

CAA CAP 1616 Options Appraisal Assessment (Phase II Full)

Title of Airspace Change Proposal:	Edinburgh Airport FASl		
Change Sponsor:	Edinburgh Airport Ltd		
ACP Project Ref Number:	ACP-2019-32		
Case study commencement date:	27/06/2025	Case study report as at:	18/08/2025

Instructions

To aid the SARG project leader's efficient project management, please highlight the "status" cell for each question using one of the four colours to illustrate if it is:

Resolved - GREEN

Not Resolved – AMBER

Not Compliant – RED

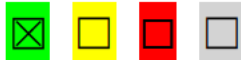
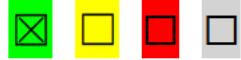
Not Applicable - GREY

Guidance



The broad principle of economic impact analysis is **proportionality**; is the level of analysis involved proportionate to the likely impact from that ACP. There are three broad levels of economic analysis; qualitative discussion, quantified through metrics, and monetised in £ terms. The more significant the impact, the greater should be the effort by sponsors to quantify and monetise the impact.

1. Background			Status
1.1	Has the change sponsor developed the initial options appraisal into a full options appraisal? [CAP1616f: 4.12-4.15]	<p>The sponsor has followed an iterative process building up from the evidence gathered from engagement and data prior to consultation. The purpose of the appraisal was to refine the design options from stage 2 with a more rigorous approach by addressing the evidence gaps.</p> <p>The appraisal in this ACP has produced a more rigorous baseline scenario and monetised the key impacts of changes to departures and arrivals to that approach in three alternative options.</p> <p>The sponsor in this document has specifically also addressed the concerns of the Economist raised in feedback from previous attempts about being much more transparent about the</p>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

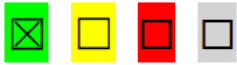
		<p>evolution of the routes. In particular, explaining the routes will transition from ATC determined vectoring to following set approaches/departures via performance based navigation from/to holding stacks or waypoints.</p> <p>Section 2 of this appraisal set out the thinking behind the development of routes from swathes presented in the earlier gateway. There were broadly four steps taken to help reduce the complexity. Individual routes were identified based upon considerations around (a) route length (b) instrument flight procedures (c) spatial analysis of population data (GoldSET) (d) airspace usage by neighbouring airports and the wider network.</p> <p>16 full airport system scenarios were then built from combining different arrival/departure route options for both runways. The options were broadly grouped into scenarios which maintained a three route structure going northbound via GRICE, westbound via GOSAM and southbound via TALLA, and a group of options which added another departure route.</p> <p>The final options for section 3 of the appraisal were then parsed through visual comparison with baseline noise contours, route length, overflight and GoldSET suitability scores. For example, as part of the iteration, the do minimal route option was explored and ruled out to ensure alignment with the airspace modernisation strategy, better integration with the airspace network and prioritising safety and efficiency through only using vectoring when necessary as well as reduce noise over populated areas.</p> <p>Three full airport system options were taken forward to the Full Options Appraisal (FOA) stage of the Edinburgh Airport Airspace Change Programme. These were Scenario 1B and 1C(option 1), scenario 3B and 1C (option 2) and scenario 2A and 2C (option 3).</p> <ul style="list-style-type: none"> • Option 1 would use a north/eastbound route from runway 24 to avoid densely populated areas and a southbound route from runway 24 to align with existing flight paths. • Option 2 is option 1 but would use an alternative north/eastbound route from runway 24 with a later turn to reflect concerns raised during consultation. • Option 3 would use an alternative north/eastbound route from runway 24, southbound route from runway 24 and a westbound route from runway 06 and selected as a sufficiently different option from options 1 and 2 to permit appraisal. <p>Annex C shows how the various technical and local design considerations used in the development of individual flight routes map to the design principles established in Stage 1. Each design principle was addressed as to how they would be covered in section 2 and further considerations and data sources used.</p>	
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1.2	<p>Has the change sponsor provided a robust rationale supported with appropriate evidence, justifying why certain design option(s) were not progressed to the full options appraisal?</p> <p>[CAP 1616f: 4.13]</p>	<p>Section 2 of the full options appraisal supplemented by Annex C sets out which design options were progressed to full options appraisal. The sponsor took a structured approach which was matured from the underlying design principles.</p> <ul style="list-style-type: none"> • Some options were ruled out because of insufficient alignment with the airspace modernisation strategy, notably those too reliant upon air traffic control for vectoring. • Some options were assessed as changing the noise contours and possible impacts upon populated areas, sensitive areas and route length and the extent of consistency with existing routes. • Some possible combinations for design options were sifted out due to similarity with others already strongly likely to be taken forward. • It is also 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 • Some design options were ruled out because the route stoked controversy in previous rounds of engagement. • Some (southbound) design options were ruled out because of conflict with Glasgow inbound routes within scope of its own respective airspace change proposal <p>The rationale was proportionate as preparation for the full options appraisal and was built upon safety and separation criteria, current flight paths, respite/relief options, operational viability (e.g. climb/descent rates), an evidence base of feedback from previous consultation, engagement with neighbouring airports, co-ordination with NERL, data managed by GoldSET and existing research. Designers were tasked to ensure all routes were safe, viable and met instrument flight procedure standards and include departure routes that connect with holding stacks and ATS routes above 7000ft and overfly the Firth of Forth in the design.</p> <p>The baseline design in the Edinburgh Airport Airspace Change Programme was developed by Edinburgh Airport Limited, with collaboration from NATS En-Route Ltd (NERL) and Glasgow Airport for integration with the wider Scottish airspace network. It was used as a reference point for assessment where relevant, particularly as NERL were determining where the holding stacks would be for the routes.</p>	
1.3	<p>Has this rationale plus the supporting evidence</p>	<p>Consultation Summary</p>	

	<p>been clearly explained in any consultation/engagement materials?</p> <p>[CAP 1616f: 4.13]</p>	<p>Sections 4.5 and Section 10 of the summary consultation document briefly discusses the appraisal work within the full options appraisal. But the rationale in the summary has been simplified to replacing vectoring in airspace serving the airport with performance based navigation (section 6) with broad benefits of reduced CO2 emissions and noise for departures (section 7.1). Figures 3-8 in this document were originally too complex to clearly explain the rationale, but have since been updated by the Sponsor to address those concerns.</p> <p>Full Consultation Document</p> <p>The full consultation document sets out the baseline scenario in a more understandable way for the lay reader, in relation to vectoring in sections 6.1.3 and 6.1.4. However, further narrative alongside Figure 22 and Figure 24 would strengthen understanding of the potential impacts of continuing to vector as per the baseline scenario.</p> <p>There is little information showing how and to what extent traffic volumes will grow between 2027 up to 2036 although the data is presented alongside Figures 22 and Figure 24. Table 7 presented comes much later but doesn't indicate it was constructed from 2023 data but in response to feedback, Sponsor has inserted general language around the data being the best available at the time of modelling and committed to updating this after the consultation.</p> <p>Table 11 is a good high level summary of the appraisal which would benefit from being reproduced to some extent in the consultation summary. However, there are areas in this table which should be revised. Under Local Air quality, a negligible impact isn't clear language about the appraisal exercise if the assessment was not undertaken e.g. because the route options did not affect air quality management areas.</p> <p>The document does cover in Section 8, the noise and overflights impacts with material from Section 5 of the Full Options Appraisal in Tables 12-19. In response to CAA feedback, the document now outlines the other design options explored. Some communities may be adversely affected over the long-term by noise in the preferred option relative to other options. So transparency is important and this has been addressed.</p> <p>The document also covers in detail the changes in classification of controlled airspace which would be of interest to aviation stakeholders. The rationale for each part of the change has been set out in Table 26 and Table 27.</p> <p>The consultation documents have since been updated in response to CAA feedback.</p>	
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1.4	<p>Has the initial options appraisal been developed into a detailed quantified and monetised assessment for the full options appraisal?</p> <p>[CAP 1616f: 4.14]</p>	<p>In general, section 4 and its supplementary annexes has matured the initial options appraisal into a full options appraisal. Sponsor has transitioned from preparing the appraisal under a previous version of CAP 1616 into version 5 of CAP 1616.</p> <p>The appraisal documents show how the evidence was developed with a section to set out how evidence gaps were addressed, methods to explain how key impacts were quantified and where they were monetised. Other potential costs and benefits have not been monetised, some due to proportionality.</p> <p>Section 3 sets out the methodology, while Section 4 sets out the appraisal and Section 5 then outlines and concludes by setting out the option to be presented for consultation. The scope of the appraisal is complicated by its interdependence with NERL which affects the impacts above 7,000ft. NERL is responsible for upper airspace and is also redesigning airspace. The routes being appraised must connect with NERLs new en-route structure including proposed Standard Instrument Departures, holding stacks and ATS routes. This affected metrics such as fuel burn and CO2 emissions.</p>	
1.5	<p>Does the full options appraisal include:</p> <ul style="list-style-type: none"> - All evidence gaps identified at Stage 2 fully assessed - All reasonable costs and benefits quantified - 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) 	<p>Evidence Gaps</p> <p>Table 9 outlines evidence gaps which were identified at Stage 2B and also feedback from the Stage 2 Gateway in March 2023. Some gaps were no longer relevant because the sponsor has chosen not to consider changes in capacity. The sponsor has also included a glossary and methodology underpinning forecasts and key impacts like fuel burn.</p> <p>In general, the evidence gaps were assessed as follows</p> <ul style="list-style-type: none"> • Noise and overflight: Detailed modelling was conducted using Environmental Research and Consultancy Department (ERCD) methodology and GoldSET tools. • Environmental impact: Fuel burn and emissions were calculated using ICAO-compliant tools rather than route length alone. • Safety: Routes were validated through technical design documents and reviewed for compliance with Instrument Flight Procedure (IFP) standards. • Interdependencies: The Cumulative Analysis Framework (CAF) was used to assess how Edinburgh's routes interact with NERL and Glasgow's proposals. • Stakeholder input: Feedback was mapped to route design changes, and controversial options were either refined or excluded. Annex I sets out the stakeholder feedback relevant to route design. <p>Questions from CAA around evidence in previous submissions of this appraisal have also</p>	









	<ul style="list-style-type: none"> - A more detailed assessment of the impacts on safety, if completed by the change sponsor - A quantified and monetised environmental assessment, including all direct and consequential impacts <p>[CAP 1616f: para 4.14]</p>	<p>been addressed.</p> <p>Costs and Benefits Quantified</p> <p>The airspace change proposal was broadly consistent with the one submitted by Glasgow's FASI-N Airspace Change Proposal. As a result, the following key impacts were quantified</p> <ol style="list-style-type: none"> 1. Noise Impacts <p>Noise contours (e.g. 54 dB LAeq,16hr). Number of people within each noise contour band and number of people newly overflowed or experiencing changes in noise levels. Health impacts such as people affected by noise and people with sleep disturbance.</p> 2. Environmental Impacts. <p>This included fuel burn using ICAO methodology, CO2 emissions and route efficiencies using total distance and altitude profiles.</p> 3. Overflight Impacts <p>This included number of people overflowed at various altitudes, distribution of impacts, overflight of sensitive sites and areas of natural beauty.</p> <p>Section 3 and Section 4 then set out costs and benefits not quantified. Some impacts were not assessed because there would be no change across all the options including the baseline. This included military airspace access, runway usage and levels of traffic. The sponsor was recommended not to categorise these impacts as quantified where no assessment was undertaken.</p> <p>Costs and Benefits not Quantified or Monetised</p> <p>An improvement in resilience and reduction in delays, training costs and deployment costs were not quantified but could be substantiated better through evidence gathered through consultation. The sponsor makes general assertions in some areas without supporting evidence from stakeholders e.g. training costs, although it is accepted that some future costs will be harder to estimate at this stage of the proposal</p> <p>The appraisal monetised environmental impacts (e.g. air pollution and noise impacts), fuel burn and CO2 emissions. However, impacts on local air quality were not quantified as air quality management areas were not affected.</p> <p>The consequential impacts of General Aviation were not assessed in this appraisal. The sponsor attributed this to general aviation movements being difficult to predict and beyond</p>	
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		<p>the responsibility of the sponsor. The reduction in controlled airspace which may increase access to airspace users can have a consequential impact upon households and populations living on the land surface underneath where controlled airspace is reduced. It would benefit the consultation to indicate, if any, the population and households living under areas where controlled airspace has been released. Sponsor has addressed this feedback through updated maps showing population density.</p> <p>Preferred Design Option</p> <p>The preferred design option was set out in Section 5 of the appraisal. The reasons for the preference set out in paragraph 5.4 have been addressed in detail in a later section of this assessment.</p> <p>Safety</p> <p>Safety impacts in the appraisal were assessed qualitatively. All of the route options in the options appraisal were checked to ensure compliance with instrument flight procedure design standards. All the options had qualitative assessments (against the baseline option) accounting for traffic growth for airspace complexity, controller and pilot workload, and the risk of conflict with other airspace routes.</p>	
1.6	<p>Has the change sponsor used the most up-to-date, credible, and clearly referenced sources of data to assess the impacts of the baseline scenarios and design options?</p> <p>[CAP1616f: 4.16]</p>	<p>The baseline scenario in the Edinburgh Airport Airspace Change Programme Full Options Appraisal is built using a combination of current data, forecasts, and planning assumptions.</p> <p>2023 flight data is used as the “current day” baseline includes actual aircraft movements, fleet mix, and route usage as opposed to the latest available year. The sponsor acknowledges the forecasting was based upon the best and most up to date information available at the time which was prior to the FOA analysis starting early in 2024.</p> <p>Data from planning portals of local authorities were used to supplement spatial information about housing, schools and other key sensitive areas. A cursory spot check indicates the information is up to date including the special schools, medical facilities and places of worship.</p> <p>The key sources of data are as follows</p> <ul style="list-style-type: none"> Population and Demographic Data - National Records of Scotland 2022, but also population data informing the GoldSET tool. Annex M also shows the sponsor has taken account of limitations in the application of the GoldSET tool Noise Contour Modelling – CAA Aircraft Noise Contour Modelling Tool. Noise 	



		<p>modelling is based upon ANCON V2.4</p> <ul style="list-style-type: none"> • Health and Wellbeing data – Public Health Scotland, WHO Environmental Noise Guidelines 2018 • Environmental and Ecological Data - NatureScot, SEPA, and local biodiversity records, Airtop tools and BADA 4.2 and and BADA 3.13. • Flight Path and Operational Data – NATS radar data and Edinburgh Airport operational data. Sponsor has taken flight data from 2023 and used long-term business plan predictions to grow this data to the 2027 baseline. • Fuel Burn - BADA 3.16 has been used for CO2 and fuel burn estimates which is an up to date model. 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. These values will naturally fluctuate, but the current global average cost for jet fuel according to the IATA Jet Fuel monitor is \$933.21 per metric tonne (source: IATA - Fuel Price Monitor) and the USD:GBP exchange rate has weakened to £0.74. 	
1.7	<p>Has the sponsor explained the methodology it adopted to reach its input and analysis results?</p> <p>[CAP 1616f: 4.16]</p>	<p>Section 3 sets out the methodology for the quantified and qualitative impacts within the appraisal. In particular, it relies on sources of data particularly in the pre-appraisal sifting stage which relied on sources which had their own methodology e.g. GoldSET - a multi-criteria spatial planning tool. Annex D sets out the how Edinburgh Airport as sponsor, supported by WSP, used the tool and the key underlying assumptions for this.</p> <p>The sponsor indicates there isn't enough detail yet to define training requirements to be costed particularly as implementation is from 2027. There is also no standard model the Sponsor can use to quantify resilience and reduced delay benefits (e.g. to estimate changes in effective capacity).</p> <p>Within the appraisal, there are some impacts within the options where the sponsor had categorised as a quantified impact. But the impact was assessed as having no change and therefore no further analysis was done. This is a qualitative assessment and should be categorised as such.</p> <p>In relation to fuel burn and CO2 estimates, the method relies upon procedures like Standard Instrument Departures because more realistic estimates rely upon operating</p>	

















		conditions which are hard to forecast.	
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2. Potential Impacts					Status
2.1	Has the change sponsor conducted a full options appraisal of each of the design options which it intends to consult/engage on using the following metrics and level of analysis? [CAP 1616f: 4.14]				<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2.1.1	Communities	Not applicable	Qualitative	Quantified	Monetised
	- Noise			X	
	- Local air quality			X	
2.1.2	Airport/ANSPs	Not applicable	Qualitative	Quantified	Monetised
	- Infrastructure			x	x
	- Operational		X		
	- Deployment		x		
	- Other(s)		x		
2.1.3	Commercial Airlines/General Aviation	Not applicable	Qualitative	Quantified	Monetised
	- Training		x		
	- Increased effective capacity		x	x	
	- Fuel burn				
	- Other(s)		x		
2.1.4	General Aviation	Not applicable	Qualitative	Quantified	Monetised
	- Access		X	X	
	- Increased effective capacity	X			

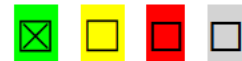
	- Fuel burn	X			
2.1.5	Wider society	Not applicable	Qualitative	Quantified	Monetised
	- Greenhouse gas emissions			X	
	- Tranquillity		X	X	
	- Biodiversity		x	X	
	- Capacity/resilience		X		
2.1.6	Military	Not applicable	Qualitative	Quantified	Monetised
	-				
2.1.7	Other	Not applicable	Qualitative	Quantified	Monetised
	Safety		X		
2.3	Has the change sponsor discussed their methodology with the CAA when quantifying and monetising impacts in the groups 'Commercial airlines' and 'Airport/air navigation service provider'? [CAP 1616f: 3.42]	Some feedback was given by CAA economists during the Feedback session on November 5 th 2024. This was in relation to the key concerns specifically around articulating the impacts of the options under discussions, the evolution of thinking and the information that should be presented in the consultation document. The main monetised impacts on airports and air navigation service providers is in the baseline, there is a £300,000 (2024 prices) one-off cost in 2030 for replacement of non-directional beacons and in the options of £10,000 every five years for review of the instrumental flight procedures. Discussion of these was not required.			   
2.4	Has the CAA reviewed the safety implications to determine whether we agree that is the only potential design option, on the grounds of safety? [CAP 1616f: 4.15]	The appraisal reviewed three options against a baseline where the safety levels were maintained at current levels, with delays in order to manage congestion. The detail provided in section 3 of the appraisal under paragraph 3.3.2 is sufficient for the CAA. A finalised cluster-wide safety assessment will be provided for a future gateway. The pre-appraisal work touched on safety considerations. For example, route design over areas east of Addiewell			   


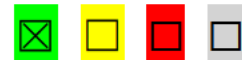
		<p>were considered but found not to have adequate separation for safe spacing of successive arrivals.</p> <p>Where the options have the same implications e.g. reclassification of airspace, additional considerations have been included to reflect safety considerations critical for stakeholders. For example, the sponsor has reflected that the boundary of the Livingston conurbation would provide a clear visual reference point for gliders which would help address the risk of gliders crossing the boundary into controlled airspace.</p>	
3. Economic Indicators			Status
3.1	<p>Has the change sponsor provided traffic forecasts for year 1 and year 10?</p> <p>[CAP 1616f: 3.22]</p>	<p>2023 flight data is used as the “current day” baseline includes actual aircraft movements, fleet mix, and route usage. But the forecasts from 2027 onwards are based upon the long-term business plan assumptions, market sector growth and anticipated fleet mix changes. The sponsor acknowledges that the further into the future, these factors become harder to predict reliably.</p> <p>However, from 2027, forecast levels of traffic are 148,000 air traffic movements which is around 30% growth from 2023 and an annual average growth of 7%. In 2024, Edinburgh airport recorded approximately 120,000 air traffic movements which would be below forecast annual average growth, suggesting the forecast for 2027 onwards relies on much stronger recovery of traffic from 2025 onwards.</p> <p>The sponsor acknowledges the forecasting was based upon the best and most up to date information available at the time which was prior to the FOA analysis starting early in 2024.</p>	

		<p>The fundamental issue behind the traffic forecasts is not the volume, but the dispersion of flights for the construction of the baseline scenario. Sponsor acknowledges that in the current day scenario, few aircraft stay on their planned routes which is hard to forecast. For example, sponsor accepts may factors which cannot be controlled for in forecasts will affect the Cramond offset or routes from holding stacks. Therefore, it becomes important for the purposes of appraisal of options for the sponsor to demonstrate that they are either using the most up-to-date data or that there would be minimal impact from updating the underlying traffic used to model from 2027 onwards.</p>	
3.2	<p>Has the change sponsor valued all relevant costs and benefits of the design options using:</p> <ul style="list-style-type: none"> - Net present value (NPV) - Benefit cost ratio (BCR) - Cost benefit analysis (CBA)? <p>[CAP 1616f: 3.43]</p>	<p>The design options were sifted down to three combinations of arrival and departure routes for the purposes of appraisal. Those routes prior to appraisal were not monetised which is a proportionate approach by the sponsor.</p> <p>Table 2 in Section 5 of the appraisal shows the cost-benefit analysis. For transparency, it would be sensible to also include the baseline as an option to make it explicit what change in impact is being compared against.</p> <p>The net present value is set out in section 5 for each of the key impacts e.g. noise (Table 3), CO2 emissions (table 9), fuel burn (Table 16).</p> <p>With the net present value, it would be more transparent to also include the baseline option. For example, the tables present the cost saving of £224,000 in infrastructure costs as a benefit, without making it clear this was because it is a cost in the baseline scenario.</p>	
3.3	<p>When appraising costs and benefits of a design option, has the change sponsor assessed them incrementally against the baseline scenarios?</p>	<p>In general, yes. The appraisal has been conducted against a baseline scenario with monetised and non-monetised impacts compared against the baseline.</p> <p>The sponsor could have taken greater care to also present</p>	

	[CAP 1616f: 3.45]	the design options against the baseline. The description in 4.2.1 illustrates the difference between the routes, but should not be in Option 1 but presented before the appraisal to give context. Each option should be illustrating the change in the route against the baseline – supporting table 34/table 35.	
3.4	Has the change sponsor expressed the values derived for the costs and benefits set out above in 'real' rather than 'nominal' terms? [CAP 1616f: 3.46]	All 'nominal' costs and benefits have been adjusted into 2024 'real' costs and benefits (using published Web TAG Databook GDP deflators) and where non-GBP reference costs were used, these were converted into GBP when necessary, using spot rates as at 22nd March 2024	   
3.5	Have values been reported in the base year for the assessment? [CAP 1616f: 3.47]	2024 is used as the base year for NPV discounting in line with current TAG guidance. The sponsor has also taken care to present costs in 2024 prices.	   
3.6	As well as taking account of inflation in real prices, has the change sponsor used a social time preference rate? [CAP 1616f: 3.48]	The sponsor sets that out that all 'real' (e.g. inflation adjusted) figures have been discounted using the Social Time Preference Rate (STPR) set by the UK Government and contained in the TAG Databook. 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%.	   
4. Summary of the Full Options Appraisal			
4.1	What are the qualitative/strategic impacts of the design options?	The main qualitative impacts of the design options were safety, tranquillity, resilience and alignment with the UK Airspace Modernisation Strategy. None of the options were assessed as impacting upon the capacity of the airport. There were also strategic impacts where the options were chosen to minimise the impact on neighbouring airports and integrate into the airspace network.	   

		<p>The sponsor has treated safety as a strategic impact. Any possible route which didn't meet safety standards was excluded from the appraisal. Similar strategic considerations were applied in relation to reducing conflict with neighbouring airports and network airspace. The sponsor has also effectively assessed airspace complexity through considerations in relation to controller workload and route interactions and used this to focus on more predictable routes which require fewer changes and less coordination.</p> <p>The sponsor has looked at resilience strategically although the appraisal focused on a qualitative assessment against the baseline. Each of the options has been considered for efficient traffic flow, flexibility during disruptions and the reduced reliance upon vectoring. Preferential routes were then ones which allowed aircraft to smoothly transition into upper airspace.</p> <p>The impacts from reduced network delays and improved resilience have not been quantified. The sponsor indicated that the introduction of new routes over the Firth of Forth for traffic will send out flights to the east and southeast directly over the North Sea, avoiding a bottle neck from southbound routes. But the sponsor has not been able to quantify this benefit beyond confidence that it will reduce the pre-departure delays.</p> <p>Community considerations have also been assessed qualitatively. Overflights have not been monetised or used to determine adverse noise effects. Noise contours and overflights were modelled quantitatively. However, the appraisal took care to take account of feedback from engagement to date and the routes avoided previously controversial areas.</p>	
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		<p>The following impacts did not change against each of the shortlisted options in the appraisal. These were local air quality, biodiversity, access to general aviation and other costs. The sponsor has correctly ensured all quantified impacts are assessed against the baseline, but also indicated qualitatively where required that there was no impact and no further work was done.</p> <p>Improvements to medium and long-term resilience were identical across the options. The sponsor asserted that in the baseline scenario, without this resilience, there is a risk that Edinburgh airport would gradually lose its published routes for departure causing a loss of revenue and critical operational issues. These should be considered a qualitative cost in the baseline.</p> <p>The sponsor also accounted on the potential impact of general aviation through enhanced access as a result of changes in the classification of airspace. The sponsor indicates this can result in general aviation flying at lower altitudes or being displaced to other areas. The impact is the same for all of the shortlisted options against the baseline. However, the fuel burn and CO2 emissions of general aviation users have not been modelled as the sponsor indicates their airspace use is not the responsibility of the airport.</p>	
4.2	What are the overall non-monetised (quantified) impacts of the design options?	<p>The overall non-monetised (quantified) impacts of the airspace design options in the Edinburgh Airport Airspace Change Programme are primarily captured through noise and overflight metrics, which are quantified but not expressed in monetary terms.</p> <p>The number of people exposed to the Lowest Observable Adverse Effect Level was quantified alongside the magnitude exposure. They showed option</p>	

		<p>2 had an increase in the noise exposure.</p> <p>Secondary noise metrics were also presented. This considered the number of daytime flights exceeding a 65 decibel level and number of nighttime flights exceeding a 60 decibel level.</p> <p>Overflights were also presented. This was used to look at the spatial dispersion of the number of people exposed to 5, 20 and 50 flights per day. This impact is also important to help identify areas in the consultation relevant for communities like schools and areas of tranquillity.</p> <p>Local air quality impacts were assessed as qualitative as no further assessment against the baseline was undertaken. This was because none of the options were likely to result in pollutants breaching legal limits in air quality management areas.</p>	
4.3	Where impacts have been monetised, what are the overall net present values (NPV) of the design options?	<p>The overall net present values in 2024 prices are £74m for option 1, £71m for option 3 and £38m for option 2. These NPVs reflect the monetised benefits and costs associated with Noise impacts (health and wellbeing), Greenhouse gas emissions (CO₂e), Fuel burn and Operational efficiency including accounting for £300k cost-avoidance for replacement non-directional beacons. Annex B would have provided further details on how the use of planned flight data in the NERL modelling affected the accounting of the CO₂ emissions. This would have been helpful to see in the appraisal itself.</p>	
4.4	<p>Has the change sponsor used the economic assessment to progress/discontinue design options and/or support the choice of the preferred design option?</p> <p>If the preferred design option does not have the highest NPV or benefit cost ratio (BCR), then has the change sponsor</p>	<p>The sponsor used the qualitative and monetised impacts of the options in the appraisal to discontinue option 2. This was really a variant of option 1 substantiated due to feedback to date.</p> <p>However, option 1 was preferred as it had the higher overall net present value largely due to adverse noise</p>	

	justified the reasons to progress this design option?	<p>effects, lower CO2 emissions and fuel savings for airlines. Option 1 also had a slight NPV in key criteria to Option 3 and aligned more closely with Government guidance on reducing adverse noise effects below 4000ft and stakeholder priorities. Section 3.3.4.3 also indicates it is possible the methodology can overestimate the benefit of one route over another and so level off restrictions were incorporated in all scenarios and procedural SIDs were used as a proxy.</p> <p>This conclusion must be qualified where it was not based on the most up to date data. Option 1 flies over 2000 less people during the day and 5000 less people during the night. However, It is unclear if the population data is using the most up-to-date population data for those areas to confirm this. Similarly, the data to model dispersion of flights was modelled on 2023 flight data. Short of redoing the appraisal using updated data and tweaked assumptions, sensitivity testing can help to provide reassurance that option 1 remains preferable to option 3.</p> <p>Sponsor should be transparent in presenting why option 3 was excluded from being taken forward for consultation consistent with how the cluster was assessed. This would include factors affecting the NPV and accounting for impacts that have not been quantified yet or qualitative factors at an early stage such as safety factors and capacity/resilience (network delay). For example, the sponsor has indicated flights departures heading eastwards would reduce the risk of congestion with southbound flights, but whether the impact would be the same for both option 3 and option 1 is left unaddressed in section 5 beyond a preliminary assumption in Section 4 that there is no difference between Option 1, Option 2 and Option 3 with respect to capacity and resilience.</p> <p>This is likely to matter at consultation stage as some local areas would have benefitted from the change in dispersion of flights. Option 3 shows more positive impacts at higher noise contour levels in areas designated for tranquillity and avoids overflying</p>	
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		Calaiswood School and overflies Ogilvie School and Cedarbank less frequently than Option 1. Option 3 shifts noise away from certain communities more affected by Option 1. The Sponsor justification is currently set out in Section 5 in paragraph 5.4 with additional visualisation in paragraph 5.3.2 showing the differential noise impact to identify extenuating local circumstances.	
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5. Other Aspects			
5.1		<p>Military impact – The sponsor indicates that NERL is proposing sharing arrangements with the military that will allow use of this airspace to enable a dedicated route to the east, with specific detail about D514 set out in 2.1.3.2.1. This helps reduce complexity in the airspace for civilian airspace, but little detail is provided in the rest of the appraisal, particularly section 5, as to the impact upon the military and whether the options would restrict or degrade military access or operational flexibility compared to the baseline. It would help to understand in the consultation whether vectoring would also be used to take account of when military danger areas need to be activated in the without and with airspace change scenarios. It would help for the sponsor to include information about the methodology from the cluster document as to how many times the area is anticipated to be activated and therefore how military impacts were treated.</p> <p>Sponsor broadly addressed Presentation issues highlighted – there were numerous typos within the five documents which constituted the Full Options Appraisal. This does not affect the assessment but takes away from the presentation of a document which is due to be presented to the wider public. Sponsor is recommended to proofread prior to publication to ensure things like consistency of terms like CO₂e (b) spelling mistakes (e.g. insultation) and (c) improving the resolution for all tables so they display clearly (e.g. table 91 and table 92). Lastly, the Sponsor may wish to remove their own tracked change comments from Annex M.</p> <p>Baseline Scenario – Table 4 in section 3 sets out helpful information about the route usage assumptions from 2027 and 2036. It would have been helpful to include the current day usage of those routes alongside. Sponsor should clarify whether the dispersion of flights was constructed from existing flight patterns or flight patterns following sponsor assumptions on how it will serve emerging routes in Table 2.</p> <p>Fleet Mix – Table 3 in Section 3 makes reference to aircraft within the fleet which are likely to be quite advanced by 2036 e.g. Boeing 737-200. As part of modelling work, the sponsor may have selected to include aircraft which are a close fit to the intended aircraft and where this has happened, it would help to make clear as additional text underneath the table.</p> <p>Greenhouse Gas Emissions – Table 20 presents annual greenhouse gas emissions for the baseline scenario. It covers departures and arrivals from/to Edinburgh airport including the paths operated by NERL above 7000ft. There is then a footnote which is an oblique reference to Section 3 of methodology. It would be preferable to signpost to the relevant section of the document (e.g. Section 3.3 - 3.3.4.4)</p> <p>Consequential Impacts - Changes to noise distribution as a result of other airspace users would mean levels from the surface to 3500ft are being changed from CAS to Class G to the northwest and southeast of the airport so GA could in the future fly in these areas which they are currently</p>	

excluded from. This could have consequential impacts on areas of tranquillity, households and population which should be accounted for.

6. Conclusions

6.1

This appraisal has built upon feedback provided in previous gateways and feedback sessions. It has a more logical and transparent approach towards why option 1 was taken forward to consultation as an evolution from the options presented in the Stage 2 gateway using a rigorous methodology. This methodology was set out in Sections 2 and 3 of the options appraisal. The construction of the baseline scenario would be very sensitive to the assumptions underpinning the level and dispersion of traffic along the routes. Within the methodology, there are also assumptions and data sources imported from modelling tools used like GoldSET and AirTOP which the sponsor has taken care to explain.

However, there are also other areas where the choice of method used may be proportionate, but their shortcomings should also be set out in a similarly transparent way such as the use of route length as a proxy for fuel burn. Some of these can be addressed through addressing the recommendations. Section 4 and its annexes constitute the full options appraisal and address the evidence gaps identified in the earlier gateway. No further evidence gaps have been identified albeit the proposal would benefit from more information in specific areas identified in the recommendations or evidence which can be gathered through consultation exercises. There are areas where greater transparency around the baseline scenario compared to the options in each case would ease understanding of the impact of the change.

The main issue in this appraisal is that Option 1 was taken forward for consultation but there is only a £5m difference between the NPV of option 3 and option 1 where option 3 performed worse on the number of people affected by flights. However, the population and flight forecasts were both based on data which could have been more up to date. The NPV figures as a whole are largely affected by subsequent volatility in spot prices for jet fuel but this would not change the ranking of the options. Sensitivity testing could have been done to help address some of this as well as presentation of the NPV as a range or at least indicate the central scenario for carbon values was used within webTAG for calculation of the monetised reduction in greenhouse gases.

CAA Full Options Appraisal Completed by	Name	Signature	Date
Airspace Regulator (Economist)			03/09/2025