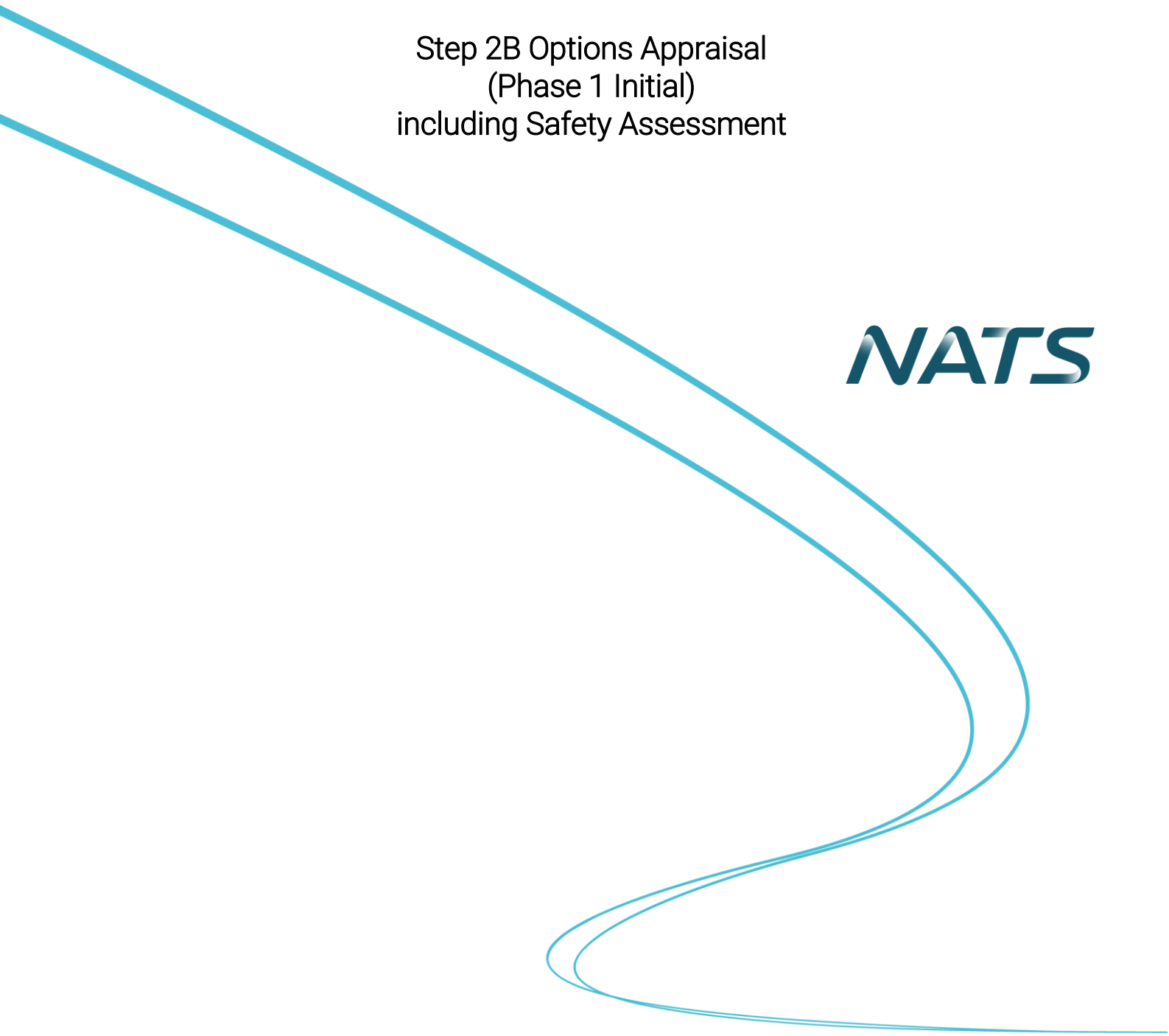
Swanwick Airspace Improvement Programme
Airspace Development 5
LAC West – ATS Route Connectivity Improvements

SAIP AD5 LAC West Connectivity

Gateway documentation:
Stage 2 Develop and Assess

Step 2B Options Appraisal
(Phase 1 Initial)
including Safety Assessment



Roles

Action	Role	Date
Produced	**Airspace Change Specialist** NATS Future Airspace and ATM	16/11/2018
Reviewed Approved	**ATC Lead** NATS Swanwick Development	16/11/2018
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Contents

1. Introduction

This document forms part of the document set in accordance with the requirements of the CAP1616 airspace change process.

This document aims to provide adequate evidence to satisfy
Stage 2 Develop and Assess Gateway, Step 2B Options Appraisal (Phase 1 Initial), including Safety Assessment.

Previous documents have reduced the number of design concepts to a shortlist of four.

2. Level 1 vs Level 2, and scalability

2.1 The following options in this proposal would technically be a Level 1 airspace changes under CAP1616. This is due to the proposed CAS volume close to EGBB, with a base of FL65. This would not change commercial aircraft traffic patterns below 7,000ft but could, potentially theoretically, change some GA traffic patterns, outside CAS, below 7,000ft.

2.2 We analysed radar data for June 2018 in the vicinity of the lowest proposed CAS volume. In that region, 94% (4,904) relevant transponding aircraft operated at FL65 or lower. This means only 6% (284) such flights would be affected by this proposed change. We contend that the actual impact is likely to be even lower, as the proposal would only affect GA flights during FUA hours of activation, excluding all flights operating in core weekday daytime hours. The numbers operating outside the peak of summer would also likely be far smaller.

2.3 Only the transponder codes of aircraft outside of controlled airspace (CAS), not participating in an air traffic service, are recorded, hence analysis of aircraft types is not possible. However typically the types of aircraft operating at the levels in question, outside CAS, would be small, private, piston-engined General Aviation aircraft.

2.4 The impacts of implementing CAS at FL65 could be one of three possibilities:

- Such flights descend to cross the base at FL65 or thereabouts;
- They route around the new CAS at their previous level (no change in noise impact); or
- They request a clearance from ATC to enter the proposed CAS at their current level (above FL65, no change in noise impact).

It is impossible to predict what proportion of the potential maximum 6% would choose which of these courses of action.

2.5 Describing the potential noise or visual impacts to people on the ground of a potential descent to FL65 of a small number of outside-CAS light aircraft traffic, types unknown, is not realistically possible. The greatest likelihood is that changes to such noise or visual impacts would not be discernible.
94% of outside-CAS flights in the region are below FL65 and would remain so, which would be far more noticeable to an observer on the ground than some of the 6% of flights at higher levels which would descend to c.FL65, the rest of the 6% could maintain the same level as per the previous paragraph.

2.6 We assess that noise metrics are not possible to measure given this scenario (or are well below the thresholds usually prescribed for noise impact studies). Thus there would be no discernible change in impact on the subject of tranquillity and also no discernible change in impact on the subject of biodiversity. There are no changes below 1,000ft and therefore no impacts on local air quality.

2.7 We contend that the environmental analysis requirements for this proposal should be scaled equivalent to a Level 2 change, i.e. CO_2 emissions only. The following Options Appraisal (Phase 1 Initial) has been written in this manner.

3. Options Appraisal (Phase 1 Initial)

3.1 The baseline (do nothing) option does not achieve any kind of improvement, modernisation or systemisation. Design principles are met by default, i.e. 'no change' hence their evaluations are mostly amber (partially met).

3.2 The final four combined option concepts all focus on the following areas of airspace development:

3.2.1 Establish appropriate CAS and ATS Routes for EGBB arrivals and departures via the MOSUN area

3.2.2 Provision of offload route(s) and appropriate CAS for some traffic inbound to EGLL

3.2.3 Establish or revise a number of high-level ATS Routes in the West End Sector Group

3.2.4 Amend the boundary of TRA 002, in conjunction with the MoD

3.3 The four options differ as described below:

3.3.1 Combined Concept 1A:
a larger Class D volume near EGBB, with Class C for the other volumes;
active evenings/ overnights/ mornings, 7 days a week

3.3.2 Combined Concept 1B:
a larger Class D volume near EGBB; with Class C for the other volumes;
active evenings/ overnights/ mornings during weekdays and active H24 at weekends

3.3.3 Combined Concept 2A:
a smaller Class D volume near EGBB; with Class C for the other volumes;
active evenings/ overnights/ mornings, 7 days a week

3.3.4 Combined Concept 2B:
a smaller Class D volume near EGBB; with Class C for the other volumes;
active evenings/ overnights/ mornings during weekdays and active H24 at weekends

3.4 The following four tables were based on key analyses described in CAP1616 Table E2 on pages 160-162. These tables compare the option with the baseline do-nothing scenario and with other options.

3.5 Combined Concept 1A

A larger Class D volume near EGBB, with Class C for the other volumes
EGBB/EGLL routes/CAS active evenings/ overnights/ mornings, 7 days a week

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	N/A	Changes to commercial air traffic patterns are all above 7,000ft. The potential noise impacts caused by a small number of non-commercial GA-type flights, descending to FL65 at certain times under certain conditions, is neither measurable nor describable.
Communities	Air quality	N/A	No changes below 1,000ft
Wider society	Greenhouse gas impact	Monetise and quantify	The proposed changes would result in a beneficial net saving in fuel burn of -2,963T in 2020, for the associated regions. In 2030 there would be an increased forecast fuel burn saving of -3,502T for the year. The impact assessment indicates that c.267,000 flights would be impacted by the change by 2030. The forecast used was NATS 2017 Annual Base Forecast to produce the annualised numbers. WebTAG was used to assess the greenhouse gas impact over time from the proposed changes, for the traded sector. This concept would yield a positive Net Present Value which reflects a benefit i.e. a CO_2 emissions reduction. There would be a reduction of CO_2 in the opening year (2020) of -9,423T which would further decrease to -113,073T over a 60 year appraisal period. WebTAG was also used to show the overall Net Present Value of CO_2 emissions reduction for the traded sector was calculated at £1,235,041. Traded and non-traded flights were categorised as intra-EU for traded (72.1%) and all other flights as non-traded (27.9%). These figures were calculated by looking at the origin and destination for UK arrivals, departures and overflights, in 2017. These benefits have arisen from the proposed shorter routes for EGBB arrivals and departures, the new high-level ATS routes, and the EGLL offload route(s) would deliver a small benefit within UK airspace depending on oceanic exit point. The worksheet outputs are shown on page 16 (Appendix A: WebTAG Output for Combined Concepts 1A and 2A)
Wider society	Capacity/ resilience	Qualitative	Increased flightplanning options can allow aircraft operators to avoid capacity-constrained areas. As forecast traffic levels grow, the ability to avoid restrictions by utilising alternative flightplan routes would reduce the likelihood of delay, thus improving the resilience of the wider route network.
General Aviation	Access	N/A	The main change in impact to GA users would be from the most northern block of new proposed CAS, near to EGBB. This has been proposed as having a base of FL65 and up to FL145. It would increase the area Birmingham radar can use for tactical vectoring, for their arrivals and departures. The CAS volume is proposed as Class D which allows for VFR GA transit, partially mitigating the potential impact. The GA use of this airspace is dependent on weather conditions and seasonality, but can be assumed to exist generally throughout the year. This proposal is expected to cause a relatively low impact on GA users with 94% of GA currently flying at FL65 or lower, in this region. Concept 1A would establish a larger CAS volume at low level, but active less often than Concept 1B. All four options could account for the establishment of a notifiable segregation mechanism, if required for planned special events in specific geographical areas, further mitigating potential impacts on GA access.

General Aviation/ commercial airlines	Economic impact from increased effective capacity	Quantify	N/A – there is no forecast increase in air transport movements, passenger numbers of cargo carried as an outcome of this proposal. The flightplan options this proposal would introduce could allow airlines to avoid capacity constrained areas and avoid consequential delay and cost. However this is not quantifiable, and no specific capacity increase is assumed by this proposal.
General Aviation/ commercial airlines	Fuel burn	Monetise	Analysis predicts a decrease in fuel usage and burn, at a saving of £1,588,982 in 2020, increasing to become a saving of £1,877,683 in 2030 (both Net Present Value). This was based on the IATA jet fuel price of 09 Nov 18, at 696.39 USD per tonne converted to GBP at 0.77$/£ and presumes a constant fuel price and exchange rate. The forecast used was NATS 2017 Annual Base Forecast.
Commercial airlines	Training cost	N/A	N/A – it is not proportionate to attempt to quantify airline training costs.
Commercial airlines	Other costs	N/A	N/A – there are no other known costs which would be imposed on commercial aviation.
Airport/ Air navigation service provider	Infrastructure costs	N/A	N/A – there would be no costs attributable to infrastructure.
Airport/ Air navigation service provider	Operational costs	N/A	N/A – this proposal would not lead to changes in operational costs.
Airport/ Air navigation service provider	Deployment costs	Qualitative and quantitative	Approximately 140 LAC/ LTC controllers would require full training. They would require the NATS simulator facility. Support staff are required to run the simulator – data preparation, testing, simulator setup, pseudo pilots, feed sector controllers, training staff, safety analysts, output to be collated into a sim report. Some operational support staff may require briefings. The reduced availability of operational controllers during their conversion training means that operational rostering becomes a factor when considering continuous service delivery. NB NATS cannot quantify training costs for other ANSPs; however their acceptance of this proposal is a high-priority design principle. This proposal cannot be introduced without their agreement and it is assumed that any such training costs are acceptable to these agencies.

3.6 Combined Concept 1B

A larger Class D volume near EGBB with Class C for the other volumes
EGBB/EGLL routes/CAS active evenings/ overnights/ mornings during weekdays and active H24 at weekends

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	N/A	Changes to commercial air traffic patterns are all above 7,000ft. The potential noise impacts caused by a small number of non-commercial GA-type flights, descending to FL65 at certain times under certain conditions, is neither measurable nor describable.
Communities	Air quality	N/A	No changes below 1,000ft
Wider society	Greenhouse gas impact	Monetise and quantify	The proposed changes would result in a beneficial net saving in fuel burn of -3,037T in 2020, for the associated regions. In 2030 there would be an increased forecast fuel burn saving of -3,583T for the year. The impact assessment indicates that c.267,000 flights would be impacted by the change by 2030. The forecast used was NATS 2017 Annual Base Forecast to produce the annualised numbers. WebTAG was used to assess the greenhouse gas impact over time from the proposed changes, for the traded sector. This concept would yield a positive Net Present Value which reflects a benefit i.e. a CO_2 emissions reduction. There would be a reduction of CO_2 in the opening year (2020) of -9,659T which would further decrease to -115,784T over a 60 year appraisal period. WebTAG was also used to show the overall Net Present Value of CO_2 emissions reduction for the traded sector was calculated at £1,264,695. Traded and non-traded flights were categorised as intra-EU for traded (72.1%) and all other flights as non-traded (27.9%). These figures were calculated by looking at the origin and destination for UK arrivals, departures and overflights, in 2017. These benefits have arisen from the proposed shorter routes for EGBB arrivals and departures, the new high-level ATS routes, and the EGLL offload route(s) would deliver a small benefit within UK airspace depending on oceanic exit point. The worksheet outputs are shown on page 17 (Appendix B: WebTAG Output for Combined Concepts 1B and 2B)
Wider society	Capacity/ resilience	Qualitative	Increased flightplanning options can allow aircraft operators to avoid capacity-constrained areas. As forecast traffic levels grow, the ability to avoid restrictions by utilising alternative flightplan routes would reduce the likelihood of delay, thus improving the resilience of the wider route network.
General Aviation	Access	N/A	The main change in impact to GA users would be from the most northern block of new proposed CAS, near to EGBB. This has been proposed as having a base of FL65 and up to FL145. It would increase the area Birmingham radar can use for tactical vectoring, for their arrivals and departures. The CAS volume is proposed as Class D which allows for VFR GA transit, partially mitigating the potential impact. The GA use of this airspace is dependent on weather conditions and seasonality, but can be assumed to exist generally throughout the year. This proposal is expected to cause a relatively low impact on GA users with 94% of GA currently flying at FL65 or lower, in this region. Concept 1B would establish a larger CAS volume at low level, active more often than Concept 1A. All four options could account for the establishment of a notifiable segregation mechanism, if required for planned special events in specific geographical areas, further mitigating potential impacts on GA access.

General Aviation/ commercial airlines	Economic impact from increased effective capacity	Quantify	N/A – there is no forecast increase in air transport movements, passenger numbers of cargo carried as an outcome of this proposal. The flightplan options this proposal would introduce could allow airlines to avoid capacity constrained areas and avoid consequential delay and cost. However this is not quantifiable, and no specific capacity increase is assumed by this proposal.
General Aviation/ commercial airlines	Fuel burn	Monetise	Analysis predicts a decrease in fuel usage and burn, at a saving of £1,628,662 in 2020, increasing to become a saving of £1,921,116 in 2030 (both Net Present Value). This was based on the IATA jet fuel price of 09 Nov 18, at 696.39 USD per tonne converted to GBP at 0.77$/£ and presumes a constant fuel price and exchange rate. The forecast used was NATS 2017 Annual Base Forecast.
Commercial airlines	Training cost	N/A	N/A – it is not proportionate to attempt to quantify airline training costs.
Commercial airlines	Other costs	N/A	N/A – there are no other known costs which would be imposed on commercial aviation.
Airport/ Air navigation service provider	Infrastructure costs	N/A	N/A – there would be no costs attributable to infrastructure.
Airport/ Air navigation service provider	Operational costs	N/A	N/A – this proposal would not lead to changes in operational costs.
Airport/ Air navigation service provider	Deployment costs	Qualitative and quantitative	Approximately 140 LAC/ LTC controllers would require full training. They would require the NATS simulator facility. Support staff are required to run the simulator – data preparation, testing, simulator setup, pseudo pilots, feed sector controllers, training staff, safety analysts, output to be collated into a sim report. Some operational support staff may require briefings. The reduced availability of operational controllers during their conversion training means that operational rostering becomes a factor when considering continuous service delivery. NB NATS cannot quantify training costs for other ANSPs; however their acceptance of this proposal is a high-priority design principle. This proposal cannot be introduced without their agreement and it is assumed that any such training costs are acceptable to these agencies.

3.7 Combined Concept 2A

A smaller Class D volume near EGBB with Class C for the other volumes
EGBB/EGLL routes/CAS active evenings/ overnights/ mornings, 7 days a week

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	N/A	Changes to commercial air traffic patterns are all above 7,000ft. The potential noise impacts caused by a small number of non-commercial GA-type flights, descending to FL65 at certain times under certain conditions, is neither measurable nor describable.
Communities	Air quality	N/A	No changes below 1,000ft
Wider society	Greenhouse gas impact	Monetise and quantify	The proposed changes would result in a beneficial net saving in fuel burn of -2,963T in 2020, for the associated regions. In 2030 there would be an increased forecast fuel burn saving of -3,502T for the year. The impact assessment indicates that c.267,000 flights would be impacted by the change by 2030. The forecast used was NATS 2017 Annual Base Forecast to produce the annualised numbers. WebTAG was used to assess the greenhouse gas impact over time from the proposed changes, for the traded sector. This concept would yield a positive Net Present Value which reflects a benefit i.e. a CO_2 emissions reduction. There would be a reduction of CO_2 in the opening year (2020) of -9,423T which would further decrease to -113,073T over a 60 year appraisal period. WebTAG was also used to show the overall Net Present Value of CO_2 emissions reduction for the traded sector was calculated at £1,235,041. Traded and non-traded flights were categorised as intra-EU for traded (72.1%) and all other flights as non-traded (27.9%). These figures were calculated by looking at the origin and destination for UK arrivals, departures and overflights, in 2017. These benefits have arisen from the proposed shorter routes for EGBB arrivals and departures, the new high-level ATS routes, and the EGLL offload route(s) would deliver a small benefit within UK airspace depending on oceanic exit point. The worksheet outputs are shown on page 16 (Appendix A: WebTAG Output for Combined Concepts 1A and 2A)
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General Aviation/ commercial airlines	Economic impact from increased effective capacity	Quantify	N/A – there is no forecast increase in air transport movements, passenger numbers of cargo carried as an outcome of this proposal. The flightplan options this proposal would introduce could allow airlines to avoid capacity constrained areas and avoid consequential delay and cost. However this is not quantifiable, and no specific capacity increase is assumed by this proposal.
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Airport/ Air navigation service provider	Deployment costs	Qualitative and quantitative	Approximately 140 LAC/ LTC controllers would require full training. They would require the NATS simulator facility. Support staff are required to run the simulator – data preparation, testing, simulator setup, pseudo pilots, feed sector controllers, training staff, safety analysts, output to be collated into a sim report. Some operational support staff may require briefings. The reduced availability of operational controllers during their conversion training means that operational rostering becomes a factor when considering continuous service delivery. NB NATS cannot quantify training costs for other ANSPs; however their acceptance of this proposal is a high-priority design principle. This proposal cannot be introduced without their agreement and it is assumed that any such training costs are acceptable to these agencies.

3.8 Combined Concept 2B

A smaller Class D volume near EGBB with Class C for the other volumes
EGBB/EGLL routes/CAS active evenings/ overnights/ mornings during weekdays and active H24 at weekends

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	N/A	Changes to commercial air traffic patterns are all above 7,000ft. The potential noise impacts caused by a small number of non-commercial GA-type flights, descending to FL65 at certain times under certain conditions, is neither measurable nor describable.
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General Aviation/ commercial airlines	Economic impact from increased effective capacity	Quantify	N/A – there is no forecast increase in air transport movements, passenger numbers of cargo carried as an outcome of this proposal. The flightplan options this proposal would introduce could allow airlines to avoid capacity constrained areas and avoid consequential delay and cost. However this is not quantifiable and no specific capacity increase is assumed by this proposal.
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Commercial airlines	Other costs	N/A	N/A – there are no other known costs which would be imposed on commercial aviation.
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Airport/ Air navigation service provider	Operational costs	N/A	N/A – this proposal would not lead to changes in operational costs.
Airport/ Air navigation service provider	Deployment costs	Qualitative and quantitative	Approximately 140 LAC/ LTC controllers would require full training. They would require the NATS simulator facility. Support staff are required to run the simulator – data preparation, testing, simulator setup, pseudo pilots, feed sector controllers, training staff, safety analysts, output to be collated into a sim report. Some operational support staff may require briefings. The reduced availability of operational controllers during their conversion training means that operational rostering becomes a factor when considering continuous service delivery. NB NATS cannot quantify training costs for other ANSPs; however their acceptance of this proposal is a high-priority design principle. This proposal cannot be introduced without their agreement and it is assumed that any such training costs are acceptable to these agencies.

4. Options Appraisal Safety Assessment – Baseline (no change scenario)

EGBB Arrivals and Departures

4.1 EGBB arrivals and departure traffic, which routes via the MOSUN region, currently leaves CAS when transiting between the Birmingham area and the Cotswold CTAs. This is according to the times and conditions in the AIP (AD 2.EGBB, section 2.22 para 2 refers).

4.2 NATS (NERL) AC and Birmingham Radar control this traffic when operating within CAS, whilst an ATSOCAS is provide by either Western Radar or RAF(U) Swanwick, subject to availability.

4.3 This is a complex procedure and requires a large amount of coordination, monitoring and controller interactions – with pilots and between controllers.

4.4 A 'controller interaction' is typically a radio transmission with a pilot or a telephone call with a controller colleague, within the same centre or internationally. Each time a controller interacts with either a pilot or a controller, the other party must repeat the decision/instruction to ensure accuracy.

4.5 Thus a single controller interaction is comprised of at least two events – the outbound instruction or request, and the returning confirmation check, known as a 'readback'. When controller interactions with pilots get busy, it is known as a high RT loading. RT loading is one of the major limiting factors to the operating efficiency of an air traffic control sector.

4.6 There are also currently limited flightplanning options for flights between the Midlands area to/ from the southwest, which do not support a predictable environment for EGBB aircraft operators.

4.7 This means that controllers manage the flights in a tactical way. Controllers offer, where possible, more optimal routings than those flightplanned. This can take the aircraft into ATC sectors not originally covered by the flightplan.

EGLL Offload Routes

4.8 If the EGLL OCK hold is currently at or near capacity, EGLL arrivals can be rerouted to the BNN hold; often this occurs at late notice.

4.9 This relates to Oceanic and Irish traffic inbound to EGLL, from the S23 – TC SW – OCK flow; affecting around 2,600 flights in 2017.

4.10 This can lead to a highly complex tactical operation for NATS (NERL) AC controllers, which can create an unsustainable increase in cockpit and controller workload; as a result of increased monitoring and controller interactions (as described above).

4.11 This is the current situation, and is managed safely in the relevant regions.

5. Options Appraisal Safety Assessment – All Four Concept Options

EGBB Arrivals and Departures

5.1 The flows proposed would provide a modernisation and partial systemisation of the region, whereby the handling of flights would be much more predictable.

5.2 The proposal aims to provide more systemised, predictable flightplanning options for EGBB arrivals and departures which would be fully contained within the proposed CAS volumes thus reducing overall controller and cockpit workload.

5.3 The proposed volumes of CAS would contain EGBB arrivals and departures within CAS. This is a more predictable air traffic environment during the hours of operation, and logically flights within CAS are safer than those outside CAS.

5.4 This would cause a reduction in the complexity of the region's airspace for the same amount of traffic, for both ATC and pilots. There would be less coordination and fewer tactical actions required, thus reducing the number of controller interactions. This would also result in a lower RT loading.

5.5 NATS' first priority is safety (and transparently demonstrating its commitment to safety). NATS will construct an appropriate safety case to show that an appropriate containment buffer for ATS Routes is applied to the proposed volumes of CAS.

EGLL Offload Routes

5.6 The flows proposed would provide a more predictable method for the tactical balancing of flows by reducing the need for late tactical stack swaps. This would lead to a more modernised and partially systemised environment.

5.7 This would consequently reduce the operational complexity currently experienced within this region.

5.8 The proposed offload route(s) could be used by pre-selected flights. This would increase the overall environmental efficiency.

5.9 A decrease in coordination and controller interactions would reduce ATC complexity. A reduction in late-notice stack-swaps would reduce cockpit workload.

5.10 NATS' first priority is safety (and transparently demonstrating its commitment to safety). NATS will construct an appropriate safety case in accordance with standard practice.

ATS routes and TRA 002

5.11 There is no particular safety consideration to be addressed by the implementation of new/revised high level ATS routes. However, some items are commonly used tactical-directs which would become formal ATS routes, logically these have better aeronautical data definitions (e.g. AIP publication, defined RNAV status etc).

5.12 There is no particular safety consideration to be addressed by the implementation of a revised TRA 002 boundary. The MoD are content that this would not cause a safety issue for their operation.
NATS is similarly content, and appreciates the MoD's acceptance of this item.

6. Conclusion and Next Steps

6.1 This proposal has been developed following the submission of a Statement of Need, reference DAP1916-1806. Its text was:

Current situation
Traffic from the Irish FIR boundary into UK airspace essentially uses two main high-level flows, one from central/northern Eire across the Irish Sea over the North Wales coast towards the Manchester area, and the other from southern Eire across southern Wales towards the London area. There are limited flight planning options for LTMA overflights from Irish airspace over mid-Wales. There are also limited flight planning options to access the Midlands area to and from the southwest.

Issue or opportunity to be addressed, and the cause
The proportions of eastbound flights using the southern flow increased after the Irish FIR implemented Free Route Airspace in December 2009. This proportion-change means some Heathrow arrivals need to be "stack swapped" from the OCK hold to the BNN hold more often and at short notice, causing tactical complexity for NATS Swanwick ATC. There is an opportunity to add an additional flow in the "gap" between the two main flows and make additional connectivity improvements in this area as part of a single airspace change deployment.

Desired outcome
Partial redressing of the balance between the main flows for Heathrow arrivals.
Additional flightplanning options for aircraft operators, whether landing in the UK or overflying.
Reduction in flightplan track miles flown in UK airspace with consequential fuel/emissions and route charge savings for aircraft operators.

Specific challenges
Managing the proportions of traffic using the new system of flows so that no single flow causes issues to the network.

6.2 This document describes four options, all of which address the Statement of Need as follows:

Proposed introduction of:

A new Heathrow arrival route specifically to reduce the need for short-notice stack swaps.
Additional predictable CAS-contained flightplanning options to access the Midlands area to and from the southwest.
Additional high-level flightplanning options for aircraft operators across the region.

A reduction in UK flightplan track miles, leading to reduced fuel/emissions and cost savings.

Greater ATC flexibility to balance traffic flows, reducing the likelihood that any single flow in the region would cause network issues.

6.3 Additionally, the options have been developed thus far with significant assistance, input, feedback and effort from senior representatives of the GA community, senior MoD staff, senior executives from several airlines, Birmingham Airport ATC management assisted by their Sustainability Team, and Heathrow Airport's Airspace Performance Manager.
NATS thanks all these stakeholders and looks forward to continuing the development of this proposal.

6.4 The options known as Combined Concepts 1A, 1B, 2A and 2B have been appraised and are suitable for further development.

6.5 The next step is the Stage 2 Gateway Assessment planned for 30th November 2018.
Subject to CAA approval, this proposal would move on to Stage 3 Consult.

7. Appendix A: WebTAG Output for Combined Concepts 1A and 2A

Based on the previously described EGBB/EGLL route structures available evenings/overnights/mornings, 7 days a week:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: NATS SAIP AD5-7 days overnight

Present Value Base Year	2010
Current Year	2018
Proposal Opening year:	2020
Project (Road/Rail or Road and Rail):	road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £1,235,041

*positive value reflects a **net benefit** (i.e.CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -113,073
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -81525.52485

Change in carbon dioxide equivalent emissions in opening year (tonnes): -9,423
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £1,760,540
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e.CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	-20752.91475	-37057.05675
Non-traded sector	0	0	-8030.600852	-14339.69325

Qualitative Comments:

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £1,852,562

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £617,521

Data Sources:

8. Appendix B: WebTAG Output for Combined Concepts 1B and 2B

Based on the previously described EGBB/EGLL route structures available evenings/overnights/mornings, 5 days a week, and H24 weekends:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: NATS SAIP AD5-5 days overnight plus H24 weekends

Present Value Base Year	2010
Current Year	2018
Proposal Opening year:	2020
Project (Road/Rail or Road and Rail):	road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £1,264,695

*positive value reflects a **net benefit** (i.e.CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -115,784
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -83480.1198

Change in carbon dioxide equivalent emissions in opening year (tonnes): -9,659
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £1,802,266
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e.CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	-21266.72675	-37945.509
Non-traded sector	0	0	-8229.426854	-14683.491

Qualitative Comments:

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £1,897,042

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £632,347

Data Sources:

End of document