CAA CAP 1616 Options Appraisal Assessment (Phase II Full)

Title of Airspace Change Proposal:	Glasgow Airport FASI		
Change Sponsor:	Glasgow Airport Ltd		
ACP Project Ref Number:	ACP-2019-46		
Case study commencement date:	02/08/2024	**Case study report as at:**	21/08/2025

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

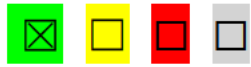
Guidance

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]	Full options appraisal matures initial options appraisal in stage 2B with considerations for airspace and instrument flight procedures. This is set out in Section 3 (Evolution of Options). This also sets out where the options have been refined in conjunction with cluster stakeholders in order to integrate with the wider airspace network. Section 4 and Appendix B provide a summary of the FOA process, explaining how the initial options were developed,	☒ ☐ ☐ ☐

		assessed, and refined. It outlines the transition from Initial Options Appraisal (IOA) to Full Options Appraisal (FOA), including stakeholder engagement, technical integration, and environmental assessments.	
1.2	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? [CAP 1616f: 4.13]	The rationale is documented in Section 2.2 of the FOA and reinforced in Sections 5.4 and 5.5, with supporting tables and figures. Design principle evaluation was used to draw up the shortlist alongside further work to strengthen network connectivity. • Table 5 set out how some iterations of options were removed to reduce risk of confusion or mitigate workload for air traffic controllers. • Table 6 set out how noise management considerations informed the shortlist. • Tables 9 and 10 showed multiple arrival routes were also not proposed due to limited net benefit. Figures 6–14 help to show route evolution and discontinued paths.	☒ ☐ ☐ ☐
1.3	Has this rationale plus the supporting evidence been clearly explained in any consultation/engagement materials? [CAP 1616f: 4.13]	The specific rationale was set out in Section 4 and Appendix B of the consultation materials with a step-by-step narrative of how options were developed, assessed, and shortlisted. Appendix B provides a non-technical summary of why certain options were not taken forward. It explains how the Government's altitude-based environmental priorities were applied. Sponsor has responded to feedback from economists to help provide further explanation of the assumptions underpinning the analysis which were shared with Edinburgh and NERL. There is now more discussion around the trade-offs and the reasoning behind selecting Option 5 for consultation.	☒ ☐ ☐ ☐

1.4	Has the initial options appraisal been developed into a detailed quantified and monetised assessment for the full options appraisal? [CAP 1616f: 4.14]	The initial options appraisal has been fully developed into a detailed, quantified, and monetised Full Options Appraisal (FOA), in full compliance with CAP1616f Section 4.14. Key evidence includes quantified assessments for noise, greenhouse gas emissions, air quality, fuel burn, delay costs and an assessment of the volume of controlled airspace.	☒ ☐ ☐ ☐
1.5	Does the full options appraisal include: - 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) - 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 [CAP 1616f: para 4.14]	Table 27 has set out the evidence gaps. Evidence Gaps from Stage 2 are all addressed in the full options appraisal (e.g., noise contouring, overflight metrics, controlled airspace volumes) Costs and benefits have been quantified using data available at the time to inform the modelling. Section 4 set out the methodology and the limits of quantifying or monetising the impacts. The methodology was developed in order to support the assessment criteria to help determine the preferred option to take forward to consultation. These were safety, noise, air quality, GHG emissions, tranquillity, biodiversity, capacity, resilience, fuel burn, costs, AMS alignment. The Full Options Appraisal does include a quantified and monetised environmental assessment, covering all direct and consequential impact. Impacts were generally monetised using the Government's TAG methodology. This included health impacts as a consequence of noise, air quality and tranquillity. Consequential impacts examined in the appraisal and reflected to some extent in the consultation included Population Newly Overflown and impacts on noise sensitive buildings. The preferred design option has been set out at the end of the document in section 6.3 but the rationale for only this option requires further justification as Table	☒ ☐ ☐ ☐

		167 suggests it wasn't the strongest in vfm terms. Sensitivity analysis in line with TAG guidance has been suggested to the Sponsor as an approach that would strengthen the case around the preferred option. However, this is not an explicit requirement under CAP 1616 and the sponsor has instead undertaken to provide more narrative to explain the difference between the options. Furthermore ,the sponsor has applied conservative assumptions where uncertainty exists around the modelling approach.	
1.6	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? [CAP1616f: 4.16]	The forecast for flight movement data was based on 2022 Electronic Flight Progress Strip (EFPS) data. The fleet mix forecast was derived from Glasgow Airports business plan. Sponsor has acknowledged in the document that more up to date data is available from the CAA website. 2022 data used for noise, overflight and air quality – latest available data at the time of undertaking modelling. However, fuel burn and ghg emissions would have benefitted from 2023 baseline data due to shared approach. It is important that stakeholders are able to assess if these assumptions are valid. This would be consistent with 4.16 of 1616F "*It must also provide the referenced sources of data that support its analysis outcome*". Sponsor has provided clear referencing of the data informing assessment of the baseline and design options. This includes population data from 2023 CACI datasets, monitoring data for air quality from 2023 Air Quality Annual Progress Reports from local authorities and DEFRA. Sponsor has responded to feedback by indicating this approach is proportionate and data will be updated at the next stage after consultation.	

1.7	Has the sponsor explained the methodology it adopted to reach its input and analysis results? [CAP 1616f: 4.16]	Yes. Section 4 is the methodology section denoted "full options appraisal methodology". Table 14 sets out the assessment criteria for which methodology is drawn up.	☒ ☐ ☐ ☐

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]				☒ ☐ ☐ ☐
2.1.1	Communities	Not applicable	Qualitative	Quantified	Monetised
	Noise			X	X
	Local air quality	X			
2.1.2	Airport/ANSPs	Not applicable	Qualitative	Quantified	Monetised
	- Infrastructure		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
	- Fuel burn				X
	- Other(s)	X			
2.1.4	General Aviation	Not applicable	Qualitative	Quantified	Monetised

	- Access			X	
	- Increased effective capacity	X			
	- Fuel burn	X			
2.1.5	Wider society	Not applicable	Qualitative	Quantified	Monetised
	Greenhouse gas emissions				X
	- Tranquillity			X	
	- Biodiversity			X	
	Capacity			X	
	Resilience		X		
2.1.6	Military	Not applicable	Qualitative	Quantified	Monetised
	-				
2.1.7	Other	Not applicable	Qualitative	Quantified	Monetised
	Habitats Approach	x			
	Airspace Modernisation Strategy?		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]	There was no separate discussion between the CAA and the Sponsor regarding discussions around methodology beyond feedback sessions after Gateway assessments. Sponsor undertook to refine and improve the methodology in response to concerns raised. However, the methodology was based upon shared assumptions and similar methods at a cluster level. Sponsor also queried minor areas such as how to treat Training costs as part of regulatory engagement.			☒ ☐ ☐ ☐
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?	All 8 options were assessed as 'expected to maintain, and in some areas enhance safety compared to the 'without airspace change' baseline.'			☐ ☐ ☐ ☒

	[CAP 1616f: 4.15]	As a minimum the sponsor is required to justify why a single design option has been taken forward for consultation	

3. Economic Indicators			Status
3.1	Has the change sponsor provided traffic forecasts for year 1 and year 10? [CAP 1616f: 3.22]	Yes. The baseline traffic forecast is on p78-79 and on Table 11. Helicopter movements have been omitted from traffic counts. These figures for the forecast are based on Glasgow Airport's long-term business plan and historical growth trends, Business intelligence on route frequency, fleet changes, and post-COVID recovery The presumption is that the forecast movement based upon 2022 data will be aligned with the Airports own 5 year forecast and subsequent assumptions around annual average growth. There is greater uncertainty around forecasting as the base data gets older. As a result, conservative assumptions were also applied to reflect the uncertainty. The sponsor commits to updating forecasts for Stage 4 Final Options Appraisal using the most current data.	☒ ☐ ☐ ☐
3.2	Has the change sponsor valued all relevant costs and benefits of the design options using: - Net present value (NPV) - Benefit cost ratio (BCR) - Cost benefit analysis (CBA)? [CAP 1616f: 3.43]	There is a net present value arising out of a cost-benefit analysis with information in an accompanying worksheet. NPV calculations were performed for each option over a 10-year appraisal period (2027–2036), using 2024 prices. Monetised categories include: Noise impacts (using TAG methodology), Greenhouse gas emissions (CO_2e reductions), Fuel burn savings, Operational delay reductions and Infrastructure and maintenance costs. the appraisal confirms that all options have positive NPVs which would mean all the benefit cost ratios would exceed 1.	☒ ☐ ☐ ☐
3.3	When appraising costs and benefits of a design option, has the change sponsor assessed them incrementally against the baseline scenarios?	Yes, In section 7 (full options appraisal), appraisal of the options has been conducted against a baseline.	☒ ☐ ☐ ☐

	[CAP 1616f: 3.45]		
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]	Yes. This is inline with our guidance in CAP 1616f on 3.47	☒ ☐ ☐ ☐
3.5	Have values been reported in the base year for the assessment? [CAP 1616f: 3.47]	The base year chosen was 2024. This is inline with our guidance in CAP [1616f : 3.47].	☒ ☐ ☐ ☐
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]	Yes. The sponsor has prepared the Net Present Value with assumptions of 3.5% for the social time preference rate and 1.5% for the health impacts social time preference rate.	☒ ☐ ☐ ☐

4. Summary of the Full Options Appraisal			
4.1	What are the qualitative/strategic impacts of the design options?	The qualitative assessment was around the design principle evaluation, alignment with Airspace Modernisation Strategy and Network Connectivity. Within the airspace modernisation strategy, it was important that the preferred design option also align with the Scottish Airspace Modernisation Masterplan. The Airspace Modernisation Strategy approach meant options had to also be discerned for their impact (against the baseline) for safety, integration of other airspace users, reduced complexity of routes and noise and greenhouse gas reductions as part of environmental sustainability. The key qualitative assessments (not suitable for monetisation) would be safety and initial assessment of impacted habitats and air navigation service providers and airport infrastructure and deployment costs. There was no significant impact on areas relevant to biodiversity impacts and minimal tranquillity impacts.	☒ ☐ ☐ ☐

		The qualitative assessments were also crucial in the appraisal in helping to discern between the options. In the context of noise impact, options with Offset SIDS offered relief to some communities but could also introduce significant adverse effects to others. Similarly, options with performance based navigation would help to reduce dependency upon ground based navigational aids.	
4.2	What are the overall non-monetised (quantified) impacts of the design options?	In general, the impacts which have not been monetised are resilience, additional noise impacts, and (environmental) impacts on wider society from tranquillity, biodiversity and capacity.	☒ ☐ ☐ ☐
4.3	Where impacts have been monetised, what are the overall net present values (NPV) of the design options?	Section 6.1 sets this out for each of the tables and they range between £53m-£56m in discounted net present value using 2024 as the base year in which the values are presented. The main impacts which have been monetised are (departure) delay benefits (to commercial airlines), operational costs to airport, traded/nontraded greenhouse gas emission reductions, fuel efficiency benefits. With regards to human health, the primary impacts of noise have been taken into account.	☒ ☐ ☐ ☐
4.4	Has the change sponsor used the economic assessment to progress/discontinue design options and/or support the choice of the preferred design option? If the preferred design option does not have the highest NPV or benefit cost ratio (BCR), then has the change sponsor justified the reasons to progress this design option?	The economic assessment has informed the maturity of the design options, but the option with the strongest NPV was not the preferred option. Some justification was given in section 6.3 but in response to CAA feedback, this section has been substantially strengthened to show that option 5 offered the best overall balance of environmental, operational, and community impacts. Sponsor has now provided much more narrative supported by evidence around taking option 5 only for consultation. This included that (against the baseline), it led to reductions in noise exposure and greenhouse gas	☒ ☐ ☐ ☐

		emissions and departure delay minutes. Other options not taken forward despite the NPV values were due to significant noise impacts, overflight of new communities and sensitive buildings and concerns from stakeholders. Sponsor noted that Option 5 maintained consistency with current airspace arrangements and thus minimising disruption for air traffic controllers and mitigated adjustment for new communities affecting by overflights.	

5. Other Aspects

5.1	Sponsor has addressed concerns around labelling in the TAG noise assessments, referencing of source materials and some minor typos.

6. Conclusions	
6.1	In general, the methodology for the full options appraisal has been matured in line with TAG guidelines to arrive at a point from the longlisted options in Stage 2 to option 5 as the preferred shortlisted option to be taken forward for consultation. Given the inherent uncertainty in forecasting from 2027 using 2024 as a base year, it would be proportionate to take into account relevant feedback from consultation about traffic levels and reflect input assumptions in a way in which they can be assessed against scenarios in future stages. There are minor edits to be addressed in this full options appraisal before it is published. Given the complexity, the assumptions and interdependencies should always be set out and signposted clearly within the document. The vfm conclusions are predicated on the back of forecasts where there can be greater transparency on how uncertainty should be taken into account. Although not explicitly required under CAP 1616, it is generally good practise in transport appraisal to conduct sensitivity testing or presenting ranges for each of the options in cost benefit analysis where there was underlying uncertainty. This could then help justify why only one option is suitable for consultation. Update – The options appraisal document has been updated in response to comments from the CAA and in conjunction with the cluster approach. There is more transparency around key statistics and reference figures used for the calculation of cost-benefit analysis. There is an acceptance that data was used that was the most up-to-date at the time of analysis and has been updated since e.g. jet fuel prices, exchange rates for currency conversions and flight data. This doesn't prejudice the options appraisal but sets out a proportionate approach under CAP 1616, which will be addressed through updates to the appraisal after consultation. Sponsor has also updated the table and appendices references throughout the document to ease the reader.

CAA Full Options Appraisal Completed by	Name	Signature	Date
Airspace Regulator (Economist)	[redacted]	[redacted]	15/10/2024 23/07/2025(Review) 03/09/2025(Review 2)