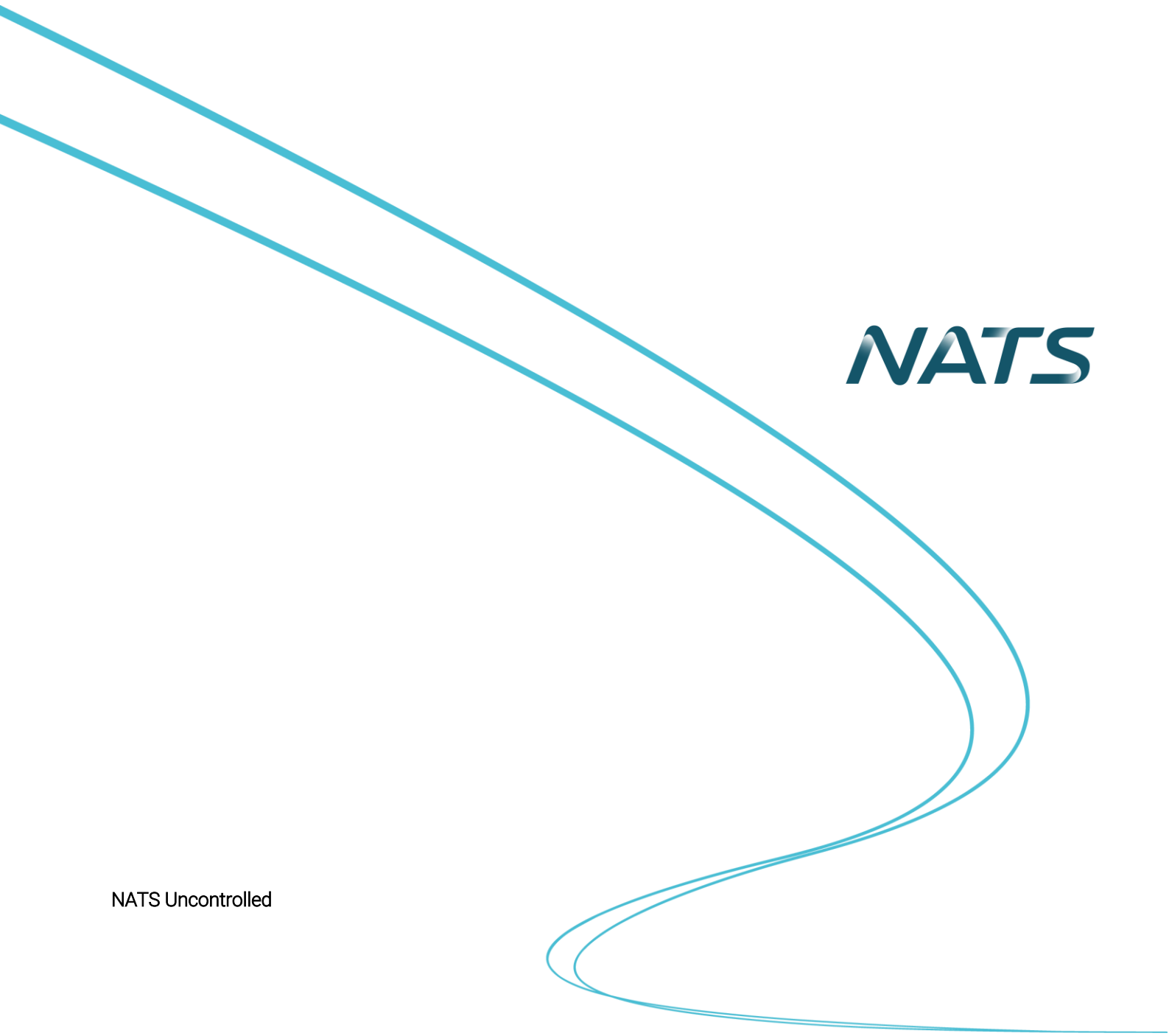
Future Airspace Strategy
Implementation North (FASI-N)

PLAS ScTMA
Gateway documentation:
Stage 3 Consult

Options Appraisal



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Publication history

Issue	Month/Year	Change Requests in this issue
Issue 1	April 2018	First issue released to SARG.
Issue 1.7	April 2018	Incorporating revisions following CAA review.

References

Ref No	Description	Hyperlinks
1	FASIN Scottish TMA CAA web page – progress through CAP1616	Link
2	Stage 1 Assessment Meeting Minutes	Link
3	Stage 1 Design Principles	Link
4	Stage 1 Evidence of Stakeholder Engagement	Link
5	Stage 2 Design Options	Link
6	Stage 2 Design Principle Evaluation	Link
7	Stage 3 Consultation document	

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1. Introduction

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

1.2 This document aims to provide adequate evidence to satisfy Stage 3 Consult Gateway, Step 3B Full Options Appraisal (Draft)

1.3 See Stage 1 Gateway Design Principles for full details of the proposed design principles (Ref 3).

1.4 The changes that have been evaluated for this ACP can be summarised according to the following option categories:

Option 1 Do nothing (no change)

Option 2 Implement the minimum changes necessary to support the airports' proposals and provide the necessary connectivity to the enroute network.

Option 3 Implement innovative new routes to further systemise the ScTMA.

Proposals that constituted innovation (option 3) were discounted after extensive testing in real time simulations (see Stage 2 Design options evaluation (ref 6)). The proposals that are being progressed herein fall into the category of Option 2 since only changes that are necessary to support the airports' proposals and provide the necessary connectivity to the enroute network are being progressed.

1.5 The option being progressed is described in detail in section 5 and 6 of the consultation document (Ref 7) for brevity this will be referred to below as "Option 2".

2. Options Appraisal

2.1 The full options appraisal below is based on the final proposed changes as detailed in the consultation document (Ref 7).

2.2 Option 1 is the "Do Nothing" option, as such all comparisons below are made in relation to this option.

2.3 Option 2 (which is being proposed) is limited to integrating the airports' proposed changes and providing the necessary connectivity to the enroute network. Table 1 below summarises the expected impacts of the proposed airspace change (note this is structured as per CAP1616 Appendix E Table E2).

2.4 Option 3 was discarded at the CAP 1616 stage 2 and hence is not included here.

Option Appraisal (Option 2)

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	Not applicable	Not applicable. The NATS sponsored airspace changes affect flights above 7,000ft (see consultation document Appendix B). Impacts of changes below 7,000ft are dealt with in the airports' individual consultations/ACPs.
Communities	Air quality	Not applicable	Not applicable – The NATS sponsored airspace changes are above 1,000ft
Wider society	Greenhouse gas impact.	Monetise and quantify	Emissions analysis of the proposed ScTMA route network (incorporating the airports proposed changes and the NATS link routes) has been undertaken. This has quantified the change in CO_2 per flight related to the proposed changes. The change in CO_2 emissions is detailed in the Consultation Document (Ref 7) Tables 5 - 7. Due to the interconnectedness of this ACP with those of Edinburgh, Glasgow and Prestwick airports two sets of WebTAG emissions results have been included below. 1. Results due to changes solely contained within this ACP. The proposed changes to routes N562 and Y96 (solely contained in this ACP) are forecast to result in a total annual reduction in CO_2 emissions (2019 traffic level) of 454 tonnes p.a. rising to 515 tonnes by 2029. WebTAG was used to monetise the impact of the change in CO_2 emissions due to these proposed changes. This would yield an overall emissions net benefit for carbon dioxide of -£255,910 NPV. Sensitivity analysis states a possible range of the benefit from £383,866 - £127,955. This benefit is due to routes being shorter and having more efficient climb profiles (which yield significant savings in CO_2 emissions). Appendix A includes the above greenhouse gas WebTAG analysis output.

Wider society	Capacity/ resilience	Qualitative	Edinburgh's changes are intended to improve the capacity at each of these airports. Prestwick Airport's ACP however is not motivated by capacity drivers. The proposals in this ACP seek to integrate the airports' changes into the enroute network. As such the overall airspace infrastructure will be enhanced; however no claims of increased capacity to the network or greater resilience of the network are made.
General Aviation	Access	Not applicable	Not applicable – there would be no change in impact to General Aviation airspace users. There are no changes in classification or extent of controlled airspace proposed.
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Not applicable	Not applicable – this concept was not designed with the intention of increasing the capacity of this region of airspace.
General Aviation/ commercial airlines	Fuel burn	Monetise and quantify	The projected annual fuel burn saving are: **Results due to changes solely contained within this ACP.** **Year** / **Amount** / **Value (NPV)** 2019 / 143 tonnes / £66,756 2029 / 161 tonnes / £75,752 10 year Total / 1,677 tonnes / £783,360 This was based on the IATA jet fuel price (April 2018).
Commercial airlines	Training cost	Not applicable	Beyond familiarisation there are no training costs to the airlines associated with the proposed changes.
Commercial airlines	Other costs	Not applicable	Not applicable – there are no other costs known which would be incurred by commercial aviation.
Airport/ Air navigation service provider	Infrastructure costs	Monetise and quantify	Not applicable – there will be no costs attributable to infrastructure such as equipment or construction costs.
Airport/ Air navigation service provider	Operational costs	Not applicable	Not applicable – this proposal would not lead to a change in operational costs.
Airport/ Air navigation service provider	Deployment costs	Monetise and quantify	Training Costs: £300 - £500k NPV Delivery of change under AIRAC process: £100k NPV

Table 1 Option 2 appraisal summary

3. Safety Assessment

3.1 This section provides a summary of the safety work that has been carried out to-date on the ScTMA Deployment of the FASIN/PLAS Project.

Safety Analysis - Airspace Safety Review

3.2 As required by the NATS Safety by Design process, a combined Airspace Safety Review and Tempest Assessment (a method of highlighting what the RAT (Eurocontrol Risk Assessment Tool) ATM Ground points are expected to be following the introduction of a project change) was carried out in early 2018.

3.3 The output of the Tempest assessment predicted a negligible, change in safety in terms of the enroute ATM waypoints for the Airports ACP-only option.

3.4 Once the airspace change has been validated a Post-Design Safety Review (PDSR) will take place to review the design against the airspace safety principles, to ensure each principle has been adequately considered.

Concept Simulations

3.5 Two separate concept simulations were held in November and December 2017 to evaluate the impact on NERL airspace by the proposed design changes of Edinburgh, Glasgow and Prestwick Airports.

3.6 The November simulations considered the airport sponsored changes as well as connectivity into ScTMA route network, and a new design with the use of Systemisation (i.e. RNAV link routes in the Enroute airspace). A number of safety objectives were derived to determine the safety impact of the changes to the NERL operation, and this was focussed on the new routes, the time-dependent elements of the SIDs, routes vs. HOLD interactions and airspace complexity. Overall the designs were positively received by the controllers, and the only issues of note were as follows:

- Further analysis of the time-dependent elements of the design is required to understand how controllers can efficiently deal with delayed aircraft which may utilise a different SID to that expected. This will be reviewed in the next simulation and during the subsequent hazard analysis (HAZID) workshop.
- As part of the design iteration process the required safety activities have been scheduled such that required development is aligned with ScTMA Airports to refine designs and procedures in accordance with implementation timelines
- Systemised routes: the November & December simulations highlighted that there was no safety benefit associated with implementing these routes. As a result the “option 3” enhanced route structure was discounted.

Timeline of Planned Safety Assurance Work

3.7 The following further Safety Assurance work is planned:

- April 2018: production of PLAS ScTMA Safety Plan
- May 2018: attendance at ScTMA simulation activities to determine if pre-defined safety objectives have been met
- June 2018: Combined hazard analysis / Human Error Safety Assurance Process (HAZID/HESAP) workshop will be held to determine the safety impact of the airport design changes on the NERL operation.
- July 2018: Work will commence on the Project Safety Assurance Report (PSAR).

3.8 Further HAZID/HESAP workshops will follow any subsequent simulation activities to ensure the latent risk to the NERL operation is fully understood and mitigated against.

4. Appendix A – Greenhouse gas WebTAG

Greenhouse Gases Workbook - Worksheet 1 (NATS ACP only)

Scheme Name: NATS FASIN PLAS ScTMA

Present Value Base Year 2018

Current Year 2018

Proposal Opening year: 2019

Project (Road/Rail or Road and Rail): road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £255,910

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

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 10 year appraisal period (tonnes): -4,817
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 0

Change in carbon dioxide equivalent emissions in opening year (tonnes): -454
(between 'with scheme' and 'without scheme' scenarios)

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	0	0
Non-traded sector	0	0	-1854	-2454

Qualitative Comments:
The results in this sheet relate only to the routes which are contained 100% within the NATS ACP.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £383,866

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £127,955

Data Sources:

Computer simulation using AirTOP modelling tool, with BADA performance data.
Traffic data extracted using Eurocontrol's Network Strategic Tool (NEST).
Traffic growth rates as per NATS base case traffic forecasting