Future Airspace Strategy Implementation South (FASI-S)

Cardiff Airport

Gateway documentation:

Stage 2 Develop & Assess

2B (ii) Initial Options Appraisal

cardiff airport
maes awyr caerdydd

Sign-Off

Action	Role	Date
Produced	Airspace Change Specialist	28/01/2022
Reviewed Approved	NATS Cardiff General Manager	28/01/2022
Reviewed Approved	Cardiff Head of Airfield Operations	28/01/2022

Publication History

Issue	Date	Comments
Issue 1.0	28/01/2022	First issue submitted to the CAA
Issue 2.0	XX/06/2022	Updated following CAA feedback with further information on the baseline and impact on biodiversity and tranquillity included

Contents

1. Introduction

This document forms part of the document set in accordance with the requirements of CAP1616 airspace change process. It aims to provide adequate evidence to satisfy *Stage 2 Develop and Assess Gateway, Step 2B Options Appraisal (Phase I Initial),* including a Safety Assessment.

This document has been submitted to the CAA to satisfy the requirements for Stage 2 alongside the *Design Options* and *Design Principle Evaluation* documentation which can also be found on the portal (link).

This Initial Options Appraisal is the first of three options appraisals as part of CAP1616. The design options presented herein all passed the required criteria of the Stage 2A Design Principle Evaluation. This appraisal builds on the Design Principle evaluation and identifies the key impacted audiences of the design options and a qualitative assessment of each. This assessment takes into consideration feedback received from stakeholders during the Stage 2 engagement activities alongside operational knowledge of the ACP design team.

The changes proposed in Cardiff Airport's ACP will impact flights below 7,000ft. Hence in accordance with the Levels as defined in CAP1616, it has been categorised as a Level 1 change. In line with the requirements for a Level 1 change, this Initial Options Appraisal contains a qualitative environmental impact assessment which has been conducted on the basic of CO_2 emissions and noise impact.

The baseline (do nothing) option would not deliver any improvement or modernisation from today's operations and is used as the benchmark against which the benefits of the proposed change can be measured. The Design Principles are either not met or met by default for this option, i.e., 'no change'. As such, this option is not being progressed but is included here for comparative purposes.

The detailed makeup of the baseline option and the Hold/ SID options, including evaluation is detailed in Stage 2 Develop and Assess: *Stage 2A(i) Design Options* and *Stage 2A(ii) Design Principle Evaluation*.

Following on from the Design Principle Evaluation, Cardiff Airport is progressing the following different design options which form the focus of this Initial Options Appraisal:

- 8 options for Runway 12 SIDs
- 8 options for Runway 30 SIDs
- 5 options for a Hold

Biodiversity

From a biodiversity point of view and CAP1616, airspace changes at the altitudes proposed here are unlikely to have an impact on biodiversity because they do not involve ground infrastructure changes. Engagement with biodiversity legislation or guidance is unlikely to be

required. Changes in greenhouse gas emissions and tranquillity, which may have a potential indirect impact on biodiversity, are described separately in this document.

Noise Modelling Methodology

As part of the Stage 2 Gateway, the CAA requires the change sponsor (here being Cardiff Airport) to justify the category its noise modelling methodology falls into. The noise modelling categories can be found in the CAA's CAP2091 document which describes the "minimum acceptable level of sophistication of noise modelling" that can be used for an airspace change, alongside other statutory duties.

CAP2091 describes five noise modelling categories A-E, with category A being the most sophisticated, reflecting the most accurate impact of noise experienced by local stakeholders, and Category E is the least and uses standard ICAO datasets.

As covered above, Cardiff Airport is conducting a qualitative Initial Options Appraisal and it is therefore not proportional to categorise this sort of assessment. We have provided high-level statements, based on stakeholder feedback and SME input, which indicates whether the noise impact is likely to change.

As our design options are refined in Stage 3 and beyond, we will update our options appraisal with quantitative evidence where appropriate, which will include the noise modelling. Based on the category descriptions contained within CAP2091, Cardiff Airport's noise modelling will fall under Category E, which will use a standard ICAO dataset.

Assessment Criteria

The evidence supplied here is qualitative and high level, the assessment criteria based on the opinions of subject matter experts, feedback derived from stakeholders and the evolving design work. Cardiff Airport do not have an accurate enough traffic forecast to build quantitative airspace change options appraisals. Therefore, the qualitative initial appraisals for each indicative design option do not consider the traffic forecast. A suitable forecast is required as part of the quantitative analysis at Stage 3 and this will be provided.

Each design option has been assessed based on the criteria contained within CAP1616. These criteria can be found below.

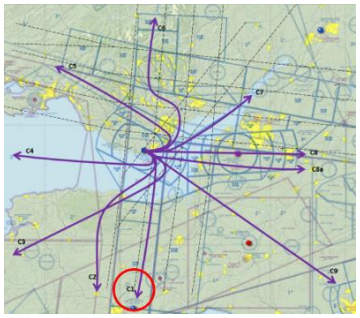
Group	Impact
Communities	Noise impact on health and quality of life
A qualitative assessment of any changes to the noise impact to those affected on the ground. A qualitative assessment of any changes to the tranquillity impact, notably for Areas of Outstanding Natural Beauty or National Parks	
Communities	Air quality
A qualitative assessment of any changes to the air quality impact.	
Wider society	Greenhouse gas impact
A qualitative assessment of any changes to the CO_2 impact.	
Wider society	Capacity/ resilience
A qualitative assessment of any changes to the impact on overall UK airspace structure, specifically in relation to capacity and resilience.	
General Aviation	Access

A qualitative assessment of any changes to the access to airspace for GA users.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
A qualitative assessment of any changes to the forecast increase in air transport movements.	
General Aviation/ commercial airlines	Fuel Burn
A qualitative assessment of any changes to the fuel burn costs.	
Commercial airlines	Training costs
A qualitative assessment of any changes to the training costs.	
Commercial airlines	Other costs
A qualitative assessment of any changes to any other relevant costs.	
Airport/ ANSP	Infrastructure costs
A qualitative assessment of any changes to infrastructure costs.	
Airport/ ANSP	Operational costs
A qualitative assessment of any changes to operational costs.	
Airport/ ANSP	Deployment costs
A qualitative assessment of any changes to deployment costs.	

2. Baseline (do nothing)

The design options in this document are compared to the baseline do-nothing option. As summarised in our Step 2Aii document, the baseline was rejected as it did not meet Design Principles relating to resilience and capacity criteria. It is included here for comparison purposes but is not an option to be progressed.

Group	Impact
Communities	Noise impact on health and quality of life
The same set of communities would continue to be overflown below 7,000ft, resulting in concentration of overflight at low altitudes. There would be no opportunities to provide respite or to otherwise alter flightpaths. If this baseline was retained, the noise impact would not change. Some areas of the Brecon Beacons National Park and AoNBs (Cotswolds, Mendip Hills and Wye Valley) are overflown in a dispersed manner below 7,000ft, which may have an impact on tranquility. If this baseline system was retained,, this impact on tranquillity would not change.	
Communities	Air quality
The same flightpaths would be flown below 1,000ft . If this baseline system was retained, arrivals would not change flightpath below 1,000ft, departures would not change flightpath below 1,000ft, and local air quality impacts would not change.	
Wider society	Greenhouse gas impact
The same route lengths would be flown, and the same typical altitudes would be attained along the track. If this baseline system was retained, track lengths could not be shortened, altitudes could not increase, and greenhouse gas impacts would not change.	
Wider society	Capacity/ resilience
There would be no opportunity to improve airspace capacity or resilience. If this baseline system was retained, the predominant swathes of traffic to/ from the east and south of the airport will remain the same; capacity and resilience impacts would not change.	
General Aviation	Access
GA access to Cardiff Airport's airspace would continue in the areas currently observed (generally this is at or below 4,000ft). If this baseline system was retained, GA would continue to access the same areas in a similar manner and access impacts would not change. The current access is considered sub-optimal for all airspace users.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
There would be no opportunity to improve airspace capacity. If this baseline system was retained, the predominant broad swathes of traffic to/ from the east and south of the airport will remain the same. Capacity impacts would not change, and there would be no change in economic impact for either GA or commercial operators.	
General Aviation/ commercial airlines	Fuel Burn
The same route lengths would be flown, and the same typical altitudes would be attained along the track. If this baseline system was retained, track lengths could not be shortened, altitudes could not increase, and fuel burn impacts would not change for either GA or commercial operators.	
Commercial airlines	Training costs
Flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. If this baseline system was retained, the same flight procedures would be used and training cost impacts would not change.	
Commercial airlines	Other costs
We are not aware of other commercial airline costs that are appropriate for inclusion in this appraisal. If this baseline system was retained, those other costs would not change.	
Airport/ ANSP	Infrastructure costs
The infrastructure in place is used daily. If this baseline system was retained, the same infrastructure would continue to be used in the same way, with no additional costs beyond typical maintenance.	
Airport/ ANSP	Operational costs
The operation is used daily. If this baseline system was retained, the same operation would continue in the same way, with no additional operational costs.	
Airport/ ANSP	Deployment costs
If this baseline system was retained, there would be no deployment, hence no associated costs.	

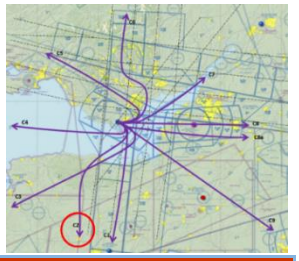


3. Runway 12 SIDs

Runway 12 SID C1

Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb up to 7,000ft is over water. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option has the potential to overfly the north edge of the Quantock Hills Area of Outstanding Natural Beauty (AoNB). This could be below 7,000ft, particularly if departures are held down, and therefore potentially have an impact on tranquillity. This is very similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current Noise Preferential Route (NPR) subject to further design work.	
Wider society	Greenhouse gas impact
Direct route however, CCOs (Continuous Climb Operation) may not be achievable above 7,000ft, due to a potential location of Cardiff's Hold/ transitions. This could therefore increase the greenhouse gas impact and contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – anticipated to be frequently used as a large percentage of traffic flies to/ from southern locations. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option is primarily positioned over the water at lower levels and within existing CAS (Controlled Airspace). This design option has the potential to have a reduced impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Direct route however, CCOs may not be possible which would increase fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery.	

Internal documentation will also require updating.



Runway 12 SID C2

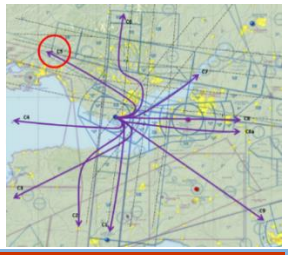
Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb up to 7,000ft is over water. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would overfly the Exmoor National Park well above above 7,000ft and could therefore have a visual impact on tranquillity. This is different to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Longer track than currently flown and CCOs above 7,000ft may not be achievable, due to a potential location of Cardiff's Hold/ transitions. This could therefore increase the greenhouse gas impact and contribution of this design option when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – anticipated to be frequently used as a large percentage of traffic flies to/ from southern locations. Good alignment with the network route structure. Also, should be suitable for lower performance aircraft types. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option is primiarily positioned over the water at lower levels and primarily contained within existing CAS (Controlled Airspace). However, it may require a small amount of additional CAS to the west of the current Berry Head CTA which has the potential to have a slightly increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Longer than currently flown and CCOs may not be possible which would increase fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	

Runway 12 SID C3

Group	Impact
Communities	Noise impact on health and quality of life
New route intended only for some early morning departures (low demand). Most of the intial climb up to 7,000ft. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would overfly the Exmoor National Park well above above 7,000ft and could therefore have a visual impact on tranquillity. This is different to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Slightly shorter track than today (cuts the corner) however, CCOs above 7,000ft may not be possible due to a potential location of Cardiff's Hold/ transitions. This design option is anticipated to provide a reduction in greenhouse gas impact and combination when compared with the baseline do-nothing option. However, if CCOs are not possible, this could lessen a reduction in greenhouse gas impact and contribution.	
Wider society	Capacity/ resilience
This route would be used as an early morning offload route for departures joining southerly Atlantic tracks or southern Europe destinations. Supports growth for these destinations however, low demand initially anticipated. Does not currently align with the network route structure, further work would be required. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option may climb outside of CAS for a short amount of time but this would only be early in the morning. This design option is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Small reduction in fuel burn for airlines as this option would cut the corner slightly when compared with the baseline do-nothing option. However, CCOs above 7,000ft may not be achievable, due to a potential location of Cardiff's Hold/ transitions. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	

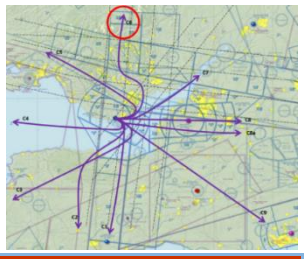
Runway 12 SID C4

Group	Impact
Communities	Noise impact on health and quality of life
New route intended only for some early morning departures (low demand). Most of the intial climb up to 7,000ft is also over water. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
CCOs above 7,000ft may not be possible due to a potential location of Cardiff's Hold/ transitions. This could therefore increase the greenhouse gas impact and contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
This route would be used as an early morning offload route for departures joining southerly Atlantic tracks or southern Europe destinations. Supports growth for these destinations however, low demand initially anticipated. Does not currently align with the network route structure, further work would be required. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
A significant amount of additional CAS would be required. However, as this would be over water there would be minimal impact on other airspace users. This design option is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
CCOs may not be possible which fuel planning would have to take into account. It is anticipated that this design option could have a negative impact on fuel burn impact when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



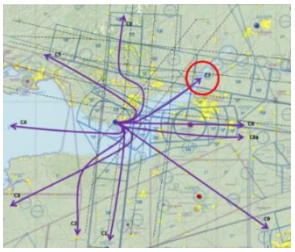
Runway 12 SID C5

Group	Impact
Communities	Noise impact on health and quality of life
Potential to impact new communities around Cardiff City. This design option has the potential to increase the overall imapcts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would overfly the Brecon Beacons National Park and may have a minor impact on tranquillity if the departure climb rate is reduced. This is similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
More direct route than currently flown therefore, reduced impact for greenhouse gas contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – this would formalise a tactical procedure which is currently used in the operation. Good alignment with the network route structure. However, there may be an increase in operational complexity as this route would depart towards adjacent CAS. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This route option would require a small amount of additional CAS to the north-west of Cardiff Airport. This could impact GA access by reducing the area they can operate within. Therefore, this design option is anticipated to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
More direct route than currently flown therefore, a reduction in fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



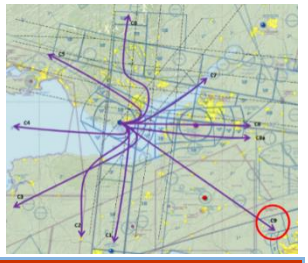
Runway 12 SID C6

Group	Impact
Communities	Noise impact on health and quality of life
Minimal impact - the intial climb is over water then the route is specifically positioned to avoid communities (resulting in a slightly longer track distance than what is currently flown). This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would overfly the Brecon Beacons National Park well above above 7,000ft and could therefore have a visual impact on tranquillity. This is similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Slightly longer track distance than currently flown which could increase the greenhouse gas impact and contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – similar to current route and good alignment with the network route structure. However, there may be an increase in operational complexity as this route would depart towards adjacent CAS. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option is contained within existing CAS therefore it is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Slightly longer track distance than what is currently flown therefore, slight increase in fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



Runway 12 SID C7

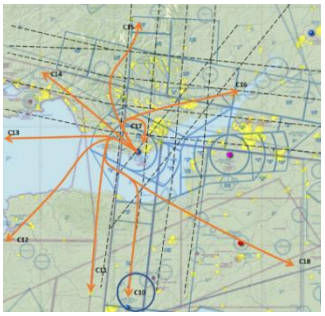
Group	Impact
Communities	Noise impact on health and quality of life
Positioned to purposefully overfly water to minimise the impact for ground-based stakeholders. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Shorter track distance than today therefore this would reduce the greenhouse gas impact and contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – should support an expected increase in future traffic to eastern destinations alongside being suitable for lower performance aircraft types. It would also have good alignment with the network structure. However, this design option would require increased collaboration with Bristol Airport due to the potential impact on Bristol arrivals. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option is primarily positioned over the water at lower levels and within existing CAS (Controlled Airspace). This design option has the potential to have a reduced impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Shorter track distance than currently flown therefore a reduction in fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



Runway 12 SID C9

Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb up to 7,000ft is over water. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Direct route with a significant reduction in its greenhouse gas contribution when compared with the baseline do-nothing option. However, this could be reduced as CCOs may not be possible above 7,000ft due to a potential location of Cardiff's Hold/ transitions. This could be further lessened as this route would only be used during early morning hours.	
Wider society	Capacity/ resilience
This design option would be used to reduce pre-departure delay during first rotation (a known high demand period). However, it would not comply with network connectivity and further work would be required. It is also anticipated that it would increase workload for sector controllers when compared with today. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
A significant amount of additional CAS would be required however this is unlikely to have an impact on GA access, particularly as this route will only be used during early morning hours. This design option is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Direct route with a significant reduction in fuel burn for airlines when compared with the baseline do-nothing option. However, this could be reduced as CCOs may not be possible above 7,000ft due to a potential location of Cardiff's Hold/ transitions. Any potential saving could be further lessened as this route would only be used during early morning hours. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery.	

Internal documentation will also require updating.



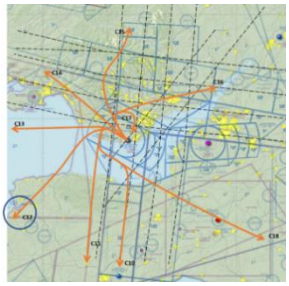
4. Runway 30 SIDs

Runway 30 SID C10

Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb is over water then avoids overflying any large populations. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Slight track extension introduced to best avoid St Athan operations and CCOs may not be possible due to a potential location of Cardiff's Hold/ transitions. Therefore, greenhouse gas emissions could slightly increase when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – anticipated to be frequently used as a large percentage of traffic flies to/ from southern locations. Also, good alignment with network connectivity and similar to what is flown today. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option is primarily positioned over the water at lower levels and within existing CAS (Controlled Airspace). This design option has the potential to have a reduced impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Slight track extension introduced to best avoid St Athan operations and CCOs may not be possible due to a potential location of Cardiff's Hold/ transitions. This design option would increase the fuel burn impact when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	

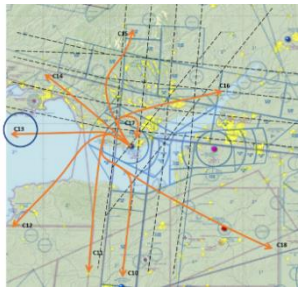
Runway 30 SID C11

Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb is over water then avoids overflying any large populations. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
CCOs may not be possible due to a potential location of Cardiff's Hold/ transitions. Therefore, greenhouse gas emissions could slightly increase when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – anticipated to be frequently used as a large percentage of traffic flies to/ from southern locations. However, further design work required as it would currently align with an opposite aligned network route. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
Likely to require additional CAS however this is unlikely to have an impact on GA operations. This design option is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
CCOs may not be possible due to a potential location of Cardiff's Hold/ transitions therefore, airline fuel burn could slightly increase when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



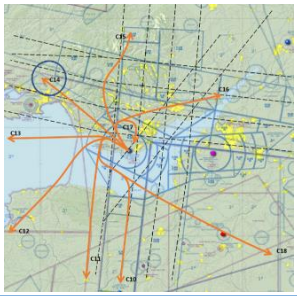
Runway 30 SID C12

Group	Impact
Communities	Noise impact on health and quality of life
New route intended only for some early morning departures (low demand). Most of the intial climb is also over water. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Small reduction in greenhouse gas contribution as this option would cut the corner slightly when compared with the baseline do-nothing option. However, CCOs above 7,000ft may not be achievable, due to a potential location of Cardiff's Hold/ transitions. This could therefore lessen the reduction of greenhouse gas impact for this design option.	
Wider society	Capacity/ resilience
This route would be used as an early morning offload route for departures joining southerly Atlantic tracks or southern Europe destinations. Supports growth for these destinations however, low demand initially anticipated. Does not currently align with the network route structure, further work would be required.	
General Aviation	Access
This design option may climb outside of CAS for a short amount of time but this would only be early in the morning and unlikely to have an impact on GA access. This design option is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Small reduction in fuel burn for airlines as this option would cut the corner slightly when compared with the baseline do-nothing option. However, CCOs above 7,000ft may not be achievable, due to a potential location of Cardiff's Hold/ transitions. This could therefore impact the fuel burn saving. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



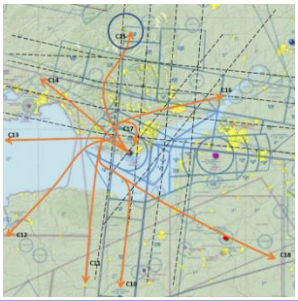
Runway 30 SID C13

Group	Impact
Communities	Noise impact on health and quality of life
Overflies minmal land and no populated areas to minimise the impact for ground-based stakeholders. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option.It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Direct track to the west introducing a small greenhouse gas impact and contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
This route would be used for departures joining southerly Atlantic tracks or southern Europe destinations. Supports growth for these destinations however, low demand initially anticipated. Does not currently align with the network route structure, further work would be required. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
A significant amount of additional CAS would be required for protection purposes and would likely impact upon GA access. Therefore, this design option is anticipated to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Direct track to the west introducing a small fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



Runway 30 SID C14

Group	Impact
Communities	Noise impact on health and quality of life
Small increase in noise impact for new communities around Cowbridge. Therefore, this design option has the potential to increase the overall impacts of aircraft noise when compared with the baseline do-nothing option.It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
More direct route than currently flown therefore, reduced impact for greenhouse gas contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
No capacity constraints – this support growth for more western and transatlantic flights in the future. Good alignment with the network route structure. However, potential to conflict with en route traffic in a known busy region of airspace. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This route option would likely require additional CAS for protection purposes. The positioning of the route would have a significant impact specifically on gliding operations around Brecon and potentially other GA users too. Therefore, this design option is anticipated to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
More direct route than currently flown therefore, reduced fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	

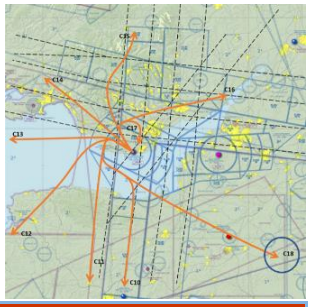


Runway 30 SID C15

Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb is over water then the route is specifically positioned to avoid communities (resulting in a slightly longer track distance than what is currently flown). This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would overfly the Brecon Beacons National Park and therefore has the potential to have an impact on tranquillity. This is similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Slightly longer track distance than currently flown which could increase the greenhouse gas impact and contribution when compared with the baseline do-nothing option.	
Wider society	Capacity/ resilience
Good alignment with the network route structure however may interact with LTMA arrivals within this known busy region of airspace. Also, possible further capacity constraints from conflict with other Cardiff traffic such as slow departures. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
There is a small chance that the CAS base would require lowering but otherwise, contained within existing CAS. Therefore, this design option has the potential to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Slightly longer track distance than what is currently flown therefore, slight increase in fuel burn for airlines when compared with the baseline do-nothing option. Airline fuel planning would have to take into account an increase in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	

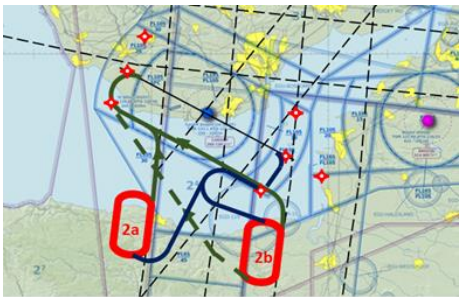
Runway 30 SID C16

Group	Impact
Communities	Noise impact on health and quality of life
All of the climb is over land with the potential to impact new stakeholders north of Cardiff City. Therefore, this design option has the potential to increase the overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option has the potential to overfly a small region of the Brecon Beacons National Park and therefore could have an impact on tranquillity. This is similar to what is flown today (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Shorter track distance than today therefore this would reduce the greenhouse gas impact and contribution when compared with the baseline do-nothing option. However, London Airport arrivals could impact the potential for a continuous climb.	
Wider society	Capacity/ resilience
No capacity constraints – should support an expected increase in future traffic to eastern destinations alongside being more direct and simpler than the current departure route. It would also have good alignment with the network structure. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option is designed to be contained within existing CAS. This design option is anticipated to have a similar impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Shorter track distance than today therefore a reduction in fuel burn for airlines when compared with the baseline do-nothing option. However, London Airport arrivals could impact the potential for a continuous climb. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



Runway 30 SID C18

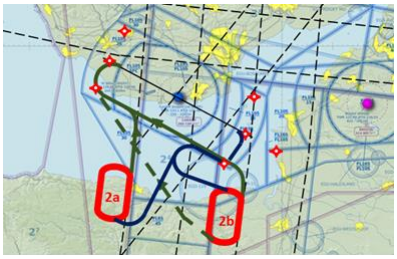
Group	Impact
Communities	Noise impact on health and quality of life
Most of the intial climb is over water and avoids overflying any large populations to minimise the impact for ground-based stakeholders. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. It should be noted that any re-alignment from the current NPR could overfly new communities. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is different to what is flown today (baseline do-nothing option) and therefore offers an improvement.	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Departing aircraft will still climb through 1,000ft on initial departure, between 2 and 4 nautical miles (about 4-7km) from either end of the runway. This is unlikely to change much from today however, there may be a slight re-alignment of the current NPR subject to further design work.	
Wider society	Greenhouse gas impact
Direct route with a significant reduction in its greenhouse gas contribution when compared with the baseline do-nothing option. However, this could be lessened as this route would only be used during early morning hours.	
Wider society	Capacity/ resilience
This design option would be used to reduce pre-departure delay during first rotation (a known high demand period). However, it would not comply with network connectivity and further work would be required. It is also anticipated that it would increase workload for sector controllers when compared with today. All SID options will be explored for suitability of applying reduced departure separations, thus reducing pre-departure delay.	
General Aviation	Access
This design option may require some additional CAS although the initial climb would occur within existing CAS. It is anticipated to only have a small impact on GA access, particularly as this route will only be used during early morning hours. Therefore, this design option has the potential to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Direct route with a significant reduction in fuel burn for airlines, when compared with the baseline do-nothing option. However, this could be lessened as this route would only be used during early morning hours. Airline fuel planning would have to take into account a reduction in track miles.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



5. Cardiff Airport Hold Options

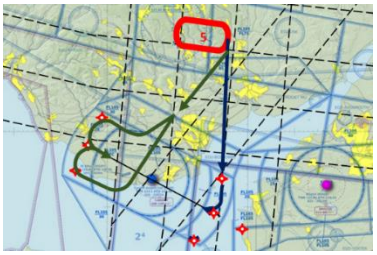
Hold 2A

Group	Impact
Communities	**Noise impact on health and quality of life**
Transitions would primarily be positioned over water and not overfly any large populations. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. PBN routing will be used to minimise overflying population centres. This Hold is positioned over the Exmoor National Park (above 7,000ft) and could therefore have a visual impact on tranquillity. This is a different location to today's holding procedure (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Arriving aircraft will still descend through 1,000ft on final approach, between 2 and 4 nautical miles (about 4-7km) from touchdown at either end of the runway. This is close to landing, in the very final stages of the approach, and is no change from today.	
Wider society	Greenhouse gas impact
Appropriate location as this Hold is close to the airport and the majority of arrivals are from the south and east. Fuel planning does not have to take into account additional track miles due to the location therefore no superfluous environmental impact. Net increase in CO_2 emissions would be small as holding will not be employed for most arrivals (only when required for reasons such as delay absorption, or technical troubleshooting).	
Wider society	Capacity/ resilience
Good alignment with the network route structure and appropriate location for the majority of arrivals from the south and east. Removes Hold from the overhead thus enabling more use of continuous climb operations (CCO) for departures. However, there may be some climb restriction on departures to the south due to the location of the transitions from the hold to the runway.	
General Aviation	Access
Although GA flights generally avoid this region due to high terrain, the Runway 12 transition may have a small impact on GA flights. Therefore, this design option has the potential to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Appropriate location as this Hold is close to the airport and the majority of arrivals are from the south and east. Fuel planning therefore does not have to take into account additional track miles due to Hold location.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



Hold 2B

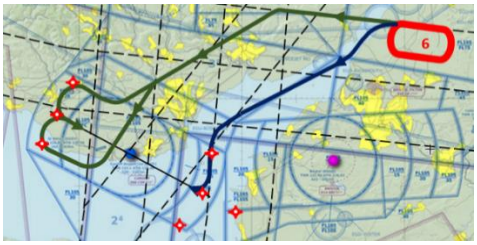
Group	Impact
Communities	**Noise impact on health and quality of life**
Transitions would primarily be positioned over water and not overfly any large populations. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. PBN routing will be used to minimise overflying population centres. The transitions from this Hold may overfly the western edge of the Quantock AoNB and could therefore have an impact on tranquillity. This is a different location to today's holding procedure (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Arriving aircraft will still descend through 1,000ft on final approach, between 2 and 4 nautical miles (about 4-7km) from touchdown at either end of the runway. This is close to landing, in the very final stages of the approach, and is no change from today.	
Wider society	Greenhouse gas impact
Appropriate location as this Hold is close to the airport and the majority of arrivals are from the south and east. Fuel planning does not have to take into account additional track miles due to the location therefore no superfluous environmental impact. Net increase in CO_2 emissions would be small as holding will not be employed for most arrivals (only when required for reasons such as delay absorption, or technical troubleshooting).	
Wider society	Capacity/ resilience
Good alignment with the network route structure and appropriate location for the majority of arrivals from the south and east. Removes Hold from the overhead thus enabling more use of continuous climb operations (CCO) for departures. However, potential constraint on capacity if departures have to be held beneath the Hold.	
General Aviation	Access
The Hold and transitions would be contained within existing CAS alongside the transitions primarily overflying water. GA flights also generally avoid this region due to high terrain.. Therefore, this design option has the potential to have a reduced impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Appropriate location as this Hold is close to the airport and the majority of arrivals are from the south and east. Fuel planning therefore does not have to take into account additional track miles due to Hold location.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	



Hold 5

Group	Impact
Communities	**Noise impact on health and quality of life**
The transition to Runway 12 would descend over and significantly impact upon new populations (not impacted today). Further design work will investigate whether this could be mitigated by extending the transition further to the south. However it is likely that this would have a detrimental environmental impact from increased track miles. Thereof,re this design option has the potential to increase overall impacts of aircraft noise when compared with the baseline do-nothing option. PBN routing will be used to minimise overflying population centres where possible. This Hold is positioned over the Brecon Beacons National Park (above 7,000ft) and could therefore have a visual impact on tranquillity. This is a different location to today's holding procedure (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Arriving aircraft will still descend through 1,000ft on final approach, between 2 and 4 nautical miles (about 4-7km) from touchdown at either end of the runway. This is close to landing, in the very final stages of the approach, and is no change from today.	
Wider society	Greenhouse gas impact
Not an optimal location for arrivals from the south. This would have a negative impact on greenhouse gas emissions when compared with other Hold design options. Net increase in CO_2 emissions would be small as holding will not be employed for most arrivals (only when required for reasons such as delay absorption, or technical troubleshooting). Flights will however have to plan fuel loading to take into account routing to the holding facility; for flights from the south, this would require higher fuel load planning compared with a hold to the south and corresponding higher fuel burn.	
Wider society	Capacity/ resilience
Not an optimal location from a large percentage of arrivals, particularly from the south. Transitions may have an impact on Bristol operations requiring tactical intervention to deconflict, or a restriction on movements in order to deconflict.	
General Aviation	Access
Transitions are likely to conflict with gliders which operate in this Class D region of airspace. Minimal impact otherwise – Hold and transitions would be contained within existing CAS. Therefore, this design option has the potential to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Not an optimal location for a significant percentage of arrivals, particularly those from the south. Airlines would have to carry excessive fuel to account for the location of the Hold.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery.	

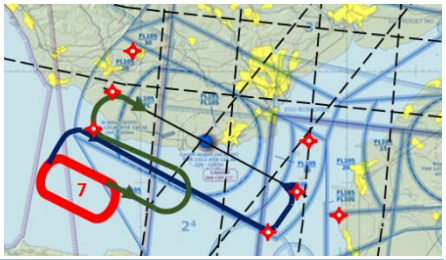
Internal documentation will also require updating.



Hold 6

Group	Impact
Communities	**Noise impact on health and quality of life**
The transition to Runway 12 would descend over and significantly impact upon new populations (not impacted today). Further design work will investigate whether this could be mitigated by extending the transition further to the south. However it is likely that this would have a detrimental environmental impact from increased track miles. Therefore, this design option has the potential to increase overall impacts of aircraft noise when compared with the baseline do-nothing option. PBN routing will be used to minimise overflying population centres where possible. This Hold is also positioned over the Cotswolds AoNB (above 7,000ft) and could therefore have a visual impact on tranquillity. This is a different location to today's holding procedure (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Arriving aircraft will still descend through 1,000ft on final approach, between 2 and 4 nautical miles (about 4-7km) from touchdown at either end of the runway. This is close to landing, in the very final stages of the approach, and is no change from today.	
Wider society	Greenhouse gas impact
Not an optimal location for a significant percentage of arrivals, particularly those from the south. This would have a negative impact on greenhouse gas emissions when compared with other Hold design options. Net increase in CO_2 emissions would be small as holding will not be employed for most arrivals (only when required for reasons such as delay absorption, or technical troubleshooting). Flights will however have to plan fuel loading to take into account routing to the holding facility; for flights from the south, this would require higher fuel load planning compared with a hold to the south and corresponding higher fuel burn.	
Wider society	Capacity/ resilience
Good alignment with the network route structure. However, not an optimal location from a large percentage of arrivals, particularly from the south. The location could also potentially constrain capacity such as last-minute runway changes being difficult to accommodate.	
General Aviation	Access
The transitions are likely to conflict with GA flights such as frequent cross-country flights which operate around the Cotswolds within Class D airspace. This could be further exasperated if transitions require additional CAS. Therefore, this design option has the potential to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Not an optimal location for a significant percentage of arrivals, particularly those from the south. Transitions are also excessively long. Flights will have to plan fuel loading to take into account routing to the holding facility; for flights from the south, this would require higher fuel load planning compared with a hold to the south and corresponding higher fuel burn.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery.	

Internal documentation will also require updating.



Hold 7

Group	Impact
Communities	**Noise impact on health and quality of life**
The transitions would primarily be over water which would minimise the impact on ground-based stakeholders. This design option has the potential to reduce overall impacts of aircraft noise when compared with the baseline do-nothing option. PBN routing will be used to minimise overflying population centres where possible. This design option would not overfly any AoNBs or National Parks and therefore have no impact on tranquillity. This is a different location to today's holding procedure (baseline do-nothing option).	
Communities	Air quality
Government guidance states that aircraft flying above 1,000ft are unlikely to have a significant impact on local quality. Arriving aircraft will still descend through 1,000ft on final approach, between 2 and 4 nautical miles (about 4-7km) from touchdown at either end of the runway. This is close to landing, in the very final stages of the approach, and is no change from today.	
Wider society	Greenhouse gas impact
Appropriate location for a significant percentage of arrivals, particularly those from the south. However, slight increase in emissions for arrivals from the east when compared with other Hold locations. Net increase in CO_2 emissions would be small as holding will not be employed for most arrivals (only when required for reasons such as delay absorption, or technical troubleshooting).	
Wider society	Capacity/ resilience
Good alignment with the network route structure. Appropriate location for a large number of arrivals. However, there may be an impact on continuous climb operations for southerly departures from Cardiff runway 30 created by transitions to runway 30.	
General Aviation	Access
The transition to runway 30 is likely to require additional CAS. Otherwise this design option would utilise a relatively quiet region of current CAS. Mnimal impact on GA flights. Therefore, this design option has the potential to have an increased impact on GA access when compared with the baseline do-nothing option.	
General Aviation/ commercial airlines	Economic impact from increased effective capacity
No effect on capacity.	
General Aviation/ commercial airlines	Fuel Burn
Appropriate location for a significant percentage of arrivals, particularly those from the south. However, slight increase in fuel planning for arrivals from the east when compared with other Hold locations.	
Commercial airlines	Training costs
Qualitatively, flight procedures change worldwide with each AIRAC cycle and airlines would update their procedures accordingly, training if required. This proposal is not anticipated to require additional training costs for airlines.	
Commercial airlines	Other costs
No other airline costs are foreseen.	
Airport/ ANSP	Infrastructure costs
This proposal is not expected to change airport or ANSP infrastructure, beyond the initial deployment phase which would require some system engineering amendments (internal ATC system adaptation changes only).	
Airport/ ANSP	Operational costs
This proposal is not expected to change airport or ANSP operational costs.	
Airport/ ANSP	Deployment costs
This proposal is expected to require air traffic controller training for controllers and assistants at Cardiff Airport and NATS Swanwick with use of the NATS simulator facilities at both locations. Support staff are required to run the simulator – planning, training staff, data preparation and testing, pseudo pilots, safety analysts, outputs to be recorded and reported etc. Some staff may only require briefings. There may be occasions where the reduced availabilty of operational controllers during their conversion training could mean operational rostering becomes a factor when considering continuous service delivery. Internal documentation will also require updating.	

6. Safety Assessment

A qualitative safety assessment has been completed for each of the above design options and also includes those which were rejected as part of the *Step 2 - Stage 2A Design Principle Evaluation.*

This safety report documents the initial safety appraisal of the Cardiff Airport design options by providing a summary of potential safety implications and a qualitative statement for each design option.

The safety assessment has been summarised in a separate report and uploaded to the portal (link) alongside this document.

7. Conclusion and Next Steps

This proposal has been developed following the submission of the linked Statement of Need to the CAA Airspace Regulation. This summarised Cardiff Airport's requirement for an airspace change including and limiting the environmental impact of flights and better management of noise impact for ground-based stakeholders.

This document has described the design options which address the Statement of Need by the proposed introduction of new arrival and departure procedures. These options have been developed through engagement with Cardiff Airport's stakeholders including representatives from airlines and the GA/ MoD communities. Cardiff Airport thanks all of these stakeholders and looks forward to continuing the development of this proposal alongside them.

These design options have been qualitatively appraised and will be taken forward for further development and consultation. Subject to CAA approval at the *Stage 2 Develop and Assess* Gateway Assessment, this proposal will then move on to *Stage 3 Consult*.

At this point in the process, we have not rejected any of the design options based on the outcome of this Initial Options Appraisal. Where negative impacts have been identified, such as an increased noise impact, there is ample opportunity for the options to be further refined and impacts reduced later in the process. Similarly, there is not currently enough quantitative information required for us to identify a "preferred" option(s) at this point in the process.

Each of the design options featured herein passed the Step 2Aii Design Principle Evaluation and are in support of Cardiff Airport's Statement of Need. By progressing each of these remaining indicative design options, it provides an opportunity for the maximum number of options to glean further benefit through combination with each other – or other airspace change proposals. Our Stage 3 work will include a cumulative impact assessment of our proposed design options alongside other changes in the West Terminal Airspace cluster (Bristol, Exeter and NERL) which will provide this detail.