Haywood, deserted mining village	Y			
High House of Edmonston, tower house	Y			
Highwood House, enclosure 800m S of	Y			
Hilltop House, coal pit 250m NNW of			Y	
Hirendean Castle	Y			
Hodge Cairn, fort, Shank Wood	Y			
Home Farm, enclosure 300m ENE of	Y			
Hope, enclosure 300m SSE of	Y			
Huly Hill, cairn & stone circle SW of Newbridge roundabout	Y	Y	Y	Y
Hunter's Craig or Eagle Rock, rock carving, Dalmeny	Y	Y	Y	Y
Inchcolm, Abbey, hermit's cell, First World War and Second World War defences	Y	Y	Y	
Inchkeith Island and fortifications	Y	Y	Y	Y
Inchmickery, fortifications	Y	Y	Y	Y
Inveresk House, Roman civil settlement, Inveresk	Y			
Inveresk, Roman civil settlement W of Inveresk Gate	Y			

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Inveresk, Roman fort & civil settlement	Y			
Kaimes Hill, fort		Y	Y	Y
Kemback School, church 155m WNW of		Y	Y	Y
Kersewell Mains, cairn 450m NE of	Y			
Kersewell Mains, cairn 1400m E of	Y			
Kersewell Mains, cairn 1400m ENE of	Y			
Kiloran, settlement 25m NE of	Y			
Kinghorn, old parish church	Y			
Kirkton, old parish church 400m ESE of Kirkton Mains, Bathgate	Y	Y	Y	Y
Largo Parish Church, cross slab		Y	Y	Y
Lasswade old parish church	Y			
Lawfield Wood, fort	Y	Y	Y	Y
Lawfield, enclosure 500m E of	Y	Y	Y	Y
Linlithgow Palace, Peel and Royal Park				Y
Lochend Farm, standing stone 100m WNW of	Y	Y	Y	Y
Longfaugh Fort, Crichton	Y			
Longfaugh, enclosures 200m E of	Y			
Loquhariot, fort 500m SW of	Y	Y	Y	Y
Melville Grange, homestead and pit alignments 600m ESE of	Y			
Middlebank House, souterrain 370m ENE of	Y	Y	Y	
Midfield House, settlement 200m ENE of	Y			
Monktonhall Junction, Neolithic cursus 150m N of Whitecraig	Y			
Monktonhall Junction, Roman camps and prehistoric settlement	Y			
Moorfoot Chapel, monastic grange and chapel	Y			
Morton of Blebo, motte 350m S of		Y	Y	Y

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Mountmarle, cairn 260m SW of	Y			
Muirburn Castle, fort & scooped settlement	Y			
Murieston Castle		Y	Y	Y
Nether Brotherstone, fort, Heriot	Y			
Nether Stewarton, settlement 850m W of		Y	Y	Y
Newark Castle & dovecot		Y	Y	Y
Newbattle Abbey, abbey church, cloisters and associated buildings	Y			
Newbigging market cross	Y			
Newbigging, enclosure 400m NE of	Y			
Newbigging, enclosure 400m WNW of	Y			
Newbyres Castle	Y	Y	Y	Y
Newlands Church and graveyard, 50m SW of Newlands House		Y	Y	Y
Newmill, enclosures SW of	Y			
Newparks, lime kilns 120m NNE of			Y	
Newton Church, church, enclosures and field system	Y			
Newton, pit alignment 150m E of	Y			
Newton, pit alignment 150m NE of	Y			
Newton, pit alignment 500m E of	Y			
Newton, pit alignment 600m SE of	Y			
Niddrie, standing stone 65m SSE of 160 Greendykes Road	Y			
North Muir, cairns		Y	Y	Y
North Muir, Upper Cairn		Y	Y	Y
North Wood, Dunfermline, cairn 140m NNW of crematorium		Y	Y	
Old Harestanes, stone circle 180m NE of	Y			
Old West Calder Church, West Calder	Y	Y	Y	Y

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Old Woodhouselee Castle	Y			
Ormiston Hall, St Giles Kirk	Y			
Ormiston, market cross	Y			
Oxenfoord Mains, enclosure 400m NE of	Y			
Pardivan, enclosure 200m W of	Y			
Pathhead, Roman camps, enclosures and pit alignment	Y			
Peace Knowe, fort		Y		Y
Pinkiehill, field system 300m S of	Y			
Pitcruvie Castle		Y	Y	Y
Play Hill, settlement	Y			
Prehistoric settlement and enclosure, 65m ENE of 21 Colliehill Road, Biggar	Y			
Preston Mains, enclosure	Y			
Preston Toll, fort	Y			
Preston Tower and Dovecot	Y			
Preston, market cross	Y			
Queen Mary's Mount, fort	Y	Y	Y	Y
Raven Craig, cairn			Y	
Rectilinear enclosure 80m SW of Kilronan	Y			
Ring enclosures 550m and 595m WNW of Kilrubie Hill		Y	Y	Y
Romanno Mains, barrow 910m SE of		Y	Y	Y
Romanno Mains, two barrows 550m SE of		Y	Y	Y
Rosslyn Castle, Roslin	Y			
Rosslyn Chapel, burial ground, buried remains of nave and remains of St Matthew's Church, Roslin	Y			
Rosyth Castle	Y			
Rosyth Castle Dovecot	Y			

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Saughland, enclosure 1000m ESE of	Y			
Saughland, enclosure 150m W of	Y			
Scooped settlement, 780m ESE of the summit of Carcant Hill	Y			
Seafield Tower	Y			
Seton Collegiate Church	Y			
Seton Mains, enclosure and ring ditch, 300m NE of	Y			
Seton Mains, fort	Y			
Seton West Mains, enclosures 500m SW of	Y			
Shaw Hill, cairn	Y			
Sir Andrew Wood's Tower, Largo House		Y	Y	Y
Skirling Mains, enclosure 320m WSW of	Y			
Slipperfield Mount, cairn S of		Y	Y	Y
Smeaton Bridge, pit alignment 100m NW of	Y			
South Elphinstone, settlement, chapel and graveyard 370m WSW of	Y			
South Hill Head, homestead		Y	Y	Y
South Hill Head, settlement WNW of		Y	Y	Y
South Lodge, enclosure 200m SE of	Y	Y	Y	Y
South Mains, homestead moat 200m N of				Y
South Slipperfield, barrows 1850m SSW and 1620m S of		Y	Y	Y
St Bridget's Kirk	Y	Y	Y	
St Mary's Chapel, chapel 250m ENE of Mount Lothian	Y			
St Monans windmill and saltpans, 350m E of 45 Miller Terrace		Y	Y	Y
Stacks, enclosure 250m ESE of		Y		Y
Stacks, enclosure 250m WSW of		Y		Y
Stacks, enclosure 300m N of		Y		Y

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Tashieburn, horse engine platform 50m NE of	Y			
Temple, Old Parish Church	Y			
Templehall, enclosure 700m SW of	Y			
Templehall, enclosures 500m NNW of	Y			
Terrace Wood, cultivation terraces		Y	Y	Y
Tormain Hill, cup & ring marked rocks 700m NE of Bonnington Mains		Y	Y	Y
Torphichen Bridge, mill, lade & trackway 200m NE of			Y	
Torphichen Preceptory			Y	
Torphichen Preceptory, refuge stone at Torphichen Kirk			Y	
Tranent Tower	Y			
Turniedykes, enclosure 150m NW of	Y			
Union Canal, Fountainbridge to River Almond		Y	Y	Y
Union Canal, River Almond to River Avon	Y	Y	Y	Y
Union Canal, River Avon to Greenbank			Y	
Upper Kidston, fort & settlement NNW of		Y	Y	Y
Wallace's Cave, cave and rock carvings	Y			
Walton, enclosure 650m NE of		Y		Y
Waulkmill, cairn 310m SE of	Y			
West Harwood, burial mound 720m SSE of		Y	Y	Y
West Mains, fort	Y	Y	Y	Y
Wester Pencaitland, fort and enclosure	Y			
Wester Yardhouses, cairn 630m S of	Y			
Wester Yardhouses, hut-circle 470m SSE of	Y			
Wester Yardhouses, hut-circles and cairns 270m SSW of	Y			
Wester Yardhouses, souterrain 180m WNW of	Y			
Westpans, potteries	Y	Y	Y	Y

Table 195: Scheduled Monuments Overflown 2027

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
White Meldon, enclosures W of		Y	Y	Y
White Meldon, platform settlement 640m NW of		Y	Y	Y
White Meldon, platform settlement 730m NNW of		Y	Y	Y
Whitebog Farm, enclosure 450m SE of	Y			
Whiteside Hill, fort & enclosure		Y	Y	Y
Whitewellbrae Wood, henge 60m E of NE corner	Y			
Wilsontown Ironworks	Y			
Windygates, hut-circle 385m NNW of	Y			
Windywa's Silvermine, silvermine 300m SW of Wester Tartraven			Y	
Wolfstar, enclosure	Y			
Woodmuir Farm, coke ovens and reservoir 600m SSE of	Y	Y	Y	Y

Table 196: Candidate Quiet Areas Overflown 2027

Candidate Quiet Areas	Without Airspace Change	Option 1	Option 2	Option 3
Firth of Forth	Y	Y	Y	Y
Firth of Forth	Y	Y	Y	Y
Ancient Woodland at Addiston Lodge		Y	Y	Y
Ancient Woodland at Ratho Park Golf Club		Y	Y	Y
Muir o'Dean		Y	Y	Y
Crow Wood		Y	Y	Y
Ancient Woodland at Cammo House		Y	Y	Y

Table 197: Gardens and Designated Overflown Landscapes 2027

Gardens and Designated Landscape Areas	Without Airspace Change	Option 1	Option 2	Option 3
Aberdour Castle	Y			Y
Arniston	Y	Y	Y	Y
Balcaskie		Y	Y	Y
Cammo		Y	Y	Y
Carberry Tower	Y	Y	Y	Y
Cockenzie House	Y			
Craigiehall	Y	Y	Y	Y
Dalkeith House (Palace)	Y			
Dalmeny	Y	Y	Y	Y
Fordell Castle	Y	Y	Y	
Harburn House		Y	Y	Y
Hatton House		Y	Y	Y
House of The Binns		Y		Y
Lahill		Y	Y	Y
Little Sparta (Stonypath)	Y			
Mavisbank	Y			
Melville Castle	Y			
Millburn Tower		Y	Y	Y
Newbattle Abbey	Y			
Newhailes	Y			
Newliston	Y	Y	Y	Y
Oxenfoord Castle	Y	Y	Y	Y
Pinkie House	Y			
Portmore	Y			
Prestonhall	Y			
Roslin Glen And Hawthornden Castle	Y			

Table 197: Gardens and Designated Overflown Landscapes 2027

Gardens and Designated Landscape Areas	Without Airspace Change	Option 1	Option 2	Option 3
Seton House (Palace)	Y			
St Colme	Y	Y	Y	
The Drum	Y			
The Murrel	Y			Y
Winton Castle	Y			

Table 198: Country Parks Overflown 2027

Country Parks	Without Airspace Change	Option 1	Option 2	Option 3
Almondell and Calderwood		Y	Y	Y
Almondell and Calderwood		Y	Y	Y
Beecraigs		Y		Y
Muiravonside			Y	
Polkemmet	Y			
Roslin Glen	Y			
Roslin Glen	Y			
Roslin Glen	Y			
Vogrie	Y	Y	Y	Y

Table 199: Regional Parks Overflown 2027

Regional Parks	Without Airspace Change	Option 1	Option 2	Option 3
Pentland Hills		Y	Y	Y

Table 200: National Scenic Areas Overflown 2027

National Scenic Areas	Without Airspace Change	Option 1	Option 2	Option 3
Upper Tweeddale		Y	Y	Y

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Aberdour Castle	Y			Y
Aberdour Lodge, standing stone 110m SW of	Y	Y	Y	
Almondell, footbridge & aqueduct		Y	Y	Y
Ardross Castle		Y	Y	Y
Back Braes, enclosure	Y			
Balbougie, enclosed settlement 310m NNE of	Y	Y	Y	
Barrow, 55m E of 20 David Herkes Way, Gowkshill	Y			
Bathgate Castle	Y	Y	Y	Y
Beech Knowe, enclosure, Remote	Y			
Birsley Brae, medieval coal mine	Y			
Bizzyberry Hill, fort & Wallace's Well	Y			
Black Meldon, fort		Y	Y	Y
Black Meldon, settlement and scooped homestead 550m E of		Y	Y	Y
Blackness Castle		Y		Y
Blackness House, enclosure 50m SSE of		Y		Y
Blyth Hill, fort	Y			
Blyth, cairn 1050m NNW of	Y			
Boghall Castle, Biggar	Y			
Boghall, earthwork 460m S of	Y			
Bordland Rings, fort, Bordlands Hill	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Bowden Hill, fort, Linlithgow			Y	
Braefoot Point, battery	Y	Y	Y	
Brewshott, limestone quarry	Y			
Broomy Knowes, cairn S of		Y		Y
Broughton Knowe, ring enclosures	Y			
Broughtonknowe, ring enclosures & barrow 420m NE of	Y			
Broughtonknowe, three barrows 230m SE of	Y			
Brownsbank, enclosure 300m SE of Stirkfield Farm	Y			
Brunstane, moated site 50m NNE of	Y			
Brunstane, enclosure 250m E of	Y			
Bryland, fort 640m SE of	Y			
Burngrange, long cairn 800m N of	Y			
Burnshot, settlement & field system 443m NW of		Y		Y
Cairn and hill fort, White Meldon		Y	Y	Y
Cairnpapple Hill, prehistoric ceremonial complex			Y	
Cairns Castle		Y	Y	Y
Calla Doone, hut-circle 500m ESE of	Y			
Calla, broch 650m S of	Y			
Camilty Hill, enclosure, Harburn		Y	Y	Y
Camilty Hill, Roman fortlet, Castle Greg		Y	Y	Y
Cammo Canal		Y	Y	Y
Cammo, standing stone		Y	Y	Y
Camp Wood, fort	Y	Y	Y	Y
Capielaw, enclosed settlement	Y			
Carnwath Golf Course, motte	Y			
Carriden House, Roman fort, annexe and settlement				Y

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Carrington Barns, enclosure 500m SE of	Y			
Castle Hill, fort 550m WSW of Candybank	Y			
Castle Steads, pit alignment 150m NE of	Y			
Castlesteads Park, ring ditches	Y			
Castlethorn, fort and standing stones 500m ESE of Torphichen Mains			Y	
Catherine Lodge, Roman settlement & field system 205m NNW to 585m SE of	Y			
Catstane, inscribed stone and long cist cemetery 690m E of Carlowrie	Y	Y	Y	Y
Chalkieside Quarry, enclosure	Y	Y	Y	Y
Chalkieside, enclosure 400m SSW of	Y	Y	Y	Y
Chalkieside, enclosure 600m SW of	Y	Y	Y	Y
Chalkieside, enclosure 500m SW of	Y	Y	Y	Y
Charles Hill, Monks' Cave storehouse, military camp and battery	Y	Y	Y	
Choir of St Nicholas' Collegiate Church, Dalkeith	Y			
Cleugh House, bell pits and inclined plane 130m SSW of	Y			
Cockpen, old parish church	Y			
Cornhill, Roman camp N of	Y			
Corsehope Rings, fort	Y			
Corston Hill, cairn		Y	Y	Y
Cortleferry, scooped settlement 400m NW of	Y			
Costerton, fort 800m E of	Y			
Coulter Motte, motte, Wolfclyde	Y			
Cousland Castle, tower and house 75m ESE of Chapeldyke	Y	Y	Y	Y
Couthally Castle, Carnwath	Y			
Craigiehall, hut-circle 630m ESE of	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Craigpark Quarry, enclosure 450m W of		Y	Y	Y
Cramond Island, First World War and Second World War defences	Y	Y	Y	Y
Cramond, Roman fort & civil settlement	Y	Y	Y	Y
Crichton Castle	Y			
Crichton Mains, souterrain 1280m E of	Y			
Crosswood, cairn 750m SE of		Y	Y	Y
Dalmahoy Hill, fort		Y	Y	Y
Dalmahoy, cross slab, St Mary's Church		Y	Y	Y
Dodridge Law, fort	Y			
Downing Point, battery and camp 100m S of 22 The Inches	Y			
Drum Maw,settlement 780m SE of		Y	Y	Y
Dunearn, fort				Y
Dunsyre Hill, cairn	Y			
Dunsyre Hill, field systems	Y			
Earlsferry, chapel		Y	Y	Y
Easter Cowden, enclosure 200m E of	Y	Y	Y	Y
Easter Cowden, enclosures	Y	Y	Y	Y
Easter Gormyre, refuge stone, 475m ENE of			Y	
Easter Norton, standing stone 280m WSW of		Y	Y	Y
Easter Pitcorthie, standing stone, Standing Stone Walk, Dunfermline		Y	Y	
Easter Toftcombs, fort 820m NW of	Y			
Eastfield, enclosures and pit alignments, Old Craighall	Y			
Elginhaugh, Roman camp, native fort and palisaded enclosure 600m NE of	Y			
Elginhaugh, Roman fort, annexe and bathhouse 200m NE of	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Elphinstone Tower, enclosure and ring ditch 600m W of	Y	Y	Y	Y
Elphinstone Tower, towerhouse	Y			
Enclosed settlement 210m NW of Hardengreen Roundabout	Y			
Enclosed settlement and pit alignment, 65m E of 53/54 The Crescent, Gowkshill	Y			
Enclosed settlement, 480m SE of Stonefieldhill Farm	Y			
Eskgrove, Roman civil settlement 40 m N of	Y			
Ewe Hill, barrows 750m NE of Biggarshiels Farm	Y			
Falla Luggie Tower, towerhouse	Y			
Five Sisters, shale bing SE of Mid Breich	Y	Y	Y	Y
Fordel Mains, fort 350m SW of	Y	Y	Y	Y
Frostineb, enclosure 600m E of	Y			
Fuffet Wood, enclosure and cropmarks 100m E of	Y	Y	Y	Y
Gala Braes, standing stone	Y		Y	
Gillespie Moat, motte, Parkmanse Garden	Y			
Glenkevock, enclosure 400m NW of	Y			
Gogar Mains, fort, palisaded enclosure and field system 850m SSE of		Y	Y	Y
Green Knowe, cairn NE of		Y	Y	Y
Green Knowe, platform settlement		Y	Y	Y
Greenaton Farm, enclosed settlement 250m WNW of	Y			
Greendykes, enclosure 310m SSE of	Y			
Greendykes, enclosure 200m W of	Y			
Greens Moor, long cairn, cairns and field system NW of Kersewell Mains	Y			
Halltree Rings, settlement, Chapel Hill	Y			
Hardgatehead, Roman road and turnpike road 600m SW of	Y	Y	Y	Y

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Hare Law, cairn 730m SSE of Wester Yardhouses	Y			
Harehope Rings, fort, Harehope Hill		Y	Y	Y
Harehope, cairn 1510m ESE of		Y	Y	Y
Harehope, earthwork 550m NNE of		Y	Y	Y
Harehope, earthwork SW of		Y	Y	Y
Harehope, palisaded settlement 730m NNE of		Y	Y	Y
Haywood, deserted mining village	Y			
Heavyside, two enclosures 1000m E of	Y			
Henderland Hill, fort	Y			
High House of Edmonston, tower house	Y			
Highwood House, enclosure 800m S of	Y			
Hillhead, earthwork 1220m NNW of	Y			
Hillhead, earthwork 930m N of homestead moat	Y			
Hilltop House, coal pit 250m NNW of			Y	
Hirendean Castle	Y			
Hodge Cairn, fort, Shank Wood	Y			
Home Farm, enclosure 300m ENE of	Y			
Hope, enclosure 300m SSE of	Y			
Huly Hill, cairn & stone circle SW of Newbridge roundabout	Y	Y	Y	Y
Hunter's Craig or Eagle Rock, rock carving, Dalmeny	Y	Y	Y	Y
Inchcolm, Abbey, hermit's cell, First World War and Second World War defences	Y	Y	Y	
Inchkeith Island and fortifications	Y	Y	Y	Y
Inchmickery, fortifications	Y	Y	Y	Y
Inveresk House, Roman civil settlement, Inveresk	Y			
Inveresk, Roman civil settlement W of Inveresk Gate	Y			
Inveresk, Roman fort & civil settlement	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Jeffries Corse, cairn	Y			
Kaimes Hill, fort		Y	Y	Y
Kemback School, church 155m WNW of		Y	Y	Y
Kersewell Mains, cairn 450m NE of	Y			
Kersewell Mains, cairn 1400m E of	Y			
Kersewell Mains, cairn 1400m ENE of	Y			
Kiloran, settlement 25m NE of	Y			
Kinghorn, old parish church	Y			
Kirkton, old parish church 400m ESE of Kirkton Mains, Bathgate	Y	Y	Y	Y
Kirkurd, church SE of Castlecraig	Y			
Langlaw Hill, fort, enclosure & barrows	Y			
Largo Parish Church, cross slab		Y	Y	Y
Lasswade old parish church	Y			
Lawfield Wood, fort	Y	Y	Y	Y
Lawfield, enclosure 500m E of	Y	Y	Y	Y
Linlithgow Palace, Peel and Royal Park				Y
Lochend Farm, standing stone 100m WNW of	Y	Y	Y	Y
Lochurd Farm, ring enclosures & mound 1550m S of	Y			
Longfaugh Fort, Crichton	Y			
Longfaugh, enclosures 200m E of	Y			
Loquhariot, fort 500m SW of	Y	Y	Y	Y
Melville Grange, homestead and pit alignments 600m ESE of	Y			
Middlebank House, souterrain 370m ENE of	Y	Y	Y	
Middlehill, fort	Y			
Midfield House, settlement 200m ENE of	Y			
Monktonhall Junction, Neolithic cursus 150m N of Whitecraig	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Monktonhall Junction, Roman camps and prehistoric settlement	Y			
Moorfoot Chapel, monastic grange and chapel	Y			
Morton of Blebo, motte 350m S of		Y	Y	Y
Mountmarle, cairn 260m SW of	Y			
Muirburn Castle, fort & scooped settlement	Y			
Murieston Castle		Y	Y	Y
Nether Brotherstone, fort, Heriot	Y			
Nether Stewarton, settlement 850m W of		Y	Y	Y
Newark Castle & dovecot		Y	Y	Y
Newbattle Abbey, abbey church, cloisters and associated buildings	Y			
Newbigging market cross	Y			
Newbigging, enclosure 400m NE of	Y			
Newbigging, enclosure 400m WNW of	Y			
Newbyres Castle	Y	Y	Y	Y
Newlands Church and graveyard, 50m SW of Newlands House	Y	Y	Y	Y
Newmill, enclosures SW of	Y			
Newparks, lime kilns 120m NNE of			Y	
Newton Church, church, enclosures and field system	Y			
Newton, pit alignment 150m E of	Y			
Newton, pit alignment 150m NE of	Y			
Newton, pit alignment 500m E of	Y			
Newton, pit alignment 600m SE of	Y			
Niddrie, standing stone 65m SSE of 160 Greendykes Road	Y			
North Muir, cairns	Y	Y	Y	Y

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
North Muir, Nether Cairn	Y			
North Muir, Upper Cairn		Y	Y	Y
North Queensferry, St James' Chapel	Y			
North Wood, Dunfermline, cairn 140m NNW of crematorium		Y	Y	
Old Harestanes, stone circle 180m NE of	Y			
Old West Calder Church, West Calder	Y	Y	Y	Y
Old Woodhouselee Castle	Y			
Ormiston Hall, St Giles Kirk	Y			
Ormiston, market cross	Y			
Oxenfoord Mains, enclosure 400m NE of	Y			
Pardivan, enclosure 200m W of	Y			
Pathhead, Roman camps, enclosures and pit alignment	Y			
Peace Knowe, fort		Y		Y
Pinkiehill, field system 300m S of	Y			
Pitcruvie Castle		Y	Y	Y
Piteadie Castle	Y			
Play Hill, settlement	Y			
Portobello, Harbour Road, pottery kilns	Y			
Prehistoric settlement and enclosure, 65m ENE of 21 Colliehill Road, Biggar	Y			
Preston Mains, enclosure	Y			
Preston Toll, fort	Y			
Preston Tower and Dovecot	Y			
Preston, market cross	Y			
Queen Mary's Mount, fort	Y	Y	Y	Y
Raven Craig, cairn			Y	
Rectilinear enclosure 80m SW of Kilronan	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Ring enclosures 550m and 595m WNW of Kilrubie Hill		Y	Y	Y
Romanno Mains, barrow 910m SE of		Y	Y	Y
Romanno Mains, two barrows 550m SE of		Y	Y	Y
Rosslyn Castle, Roslin	Y			
Rosslyn Chapel, burial ground, buried remains of nave and remains of St Matthew's Church, Roslin	Y			
Rosyth Castle	Y			
Rosyth Castle Dovecot	Y			
Saughland, enclosure 1000m ESE of	Y			
Saughland, enclosure 150m W of	Y			
Scooped settlement, 780m ESE of the summit of Carcant Hill	Y			
Seafield Tower	Y			
Seton Collegiate Church	Y			
Seton Mains, enclosure and ring ditch, 300m NE of	Y			
Seton Mains, fort	Y			
Seton West Mains, enclosures 500m SW of	Y			
Shaw Hill, cairn	Y			
Sir Andrew Wood's Tower, Largo House		Y	Y	Y
Skirling Mains, enclosure 320m WSW of	Y			
Slipperfield Mount, cairn S of		Y	Y	Y
Smeaton Bridge, pit alignment 100m NW of	Y			
South Elphinstone, settlement, chapel and graveyard 370m WSW of	Y			
South Hill Head, homestead		Y	Y	Y
South Hill Head, settlement WNW of		Y	Y	Y
South Lodge, enclosure 200m SE of	Y	Y	Y	Y
South Mains, homestead moat 200m N of				Y

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
South Slipperfield, barrows 1850m SSW and 1620m S of	Y	Y	Y	Y
Southfield, ring ditch 350m SW of	Y			
St Bridget's Kirk	Y	Y	Y	
St Mary's Chapel,chapel 250m ENE of Mount Lothian	Y			
St Monans windmill and saltpans, 350m E of 45 Miller Terrace		Y	Y	Y
Stacks, enclosure 250m ESE of		Y		Y
Stacks, enclosure 250m WSW of		Y		Y
Stacks, enclosure 300m N of		Y		Y
Stirkfield Rig, ring enclosures	Y			
Stirkfield, barrow and enclosed cremation cemetery 1120m ESE of	Y			
Stirkfield, settlements and cultivation remains 1300m ESE of	Y			
Tashieburn, horse engine platform 50m NE of	Y			
Temple, Old Parish Church	Y			
Templehall, enclosure 700m SW of	Y			
Templehall, enclosures 500m NNW of	Y			
Terrace Wood, cultivation terraces	Y	Y	Y	Y
Tormain Hill, cup & ring marked rocks 700m NE of Bonnington Mains		Y	Y	Y
Torphichen Bridge, mill, lade & trackway 200m NE of			Y	
Torphichen Preceptory			Y	
Torphichen Preceptory, refuge stone at Torphichen Kirk			Y	
Tranent Tower	Y			
Turniedykes, enclosure 150m NW of	Y			
Union Canal, Fountainbridge to River Almond		Y	Y	Y
Union Canal, River Almond to River Avon	Y	Y	Y	Y

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Union Canal, River Avon to Greenbank			Y	
Upper Kidston, fort & settlement NNW of		Y	Y	Y
Uttershill Castle	Y			
Wallace's Cave, cave and rock carvings	Y			
Walton, enclosure 650m NE of		Y		Y
Waulkmill, cairn 310m SE of	Y			
West Harwood, burial mound 720m SSE of	Y	Y	Y	Y
West Mains, enclosure 200m NE of	Y			
West Mains, fort	Y	Y	Y	Y
Wester Pencaitland, fort and enclosure	Y			
Wester Yardhouses, cairn 630m S of	Y			
Wester Yardhouses, hut-circle 470m SSE of	Y			
Wester Yardhouses, hut-circles and cairns 270m SSW of	Y			
Wester Yardhouses, souterrain 180m WNW of	Y			
Westpans, potteries	Y	Y	Y	Y
White Meldon, enclosures W of		Y	Y	Y
White Meldon, platform settlement 640m NW of		Y	Y	Y
White Meldon, platform settlement 730m NNW of		Y	Y	Y
Whitebog Farm, enclosure 450m SE of	Y			
Whiteside Hill, fort & enclosure		Y	Y	Y
Whitewellbrae Wood, henge 60m E of NE corner	Y			
Wilsontown Ironworks	Y			
Windy Mains, enclosures 600m SE of	Y			
Windygates, hut-circle 385m NNW of	Y			
Windywa's Silvermine, silvermine 300m SW of Wester Tartraven			Y	
Winton Hill, enclosure	Y			

Table 201: Scheduled Monuments Overflown 2036

Scheduled Monuments	Without Airspace Change	Option 1	Option 2	Option 3
Wolfstar, enclosure	Y			
Woodmuir Farm, coke ovens and reservoir 600m SSE of	Y	Y	Y	Y

Table 202: Candidate Quiet Areas Overflown 2036

Candidate Quiet Areas	Without Airspace Change	Option 1	Option 2	Option 3
Firth of Forth	Y	Y	Y	Y
Firth of Forth	Y	Y	Y	Y
Ancient Woodland at Addiston Lodge		Y	Y	Y
Ancient Woodland at Ratho Park Golf Club		Y	Y	Y
Muir o'Dean		Y	Y	Y
Crow Wood		Y	Y	Y
Ancient Woodland at Cammo House		Y	Y	Y

Table 203: Gardens and Designated Landscapes Overflown 2036

Gardens and Designated Landscape Areas	Without Airspace Change	Option 1	Option 2	Option 3
Aberdour Castle	Y			Y
Arniston	Y	Y	Y	Y
Balcaskie		Y	Y	Y
Cammo		Y	Y	Y
Carberry Tower	Y	Y	Y	Y
Cockenzie House	Y			
Craigiehall	Y	Y	Y	Y

Table 203: Gardens and Designated Landscapes Overflown 2036

Gardens and Designated Landscape Areas	Without Airspace Change	Option 1	Option 2	Option 3
Dalkeith House (Palace)	Y			
Dalmeny	Y	Y	Y	Y
Fordell Castle	Y	Y	Y	
Harburn House	Y	Y	Y	Y
Hatton House		Y	Y	Y
House of The Binns		Y		Y
Lahill		Y	Y	Y
Little Sparta (Stonypath)	Y			
Mavisbank	Y			
Melville Castle	Y			
Millburn Tower		Y	Y	Y
Newbattle Abbey	Y			
Newhailes	Y			
Newliston	Y	Y	Y	Y
Oxenfoord Castle	Y	Y	Y	Y
Penicuik	Y			
Pinkie House	Y			
Portmore	Y			
Prestonhall	Y			
Raith Park And Beveridge Park	Y			
Roslin Glen And Hawthornden Castle	Y			
Seton House (Palace)	Y			
St Colme	Y	Y	Y	
The Drum	Y			
The Murrel	Y			Y
Winton Castle	Y			

Table 204: Country Parks Overflown 2036

Country Parks	Without Airspace Change	Option 1	Option 2	Option 3
Almondell and Calderwood		Y	Y	Y
Almondell and Calderwood		Y	Y	Y
Beecraigs		Y		Y
Muiravonside			Y	
Polkemmet	Y			
Roslin Glen	Y			
Roslin Glen	Y			
Roslin Glen	Y			
Vogrie	Y	Y	Y	Y

Table 205: Regional Parks Overflown 2036

Regional Parks	Without Airspace Change	Option 1	Option 2	Option 3
Pentland Hills		Y	Y	Y

Table 206: National Scenic Areas Overflown 2036

National Scenic Areas	Without Airspace Change	Option 1	Option 2	Option 3
Upper Tweeddale		Y	Y	Y

7. Table of figures with links

8. Table of tables with links

Annex M: Review of Fife coastal areas beyond GoldSET data

The development in the design prior to FOA led to changes in the design for the PBN approach transitions that took them beyond the extent of the GoldSET data collection area that was established at the start of the design process. This is shown in the Figure below which shows how the PBN approach transition from the north and east goes over part of the fife coastal areas beyond the GoldSET data collection area (indicated by the coloured area of the map).

This data was missed because at that time it was not expected that any routes would extend over this area.

The subsequent design of the holds from the north and east (discussed in Section 2.1.2.2) identified hold positions that would ensure that the approach transitions could be positioned mostly over water when below 7,000ft, but as a result they pass over part of the Fife coast beyond the GoldSET data.

A manual review of potentially effected sites was therefore undertaken and fed into the design team to be considered alongside the GoldSET data.

In the above diagram the pink line denotes the runway 24 STOBS approach transition and the blue line the WORM2 approach transition. The yellow spots are where we estimate aircraft will typically pass through 7,000ft.

This review concluded that the runway 24 STOBS approach transition passes over the following 3 sites that would have been collected in the GoldSET data if it had extended that far:

1. The Standing Stones of Lundin
2. Dumbarnie Nature Reserve
3. Largo House

The runway 24 WORM2 approach transition passes over:

1. Ladies Tower
2. part of The Fife Coastal Path

The arrival routes for runway 06 also pass over these areas but the aircraft would be above 7,000ft when passing over the Fife coast.

On review we determined that absence of this data from the overall dataset would not have a significant affect the outcome of the pre-FOA design process and review because:

- runway 24 STOBS transitions would be used by 1% of traffic and WORM2 5%
- the overflight would be between 6,000ft and 7,000ft

This means that the inclusion of the additional sites would have little impact on the pre-FOA GoldSET analysis outcomes, and therefore we were confident that their inclusion would not change the design of transitions which overflies the water as much as is feasible.

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