

Operational Service Enhancement Project:-
P18 Extension of Times of Availability NATEB – ADN

Gateway documentation:
Stage 2 Develop and Assess

Step 2A document (i)
Airspace Change Design Principle Evaluation



NATS

Roles

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1. Introduction

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

This document aims to provide adequate evidence to satisfy Stage 2 Develop and Assess Gateway, Step 2A Design Principle Evaluation.

It is advised that this document is read alongside the Stage 2A(i) Design Options Document which gives descriptions of each option.

The following options to provide an extension to the availability of P18 are proposed for consideration:

- Do Nothing
- Option 1: Permanent H24 usage as ATS Route
- Option 2: H24 CDR - availability subject to D-1 notified MoD activity (NATS preferred)
- Option 3: Extended hours CDR- availability subject to D-1 notified MoD activity.

2. Options Assessment: Design Principle Evaluation

Tables 1, 2, 3 and 4 below summarise the impacts/ benefits of the options evaluated. The tables are based on the pro-forma contained in CAP1616 Appendix E, page 208. The degree to which the design principle has been met is indicated by the following assessment criteria:

Design Principle		Priority	Description	Assessment Criteria		
No	Category			Does not meet	Partially meets	Met
1	Safety	1	Maintain or enhance current levels of safety.	Unlikely to pass a safety case due to major safety issues from proposed changes	Issues identified that would require a robust safety case e.g. workload, IFP (flyability), new hazards	No significant safety issues identified
2	Policy	1	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	Does not accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	N/a	Accords with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.
3	Environmental	2	The proposed change will facilitate the reduction in CO ₂ emissions per flight.	Net increase in CO ₂ emissions per flight.	No change	Net reduction in CO ₂ emissions per flight
4	Environmental	2	The proposed change should result in a cumulative reduction in noise impact per flight.	Net increase in noise impact per flight.	No Change	Net reduction in noise impact per flight.
5	Economic	2	The proposed change will facilitate the reduction in fuel burn per flight.	Net increase in fuel burn per flight	No Change	Net reduction in fuel burn per flight
6	Operational	2	The impacts on MoD airspace users should be minimised.	Major impact or safety critical impact	Minor impact and not safety critical	No impact or positive impact
7	Operational	2	The impacts on civilian airspace users should be minimised.	Major impact or safety critical impact	Minor impact and not safety critical	No impact or positive impact
8	Technical	3	The proposed change will provide predictable flight planning capability.	Negative or no impact flight planning capability	Slight positive impact on Flight planning capability	Positive impact on Flight Planning capability
9	Operational	2	The proposed change will introduce no new flightpaths and therefore no new tracks over the ground.	New flight paths and/or tracks over the ground introduced	N/a	No new flightpaths or tracks over the ground introduced

2.1 Baseline (Do Nothing Option)

Design Principle Evaluation			
Do Nothing Option			REJECT
No change in the availability of P18 from today's operation.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	No Change from today's operation so Safety will be maintained.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	The unnecessary time restrictions on P18 requires aircraft to flight plan a less expeditious route, resulting in inefficient use of the airspace, increased fuel burn and CO ₂ emissions. This is contrary to the CAP1711 known outcomes of airspace modernisation.	NOT MET
DP3	The proposed change will facilitate the reduction in CO ₂ emissions per flight.	No Change from today's operation so CO ₂ emissions will be maintained.	PARTIALLY MET
DP4	The proposed change should result in a cumulative reduction in noise impact per flight.	No Change from today's operation so no change in noise impact.	PARTIALLY MET
DP5	The proposed change will facilitate the reduction in fuel burn per flight.	No Change from today's operation no change in fuel burn per flight.	PARTIALLY MET
DP6	The impacts on MoD airspace users should be minimised.	No Change from today's operation so no impact on MoD Operations.	MET
DP7	The impacts on civilian airspace users should be minimised.	No Change from today's operation so no impact on civilian airspace users.	MET
DP8	The proposed change will provide predictable flight planning capability.	No Change from today's operation, use of P18 when the CDR portion is closed will remain through pilot requests or tactical routing by ATC.	NOT MET
DP9	The proposed change will introduce no new flightpaths and therefore no new tracks over the ground.	No Change from today's operation.	MET

Table 1: Design Principle evaluation of the "Do Nothing" option.

2.1.1 "Do Nothing" Option Conclusion

The Do Nothing option does not increase the availability of P18 and therefore does not provide predictable flight planning capability (DP8) and requires, at times, aircraft to file less expeditious routes than what might be available, contrary to the CAP1711 (DP2). This Option does not lead to a reduction in fuel burn (DP5), CO₂ emissions (DP3) or noise impact (DP4). For these reasons the "Do Nothing" Option is **rejected**.

2.2 Option 1: Permanent H24 usage as ATS Route.

Design Principle Evaluation			
Option 1: Permanent H24 usage as ATS Route			REJECT
Conversion of the existing CDR into a H24 ATS route. See Stage 2A(i) document for detailed description of Option 1.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	When the CDR portion of P18 is closed, aircraft can request via ATC to follow P18 with an appropriate UK FIS as agreed. Conversion of this portion to an ATS route will ensure aircraft receive a H24 ATC service when flying this route. Safety is therefore enhanced	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	This Option is contrary to Flexible use of Airspace policy and therefore does not accord with the CAP1711.	NOT MET
DP3	The proposed change will facilitate the reduction in CO ₂ emissions per flight.	For impacted flights this is expected to reduce CO ₂ e emissions by ~150-250 kg per flight ¹ through a reduction in track miles flown and a reduction in planned fuel uplift.	MET
DP4	The proposed change should result in a cumulative reduction in noise impact per flight.	This option would allow all flights to flight plan via P18 and is expected to impact the flight plans on average of up to 16 flights per day in 2023. Some of these flights already utilise P18 following pilot requests and/or tactical routing by ATC, Radar data from 5-11 th August 2019, indicates ~2 in 3 aircraft required to plan via P600 when P18 is not available used P18. For the flights currently using (planned/ tactical) P18 there would be no change in noise impact. There could be a noise impact for flights which currently plan and fly a P600 route as their arrival profile will change. Aircraft arriving/departing the northern end of the runway will potentially overfly a higher population below 7000ft. However, as vectoring by Aberdeen controllers results in dispersal of tracks within a wide swathe and the expected number of aircraft impacted is low (<6 per day) the impact is assessed to be low.	NOT MET
DP5	The proposed change will facilitate the reduction in fuel burn per flight.	P18 offers a more direct, shorter route for aircraft arriving from the South. For impacted flights this is expected to reduce fuel burn by ~50-80 kg per flight ¹ .	MET

¹ Initial estimate by NATS analytics. Fuel saving was calculated by multiplying the milage saving for aircraft using P18 instead of P600 by the fuel burn at cruise. CO₂e was calculated by multiplying this value by 3.18 (fuel burn to CO₂ conversion factor)..

DP6	The impacts on MoD airspace users should be minimised.	Introduction of a permanent ATS route does not consider the introduction of the proposed DA by the MoD. This ATS route would limit the airspace available to the military for their DA.	NOT MET
DP7	The impacts on civilian airspace users should be minimised.	Converting P18 into a H24 ATS route will allow Civilian Air Traffic (CAT) to flight plan more expeditious routes. General Aviation (GA) will be required to request clearance to transit P18 or route underneath the airway. However, GA avoidance of CAT will be enhanced as CAT will no longer be routing through uncontrolled airspace under a reduced service.	MET
DP8	The proposed change will provide predictable flight planning capability.	As an H24 ATS Route P18 will be permanently flight plannable. This will provide predictable flight planning capability.	MET
DP9	The proposed change will introduce no new flightpaths and therefore no new tracks over the ground.	As P18 is an existing route, no new flightpaths or tracks would be introduced.	MET

Table 2: Design Principle evaluation of "Option 1".

2.2.1 "Option 1" Conclusion

Conversion of the CDR portion of P18 into an ATS route would increase safety (DP1), reduce CO₂ emissions (DP3) and fuel burn (DP5) as well as providing predictable flight planning capability (DP8). This change could lead to an increase in noise impact for some stakeholders in the area surrounding Aberdeen airport owing to the redistribution of flights from P600 to P18 (DP4). Only the do nothing option meets this DP. It should however be noted that aircraft regularly utilise P18 outside of its published hours, and aircraft tracks arriving or departing Aberdeen Airport via P18 are contained within a wide swathe, this impact is likely to be minimal. Conversion of the CDR portion of P18 into an ATS route will adversely impact the MoD, contrary to DP6. An H24 ATS route would not be compatible with the MoDs aspirations to introduce a new Danger Area (DA) in the region. For this reason, "Option 1" is **rejected**.

2.3 Option 2 – H24 CDR - availability subject to D-1 notified MoD activity (NATS preferred)

Design Principle Evaluation			
Option 2: H24 CDR - availability subject to D-1 notified MoD activity (NATS preferred)			Progressed
Extension of the existing CDR availability to H24 subject to D-1 MOD notified activity. See Stage 2A(i) document for detailed description of Option 2.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	CDR will be available H24 unless requested by the MoD. This will reduce the number of aircraft electing/requesting a reduced level of Service to fly more efficient routings, reducing Controller and Pilot workload. Therefore, safety will be enhanced.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	This Option accords with the CAP1711.	MET
DP3	The proposed change will facilitate the reduction in CO ₂ emissions per flight.	For impacted flights this is expected to reduce CO ₂ e emissions by ~150-250 kg per flight through a reduction in track miles flown and the increased weight associated with planned fuel uplift.	MET
DP4	The proposed change should result in a cumulative reduction in noise impact per flight.	This option would allow all flights to flight plan via P18 unless closure of the CDR was requested by the MoD.- This option is expected to impact the flight plans on average of up to 16 flights per day in 2023. However, some of these flights already utilise P18 following pilot requests and/or tactical routing by ATC, Radar data from 5-11th August 2019, indicates ~2:3 aircraft required to plan via P600 when P18 is not available used P18. For the flights currently using P18 either planned or tactically, there would be no change in noise impact. There could be a noise impact for flights which currently plan and fly a P600 route as their arrival profile will change. Aircraft arriving/departing the northern end of the runway will potentially overfly a higher population below 7000ft. However, as vectoring by Aberdeen controllers results in large dispersal of tracks within a wide swathe and the expected number of aircraft tracks impacted is low (<6 per day) the impact is assessed to be low.	NOT MET
DP5	The proposed change will facilitate the reduction in fuel burn per flight.	P18 offers a more direct, shorter route for aircraft arriving from the South. For impacted flights this is expected to reduce fuel burn by ~50-80 kg per flight.	MET

DP6	The impacts on MoD airspace users should be minimised.	Extending the availability of P18 CDR H24 considers the introduction of a new DA by the MoD by including the provision for the MoD to notify NATS the day before planned usage of any affected airspace closing the CDR. This Option minimises the impact on MoD Airspace users.	MET
DP7	The impacts on civilian airspace users should be minimised.	Extending the availability of P18 CDR H24 will allow Civilian Air Traffic (CAT) to flight plan more expeditious routes. General Aviation (GA) will be required to request clearance to transit P18 or fly underneath. However, GA avoidance of CAT will be enhanced as these aircraft will no longer be routing through uncontrolled airspace under a reduced service.	MET
DP8	The proposed change will provide predictable flight planning capability.	As an H24 CDR Route, P18 will become permanently flight plannable except on occasions where the MoD have requested the airspace. This will provide predictable flight planning capability as notification of closure will be promulgated in advance.	MET
DP9	The proposed change will introduce no new flightpaths and therefore no new tracks over the ground.	As P18 is an existing route, no new flightpaths or tracks would be introduced.	MET

Table 3: Design Principle evaluation of "Option 2".

2.3.1 "Option 2" Conclusion

"Option 2" meets all but one (DP4) of the design principles. Only the do nothing option meets DP4 which states that the change should result in a cumulative reduction in noise impact per flight. Any increase in the availability of P18 as proposed in the SoN will result in more aircraft arriving via P18, redistributing the aircraft within the Aberdeen Control Area/Zone. However, this change is not likely to be discernible from the current operation as no new routes are being introduced and aircraft do not follow defined tracks from the airway to runway. Aircraft are vectored during this portion of the flight which results in a natural distribution of aircraft within a wide swathe. Furthermore, radar data has indicated that most aircraft which will be affected by this change already arrive via P18 through tactical vectoring by ATC and pilot requests and this change is only likely to move approximately 6 aircraft a day onto P18. For this reason, Option 2 will be **progressed**.

2.4 Option 3 – Extended hours CDR- availability subject to D-1 notified MoD activity

Design Principle Evaluation			
Option 3: Extended hours CDR - availability subject to D-1 notified MoD activity			REJECT
Extension of the existing CDR availability subject to D-1 MOD notified activity. See Stage 2A(i) document for detailed description of Option 3.			
Design Principle		Summary of assessment	MET?
DP1	Maintain or enhance current levels of safety.	CDR will have extended availability unless requested by the MoD. This increased availability will reduce the number of aircraft electing for a reduced level of Service to fly more efficient routings. Therefore, safety will be enhanced.	MET
DP2	Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it.	Extending the hours of the CDR portion of P18 will reduce the number of aircraft flight planning less expeditious routes but this route would not be available H24. This would result in inefficient use of the airspace and an unnecessary increase in fuel burn and CO ₂ emissions outside of the published availability of P18. This is contrary to the CAP1711 known outcomes of airspace modernisation.	NOT MET
DP3	The proposed change will facilitate the reduction in CO ₂ emissions per flight.	For impacted flights this is expected to reduce CO ₂ e emissions by ~150-250 kg per flight through a reduction in track miles flown and the increased weight associated with planned fuel uplift.	MET
DP4	The proposed change should result in a cumulative reduction in noise impact per flight.	This option would allow an increase in the number of flights able to flight plan via P18 unless closure of the CDR was requested by the MoD. This option could impact the flight plans of up to 16 flights per day (the expected number of impacted flights if P18 became H24) in 2023. However, some of these flights already utilise P18 following pilot requests and/or tactical routing by ATC, Radar data from 5-11th August 2019, indicates ~2:3 aircraft required to plan via P600 when P18 is not available used P18. For the flights currently using P18 either planned or tactically, there would be no change in noise impact. There will be no noise impact for flights outside of the P18 availability times. There could be a noise impact for those flights which following the extended P18 availability would become able to flight plan a route via P18. Aircraft arriving/departing the northern end of the runway will potentially overfly a higher population below 7000ft. However, as vectoring by Aberdeen controllers results in large dispersal of tracks within a wide swathe and the expected number of aircraft tracks impacted is low (<6 per day) the impact is assessed to be low.	NOT MET

DP5	The proposed change will facilitate the reduction in fuel burn per flight.	P18 offers a more direct, shorter route for aircraft arriving from the South. For impacted flights this is expected to reduce fuel burn by ~50-80 kg per flight.	MET
DP6	The impacts on MoD airspace users should be minimised.	Extending the availability of P18 CDR does consider the introduction of a new DA by the MoD by including the provision for the MoD to notify NATS the day before planned usage of any affected airspace closing the CDR. This Option minimises the impact on MoD Airspace users.	MET
DP7	The impacts on civilian airspace users should be minimised.	Extension of the P18 CDR availability will allow some Civilian Air Traffic (CAT) to flight plan more expeditious routes. General Aviation (GA) will be required to request clearance to transit P18 when P18 is in use or fly underneath. However, GA avoidance of CAT will be enhanced as a greater portion of these aircraft will be contained within CAS.	MET
DP8	The proposed change will provide predictable flight planning capability.	Extending the availability of CDR P18 will increase the availability of this route for flight planning purposes. However, like the current operation periods of defined unavailability will mean that any delays could lead to a flight planned route not being available to an aircraft. Whilst this option improves predictable flight planning capability it is limited by defined periods where P18 is not available.	PARTIALLY MET
DP9	The proposed change will introduce no new flightpaths and therefore no new tracks over the ground.	As P18 is an existing route, no new flightpaths or tracks would be introduced.	MET

Table 4: Design Principle evaluation of "Option 3".

2.4.1 "Option 3" Conclusion

"Option 3" Does not accord with the CAP1711 (DP2) nor is it likely to lead to a reduction in noise impact (DP4). Whilst there is slight improvement in predictable flight planning capability this is limited by having defined hours where this route would not be available for flight planning. For these reasons Option 3 is **rejected**.

3. High Level Qualitative Cost Assessment

Extending the availability of P18 CDR H24 will lead to a substantial reduction in fuel burn (50-80 kg per flight) and the associated CO₂e emissions (150-240kg per flight). The predicted value of these CO₂ emissions is ~£575k over 10 years (calculated using WebTAG, see Annex A).

Any increase in the availability of P18 would result in a redistribution of flights arriving/departing Aberdeen from the West (via P600) to the South (P18). While this redistribution may reduce the overall population overflown, it could increase the population overflown below 7,000ft leading to an increased noise impact for some. Radar data from 5-11th August 2019 showed that 72 flights arrived/departed Aberdeen via P18 outside of its published availability. In a week this ACP is expected to impact up to 112 flights, therefore, this ACP is only likely to redistribute approximately 40 flights per week (<6 a day). Vectoring by Aberdeen controllers from/to the airways to/from Aberdeen airport produces a wide swathe of aircraft tracks. This distribution of traffic further dilutes any noise impact of a single overflight has to any individual stakeholder and is not likely to lead to a perceivable change in aircraft noise associated with the Aberdeen operation.

Whilst there is the potential for an increase in the noise impact, this has not been quantitatively assessed for the Stage 2 documentation. ERCD will be commissioned to undertake a noise analysis to quantify the noise impact of this change and the findings will be included in the stage 3 gateway submission.

4. Conclusion and Shortlist

No Design option fully meets all the design principles.

All Design Options met the high priority DP1- Maintain or enhance current levels of safety.

Neither Design Option 1 or 3 met the high priority DP2- Must accord with the CAA's published Airspace Modernisation Strategy (CAP1711) and any current or future plans associated with it. These options were therefore rejected.

While the overall population overflown may reduce, an unavoidable consequence of moving aircraft from P600 to P18 is the potential to overfly a larger population below 7000 ft. However, aircraft arriving/departing Aberdeen are vectored by ATC resulting in an unpredictable track over the ground contained within large swathe providing natural respite. This will minimise the cumulative noise impact of this change. As such No Design Option met DP4- The proposed change should result in a cumulative reduction in noise impact per flight.

Option 2 (24 CDR - availability subject to D-1 notified MoD activity (NATS preferred)) fully meets all other design principles. As such, only Option 2 will be carried forward to consultation.

5. Annex A- WebTAG Output for H24 P18

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: P18 CDR Extension

Present Value Base Year

Current Year

Proposal Opening year:

Project (Road/Rail or Road and Rail):

Overall Assessment Score:

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

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

Quantitative Assessment:

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

Of which Traded

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

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

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

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	-1549	-8472.5
Non-traded sector	0	0	0	0

Qualitative Comments:

Sensitivity Analysis:

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

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

Data Sources:

End of document