GLASGOW PRESTWICK AIRPORT AIRSPACE CHANGE PROPOSAL

FRAMEWORK BRIEFING: RECORD OF AGREEMENT
23 FEBRUARY 2017, CAA HOUSE, KINGSWAY, LONDON

Action	Position	Name	Acknowledged	Date
Produced	NATS, Design, Airspace Change Assurance	XXXXXXX XXXXXXX		
Accepted	Glasgow Prestwick Airport, ACP Technical Lead	XXXXXXX XXXXXXX		
Accepted	CAA, SARG, Controlled Airspace Section, Case Officer	XXXXXXX XXXXXXX		

CAA (SARG) Attendees:	Sponsor Attendees:
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CAA CC:	Sponsor CC: - XXXXXXX XXXXXXX - XXXXXXX XXXXXXX - XXXXXXX XXXXXXX - XXXXXXX XXXXXXX

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CONTENTS

1. INTRODUCTION

1.1. This document is a record of the framework briefing to the CAA regarding the airspace change proposed by Glasgow Prestwick Airport (GPA) (the Sponsor). It was agreed that SARG would assess the proposed airspace change for this project in accordance with the information contained in this document. Acceptance of this record by SARG will represent agreement `in principle' that the process undertaken thus far, and the process proposed herein, meets the requirements of the CAP725 airspace change process.

1.2. The content of this record, and the CAA's agreement to the proposed content of the ACP, will form part of the evidence required to evaluate whether the project is viable. Hence it should be stressed that, at this stage, the decision to proceed with the project has not been taken. If GPA does intend to proceed a separate "Intention to Proceed" letter will be submitted to the CAA in due course.

1.3. Should any of the elements of this document change significantly as the plans/processes develop, GPA will provide the rationale for change to SARG and seek further agreement in principle for the revisions.

2. SARG / DFT DESIGN REQUIREMENTS

2.1. The generic design aims (including those relating specifically to environmental aspects) recommended by SARG/DfT for all airspace change projects are given below. Those which can be applied to this development are highlighted in bold.

2.2. SARG/DfT design aims:

- To design routes based on RNAV1.
- To ensure that designs are consistent with Government policy.[1]
- Runway development: where applicable accommodate future growth due to proposed runway expansion projects.

2.3. Environmental design aims:

Where practical, within operational and safety constraints:

- enable CDAs
- minimise track mileage
- allow more efficient flight profiles (i.e. clear climbs/descents on separated tracks)
- minimise population over-flown
- minimise exposure of new populations to noise and visual impacts
- minimise low level over-flight of AONBs[2] , National Parks and other tranquil areas

[1] E.g. Department For Transport, Guidance to the Civil Aviation Authority on Environmental Objectives Relating to the Exercise of its Air Navigation Functions (Jan 2014), and Air Transport White Paper/Review.
[2] In Scotland these are referred to as National Scenic Areas (NSAs).

2.4. These aims are aspirational in so much that it may not be possible to achieve all aims within one design. The final design will hence reflect a balance between competing requirements (e.g. avoiding population may only be possible with additional track mileage). GPA will seek to demonstrate a balanced approach to achieving all the design aims within the consultation documents and ACP.

CAP725 PROCESS

2.5. The current version of CAP725 prescribes a seven stage process:

- Stage 1: Framework Briefing
- Stage 2: Proposal Development
- Stage 3: Preparing for Consultation
- Stage 4: Consultation and Formal Proposal Submission
- Stage 5: Regulatory Decision
- Stage 6: Implementation
- Stage 7: Operational Review

2.6. The Regulatory Decision stage includes one week for checking the files followed by a sixteen week period for reviewing the airspace change proposal and publishing a decision.

2.7. The CAA is currently in the process of revising CAP725. A new version is expected to be tabled for consultation in April 2017. The DfT is also currently consulting on a new UK Airspace Policy which is due to close in May 2017. This policy may change the metrics required for airspace change proposals. In order to reduce disruption and uncertainty the CAA intends to harmonise the publication of the revised CAP725 guidance with the publication of the new UK Airspace Policy. This is likely to happen in Q4 2017.

2.8. The CAA and DfT are intending to provide a transitional period such that any airspace change projects which have commenced consultation before the new policy and guidance are published are able to follow the current process and any projects which commence consultation after the new policy and guidance are published would have to follow the new process.

2.9. The new policy and guidance are likely to emphasize the importance of stakeholder engagement and transparency as part of the process. The CAA would therefore encourage sponsors to consider these factors in their projects even if they are still following the current CAP725 process.

2.10. In line with the points and timescales above, this ACP is intended to follow the current CAP725 process, but taking into account the CAA encouragement to use the principles of the revised process where this is feasible.

3. JUSTIFICATION / SCOPE

3.1. In line with the ECAC-wide Navigation Strategy, the CAA has approved a reduction in the en route navigation aid infrastructure. This includes removal of the TRN and NGY

navigation aids that are used for both departures and arrivals in and out of Glasgow Prestwick.

3.2. NATS En Route Limited (NERL) is currently undertaking this reduction via the "VOR Rationalisation" project which will result in the Turnberry (TRN) VOR and New Galloway (NGY) NDB being decommissioned in 2018. TRN and NGY conventional departure routes will therefore have to be withdrawn.[3]

3.3. The primary purpose of this ACP is therefore to replace the current conventional TRN and NGY departures with RNAV SIDs.[4]

3.4. In order to improve departure routings, GPA has decided to introduce two new departure routes from runways 12 and 30. These are:

- A new SID to HERON which will provide a more direct routing for aircraft departing to the West via N562.
- A new SID to TLA which will provide a more direct routing for aircraft departing to the East via Y96.[5]

3.5. To cater for non-RNAV capable aircraft, omnidirectional departures will be designed for runways 12, 21, and 30. These will provide terrain clearance only and allow controllers to issue tactical departure clearances when necessary, in particular to search and rescue helicopter flights.

3.6. GPA has also taken this opportunity to implement new RNAV(GNSS) approach procedures to runways 12, 21, and 30. The procedures for runways 12 and 30 will replicate the existing ILS approaches. The procedure for runway 21 will replicate the existing SRA approach alignment but the descent gradient will be reduced from 6.39% (3.7°) to 6.12% (3.5°) to comply with Baro-VNAV and SBAS design criteria. All RNAV(GNSS) approaches will be published with LNAV, LNAV/VNAV (Baro-VNAV), and LPV (SBAS) minima. All RNAV(GNSS) approaches will be designed with T-Bar style initial approaches where possible.

3.7. In order to connect arriving aircraft to the instrument approach procedures, RNAV Arrival Transitions will be designed from the TRN STARs to runways 12, 21, and 30 and from the SUMIN tactical waypoint to runways 21 and 30.

3.8. GPA is not requesting any changes to the boundaries of controlled airspace as part of this airspace change proposal.

3.9. GPA has been awarded GSA funding for the development of the RNAV(GNSS) approach procedures.

3.10. All SIDs will be reviewed to determine the most appropriate termination / truncation point. RNAV Departure Transitions will link the end of each SID to the intended ATS

[3] A waypoint will remain at the location of the TRN VOR and will be used by both arrival and departure procedures. The conventional STARs terminating at TRN and the conventional hold at TRN will be converted to RNAV by the VOR rationalisation project. The final name for the new waypoint has not yet been determined so for the purposes of this project it will continue to be referred to as TRN.

[4] It has subsequently been determined that aircraft departing to the Southeast via T256 would benefit from a departure route that connects to the en route structure at OSMEG rather than NGY.

[5] It has also been determined that aircraft departing to the East via Y96 would benefit from a departure route that connects to the en route structure at HAVEN rather than TLA.

routes. These Departure Transitions will be designed in coordination with the PLAS project and will be included in the GPA ACP. However they will become the responsibility of the en route ANSP following publication.

4. CONSULTATION PLAN

4.1. Formal consultation for this project is planned to take place in Q2/Q3 2017 and will take the form of a single 12 week (minimum) consultation across the Prestwick area. The consultation will present the variables taken in to consideration in the design, the routes considered and the working as to how Glasgow Prestwick Airport arrived at the preferred route that is being put forward for consultation.

4.2. The purpose of consultation is to attain or confirm views and opinions about the potential impact of a particular ACP. GPA will design the routes in line with government policy unless there is a clear, justified remit across affected stakeholders to do differently. Consultees therefore have a crucial role in providing relevant and timely feedback to the Change Sponsor in the form of their views and opinions on the impact of a particular Airspace Change Proposal.

4.3. Experience has shown that those who perceive a potential dis-benefit are more likely to respond to consultation than those who would potentially benefit; therefore consultation response is not a reliable measure of the relative benefit or dis-benefit of a proposal. Hence the aim of consultation is to collect information/requirements to consider in the on-going design process, rather than being a voting process to determine popularity.

STAKEHOLDER IDENTIFICATION

4.4. The formal consultation will include distribution by email of consultation material to the following stakeholder groups:

- MSPs, MPs, MEPs
- All affected Unitary Authorities
- All affected Community Councils
- NATMAC
- Airport Operators for all affected airports
- Aircraft Operators operating from Glasgow Prestwick Airport
- Other airspace users (Flying clubs, Light Aircraft Association, British Microlight Aircraft Association, British Gliding Association, etc.)
- National Environmental bodies (Scottish Natural Heritage, National Trust for Scotland, UK Association of National Park Authorities, Historic Scotland, etc.)
- Business representatives (Ayrshire Chamber of Commerce and Industry, Scottish Enterprise, Visit Scotland, Royal Highland and Agricultural Society of Scotland, etc.)

CONSULTATION BRIEFINGS

4.5. GPA has regular meetings with a variety of stakeholders. Where a briefing is indicated below, it may be included in one of these regular meetings or planned as a separate briefing as appropriate.

4.6. Briefings will be offered to the following groups:

- All affected MSPs and MPs
- All affected Unitary Authorities
- Glasgow Prestwick Airport Consultative Committee (GPACC)

4.7. Collective briefings will be offered to Community Council representatives beneath hotspot areas, i.e. potentially noticeable changes such as holds, transitions, and SIDs flown below 7000ft.

4.8. Briefings will not be offered to:

- Unitary Authorities and Community Councils beneath routes changing above 7000ft.
- Other special interest groups (e.g. national bodies or pressure groups focussing on single issues).

These groups will be invited to attend one of the public roadshows.

4.9. One or more public roadshows will be hosted with the opportunity to meet the project team and discuss the airspace change. Locations for these roadshows will be selected based on the anticipated hotspots, population size, and accessibility factors.

CONSULTATION MATERIALS

4.10. The consultation materials will consist of a hierarchy of materials as follows:

4.10.1. First tier – Summary information providing an overview of the proposed changes and allowing people to determine whether they could be affected.

4.10.2. Second tier – Main consultation document providing details of the changes proposed for each route and the potential impact of those changes. This will include justification, route maps, environmental analysis results, and FAQs.

4.10.3. Third tier – Technical documents providing information on how we came to our conclusions. This will include environmental analysis reports and technical FAQs. These will be in technical language presented for specialists rather than the general public.

4.11. The consultation materials will be published via a website, with printed copies also being available as required.

4.12. Route maps provided in the consultation materials will include information on the potential impact of the change. This information will include:

- The potential number of aircraft that would fly on the route

- The expected altitudes for these aircraft
- A measurement of how loud aircraft at that height would sound at ground level (a metric known as L_{max})

This will allow people to determine how significant they consider the potential impact to be.

4.13. The website will include a set of frequently asked questions (FAQs) along with their answers. Where new, relevant, questions arise during the consultation period these will be added to the FAQs.

4.14. The consultation materials will be produced in English only.

4.15. SARG will be asked to review and comment on the consultation material prior to publication. A one week turnaround requirement for review and any comments was provisionally agreed at the meeting.

4.16. It is important to ensure that stakeholders are aware of the scope of the consultation, so that the feedback provided has the maximum possibility of affecting the final design. This necessarily involves highlighting issues that will be beyond the scope of the consultation such as:

- Government policy (e.g. tranquillity versus population, targets to reducing CO_2).
- CAA Policy (e.g. use of P-RNAV, design guidance)
- Traffic growth (e.g. whether continued growth is good or the effect of the recent downturn)
- Airport expansion/Air Transport White Paper
- Analysis methodologies (we are not consulting on the appropriateness of analysis techniques or models, e.g. ANCON noise modelling system)

CONSULTATION RESPONSE MANAGEMENT

4.17. The feedback channels for consultees will be as follows:

- Web based questionnaire with multiple choice and free text entry
- Postal address to be provided for postal response
- Feedback forms at public roadshows

4.18. All responses will be logged in a database and categorised according to “theme”. Consultation responses will be analysed and new information contained within responses will be logged.

4.19. GPA will use the following guidelines for acknowledgment and replies to questions raised by consultees during the consultation:

- Online responses to the consultation will be automatically acknowledged.
- Postal responses and feedback forms will not be acknowledged.
- Where we consider that additional information is necessary for respondents to provide their representations, whether it comes to our attention through a question from a consultee or through other channels, we will publish the additional information in the FAQs section of the consultation website, so that

the information is available to everyone. Potentially affected stakeholders will be notified if additional information is published including, if applicable, any consultee that identified the need for additional information in their response.

4.20. Late responses will be logged and stored but not analysed. In individual cases GPA may consider there to be sufficient justification to accept and respond to late feedback, however this will be at GPA's discretion.

4.21. The web response facility will be closed at the end of the consultation period.

4.22. Postal responses considered "late" will be:

- Any postal response where the respondent has dated the letter after the end of the consultation period, or
- Any response received more than 7 days after the end of the consultation period.

4.23. Once the consultation period has closed, a feedback document will be published. The feedback document will give statistical analysis of the responses and summarise all the themes and the GPA responses to any issues that are raised. The feedback document will be available for download via the GPA website. A second design report will be published as part of the ACP submission, detailing the design being submitted and making reference to changes that have been made to take account of consultation feedback.

4.24. All responses to the consultation exercise will be provided to SARG in full as part of the ACP documentation set, except where the respondent requests anonymity in which their personal details will be removed.

5. ENVIRONMENTAL ANALYSIS

5.1. While the primary goal of this project is to mitigate the impact of the DVOR Rationalisation project, GPA will endeavour to reduce the environmental impact of their procedures wherever possible.

5.2. New routes will be designed to minimise fuel burn while avoiding overflying new populations at low levels wherever possible.

5.3. The revised departure routes will facilitate shorter routings for aircraft departing to the East or to the West. This will reduce the amount of tactical controller intervention required and is expected to result in an increase in continuous climb operations (CCOs).

5.4. It is anticipated that the proposed changes will provide more predictable arrival routes, enabling aircraft to plan their descent more efficiently. This is expected to result in an increase in continuous descent operations (CDOs).

5.5. It was noted that GPA may need to analyse historical data to determine the current CCO and CDO performance. Level restrictions on the new routes will be designed to accommodate CCOs and CDOs as far as possible.

5.6. Noise analysis of the proposed routes will be conducted by ERCD using the ANCON noise model. 57 dBA L_{eq} contours and SEL footprints will be produced for the current situation, the situation immediately following the airspace change, and the situation five years after the airspace change.

5.7. CO_2 emissions analysis will be carried out using the Aviation Environmental Design Tool (AEDT).[6]

5.8. A detailed list of the environmental requirements and the GPA proposal for fulfilling them is provided at Annex A.

6. IMPLEMENTATION

6.1. The timeline for this project is driven by the decommissioning date for the TRN VOR. The exact date has yet to be confirmed but is likely to be in Q1/Q2 2018.

6.2. The airspace change will be implemented in a single transition on or before the date the TRN VOR is decommissioned.

6.3. The CAA informed GPA that based on the number of procedures being proposed; this airspace change would not require a "double AIRAC" cycle for promulgation and could be published in a single cycle instead.

6.4. The deadline for ACP approval and AIP Change Request submission for AIRAC 04/2018 (effective 29/03/2018) is 29 December 2017. The ACP would therefore have to be submitted to the CAA by 01 September 2017 in order to meet this deadline. These deadlines were noted by the GPA team who undertook to keep in contact with CAA on this aspect of the timeline.

7. CLARIFICATIONS

7.1. The CAA asked whether there was contingency time in the project plan to accommodate any delays encountered during the process. GPA indicated that the project plan had been developed to target the earliest possible decommissioning date for the TRN VOR and did not have any contingency time available. However any delay to the decommissioning of the TRN VOR would result in contingency time in the schedule which could either be used to relieve some of the pressure in the project plan or held to mitigate any unforeseen delays to the process.

7.2. The CAA asked whether the DVOR Rationalisation Project had communicated its plans clearly to GPA. GPA responded that they were still awaiting a final confirmed date for the decommissioning of the TRN VOR. The CAA indicated that they would ask the DVOR Rationalisation Project to clarify their plans to GPA as soon as possible.

7.3. The CAA asked about the proposed changes to routes in the vicinity of XXXXXX and XXXXXX. In particular whether the adjustment to the nominal track would be adequate to provide a noticeable noise benefit to XXXXXX and whether the adjustment would cause a noticeable noise impact to XXXXXX. GPA indicated that the intention of this proposed change was to reduce the noise impact to some of the residents of XXXXXX

[6] We had incorrectly stated that the CO_2 emissions analysis would be carried out using KERMIT in our framework briefing presentation.

by routing flights over a more sparsely populated area. However, no noise analysis or impact assessment had yet been done, and these would form part of the consultation process.

7.4. The CAA asked how often runway 21 is used as the proposed final approach track appeared to pass over XXXXXX. If the final approach track for the RNAV(GNSS) approach is being aligned with the runway this will be a change from the alignment of the existing NDB approach procedure. If the descent gradient is also being reduced from 6.39% to 6.12% this could have the result of moving and increasing the noise from arrivals. GPA acknowledged this issue, but indicated that the likely track change will be small and that XXXXXX is already overflown by arrivals to runway 21. They added that 21 is primarily used when there are strong southerly winds. However the question was noted and the GPA team undertook to ensure that this is addressed within noise analysis and consultation.

7.5. The CAA asked how frequently training flights fly a full missed approach. If the missed approaches are redesigned to terminate at the TRN hold rather than the PIK hold this could result in an increase in the traffic in the TRN hold. The GPA team advised that this is infrequent.

7.6. The CAA asked whether GPA had involved any community representatives in the design process so far. GPA responded that they had only engaged with aviation stakeholders so far and that their intention was to use the consultation as the method for gaining community feedback.

7.7. The CAA suggested that GPA consider noise as a factor up to 7000ft AGL rather than AMSL. They may therefore have to consider a slightly larger area for noise analysis if there is any high ground in the vicinity of the aerodrome. This suggestion was noted by the GPA team.

7.8. The CAA questioned whether GPA would be able to achieve any CCO and CDO improvements when taking the Glasgow International airspace change into consideration. GPA responded that most arrival and departure routes are from / to the South and remain outside Glasgow International's airspace. They are therefore not expected to be constrained by the Glasgow International airspace change. Arrivals to runway 21 may not support CDO due to the limited airspace available to the North of the airport.

7.9. A discussion was held regarding the noise analysis aspects, and the optimal way for these to be portrayed to the public. The CAA indicated that a number of methodologies have been used and suggested that GPA might want to consider providing additional environmental information such as spot point or average noise or the number of overflights each route is likely to generate for consultation.

7.10. The CAA advised GPA to consider the impact of the airspace change on tranquillity, particularly at any National Scenic Areas, National Parks, Conservation Areas, etc. While there is no specific definition or metric available for tranquillity, a subjective analysis could be considered.

7.11. The CAA asked whether GPA had discussed the NAS adaptation build schedule in relation to the proposed link routes. NAS adaptations are normally delivered every

third AIRAC cycle. The CAA advised GPA to ensure that the new link routes were submitted for NAS adaptation in enough time to ensure the new routes are available before the airspace change becomes effective. This point was noted by the GPA team, and they undertook to contact the PLAS team to ensure these activities are planned into the GPA timeline.

ANNEX A: ENVIRONMENTAL REQUIREMENTS

This section details the proposal to fulfil the required elements of an Environmental Assessment to be submitted for the Edinburgh ACP airspace development based upon CAP 725 – Appendix B (15 March 2016).

The requirements in this section are grouped by the degree of compliance expected from airspace change sponsors in following this guidance:

- **Must** – change sponsors are to meet the requirements in full when this term is used.
- **Should** – change sponsors are to meet these requirements unless there is sufficient reason which must be agreed in writing with the SARG case officer and the circumstances recorded in the formal airspace change documentation.
- **May** – change sponsors decide whether this guidance is appropriate to the circumstances of the airspace change.

TABLE A1 – SPONSORS **MUST** PROVIDE:

Requirement	Section	Para.	Page	GPA proposed offering
The environmental impact of an airspace change **must** be considered from the outset. The Change Sponsor **should** discuss their general intentions for environmental assessment with the SARG Project Leader and, if necessary, with ERCD staff who will provide expert advice. These discussions **should** take place before any form of external consultation.	General	B.10	68	This was discussed at the framework briefing.
A technical document containing a comprehensive and complete description of the airspace change including the environmental impact will be required and must be produced for all airspace changes.	General	B.24	72	This will be provided for the GPA consultation and ACP.
The airspace design **must** take account of the altitude-based priorities set out in the DfT's Guidance (2014, paragraphs 4.1 & 4.2). Consultation and proposal documentation **must** therefore demonstrate how each priority for each of the altitude bands has been considered and addressed.	General	B.27	73	This will be provided for the GPA consultation and ACP.
The environmental assessment **must** include a high quality paper diagram of the airspace change in its entirety as well as supplementary diagrams illustrating different parts of the change. This diagram **must** show the extent of the airspace change in relation to known geographical features and centres of population.	Airspace Design	B.28	73	This will be provided for the GPA consultation and ACP.

Requirement	Section	Para.	Page	GPA proposed offering
The Change Sponsor **must** provide SARG with a complete set of coordinates describing the proposed change in electronic format using World Geodetic System 1984 (WGS 84). In addition, the Change Sponsor **must** supply these locations in the form of Ordnance Survey (OS) national grid coordinates.	Airspace Design	B.31	74	This will be provided for the GPA ACP.
This electronic version **must** provide a full description of the horizontal and vertical extent of the zones and areas contained within the airspace change. It **must** also include coordinates in both WGS 84 and OS national grid formats that define the centre lines of routes including airways, standard instrument departures (SID), standard arrival routes (STAR), noise preferential routes (NPR) or any other arrangement that has the effect of concentrating traffic over a particular geographical area.	Airspace Design	B.31	74	This will be provided for the GPA ACP.
Change Sponsors **must** provide a description of the vertical distribution of traffic in airways, SIDs, STARs, NPRs and other arrangements that have the effect of concentrating traffic over a particular geographical area.	Airspace Design	B.33	75	This will be provided for the GPA consultation and ACP.
Change Sponsors **must** include traffic forecasts in their environmental assessment.	Traffic Forecasts	B.36	76	This will be provided for the GPA consultation and ACP.
Information on air traffic **must** include the current level of traffic using the present airspace arrangement and a forecast. The forecast will need to indicate the traffic growth on the different routes contained within the airspace change volume.	Traffic Forecasts	B.36	76	This will be provided for the GPA consultation and ACP.
The sources used for the forecast **must** be documented.	Traffic Forecasts	B.36	76	This will be provided for the GPA consultation and ACP.
Change Sponsors **must** produce L_{eq}, 16 hours noise exposure contours for airports where the proposed option entails changes to departure and arrival routes for traffic below 4,000 feet agl based on the published minimum departure and arrival gradients. Under these circumstances, at least three sets of contours **must** be produced: • Current situation – these may already be available as part of the airport's regular environmental reporting or as part of the airport master plan; • Situation immediately following the airspace change; and • Situation after traffic has increased under the new arrangements (typically five years after implementation although this **should** be discussed with the SARG Project Leader).	Noise	B.45	80	These will be provided where applicable for the GPA consultation and ACP. (Where changes to traffic patterns below 4000ft agl are proposed.)

Requirement	Section	Para.	Page	GPA proposed offering
Contours **must** be portrayed from 57 dBA L_{eq}, 16 hours at 3 dB intervals.	Noise	B.49	81	These will be provided where applicable for the GPA consultation and ACP. (See ref B.45 above)
SEL footprints **must** be used when the proposed airspace includes changes to the distribution of flights at night below 7,000 feet agl and within 25 km of a runway. Night is defined here as the period between 2300 and 0700 local time. If the noisiest and most frequent night operations are different, then footprints **should** be calculated for both of them. A separate footprint for each of these types **should** be calculated for each arrival and departure route. SEL footprints **may** be used when the airspace change is relevant to daytime only operations. If SEL footprints are provided, they **should** be calculated at both 90 dBA SEL and 80 dBA SEL.	Noise	B.57	84	These will be provided where applicable for the GPA consultation and ACP.
If Change Sponsors wish to use the L_{DEN} metric they **must** do so in a way that is compliant with the technical aspects of the Directive and any supplementary instructions issued by DEFRA. Change Sponsors **should** note the requirement for noise levels to be calculated as received at 4 metres agl. In particular, the guidance on how contours are to be portrayed, as described in the section dealing with L_{eq} contours, applies. Calculations **should** include terrain adjustments as described in the section on L_{eq} contours.	Noise	B.70	87	GPA does not intend to use the L_{DEN} metric.
Change Sponsors **must** demonstrate how the design and operation of airspace will impact on emissions. The kinds of questions that need to be answered by the sponsor are: • Are there options which reduce fuel burn in the vertical dimension, particularly when fuel burn is high e.g. initial climb? • Are there options that produce more direct routeing of aircraft, so that fuel burn is minimised? • Are there arrangements that ensure that aircraft in cruise operate at their most fuel-efficient altitude, possibly with step-climbs or cruise climbs?	Climate Change	B.103	97	This will be provided for the GPA consultation and ACP.
Change Sponsors **must** produce information on local air quality only where there is the possibility of pollutants breaching legal limits following the implementation of an airspace change.	Local Air Quality	B.116	101	Not required for GPA ACP as traffic will not be affected below 1000ft agl.

Requirement	Section	Para.	Page	GPA proposed offering
If Change Sponsors include a calculation of NPV then they **must** show financial discount rates, cash flows and their timings and any other assumptions employed. The discount rate **must** include that recommended in the Green Book currently set at 3.5%. Additionally, other discount rates **may** be used in a sensitivity analysis or because they are representative of realistic commercial considerations.	Economic Valuation	B.127	104	GPA does not intend to conduct an economic appraisal of the environmental impact.

TABLE A2 – SPONSORS **SHOULD** PROVIDE:

Requirement	Section	Para.	Page	GPA proposed offering
In order to ensure that the various areas for environmental assessment by SARG are addressed, Change Sponsors **should** submit the documentation with the following clearly defined sections: • Description of the airspace change (refer to 28 – 33); • Traffic forecasts (refer to 34 – 38); • An assessment of the effects on noise (refer to Sections 4 and 5); • An assessment of the change in fuel burn/CO_2 (refer to Section 6); • An assessment of the effect on local air quality (refer to Section 7); and • An economic valuation of environmental impact, if appropriate (refer to Section 9).	General	B.2	66	This will be provided for the GPA consultation and ACP. This will be provided for the GPA consultation and ACP. This will be provided for the GPA consultation and ACP. This will be provided for the GPA consultation and ACP. GPA does not intend to perform Local Air Quality analysis. GPA does not intend to conduct an economic appraisal of the environmental impact.
Environmental assessment **should** set out the base case or current situation so that changes can be clearly identified.	General	B.19	70	This will be provided for the GPA consultation and ACP.

Requirement	Section	Para.	Page	GPA proposed offering
Environmental assessment **should** follow the Basic Principles listed in CAP 725.	General	B.20	71	These principles have been borne in mind when providing the detailed response to the requirements listed in this set of tables. GPA seeks SARG agreement in principle to this document as confirmation that the GPA interpretation is appropriate.
The proposal **should** consider and assess more than one option then demonstrate why the selected option meets safety and operational requirements and will generate an overall environmental benefit or, if not, why it is being proposed.	Airspace Design	B.29	74	The proposal will present a number of options which have been considered.
Change Sponsors **should** provide indications of the likely lateral dispersion of traffic about the centre line of each route. This **should** take the form of a statistical measure of variation such as the standard deviation of lateral distance from the centre line for given distances along track in circumstances where the dispersion is variable.	Airspace Design	B.32	74	An illustration of the current day dispersal of traffic streams will be provided in the form of trajectory density plots of current radar data. It is assumed that the graphical representation described above will suffice given the nature of this development; GPA does not intend to provide statistical descriptions of track dispersal.
For departing traffic, Change Sponsors **should** produce profiles of the most frequent type(s) of aircraft operating within the airspace. They **should** show vertical profiles for the maximum, typical and minimum climb rates achievable by those aircraft.	Airspace Design	B.33	75	The vertical profiles for aircraft achieving the maximum, minimum and typical climb rates will be apparent from the trajectory density plots.
A vertical profile for the slowest climbing aircraft likely to use the airspace **should** also be produced.	Airspace Design	B.33	75	The vertical profile for slow climbing aircraft will be apparent from the trajectory density plots.
All profiles **should** be shown graphically and the underlying data provided in a spreadsheet with all planning assumptions clearly documented.	Airspace Design	B.33	75	Profiles will be shown as trajectory density plots. Planning assumptions will be documented.
Change Sponsors **should** explain how consideration of CDO and LPLD is taken into account within their Proposals	Airspace Design	B.34	75	The proposal will explain how these have been considered.

Requirement	Section	Para.	Page	GPA proposed offering
Typically, forecasts **should** be for five years from the planned implementation date of the airspace change. There **may** be good reasons for varying this – for example, to use data that has already been made available to the general public at planning inquiries, in airport master plans or other business plans.	Traffic Forecasts	B.37	76	Forecasts for five years from planned implementation date will be provided.
Traffic forecasts **should** contain not only numbers but also types of aircraft. Change Sponsors **should** provide this information by runway (for arrivals/departures) and/or by route with information on vertical distribution by height/altitude/flight level as appropriate.	Traffic Forecasts	B.39	77	This will be provided for the GPA consultation and proposal.
The contours **should** be produced using either the UK Aircraft Noise Contour Model (ANCON) or the US Integrated Noise Model (INM) but ANCON **must** be used when it is currently in use at the airport for other purposes.	Noise	B.47	81	Noise contours where required will be generated using ANCON model.
Terrain adjustments **should** be included in the calculation process (i.e. the height of the air routes relative to the ground are accounted for).	Noise	B.48	81	Terrain adjustments will be included.
Contours **should not** be produced at levels below 54 dBA L_{eq}, 16 hours because this corresponds to generally low disturbance to most people, and indeed aircraft noise modelling at such levels is unlikely to generate accurate and reliable results.	Noise	B.49	81	L_{eq} contours will only be produced for 57 dBA and above.
A table **should** be produced showing the following data for each 3 dB contour interval: • Area (km2); and • Population (thousands) – rounded to the nearest hundred.	Noise	B.50	81	This will be provided where applicable.

<table>
<tr><th>Requirement</th><th>Section</th><th>Para.</th><th>Page</th><th>GPA proposed offering</th></tr>
<tr><td>It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant:
This table should show cumulative totals for areas/populations/households. For example, the population for 57 dBA will include residents living in all higher contours;
The source and date of population data used should be noted adjacent to the table. Population data should be based on the latest available national census as a minimum but more recent updated population data is preferred;
The areas calculated should be cumulative and specify total area within each contour including that within the airport perimeter.</td><td>Noise</td><td>B.51</td><td>82</td><td>This will be provided where applicable.</td></tr>
<tr><td>L_{eq} contours for assessment should be provided to SARG in both of the following formats:
Electronic files in the form of a comma delimited ASCII text file containing three fields as an ordered set (i.e. coordinates should be in the order that describes the closed curve) defining the contours in Ordnance Survey National Grid in metres:<table><tr><th>Field</th><th>Field name</th><th>Units</th></tr><tr><td>1</td><td>Level</td><td>dB</td></tr><tr><td>2</td><td>Easting</td><td>Six figure easting OS national grid reference (metres)</td></tr><tr><td>3</td><td>Northing</td><td>Six figure northing OS national grid reference (metres)</td></tr></table>
Paper version overlaid on a good quality 1:50 000 Ordnance Survey map. However, it may be more appropriate to present contours on 1:25 000 or 1:10 000 Ordnance Survey maps.</td><td>Noise</td><td>B.52</td><td>82</td><td>These will be provided where applicable.</td></tr>
</table>

<table>
<tr><th>Requirement</th><th>Section</th><th>Para.</th><th>Page</th><th>GPA proposed offering</th></tr>
<tr><td>SEL footprints for assessment should be provided to SARG in both of the following formats:
Electronic files in the form of a comma delimited ASCII text file containing three fields as an ordered set (i.e. coordinates should be in the order that describes the closed curve) defining the footprints in Ordnance Survey National Grid in metres:<table><tr><th>Field</th><th>Field name</th><th>Units</th></tr><tr><td>1</td><td>Level</td><td>dB</td></tr><tr><td>2</td><td>Easting</td><td>Six figure easting OS national grid reference (metres)</td></tr><tr><td>3</td><td>Northing</td><td>Six figure northing OS national grid reference (metres)</td></tr></table>
Paper version overlaid on a good quality 1:50 000 Ordnance Survey map. However, it may be more appropriate to present footprints on 1:25 000 or 1:10 000 Ordnance Survey maps.</td><td>Noise</td><td>B.58</td><td>84</td><td>These will be provided where applicable.</td></tr>
<tr><td>As people become familiar with the application of L_{DEN} contours following publication of the 2006 contours in June 2007, it is possible that Change Sponsors will be expected to produce L_{DEN} contours in circumstances where it is appropriate to produce L_{eq} contours. However, it should be noted that L_{DEN} is supplementary to L_{eq}, 16 hours and not a replacement for it.</td><td>Noise</td><td>B.69</td><td>87</td><td>GPA does not intend to use the L_{DEN} metric.</td></tr>
<tr><td>An exception regarding L_{DEN} contours is the production of a table showing numerical data on area, population and households which should be presented by band (e.g. 55 dBA to 60 dBA) rather than cumulatively as for UK L_{eq} contours (e.g. >55 dBA). This is a Directive requirement.</td><td>Noise</td><td>B.71</td><td>88</td><td>GPA does not intend to use the L_{DEN} metric.</td></tr>
<tr><td>There is potential for confusion between the application of long standing current practice with L_{eq} contours and implementation of the Directive requirements. Change Sponsors should make it clear where areas/counts are by band or cumulative.</td><td>Noise</td><td>B.71</td><td>88</td><td>GPA does not intend to use the L_{DEN} metric.</td></tr>
</table>

Requirement	Section	Para.	Page	GPA proposed offering
Change Sponsors **should** estimate the total annual fuel burn/mass of carbon dioxide in metric tonnes emitted for the current situation, the situation immediately following the airspace change and the situation after traffic has increased under the new arrangements – typically five years after implementation. This set of scenarios needs to be discussed with the SARG Project Leader. Sponsors **should** produce estimates for each airspace option considered.	Climate Change	B.107	98	This will be provided for the GPA consultation and ACP. GPA proposes to provide a typical track comparison for major flows before and after the change. All flight profiles that are affected by the change will be modelled. An estimation of the system wide change will be provided by aggregating the effects to the individual flows based on traffic numbers.
Change Sponsors **should** provide the input data for their calculations including any modelling assumptions made. They **should** state details of the aircraft performance model used including the version numbers of software employed.	Climate Change	B.108	98	This will be provided for the GPA consultation and ACP.
Where the need to provide additional airspace capacity, reduce delays or mitigate other environmental impact results in an increase in the total annual fuel burn/ mass of carbon dioxide in metric tonnes between the current situation and the situation following the airspace change, Change Sponsors **should** provide justification.	Climate Change	B.109	99	This will be provided for the GPA consultation and ACP.
Concentrations **should** be portrayed in micrograms per cubic metre ($\mu g.m^{-3}$). They **should** include concentrations from all sources whether related to aviation and the airport or not. Three sets of concentration contours **should** be produced: • Current situation – these may already be available as part of the airport's regular environmental reporting or as part of the airport master plan; • Situation immediately following the airspace change; and • Situation after traffic has increased under the new arrangements – typically five years after implementation although this **should** be discussed with the SARG Project Leader.	Local Air Quality	B.116	101	GPA does not intend to perform Local Air Quality analysis.

Requirement	Section	Para.	Page	GPA proposed offering
Contours for assessment **should** be provided to SARG in similar formats to those used for noise exposure contours. Where Change Sponsors are required to produce concentration contours they **should** also produce a table showing the following data for concentrations at 10 $\mu.m^{-3}$ intervals: • Area (km2); and • Population (thousands) – rounded to the nearest hundred.	Local Air Quality	B.117	101	GPA does not intend to perform Local Air Quality analysis as traffic will not be affected below 1000ft agl.
The source and date of population data used **should** be noted adjacent to the table. Population data **should** be based on the latest available national census as a minimum but more recent updated population data is preferred.	Local Air Quality	B.118	102	GPA does not intend to perform Local Air Quality analysis.
If Change Sponsors wish to use either of these techniques (revealed preference and stated preference), they **should** seek specialist advice from environmental economists with expertise in assessing aircraft noise.	Economic Valuation	B.125	105	GPA does not intend to conduct an economic appraisal of the environmental impact.

TABLE A3 – SPONSORS **MAY** PROVIDE:

Requirement	Section	Para.	Page	GPA proposed offering
It is considered unlikely that airspace changes will have a direct impact on animals, livestock and biodiversity. However, Change Sponsors **should** remain alert to the possibility and **may** be required to include these topics in their environmental assessment.	General	B.18	70	GPA proposes that the nature of this airspace change will not affect flora and fauna.
It **may** be appropriate for Change Sponsors to produce a more general description of the airspace change and the rationale for its proposal in an easy-to-read style for public consumption. If such an additional separate document is produced, it **must** contain details of the environmental impact of the proposal.	General	B.24	72	Consultation material will be easy-to-read and will contain environmental impact analysis.
Change Sponsors **may** supply the outputs from simulation to demonstrate the lateral dispersion of traffic within the proposed airspace change or bring forward evidence based on actual performance on a similar kind of route. It may be appropriate for Change Sponsors to explain different aspects of dispersion e.g. dispersion within NPRs when following a departure routeing and when vectoring – where the aircraft will go and their likely frequency.	Airspace Design	B.32	74	This may be provided for the GPA ACP.

Requirement	Section	Para.	Page	GPA proposed offering
In planning changes to airspace arrangements, Change Sponsors **may** have conducted real and/or fast time simulations of air traffic for a number of options.	Traffic Forecasts	B.35	75	This will be done as part of the development process for the GPA ACP. Evidence will be provided for the GPA consultation and ACP.
It **may** also be appropriate to provide forecasts further into the future than five years: for example, extensive airspace changes or where traffic is forecast to grow slowly in the five-year period but faster thereafter.	Traffic Forecasts	B.37	76	Forecasts beyond five years will not be included.
It **may** be appropriate for Change Sponsors to outline the key factors [affecting traffic forecasts] and their likely impact. In these circumstances, Sponsors **should** consider generating a range of forecasts based on several scenarios that reflect those uncertainties – this would help prevent iterations in the assessment process.	Traffic Forecasts	B.38	76	A single traffic forecast will be used for the GPA ACP.
Types of aircraft **may** be given by aircraft type/engine fit using ICAO type designators. If this is not a straightforward exercise, then designation by the UK Aircraft Noise Contour Model (ANCON) types or by seat size categories would be acceptable.	Traffic Forecasts	B.39	77	Aircraft type data will be provided in the GPA consultation and ACP.
Change Sponsors **may** include the 54 dBA L_{eq}, 16 hours contour as a sensitivity analysis but this level has no particular relevance in policy making.	Noise	B.49	81	L_{eq} contours will only be produced for 57 dBA and above.
It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant: • Where Change Sponsors wish to exclude parts of the area within contours, for example, excluding the portion of a contour falling over sea – this **may** be shown additionally and separately from the main table of data; and • Sponsors **may** include a count of the number of schools, hospitals and other special buildings within the noise exposure contours.	Noise	B.51	82	This will be provided where applicable.
L_{eq} contours for a general audience **may** be provided overlaid on a more convenient map (e.g. an ordinary road map with a more suitable scale for publication in documents). The underlying map and contours **should** be sufficiently clear for an affected resident to be able to identify the extent of the contours in relation to their home and other geographical features. As such, the underlying map **must** show key geographical features, e.g. street, rail lines and rivers.	Noise	B.54	83	L_{eq} contours will be provided overlaid on a good quality Ordnance Survey map.

Requirement	Section	Para.	Page	GPA proposed offering
SEL footprints for a general audience **may** be provided overlaid on a more convenient map (e.g. an ordinary road map with a more suitable scale for publication in documents). The underlying map and footprints **should** be sufficiently clear for an affected resident to identify the extent of the footprints in relation to their home or other geographical features. Hence, this underlying map **must** show key geographical features, e.g. streets, rail lines and rivers. Calculations **should** include terrain adjustments as described in the section on L_{eq} contours.	Noise	B.59	84	These will be provided where applicable.
Change Sponsors **may** use the percentage highly annoyed measure in the assessment of options in terminal airspace to supplement L_{eq}. If they choose to use this method, then the guidance on population data for noise exposure contours set out **should** be followed. Sponsors **should** use the expression and associated results in calculating the number of those highly annoyed. If they wish to use a variant method, then this would need to be supported by appropriate research references.	Noise	B.66	86	GPA does not intend to use the percentage highly annoyed measure.
Change Sponsors **may** use the L_{DEN} metric but, if they choose to do so, they **must** still produce the standard L_{eq}, 16 hours contours as previously described.	Noise	B.68	87	GPA does not intend to use the L_{DEN} metric.
Change Sponsors **may** use the L_{Night} metric within their environmental assessment and consultation. If they do so, SEL footprints **must** also be produced. Calculations **should** include terrain adjustments as described in the section on L_{eq} contours.	Noise	B.74	88	GPA does not intend to use the L_{Night} metric.
Change Sponsors **may** use difference contours if it is considered that redistribution of noise impact is a potentially important issue.	Noise	B.79	89	GPA does not intend to use difference contours.
Change Sponsors **may** use PEI as a supplementary assessment metric.	Noise	B.86	92	GPA does not intend to use PEI.
Change Sponsors **may** use the AIE metric as a supplementary assessment metric. If the sponsor uses PEI as a supplementary metric then AIE **should** also be calculated as both metrics are complementary.	Noise	B.88	92	GPA does not intend to use the AIE metric.
Change Sponsors **may** vary the information displayed in Operations Diagrams providing that the diagram is a fair and accurate representation of the situation portrayed.	Noise	B.89	92	Noted.
Change Sponsors **may** use maximum sound levels (L_{max}) in presenting aircraft noise footprints for public consumption if they think that this would be helpful. This does not replace the obligation to comply with the requirement to produce sound exposure level (SEL) footprints, where applicable.	Noise	B.96	95	GPA will consider using L_{max} footprints in presenting aircraft noise footprints for public consumption.

Requirement	Section	Para.	Page	GPA proposed offering
Change Sponsors **may** produce diagrams portraying maximum sound event levels (L_{max}) for specific aircraft types at a number of locations at ground level beneath the airspace under consideration. This may be helpful in describing the impact on individuals. It is usual to include a table showing the sound levels of typical phenomenon e.g. a motor vehicle travelling at 30 mph at a distance of 50 metres.	Noise	B.97	95	GPA will consider using L_{max} spot point levels at specific locations.
Change Sponsors **may** wish to conduct an economic appraisal of the environmental impact of the airspace change, assessing the economic benefits generated by the change. If undertaken, this **should** be conducted in accordance with the guidance from HM Treasury in the Green Book (HM Treasury, 2003).	Economic Valuation	B.125	103	GPA does not intend to conduct an economic appraisal of the environmental impact.