NATS Cardiff Airport ACP

CAP1616 Stage 2 Safety Appraisal

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External use: *Yes (CAA)*

Glossary

ATC	Air Traffic Control
ATS	Air Traffic Service
DCL	Data Comms Link
HAZID	Hazard Identification
RNAV	Required navigation (Area Navigation Basic 5nm Precision 1nm)

References

ID & Title	Reference
[1] NATS Safety Management Manual	SMM Web page
[2] CAP 1616: Airspace Change guidance	CAP 1616

1. Introduction

1.1 Purpose

This report documents the initial safety appraisal of the Cardiff Airport procedure designs for an Airspace Change Proposal (ACP) process. The ACP is being conducted in accordance with CAP 1616 regulations [2]. This safety appraisal is intended to fulfil the requirements stated at Stage 2 (Develop and Assess) for the Initial Options Appraisal as defined in CAP 1616 Appendix E paras E49 to E52 [2].

1.2 Scope

The aim of this initial options appraisal is to:

- Give an indication of safety implications.
- Provide a qualitative statement on potential impacts of each option.

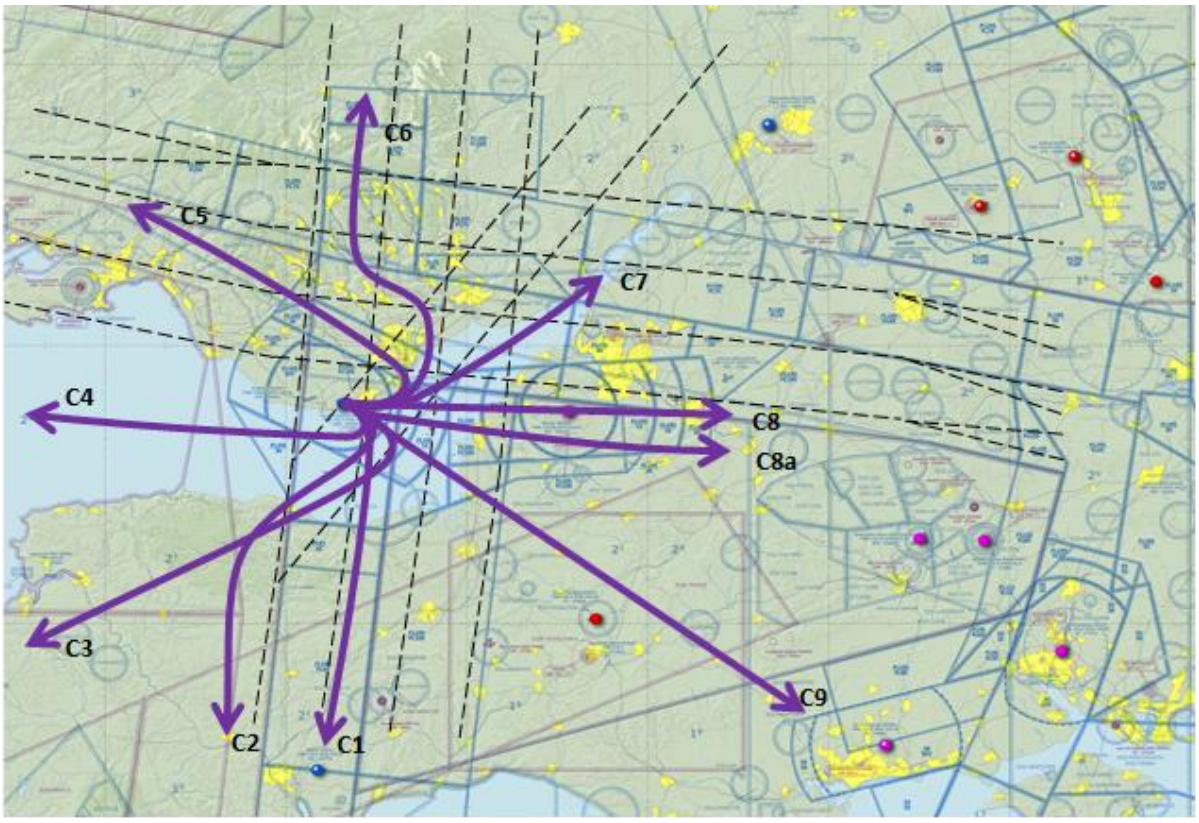
1.3 Assumptions

A number of assumptions have to be made in this appraisal as the designs are considered immature at this stage of the ACP process:

1. The designs for departure routes and holds are assumed to be below 7000ft AGL.
2. Accuracy of plot points for the routes is low and explicit lat/long positions have not been derived.
3. All options (even those thought to be untenable) have been included.

2. Method

The preliminary safety appraisal is conducted at a basic level. This involves looking at the basic design proposals that were drawn using Skyvector (link) which is a freely available open software mapping web page that also provides basic aeronautical planning services. The basic route designs were drawn as overlays to the VFR map displayed by Skyvector covering the South West region. An example is shown below:



1.1. Method

The route designs were given basic alpha-numeric descriptors and are portrayed in 2D. In order to assess the proposed designs, the design team and subject matter experts from Cardiff were consulted. The steps below outline the methodology of this task.

Step 1 - Identify any potential hazards associated with the design considering the functions and the roles of other airspace users.

Step 2 – Identify any potential hazards associated with the ATS delivery at Cardiff airport.

Step 3 – Provide recommendations to reduce safety issues for the design phase

1.2. Assessment

The procedures have been assessed using the following terminology:

Low Safety Impact = unlikely to require any in-depth analysis or modelling beyond basic assurance work such as Hazard Identification process.

Medium Safety Impact = may require more detailed analysis to quantify risk levels and/or impacted users beyond ATC.

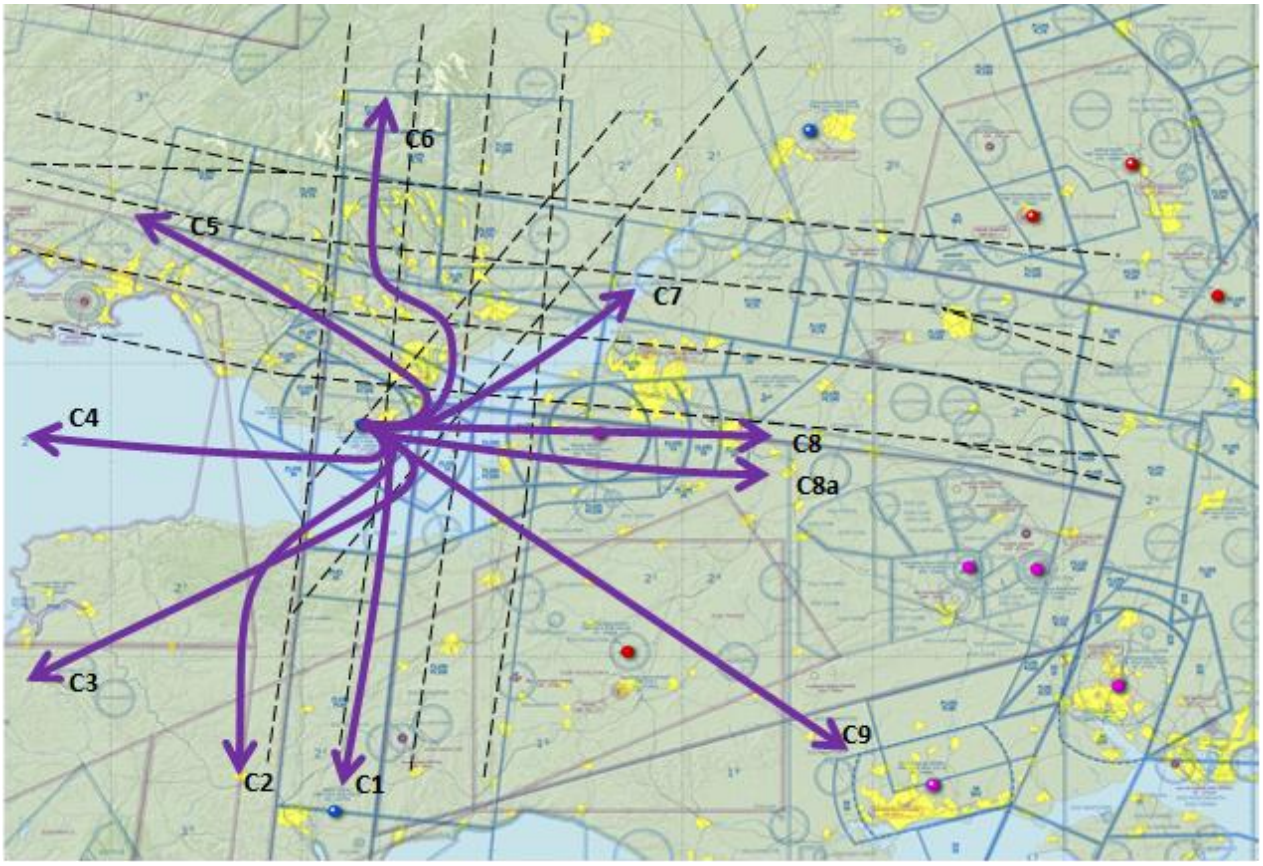
High Safety Impact = likely to require in-depth analysis of one or more safety hazards to the operation or to other users. May need modelling, explicit route-separation assurance, changes to airspace structures or complex interactions with other organisations.

In order to better assess adjacent airspace structures, not displayed on the Skyvector map, the UK AIP ENR 6-7 chart was used as that displays UK ATS Airspace Classifications from – the surface to FL195, which for this assessment is deemed sufficient. This map is displayed below:

3. Proposed Routes Safety Assessment

3.1 Departures RW12

The proposed Standard Instrument Departure (SID) routes from Runway 12:



C1
With an initial climb out to the South over water, this route appears to have low safety impact however may require integration at altitude with the airspace structure above as the base of controlled airspace for Berry Head is FL65. This would require a safety hazard assessment.

C2
An initial climb over water and further climb outside of controlled airspace, this route appears to have minimal (low) safety impact. This may have safety benefit in a reduced number of interactions required by the controller.

C3
An initial climb over water and further climb outside of controlled airspace, this route appears to have minimal (low) safety impact. This may have safety benefit in a reduced number of interactions required by the controller.

C4
A climb over water and further climb over water and avoiding adjacent airspace structures,, this route appears to have minimal (low) safety impact. This may have safety benefit in a reduced number of interactions required by the controller.

C5
This route departs toward adjacent controlled airspace structures, giving a level of complexity that would require a safety hazard assessment to controllers and other airspace users. Additionally, the route may require additional controlled airspace that could impact other airspace users (General Aviation (GA) and/or military traffic) delivering a medium safety impact and attracting further safety risk assessment to be conducted.

C6
This route departs toward adjacent controlled airspace structures, giving a level of complexity that would require a safety hazard assessment to controllers and other airspace users. The route remains within the confines of existing controlled airspace reducing impact to other airspace users (General Aviation (GA) and/or military traffic) delivering a medium safety impact and attracting further safety risk assessment to be conducted.

C7
The over-water profile of this departure route removes complexity and imposes less issues of potential conflict with GA/Military aircraft users. However, it would require a safety assessment to assess the deconfliction from Bristol inbound traffic to RW09 or if on opposing runways (an occurrence that occasionally happens) against departures from RW27. This route is a medium safety impact.

C8
This eastbound route places aircraft directly overhead Bristol airport and would require a safety assessment to assess potential conflictions with inbound and outbound traffic. It may require planning and interaction with Bristol controllers at an earlier stage of flight and delivers a high safety impact.

C8a

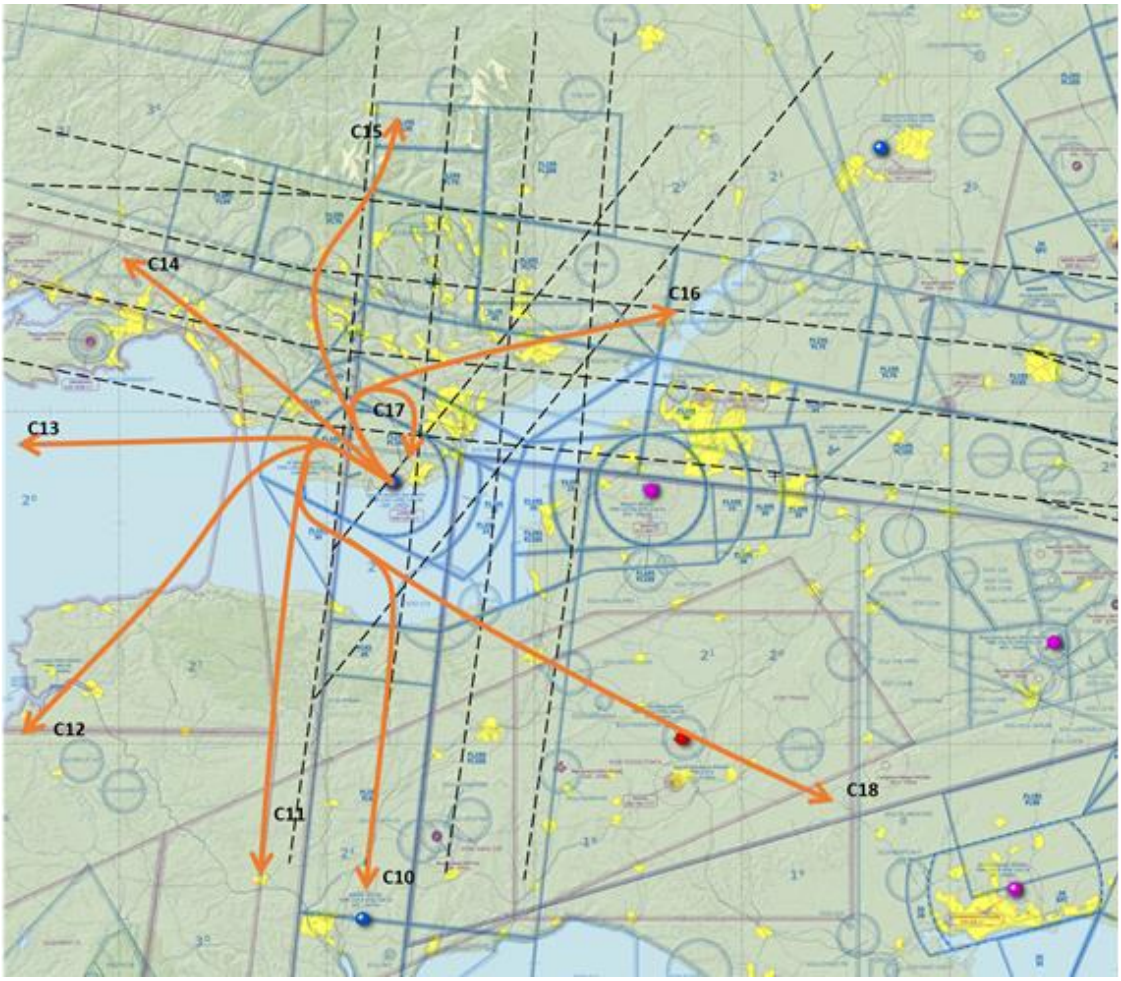
This eastbound route places aircraft directly overhead Bristol airport and would require a safety assessment to assess potential conflictions with inbound and outbound traffic. It may require planning and interaction with Bristol controllers at an earlier stage of flight and delivers a high safety impact. In addition, there is potential for aircraft to interact with the Salisbury Danger Area Complex which may require coordination and a safety assessment to assess the impact.

C9

A relatively straight-forward route to the South East avoiding airspace structures, this low impact route may require a hazard assessment to assess the impact of routing through an occasionally active flying area (EGM-TRA002). This may have safety benefit in a reduced number of interactions required by the controller.

3.2 Departures RW30

The proposed Standard Instrument Departure (SID) routes from Runway 12:



C10

The initial departure track is straight in order to avoid St Athan ATZ which is due west of Cardiff. There may be a necessity to assess any associated hazards if Westerly departures encounter issues on immediate climb out. Once the track turns south it is a relatively low safety impact however it would be prudent to assess any safety implications around joining controlled airspace (it is understood that current plans would mean that traffic on the associated airway may be travelling in the opposite direction).

C11
The initial departure track is straight in order to avoid St Athan ATZ which is due west of Cardiff. There may be a necessity to assess any associated hazards if Westerly departures encounter issues on immediate climb out. Once the track turns south it is a relatively low safety impact.

C12
The initial departure track is straight in order to avoid St Athan ATZ which is due west of Cardiff. There may be a necessity to assess any associated hazards if Westerly departures encounter issues on immediate climb out. Then the track turns South West remaining over the sea meaning it has a relatively low safety impact. This may have safety benefit in a reduced number of interactions required by the controller.

C13
This Westerly departure route avoids the St Athan ATZ before climbing out over the sea presenting a low safety impact. This may have safety benefit in a reduced number of interactions required by the controller.

C14
This departure route to the North West routes through an area routinely used for military aircraft training and GA flight. It would require the addition of controlled airspace to deconflict from other users and therefore has a medium safety impact that warrants hazard and risk assessments to be conducted.

C15
Routing North from Cardiff this route has to consider high ground and obstacles to the North that would justify a safety risk assessment to be completed, in order to determine the climb profile ability of users to maintain safe vertical distances. A medium safety impact, the route may also necessitate additional controlled airspace to ensure safe transition to the airways structure.

C16
Remaining within the confines of controlled airspace throughout this route has low safety impact.

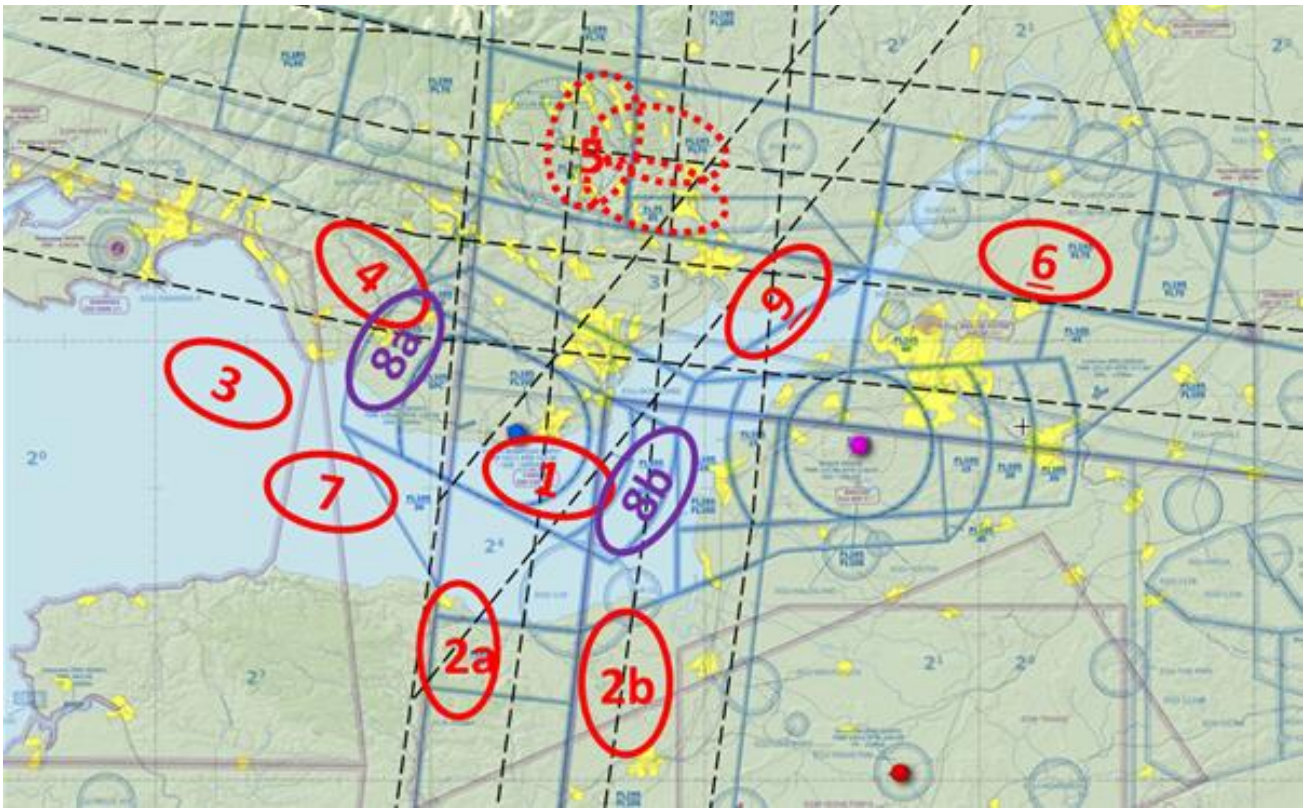
C17
This circling-climb route remains within the confines of controlled airspace and has a low safety impact. It may be worth considering safety assessment of radar coverage in the Cardiff overhead to confirm that identification on the departing track can be maintained until handover to upper sectors.

C18

Routing North west to avoid the St Athan ATZ on climb-out, this route then turns left to the South West for further climb over the Bristol Channel and outside of controlled airspace. Further to the South West the route transits the Salisbury military training area which would warrant a safety risk assessment to be conducted. This route has a relatively low safety impact.

3.3 Holds

The proposed holds below are considered for the Cardiff ACP:



Hold 1
This hold is in the same location as the current hold and has a relatively low safety impact. A Safety risk assessment is recommended to determine any hazard caused by the loss of radar contact close to the Cardiff radar overhead.

Hold 2a
Located to the South West of Cardiff, this hold has a relatively low safety impact. A risk assessment should be conducted to assess the affect of departures to the South affecting integration of aircraft leaving the hold on inbound tracks.

Hold 2b

Located to the South East of Cardiff, this hold has a relatively low safety impact. A risk assessment should be conducted to assess the affect of departures to the South affecting integration of aircraft leaving the hold on inbound tracks.

Hold 3

Located West of Cardiff, this hold is a low safety impact being away from adjacent airspace structures. There may be safety benefit from the controllers being able to clearly monitor tracks in the hold and transitions due to less radar clutter from overlapping traffic patterns.

Hold 4

Located to the North-West of Cardiff, this hold has a high safety impact that would require a safety risk assessment of the transitions to both runways to analyse potential interactions with military and/or GA traffic in the area to the West of Cardiff. New controlled airspace to contain the hold requires analysis to establish the affect on other airspace users. Additionally, the transitions planned that route through the overhead also require a risk assessment to analyse the potential loss or radar identification.

Hold 5

Located to the north and within controlled airspace, this hold has a low safety impact. The orientation might be East/West or North/south however this has no safety implications. The transit routes are also relatively benign.

Hold 6

This hold is located to the North East of Cardiff, contained within controlled airspace and attracts a low safety impact. Due to its proximity to the North of Bristol Airport, a safety assessment of interaction with Bristol traffic would be required.

Hold 7

Located to the South West of Cardiff, this hold does not interact with adjacent airspace structures and has a low safety impact. There may be safety benefit from the controllers being able to clearly monitor tracks in the hold and transitions due to less radar clutter from overlapping traffic patterns.

Hold 8a

Located to the West of Cardiff, this hold would require an extension of controlled airspace and that would affect the military and GA flying to the North West. Used in conjunction with Hold B, during runway changes a safety assessment needs conducting to examine any hazards encountered during hold swaps. This has a high safety impact and the transitions should be assessed for appropriate ground and obstacle clearances.

Hold 8b

This hold is intended to be used with Hold 8a however is located to the East. Although there is less impact on arrivals than 8a, this high safety impact hold does impact arrivals and departures to/from Bristol which would necessitate a safety risk assessment to be conducted. Additionally, during runway changes a safety assessment needs conducting to examine any hazards encountered during hold swaps.

Hold 9
Located to the North East, this hold has a medium safety impact. A safety risk assessment requires conducting to assess interaction with Bristol departures from RW27 and additionally, transitions to RW12 routing through the overhead require an assessment of potential radar loss and interaction with aircraft departing Cardiff.

4. Conclusion

This report provides qualitative safety statements for all proposed routes and holds for the Cardiff ACP. This responds to the Safety assessment for the Initial options appraisal as detailed in CAP 1616 [2], Appendix E, paras E49-52.