Future Airspace Strategy
Implementation North (FASI-N)

# PLAS ScTMA
# Gateway documentation:
# Stage 2 Develop and Assess

## 2B: Design Principle Evaluation, Options Assessment

**NATS Unclassified**

Publication history

| Issue | Month/Year | Change Requests in this issue |
|---|---|---|
| Issue 1 | Feb 2018 | First issue released to SARG. |
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Contents

# 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 2 Develop and Assess Gateway, Step 2B Options Appraisal.

1.3 It is advised that this document is read alongside the Stage 2A Design Options Document which gives diagrams and descriptions of each option.

1.4 The following six proposals for changes to the route structure in the ScTMA were considered (as presented in the Assess Briefing).

1. Change to EGPF hold (LANAK) to accommodate proposed routes.
2. EGPH/PF arrivals and departures from/to east (SAB/NATEB).
3. Additional Class D CAS to the east of the EGPH CTA & Scottish TMA to facilitate new route(s) to the east of the EDIBO hold.
4. Dual track structure on Y96
5. Three track inbound route structure from the south serving EGPH/PF,
6. Three track structure going southbound from EGPF

These proposals and the baseline (extant) enroute airspace structure were tested during real time simulations with traffic levels grown to forecast 2025 levels. For all the proposals except the proposal to move the LANAK hold, it was demonstrated that the extant enroute structure was able to cope with the airports EGPH, EGPF, EGPK new routes and grown traffic levels. As such it was determined that the extant airspace would continue to be fit for purpose up to at least 2025, hence proposals 2-6 were rejected and will not be progressed.

Proposal 1 to move the LANAK hold has demonstrated benefits and will be progressed.

## 2. Options Assessment: Design Principle Evaluation

### 2.1 Proposal 1 - Move LANAK Hold.

Table 1 below summarises the impacts/benefits of the options evaluated. This table is based on the pro-forma CAP1616 Appendix E, page 166. The degree to which the design principle has been met is indicated by the following colour coding:

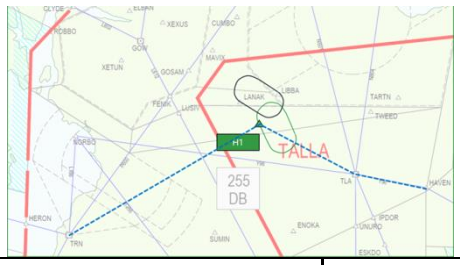
| |
|---|
| Green – MET (change represents a benefit/improvement) |
| Yellow – PARTIAL (or no change in impacts) |
| Red – NOT MET (design principle not met or change represents a detriment) |

| Design Principle Evaluation: Move LANAK Hold | | |
|---|---|---|
| Proposal 1, Option No: 1 Do nothing | | REJECT |
| Retain the current LANAK hold for arrivals to EGPF – no change to current hold | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No change. Controller intervention required. In order to maintain the same level of safety as traffic levels increase, capacity will have to be restricted, which may result in delays. | NOT MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | No change, no new CAS required. CAS kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | No change, routes not systemised. | NOT MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change (but identified as High workload) | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | No increase in airspace capacity | NOT MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | No change, climb profiles not improved | NOT MET |
| Descent profiles | No change, descent profiles not improved | NOT MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 1: Proposal 1, Option No: 1 Do nothing

| Proposal 1, Option No: 2 Move the LANAK hold to H1 | REJECT |
|---|---|

Move the LANAK hold to the position H1 dictated by the EGPF route design (as shown in Design Options doc, Fig 1).. This option was tested during real-time simulations. (Note the proposed new position of the hold was agreed with EGPF, and was constrained by the EGPF and EGPH departure routes (as proposed in their separate ACPs), hence other positions for the hold were not able to be considered).

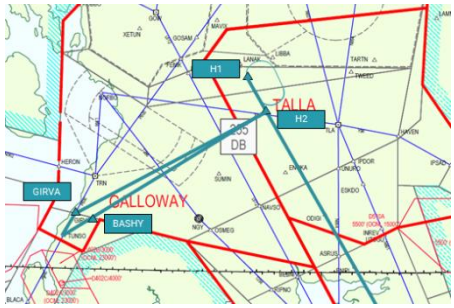



| Design Principle | Summary of assessment | MET? |
|---|---|---|
| Safety | Safety benefit – arrivals and departures better separated than extant. This will improve safety performance. | MET |
| $CO_2$ emissions | Minimal impact. Not yet quantified. | PARTIAL |
| Minimise the volume of CAS | No change, CAS required is kept to minimum | MET |
| Impact on GA | No change | MET |
| Impact on MoD | No change | MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | With traffic entering the hold at H1 it created some conflict between inbound and outbound traffic | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | With traffic entering the hold at H1 it created some conflict between inbound and outbound traffic. | NOT MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile will be improved for departures when LANAK hold is being used | MET |
| Descent profiles | Some changes to descent profiles may occur as a result of the airport ACPs. This is independent of the hold position. | PARTIAL |
| Flight planning/fuel uplift | Improvements in climb profiles will bring benefits in fuel uplift. | MET |

Table 2: Proposal 1, Option No: 2

| Proposal 1, Option No: 3 Move the LANAK hold to H1 with entry at H2. | ACCEPT |
|---|---|

Move the LANAK hold to the position H1 (dictated by the EGPF route design) but with entry via point H2. (as shown in Design Options doc, Fig 2). This option was tested during real-time simulations. (Note the proposed new position of the hold was agreed with EGPF, and was constrained by the EGPF and EGPH departure routes (as proposed in their separate ACPs), By routing the inbounds via H2 this removed the conflict between the between inbound and outbound traffic. This also ensures that aircraft enter the hold using a direct entry procedure which results in improved containment, and hence a smaller protected area.




| Design Principle | Summary of assessment | MET? |
|---|---|---|
| Safety | Safety benefit – arrivals and departures procedurally separated. This will improve safety performance. | MET |
| $CO_2$ emissions | Minimal impact. Not yet quantified. | PARTIAL |
| Minimise the volume of CAS | No change, CAS required is kept to minimum | MET |
| Impact on GA | No change | MET |
| Impact on MoD | No change | MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | With traffic entering the hold at H2 inbound and outbound traffic was better separated and ATC workload is reduced from extant. | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Capacity increased. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile will be improved for departures when LANAK hold is being used | MET |
| Descent profiles | Some changes to descent profiles may occur as a result of the airport ACPs. This is independent of the hold position. | PARTIAL |
| Flight planning/fuel uplift | Improvements in climb profiles will bring benefits in fuel uplift. | MET |

Table 3: Proposal 1, Option No: 3

As a result of the assessment Proposal 1 to move the LANAK hold has been evaluated as beneficial and will be progressed, with option 3 being the preferred option.

## 2.2 Safety Assessment – Proposal 1 Option 3 (preferred)

2.3 Currently departures from EGPH can require intervention from ATC to deconflict them from the LANAK hold.

2.4 The Proposal 1 Option 3 design would reduce/remove the requirement for controller intervention for EGPH departures when climbing against the LANAK hold.

2.5 By allowing typical aircraft using the airspace to make use of their existing navigational capability (RNAV1) these routes could be safely segregated. The H2 entry point results in a more consistent and predictable hold entry. This ensures better track-keeping conformance for aircraft when entering the

hold, which in turn requires a smaller protected area for the hold. Segregation of the hold from proximate routes is thus more easily achieved.

2.6 The improved systemisation results in reduction in the complexity of the airspace. A reduction in complexity for the same amount of air traffic would result in fewer controller interactions and a lower RT loading. This results in a reduction in controller workload which in turn will result in a commensurate improvement in safety.

## 2.7 Safety Assessment Conclusion

2.8 There would be a positive impact on safety whilst also increasing the capacity of the airspace because more traffic could be safely handled with fewer controller interactions.

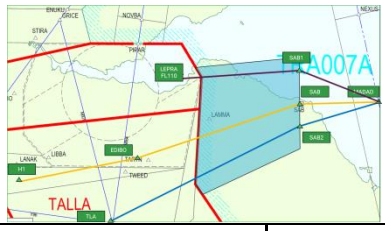
## 2.9 Proposal 2 – EGPH/PF arrivals and departures from/to east (St Abbs CTA)

| Design Principle Evaluation: EGPH/PF arrivals and departures from/to east (St Abbs CTA) | | |
|---|---|---|
| Proposal 2, Option No.1 Do nothing | | ACCEPT |
| Do not introduce new CAS, controllers will tactically separate traffic outbound from EGPH routing south via LEPRA from inbounds from the south (including EDIBO hold). | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No change. This was tested extensively during real time simulation with traffic levels grown to 2025 forecast levels. These traffic levels could be accommodated safely. | MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | CAS required is kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | The EGPH change is introducing systemised RNAV1 routes. However controller intervention may be required if holding at EDIBO. | PARTIAL |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change to current operations, but more workload than if the LAMMA triangle were introduced. | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | Airspace capacity demonstrated to be sufficient at least until 2025 | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | The EGPH proposal will improve climb profiles. Not introducing this new CAS will not impact this. | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Not introducing this new CAS will not impact this. | MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 4: Proposal 2, Option No.1 Do nothing

| Proposal 2, Option No: 2 Introduce "St Abbs CTA" new CAS | REJECT |
|---|---|

Introduce new CAS "St Abbs CTA" (as shown in Design Options doc, Fig 3) to facilitate to the introduction of three new ATS routes from LEPRA, EDIBO and TLA to MADAD. The CAS above FL110 would enable these three routes to be established to allow flights from Scotland to Northern Europe and beyond to flight plan shorter routes via St Abbs across the North Sea.




| Design Principle | Summary of assessment | MET? |
|---|---|---|
| Safety | New CAS protects the proposed routes. | MET |
| $CO_2$ emissions | Shorter route between LEPRA & E4, will reduce $CO_2$ emissions. | MET |
| Minimise the volume of CAS | Increase in CAS required. | NOT MET |
| Impact on GA | Increase in CAS will reduce UCAS and impact GA. | NOT MET |
| Impact on MoD | Increase in CAS will reduce UCAS and impact MoD by reducing the size of TRA007A. | NOT MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | TRA007A would have to be modified. | NOT MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this new CAS will not impact this. | MET |
| Flight planning/fuel uplift | Improvement due to reduced track mileage | MET |

Table 5: Proposal 2, Option No: 2

Assessment during real time simulations demonstrated that Proposal 2 to introduce the St Abbs CTA new CAS was not required. The current enroute airspace has been demonstrated to be fit for purpose for traffic levels up to 2025. **Hence Proposal 2 will not be progressed**.

## 2.10 Proposal 3 – LAMMA Triangle new CAS

Additional Class D CAS to the east of the EGPH CTA & Scottish TMA to facilitate new route(s) to the east of the EDIBO hold (aka LAMMA triangle).

| Design Principle Evaluation: LAMMA Triangle new CAS | | |
|---|---|---|
| Proposal 3, Option No.1 Do nothing | | ACCEPT |
| Do not introduce new CAS, controllers will tactically separate traffic outbound from EGPH (routing south via LEPRA) from inbounds from the south (including EDIBO hold). | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No change. The extant enroute airspace was tested extensively during real time simulation with traffic levels grown to 2025 forecast levels. The extant airspace was able to accommodate these traffic levels safely. | MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | CAS required is kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | The EGPH change is introducing systemised RNAV1 routes. However controller intervention may be required if inbounds are holding at EDIBO. | PARTIAL |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change to current operations, but more workload than if the LAMMA triangle were introduced. | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | Airspace capacity demonstrated to be sufficient at least until 2025 | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | The EGPH proposal will improve climb profiles. Not introducing this new CAS will not impact this. | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Not introducing this new CAS will not impact this. | MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 6: Proposal 2, Option No.1 Do nothing

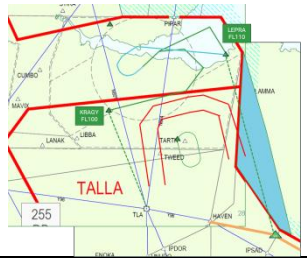
| Proposal 3, Option No: 2 Introduce LAMMA triangle of CAS | | REJECT |
|---|---|---|
| "LAMMA Triangle" of new CAS (as shown in Design Options doc, Fig 4) to facilitate to the introduction of a new ATS route from LEPRA to point E4 (east of HAVEN, north of IPSAD). This route would facilitate departures from EGPH to be separated from the EDIBO hold with no necessity for controller intervention. |  | |
| Design Principles | | |
| Safety | Arrivals and departures procedurally separated. | MET |
| $CO_2$ emissions | Shorter route between LEPRA & E4, will reduce $CO_2$ emissions. | MET |
| Minimise the volume of CAS | Increase in CAS required. | NOT MET |
| Impact on GA | Increase in CAS will reduce UCAS and impact GA. | NOT MET |
| Impact on MoD | Increase in CAS will reduce UCAS and impact MoD by reducing the size of TRA007A. | NOT MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | TRA007A would have to be modified. | NOT MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this new CAS will not impact this. | MET |
| Flight planning/fuel uplift | Improvement due to reduced track mileage | MET |

Table 7: Proposal 2, Option No: 2

Assessment during real time simulations demonstrated that Proposal 2 to introduce the LAMMA triangle of CAS was not required. The current enroute airspace has been demonstrated to be fit for purpose for traffic levels up to 2025. **Hence Proposal 2 will not be progressed**.

## 2.11 Proposal 4 – Dual track structure on Y96

Proposed introduction of a dual ATS route structure between HAVEN and NATEB. This would provide systemised routes for arrivals & departures to/from EGPH, EGPF and EGPK.

| Design Principle Evaluation: Dual track structure on Y96 | | |
|---|---|---|
| Proposal 4, Option No.1 Do nothing | | ACCEPT |
| Do not introduce dual routes and continue to use Y96 as extant, vectoring traffic as required to maintain separation. | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No change. The extant enroute airspace was tested extensively during real time simulation with traffic levels grown to 2025 forecast levels. The extant airspace was able to accommodate these traffic levels safely. | MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | CAS required is kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | Extant single route Y96 does not provide systemisation without controller intervention. | NOT MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change to current operations, but more workload than if the systemised dual routes were introduced. | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | Airspace capacity demonstrated to be sufficient at least until 2025 | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | The EGPH proposal will improve climb profiles. Not introducing this proposal will not impact this. | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Not introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 8: Proposal 2, Option No.1 Do nothing

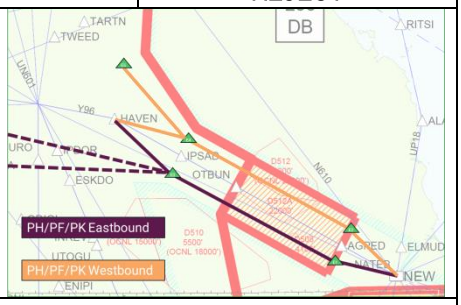
| Proposal 4, Option No: 2 Dual track structure on Y96 | | REJECT |
|---|---|---|
| Introduction of a dual ATS route structure between HAVEN and NATEB (as shown in Design Options doc, Fig 5). This would provide systemised routes for arrivals & departures to/from EGPH, EGPF and EGPK through NATEB. |  | |
| Design Principles | | |
| Safety | Arrivals and departures procedurally separated. | MET |
| $CO_2$ emissions | Longer routes between HAVEB & NATEB, will reduce increase $CO_2$ emissions. | NOT MET |
| Minimise the volume of CAS | No change in CAS volume required. | NOT MET |
| Impact on GA | Increase in CAS will reduce UCAS and impact GA. | NOT MET |
| Impact on MoD | Increase in CAS will reduce UCAS and impact MoD by reducing the size of TRA007A. | NOT MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | Increase fuel uplift due to increase in track mileage | NOT MET |

Table 9: Proposal 4, Option No: 2

Assessment during real time simulations demonstrated that Proposal 4 to introduce dual ATS route structure between HAVEN and NATEB was not required. The current enroute airspace has been demonstrated to be fit for purpose for traffic levels up to 2025. Hence Proposal 4 will not be progressed.

## 2.12 Proposal 5 – Three track inbound route structure from the south serving EGPH/PF

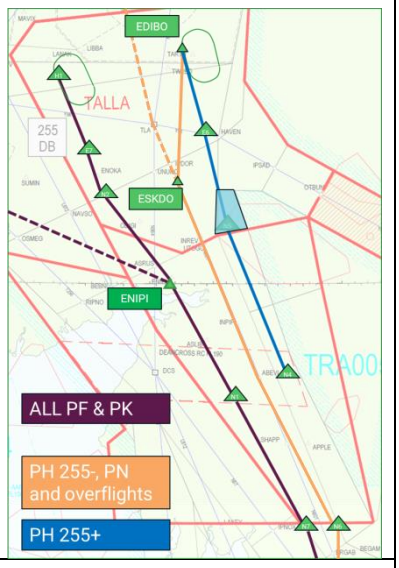
Introduction of three track inbound route structure from the south serving EGPH/PF to systemise the flows of arrivals to the ScTMA from the south.

| Design Principle Evaluation: Three track inbound route structure from the south serving EGPH/PF | | |
|---|---|---|
| Proposal 5, Option No.1 Do nothing | | ACCEPT |
| Do not introduce proposed 3 routes from the south and continue to use the extant routes. | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No change. The extant enroute airspace was tested extensively during real time simulation with traffic levels grown to 2025 forecast levels. The extant airspace was able to accommodate these traffic levels safely. | MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | CAS required is kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | No change. | NOT MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change to current operations, but more workload than if the systemised dual routes were introduced. | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | Airspace capacity demonstrated to be sufficient at least until 2025 | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | The EGPF proposal will improve climb profiles. Not introducing this proposal will not impact this. | MET |
| Descent profiles | The EGPF proposal will improve descent profiles. Not introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 10: Proposal 5, Option No.1 Do nothing

| Proposal 5, Option No: 2 Three track inbound route structure from the south serving EGPH/PF | REJECT |
|---|---|

Introduction of three track inbound route structure from the south serving EGPH/PF to systemise the flows of arrivals to the ScTMA from the south (as shown in Design Options doc, Fig 6).




| Design Principles | | |
|---|---|---|
| Safety | Arrivals and departures procedurally separated. | MET |
| $CO_2$ emissions | $CO_2$ emissions not assessed. | NOT MET |
| Minimise the volume of CAS | No change in CAS volume required. | NOT MET |
| Impact on GA | Increase in CAS will reduce UCAS and impact GA. | NOT MET |
| Impact on MoD | Increase in CAS will reduce UCAS and impact MoD by reducing the size of TRA007A. | NOT MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | Increase fuel uplift due to increase in track mileage | NOT MET |

Table 11: Proposal 5, Option No: 2

Assessment during real time simulations demonstrated that Proposal 5 to introduce a three track inbound route structure from the south serving EGPH/PF to systemise the flows of arrivals to the ScTMA from the south was not required. The current enroute airspace has been demonstrated to be fit for purpose for traffic levels up to 2025. Hence proposal 5 will not be progressed.

## 2.13 Proposal 6 – Three track structure going southbound from EGPF

Additional Class D CAS to the east of the EGPH CTA & Scottish TMA to facilitate new route(s) to the east of

| Design Principle Evaluation: Three track structure southbound from EGPF | | |
|---|---|---|
| Proposal 6, Option No.1 Do nothing | | ACCEPT |
| Do not introduce proposed 3 routes from the south and continue to use the extant routes. | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No change. The extant enroute airspace was tested extensively during real time simulation with traffic levels grown to 2025 forecast levels. The extant airspace was able to accommodate these traffic levels safely. | MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | CAS required is kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | No change. | NOT MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change to current operations, but more workload than if the systemised proposed routes were introduced. | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | Airspace capacity demonstrated to be sufficient at least until 2025 | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | The EGPF proposal will improve climb profiles. Not introducing this proposal will not impact this. | MET |
| Descent profiles | The EGPF proposal will improve descent profiles. Not introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 12: Proposal 6, Option No.1 Do nothing

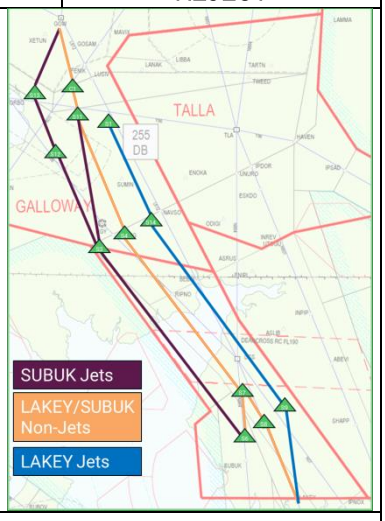
| Proposal 6, Option No: 2 Three track structure going southbound from EGPF | | REJECT |
|---|---|---|
| Introduction of a three track outbound route structure to the south serving EGPF. This is designed to systemise the flows of departures from to the ScTMA to the south (as shown in Design Options doc, Fig 7). |  | |
| Design Principles | | |
| Safety | Arrivals and departures procedurally separated. | MET |
| $CO_2$ emissions | $CO_2$ emissions not assessed. | NOT MET |
| Minimise the volume of CAS | Increase in CAS volume required. | NOT MET |
| Impact on GA | Increase in CAS will reduce UCAS and impact GA. | NOT MET |
| Impact on MoD | Increase in CAS will reduce UCAS and impact MoD by reducing the size of TRA004. | NOT MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & hold used | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | Increase fuel uplift due to increase in track mileage | NOT MET |

Table 13: Proposal 5, Option No: 2

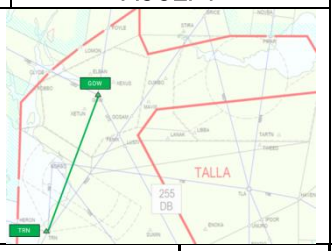
Assessment during real time simulations demonstrated that Proposal 6 to introduce a three track outbound route structure to the south serving EGPF.was not required. The current enroute airspace has been demonstrated to be fit for purpose for traffic levels up to 2025. Hence proposal 6 will not be progressed.

## 2.14 Proposal 7 – Additional ATS Routes

In order to provide flexibility and network resilience for traffic using the SIDs and STARs as proposed by EGPH, EGPF and EGPK in their separate ACPs it may be beneficial to introduce additional low level ATS routes.

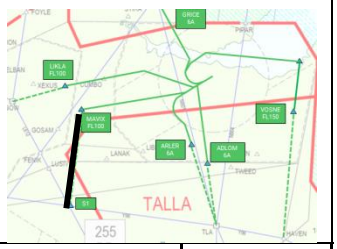
| Design Principle Evaluation: ATS Routes GOW-TRN and MAVIX-S1 | | |
|---|---|---|
| Proposal 7, Option No.1 Do nothing | | REJECT |
| Do not introduce proposed route from GOW –TRN and MAVIX-S1. | | |
| **Design Principle** | **Summary of assessment** | **MET?** |
| Safety | No impact on safety. | MET |
| $CO_2$ emissions | No change, no reduction in emissions. | NOT MET |
| Minimise the volume of CAS | CAS required is kept to minimum | MET |
| Impact on GA | No change, no impact on GA. | MET |
| Impact on MoD | No change, no impact on MoD | MET |
| Route systemisation/ RNAV1 | No change. | NOT MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | No change to current operations, but more workload than if the systemised proposed routes were introduced. | NOT MET |
| Pilot workload | No change | MET |
| Airspace capacity | Delivery of EGPH departures on BEMAS/EMJEE SIDs to GOW could impact capacity in this area. Resilience not optimal without the proposed routes. | PARTIAL |
| Airport/runway capacity | No change | MET |
| Climb profiles | No change. | MET |
| Descent profiles | No change. | MET |
| Flight planning/fuel uplift | No change, no improvement in flight plan route/ fuel uplift. | NOT MET |

Table 14: Proposal 7, Option No.1 Do nothing

| Proposal 7, Option No: 2 Introduce ATS Routes GOW-TRN | ACCEPT |
|---|---|
| Introduce proposed ATS route from GOW –TRN.   | |

| Design Principle | Summary of assessment | MET? |
|---|---|---|
| Safety | No impact on safety. | MET |
| $CO_2$ emissions | $CO_2$ emissions not yet assessed. | NOT MET |
| Minimise the volume of CAS | No change in CAS volume required. | MET |
| Impact on GA | No impact on GA. | MET |
| Impact on MoD | No impact on MoD. | MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & network resilience | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity and network resilience. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | Not yet assessed | NOT MET |

Table 15: Proposal 7, Option No: 2

| Proposal 7, Option No: 3 Introduce ATS Route MAVIX-S1 | ACCEPT |
|---|---|
| Introduce proposed ATS route from MAVIX-S1 . |  |

| Design Principle | Summary of assessment | MET? |
|---|---|---|
| Safety | No impact on safety. | MET |
| $CO_2$ emissions | $CO_2$ emissions not yet assessed. | NOT MET |
| Minimise the volume of CAS | No change in CAS volume required. | MET |
| Impact on GA | No impact on GA. | MET |
| Impact on MoD | No impact on MoD. | MET |
| Route systemisation/ RNAV1 | Improves systemisation/ RNAV1 routes & network resilience | MET |
| Avoidance of other airspace | No change | MET |
| Air traffic controller workload | Reduced ATC workload | MET |
| Pilot workload | No change | MET |
| Airspace capacity | Will have a positive impact on capacity and network resilience. | MET |
| Airport/runway capacity | No change | MET |
| Climb profiles | Climb profile improved | MET |
| Descent profiles | The EGPH proposal will improve descent profiles. Introducing this proposal will not impact this. | MET |
| Flight planning/fuel uplift | Not yet assessed | NOT MET |

Table 16: Proposal 7, Option No: 3

Assessment during real time simulations suggested that there was a need for the GOW-TRN and MAVIX-S1 routes, which warranted further exploration. **Hence proposal 7 will be progressed** with both options 2 and 3 being taken forward to the next stage for further assessment.

## 2.15 Safety Assessment – Proposal 7 Options 2 and 3

2.16 The allocation/usage of the SIDs according to destination by EGPH (and other ScTMA airports) will primarily dictate the loading of the SIDs. Without the proposal 7 routes the delivery of aircraft into the network could result in parts of the network experiencing peaks in traffic. The proposed routes provide more network options and also increase network resilience to the impact of adverse weather.

2.17 The GOW-TRN and MAVIX-S1 routes both give the opportunity for the related EGPH SIDs to be used efficiently for a greater variety of destinations.

2.18 Increased flexibility during adverse weather yields a significant safety benefit in enabling alternative routings around areas of adverse weather.

## 2.19 Safety Assessment Conclusion

2.20 There would be a positive impact on safety and network resilience. The airspace's capacity to handle bunching and demand through specific points would be enhanced.

## 3. High Level Qualitative Cost Assessment

A high level assessment of the cost/benefits is given below for each proposal.

3.1 Proposal 1:
Proposal 1 to move the LANAK hold has been evaluated as beneficial bringing benefits in safety, capacity and workload. These benefits justify the cost associated with progressing this change, and hence it will be progressed.

3.2 Proposal 2 -6:
Proposals 2 to 6 and the baseline (extant) enroute airspace structure were tested during real time simulations with traffic levels grown to forecast 2025 levels. For these proposals it was demonstrated that the extant enroute structure was able to cope with the airports' EGPH, EGPF, EGPK new routes and grown traffic levels. As such it was determined that the extant airspace would continue to be fit for purpose up to at least 2025. At current and forecast traffic levels in the ScTMA, the benefit of introducing proposals 2-6 does not justify the cost of introducing these changes. Hence proposals 2-6 were rejected and will not be progressed.

3.3 Proposal 7 :
Proposal 7 is designed to increase network flexibility and resilience for traffic using the SIDs as proposed by EGPH, EGPF and EGPK in their separate ACPs. Proposal 7 could provide valuable network resilience and hence the two proposed link routes suggested will be progressed to the next stage, for further analysis and consultation.

## 4. Options Development notes

4.1 Proposals 1 to 6 were simulated using Real Time Simulation (RTS), which was held at NATS Prestwick Centre on the 15/16/17th November and 20/21st November 2017. EGPH, EGPF, EGPK attended as participants and the CAA attended as observers. The objective of the RTS was to determine the suitability of the proposed airspace concepts. The link routes suggested by Proposal 7 were introduced as a result of feedback from the simulations.

4.2 The real time simulations held in Nov and Dec represented a significant testing exercise in which all the major aviation stakeholders either participated or were invited to observe. CAA representatives also attended and observed simulations and the engagement first hand.

4.2.1 Support from participating stakeholders on proposals 1 and 7 which are being progressed, was captured in the simulation report as follows:

> **C1.01 Understand if any changes are required within the ScTMA airspace to support Airfield ACP's**
>
> After the participants had controlled the baseline configuration with both 2017 and 2025 traffic levels they were asked consider each of the airport ACP's separately and the acceptability of the changes from the perspective of the sectors they had controlled that day. The first question they were asked was the high level question "Do you think changes are required within the ScTMA to support the ACP?"
>
> The responses to this high level question suggested that no changes are necessary to the ScTMA to support the Prestwick ACP, however for both the Edinburgh and Glasgow ACP's on all four ScTMA sectors it was felt that some changes* to the simulated baseline scenario would be required.
>
> **C1.02 Assess the acceptability of NEW HOLDS**
>
> All participants were unanimous that both the new holds for Edinburgh (EDIBO) and Glasgow (H1) were acceptable. There was however some concern that the H1 hold reduced the flexibility for TRN inbounds to Glasgow. *(note this issue was resolved by the addition of the H2 entry point)*
>
> ** Proposal 1 & 7*

Note: Glasgow, Edinburgh and Prestwick airports were key participants at the simulations and these summaries are taken from the feedback forms they completed during the simulation debriefs.

4.3 Engagement with airlines is on-going and is evidenced in the following email. Airlines were also invited to the simulations.

**From:** [redacted]
**Sent:** 12 January 2018 13:00
**To:** [redacted]
**Cc:** [redacted]
**Subject:** RE: Airlines sign-up to airspace "design principles"

[redacted]

Airlines have been consulted via the various SIP and RP2 consultation which included BAW, EZY, VIR, IATA, RYR, EXS, TUI, TCX, UAL, AAL, BEE
We have also pre-consulted the airlines for RP3 and they have been clear that they want to see modernisation of UK airspace.

- Airspace Modernisation – should be the key theme for RP3 (especially LAMP)
- Airspace modernisation with particular emphasis on LAMP Phase 2 & delivery of capacity to meet growth with more efficient PBN designs

Airlines engaged for RP3 pre-consultation:

| | |
|---|---|
| Air Canada | IATA |
| British Airways | Jet2 |
| BA CityFlyer | KLM |
| Delta | Lufthansa Group |
| DHL & European Air Transport | Ryanair |
| easyJet | Singapore |
| Emirates | Thomson |
| Flybe | Virgin Atlantic |

Regards

NATS

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## 5. Conclusion and Shortlist

5.1 We conclude that the Proposal 1 and 7 best meet all the design principles.
The shortlist comprises:

- Proposal 1, option 3 – move the LANAK hold with entry point at H2.
- Proposal 7, option 2 – new link route GOW-TRN
- Proposal 7, option 3 – new link route MAVIX-S1

For Proposals 2-6 the "do nothing" option was evaluated to be preferable, hence these proposals will not be progressed.