EASA Comment Response Tool

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Title	Performance-Based Navigation (PBN) implementation in the European Air Traffic Management Network (EATMN)
NPA Number	NPA 2015-01

UK CAA (European.Affairs@caa.co.uk) has placed **44** unique comments on this NPA:

Cmt#	Segment description	Page	Comment	Attachments
670	(General Comments)	0	General Comment **Comment:** The UK CAA is strongly supportive of the implementation of PBN in the EATMN and is taking significant steps through the UK Future Airspace Strategy (FAS) to modernise its airspace structures in the en-route and in the airport environment. The UK CAA also supports the deployment of SESAR through the Commission Implementing Regulation (EU) No. 716/2014 – 'Pilot Common Project' and is working towards the introduction of ATM Functionality AF#1 at London Heathrow, Gatwick, Stansted and Manchester by January 2024. However, the UK CAA believes that outside of the PCP, PBN implementation is a local matter and it is felt that the proposed regulation is neither sufficiently proportionate nor flexible to help make PBN an enabler for airspace modernisation. It takes no account of existing State/ANSP/airport implementation plans nor recognises the timescales involved in establishing required equipage prior to introducing airspace changes. Furthermore, it makes no allowance for the use of the full range of PBN Specifications in order to meet local performance objectives in a cost effective and proportionate approach. **Justification:** Our experience has shown that such airspace changes cannot be introduced overnight with major airspace changes typically taking anything from 5-7 years from planning to delivery. With compliance with the PCP at our major airports as our goal for January 2024, we firmly believe that a proportionate and flexible approach is required for deployment of PBN across airspace environments which are both diverse and have differing objectives affecting safety, capacity, flight efficiency and environmental impact. As drafted, the NPA has a major impact on current UK PBN implementation plans in terms of lost opportunities to generate early benefits and is not consistent with an approach towards transitioning to meet the PCP objectives, where density of movements and airspace complexity justify the implementation of more advanced PBN standards. **Suggested Resolution of Comments** The UK CAA fully endorses the plans within the PCP and therefore the principle of introducing RNP 1 and RF by 01 January 2024 at high density airports. It is recognised that some form of Acceptable Means of Compliance (AMC) is required to support the PCP and this regulation is seen as providing that material.	

In proposing changes to the NPA, one option would be to remove the provisions for RNP APCH at all non-precision runway ends by January 2024 and the optional introduction of RNP 1 and RF on SIDs and STARs and Advanced RNP and FRT in the en-route environment from December 2018. In essence, restrict the regulation to support the PCP airports only. Alternatively, revisit the PCP Regulation with targeted and self-contained “enhanced” System Requirements in the Annex for ATM Functionality #1.

A further suggestion is to align the APV mandate portion of the NPA to the original proposal from the EUROCONTROL Regulatory Approach Document i.e., end of 2018. Stakeholders have already invested in meeting the 2016 date which by agreement between EUROCONTROL and ICAO-EUR was changed to the end of 2018 to accommodate European progress. However, we recognise that the PCP has the same 2024 timeframe as the PBN.AUR regulation and any change of date for the APV mandate should be discussed with the EC.

The UK CAA would wish to continue to see the adoption of PBN in airspace designs and believe that the most proportionate and targeted approach is to adopt the principles already laid down in ICAO Assembly Resolution A37-11. That translates into RNAV 1 everywhere inside TMAs and RNP 1 + RF where required e.g., as a minimum in the PCP 25 airports. There is still a question of the upper level STARs and no regulation should force use of a PBN specification where it is impractical or inappropriate, this runs counter to the performance need concept and the principles of Better Regulation.

The justification for an RNAV 1 mandate from December 2018 is as follows:

1. There is already a high percentage of RNAV 1 equipage/approval and mandating the standard would not present as great a financial impact to operators as the proposed RNP requirement. A mandate would create a baseline performance level on which to transition to RNP 1 and RF and Advanced RNP and FRT. A mandate in December 2018 would be sufficient notice to comply.

2. There are already a number of planned RNAV 1 airspace deployments at various stages of development and implementation across Europe.

3. It is arguable that except for the very early stages of departure and late stages of arrival, the RNAV 1 standard can provide a performance based framework which can deliver almost as much as the RNP standard, without the necessity to compromise airspace design because of a range of fleet capabilities.

4. Mandating RNAV 1 at this stage provides a common performance baseline, from which users and ANSPs can progressively migrate to SESAR PCP compliance for the affected airports in an achievable timeframe. It also allows those airspaces and airports not captured within the PCP to develop their own plans for RNP implementations where appropriate and necessary, which start from a known PBN capability level.

5. The RNAV 1 standard does not require GNSS as a minimum to enable benefits and removes the need to place a

			dependency on the integrity and robustness of the current GNSS environment. The principle of harmonisation is endorsed, as is the notion of interoperability. The latter is arguably more important in terms of safety and it is questionable whether mixed operations support this aim. Achieving a homogeneous PBN environment (RNAV 1 as a minimum) offers the potential to realise local, lower-level performance objectives with the potential to transition to advanced PBN routes and procedures, where it is justified. The aircraft fleet compliance numbers required to support RNP 1 + RF and Advanced RNP + FRT in the 2018 timeframe are insufficient. By only offering these navigation specifications there is no flexibility or proportionality within the proposed rule. A 'one size fits all' approach is highly unlikely to deliver the optimum outcomes across Europe without incurring significant costs. Finally, the Cost Benefit Assessment needs to take account of the equipage issues and in this respect the EASA NPA does not appear to reflect the findings from the EUROCONTROL RAD ANNEX E. The UK CAA is willing to support EASA and the Commission in helping to develop a regulation that supports the cost effective and most efficient implementation of PBN in the European Air Traffic Management Network. PBN remains the UK's number 1 priority as we seek to modernise our airspace, however this can only be achieved within realistic timescales.	
671	(General Comments)	0	General Comment **Comment:** The UK CAA believes there has been insufficient stakeholder/industry/community consultation on the development of the PBN proposals outside of the PCP requirements. The UK CAA is of the view that, in the absence of a coherent PBN Implementation strategy and plan across Europe, development of this NPA should have been conducted through a Rulemaking Group whereupon group members, representing NSAs and other interested parties, could have assisted in the formulation of the requirements. The UK CAA proposes that: a) The PCP requirements be taken forward; b) EASA establish a RMT to follow due process for development of further requirements to meet local/network performance objectives and the ICAO A37-11 Resolution, which can then take account of evolution of PBN developments since the EUROCONTROL work in March 2013. This will also provide for full stakeholder engagement. **Justification:** The development of this NPA does not appear to have followed the normal EASA Rulemaking Process. The PBN IR started out as a EUROCONTROL mandate from which no formal consultation was undertaken and a Regulatory Approach Document was delivered to the Commission in March 2013. The PCP then took PBN as part of AF#1, but only for the EU 24 major airports.	
672	(General Comments)	0	General Comment **Comment:** In the absence of any consultation prior to the	

			publication of this NPA, it is unclear whether EASA has taken account of the State Implementation Plans and Policies required by ICAO through Assembly Resolution A37-11. It is the view of the UK CAA that the views and experiences of the States are essential in developing any Europe-wide PBN policy outside of the PCP. It is recommend that further consultation be undertaken to capture existing plans for transition to the PCP standards envisaged by 2024. **Justification:** The NPA, as written, does not acknowledge existing PBN implementation plans nor recognise the timescales involved in establishing required equipage prior to introducing airspace changes. Indeed, in some cases it puts those plans and the investment that is already spent on them, into doubt.	
673	(General Comments)	0	General Comment. **Comment:** It is understood that the Preliminary Economic Impact Assessment prepared by EUROCONTROL as ANNEX E to the Regulatory Approach Document has been used as a basis for development of this NPA. The UK CAA notes that in paragraph E.3.2.4 (Current levels of equipage), EUROCONTROL estimated 44% of aircraft were capable of performing the Radius to Fix function and only 18% the Fixed Radius Transition (FRT) function. In paragraph E.3.2.5 the projected levels of equipage for full PBN capability by the end of 2018 were estimated at approximately 75%, achieving only 90% at the beginning of 2024. The UK CAA believes that the equipage rate from December 2018 renders uneconomic any airspace development utilising the RNP standards exclusively for terminal and en-route airspace. UK experience suggests that in high density airspace an equipage rate in the order of 95% is required to support an efficient airspace implementation. The UK CAA also believes that an unintended consequence of this NPA is that airports and ANSPs will delay PBN implementation i.e., “do nothing”, waiting for equipage rates to improve. Furthermore, UK CAA believes that local airspace performance objectives could be realised through use of RNAV 1 standards in the proposed timeframe where we have evidence of much higher equipage rates at the majority of airports. **Justification:** Disproportionate rulemaking proposals **Proposed Text:** Amend Subpart PBN in PART-AUR to address stakeholder concerns and take account of the earlier EUROCONTROL Preliminary Economic Impact Assessment work.	
674	(General Comments)	0	General Comment. **Comment:** In UK airspace (in common with many European TMAs), STARs terminate at Holds supporting sequencing to the airport with connectivity provided through either tactical means or an Open or Closed Transition. The STARs are therefore considered as providing connectivity from the en-route flight phase and are considered as ATS routes (per the ICAO Annex 11 definition) and specified as requiring RNAV 5. The UK CAA proposes that the NPA be amended to recognise this	

			airspace design concept and provide for, depending on the airspace, RNAV 5 where STARs terminate in either linear or orbital holding. **Justification:** The UK CAA does not consider it necessary to specify these routes as requiring RNP 1 and RF. It would be an over-specification and does not comply with the principles of Better Regulation in terms of offering proportionality. **Proposed Text:** Amend Subpart PBN in PART-AUR to address this concern.	
675	(General Comments)	0	General Comment. **Comment:** Apart from operations on SIDs, STARs, en-route and approach, PBN can also offer flexibility in terms of operations meeting performance objectives for other airspace users. The UK CAA proposes that, subject to consideration through the rulemaking activity as previously suggested, the NPA be amended to acknowledge the application of other PBN specifications for different airspace use. This would better reflect varying levels of complexity and capacity within differing airspace environments and acknowledge the fact that variable solutions to airspace requirements may be more appropriate. **Justification:** The text proposed in the NPA would unnecessarily constrain the application of PBN to the PCP standards and Advanced RNP in en-route and in so doing, the flexibility to accommodate other airspace users who have legitimate PBN applications using a range of navigation specifications available in the ICAO PBN Manual. With reference to ICAO Doc 9613, PBN Manual, RNP 0.3 offers access to helicopter operators in all flight phases. Furthermore, RNAV 2 is the most suitable navigation specification for application in Free Route Airspace (FRA) and Advanced RNP can be applied in terminal airspace utilising scalable RNP from 0.3 to 1.0. The absence of a provision to take advantage of these PBN specifications may discourage and delay the introduction of PBN, thereby having an adverse impact on capacity and flight efficiency.	
676	(General Comments)	0	General Comment. **Comment:** Although there is no mandate for SIDs and STARs, the NPA does not appear to recognise the nature of long term investment in airspace change, i.e., through the five year planning and control periods established in the SES Performance Scheme, and the difficulty in changing specifications in those plans without an adequate lead-time. It is recommended that account be taken of existing plans across the EU and ensure adequate transition towards the PCP standards envisaged by 2024. **Justification:** There are no transitional arrangements for extant plans up to 2020 which this regulation would place at risk and by changing to RNP 1 and RF, would incur increased costs.	
677	(General Comments)	0	General Comment.	

			Comment: It is not clear whether due consideration has been given to the current lack of ATC (2012) Flight Plan provisions for RF, FRT and Advanced RNP. **Justification:** Without provisions in Doc 4444 (PANS ATM) as then implemented through FF-ICE and SWIM, it will be difficult for ANSPs to process flight plans without an indication of the aforementioned capabilities. In the proposed timescales, it is the view of the UK CAA that operators will not be able to flight plan the advanced PBN capabilities even though they may be equipped. This will hinder ANSPs in providing the appropriate level of service to aircraft that are suitably equipped.	
678	(General Comments)	0	General Comment **Comment:** The applicability of the proposed rule to the military needs to be fully reflected within the rule through appropriate references to Regulations 549/2004, 216/2008 and 677/2011. It must be recognised that the impacts of the regulation as proposed are not limited to military/state airspace users/aircraft operators, but also those military aerodromes from which such operations are carried out (specifically the instrument flight procedures associated with military or (if applicable) paramilitary aerodromes). Clarification as to how the proposed rule would apply in such circumstances is requested. **Justification:** Clarity.	
679	2. Explanatory Note - 2.1. Proposed provisions	6 - 8	**Page No:** 6 **Paragraph No:** 2.1 **Comment:** The proposed provisions refer to the need to only implement PBN routes where required to meet 'local performance objectives'. It is the UK CAA's understanding that this does not necessarily relate to 'performance' in the sense of FAB Performance Plans i.e., specified in Commission Implementing Regulation (EU) 390/2013 (Performance Scheme), but rather a 'local' objective to implement a given navigation performance requirement – such as at a given airport or terminal airspace. It is recommended that EASA clarify what is meant by local performance objectives and the roles of the respective stakeholders (airport sponsor, ANSP, regulator). **Justification:** Clarity.	
680	2. Explanatory Note - 2.1. Proposed provisions	6 - 8	**Page No:** 6 **Paragraph No:** 2.1 **Comment:** The provisions refer to 'network performance objectives'. It is the UK CAA's understanding that this does not necessarily relate to 'performance' in the sense of FAB Performance Plans i.e., specified in Commission Implementing Regulation (EU) 390/2013 (Performance Scheme), but rather an objective to implement a given navigation performance requirement at a Network level. Clarification is requested about who defines/decides upon network	

			performance objectives and the respective roles of the stakeholders. **Justification:** Clarity.	
681	2. Explanatory Note - 2.1. Proposed provisions	6 - 8	**Page No:** 6 **Paragraph No:** 2.1 **Comment:** The UK CAA believes that it is impracticable to omit the obligations on aircraft operators from this NPA. Despite citing the provisions in ORO.GEN.110 and SERA.5015 any airspace change has to be conducted cognisant of fleet equipage and therefore the Cost Benefit Analysis for the change will have to take account of the potential aircraft retrofit costs. The NPA has overlooked this point. The NPA should highlight the dependency on aircraft fleet equipage and factor this in the Regulatory Impact Assessment (Section 4 of the NPA). **Justification:** Clarity.	
682	2. Explanatory Note - 2.1. Proposed provisions	6 - 8	**Page No:** 6 **Paragraph No:** 2.1 **Comment:** The UK CAA believes it is inappropriate to cite SERA.5015 as justification for the draft regulation. SERA.5015 in itself does not specify what the equipage standards are, just that aircraft need to be suitably equipped. What SERA.5015 actually does is to emphasise the inconsistency between this draft regulation's requirements to be suitably equipped to meet the proposed PBN standard and then insisting on the ANSP/Airport having to maintain conventional procedures for those aircraft that cannot. In addition, aircraft operators may insist on maintaining their conventional capabilities, thus requiring ANSPs to provide mixed operations, ironically in accordance with proposed regulation that seeks to enhance navigational standards in a harmonised manner. The proposed regulation does nothing in a proportionate manner to break the cycle between equipage and service provision. The NPA should remove the inconsistency highlighted and recognise that aircraft fleet equipage and airspace change have to go hand-in-hand. Refer to ICAO Manual on the Use of PBN in Airspace Design Doc 9992 and the European Airspace Concept Handbook for PBN implementation Edition 3.0. **Justification:** It is inconsistent and disproportionate to expect an ANSP/airport to provide conventional procedures and not require the operators to equip for the PBN procedures whilst stating that operators should be suitably equipped for the intended route to be flown.	
683	2. Explanatory Note - 2.1. Proposed provisions	6 - 8	**Page No:** 6 and 22 **Paragraph No:** 2.1 and draft regulation Article 6 **Comment:** The UK CAA is of the view that the requirements of the proposed regulation are disproportionate, and that the NPA does not fully consider the validity (and value) of options such as RNAV 1. In addition, there appears to be little robust justification for a	

			requirement in law to extend PCP requirements beyond 'enhanced' high density TMAs and the associated en-route sectors and specified airports. Instead, the requirements proposed in AUR.PBN.2005 Routes and procedures should be recast as AMC or GM to the PCP regulation as a means of encouraging the wider adoption of PBN without diversion of resources away from PCP implementation. **Justification:** Proportionate regulation. **Proposed Text:** Replace AUR.PBN.2005 Routes and Procedures, paragraphs (1) to (4) with the following: (1) ANSPs or aerodrome operators, responsible for the provision of instrument approach procedures within airspace or at aerodromes not specified within Regulation (EU) 716/2014, should implement approach procedures with vertical guidance, that correspond to the performance and functionality as defined in Regulation (EU) 716/2014 at all instrument runway ends which are not served by a precision approach procedure. (2) Without prejudice to paragraph 1, where limiting obstacles conditions exist, ANSPs or aerodrome operators, responsible for the provision of instrument approach procedures, may implement approach procedure with vertical guidance to aerodromes that correspond to the performance and functionality as defined in Regulation (EU) 716/2014. (3) When implementing Standard Instrument Departures (SIDs) and Standard Arrival Routes (STARs), using PBN to meet the airspace performance needs, ANSPs or aerodrome operators, responsible for the provision of the routes, should ensure that the routes correspond to the performance and functionality as defined in Regulation (EU) 716/2014. (4) When implementing ATS routes using PBN to meet the network performance needs, the Network Manager, as required by Article 3(4)(a) of Regulation (EU) No 677/2011, shall ensure the coordinated design of the European Route Network that corresponds with the performance and functionality as defined in Regulation (EU) 716/2014.	
684	2. Explanatory Note - 2.1. Proposed provisions	6 - 8	**Page No:** 6 and 24 **Paragraph No:** 2.1 and AUR/PBN.1005 **Comment:** The UK CAA is of the view that the requirements of the proposed regulation are disproportionate, and that the NPA does not fully consider the validity (and value) of options such as RNAV 1 as a means of leading to implementation of the requirements contained in Regulation (EU) 716/ 2014. In addition the proposed regulation does not acknowledge the fact that a number of non-RNP 1 PBN solutions are in the throes of being implemented in several European high density TMAs as precursors to compliance with PCP requirements, and that implementation of these projects will not be completed until after December 2018. The UK CAA considers it unfeasible and economically unjustifiable to cause through lawmaking the redesign of procedures associated with such projects in order to satisfy a proposed law that could be more flexible in approach. It is, however, considered appropriate that the proposed regulation be disapplied to such projects through the application of appropriately worded transition arrangements.	

			Justification: Proportionate regulation. **Proposed Text:** Add either of the texts below as an additional paragraph to AUR.PBN.1005 as follows: **Proposed Text (1):** **"AUR.PBN.1005 Scope** 3) (a) Air Traffic Service Providers (ANSPs) referred to under Article 1(2) that provide air traffic services (ATS) in the airspace as defined in Article 1(1); and (b) aerodrome operators referred to under Article 1(2) that have developed and published local PBN implementation plans prior to the date of entry into law of this regulations shall be exempt from this regulation." **Proposed Text (2):** Alternative text: "3) Local PBN implementation plans that have been developed and published by: (a) Air Traffic Service Providers (ANSPs) referred to under Article 1(2) that provide air traffic services (ATS) in the airspace as defined in Article 1(1); and (b) aerodrome operators referred to under Article 1(2) and approved by the competent authority prior to the date of entry into law of this regulations shall be exempt from this regulation."	
685	2.2. Selection of PBN requirements - 2.2.1. Alignment issues	8	**Page No:** 8 **Paragraph No:** 2.2.1 **Comment:** Alignment of the requirement for RNP APCH at airports by January 2024, whilst compatible with the PCP, is inconsistent with obligations that States have given to ICAO in meeting General Assembly Resolution A37-11 by end of 2016. Having a 2024 date may have a negative business effect in "switching-off" investment and funding (e.g., from the European GNSS Agency (GSA)). An extension of the NPA's proposed compliance date for RNP APCH at runway ends where only a non-precision approach exists to the end of 2020 is recommended. It is recommended to either remove the extension of the PCP requirements to non-PCP aerodromes or (as a minimum) extend the NPA's proposed compliance date for RNP APCH at runway ends where only a non-precision approach exists to at least the end of 2020. **Justification:** This suggestion stems from the fact that there is a European paucity of IFP design resource (and at competent authority level the appropriate oversight and approvals resource). The NPA's 'invitation' to non-PCP aerodromes to implement PBN to the proposed specifications will place an unacceptable burden upon	

			this limited resource that will only lead to delay (or failure) to achieve the NPA's stated objective of 'safe, efficient and harmonised PBN implementation in the EATMN that support an improved operation of the network and are consistent with the requirements as specified in the Pilot Common Project'. Such damage is avoidable through proportionate and flexible regulation.	
686	2.2. Selection of PBN requirements - 2.2.1. Alignment issues	8	**Page No:** 8 **Paragraph No:** 2.2.1 **Comment:** The UK CAA strongly disagrees with the statement: *"Such a possible fragmented application of PBN would result in a complex airspace structure and operational procedures as a consequence of numerous transitions between the various possible PBN Navigation Specifications areas".* **Justification:** The UK experience is that having a homogeneous fleet capability is essential when selecting a navigation specification and that accommodating both "PBN" and "non-PBN" capabilities can lead to inefficiency in airspace design and operations with potential safety issues linked to operating an environment with a mixed capability. However, having different PBN capabilities e.g., RNAV 1 and RNP 1 within an airspace concept can work quite efficiently and indeed, the UK CAA sees the use of RNAV 1 as a transitional state that can offer short term benefits ahead of the fleet equipping to an RNP 1 standard. Having transitional requirements is essential given the diverse local requirements that exist across the UK and Europe from small regional airports with low complexity airspace and large fleet variance to that of the major airports with high density traffic and a higher fleet capability. It is for this reason that Schiphol has mandated RNAV 1 equipment carriage, London has done similarly with November 2017 for aircraft and winter 2019 for airspace changes and Paris plans to do so also. EASA is requested to provide evidence of a possible negative impact on the overall efficiency of the European network due to the possible transitional requirements, as this does not reflect European experience.	
687	2.2.2. Selection of PBN requirements	9 - 12	**Page No:** 9 **Paragraph No:** 2.2.2 **Comment:** The regulatory approach material that was developed by EUROCONTROL had only been subject to *informal* consultation and therefore was not necessarily accepted by the relevant stakeholders and member States as suggested in paragraph 2.2.2. **Justification:** The earlier EUROCONTROL work, including the informal consultation and the resulting Regulatory Approach Document (RAD) and the need for accurate reportage within the Explanatory Note **Proposed Text:** Paragraph 2.2.2 should be amended to better reflect the status of the earlier EUROCONTROL work as follows: '... This Regulatory Approach Document defined the proposed navigation specifications and functionalities that should be implemented in the European airspace. This proposal, as shown in Table 1 for reference, has been informally presented to the relevant	

			stakeholders and Member States..'	
688	2.2.2. Selection of PBN requirements	9 - 12	**Page No:** 10 **Paragraph No:** Table 1 **Comment:** Table 1 from the EUROCONTROL Regulatory Approach Document reflects RNP 1 in Terminal airspace by end of 2020 and Advanced RNP with FRT by end of 2023. These dates are informed from the ANNEX E Preliminary Economic Impact Assessment. It is not understood therefore, how the date of December 2018 for the application of these navigation specifications in the respective airspace can be justified when the EUROCONTROL work clearly suggested fleet equipage issues, the need for a later compliance date and an exemption for aircraft greater than 20 years of age. The UK CAA requests clarification of how the dates proposed by EASA were determined.	
689	2.3. Overview of the issues to be addressed	13	**Page No:** 13 **Paragraph No:** 2.3 **Comment:** See also previous UK CAA comment against 2.2.1 Alignment issues. The UK CAA maintains that an efficient, harmonised and safe implementation of PBN can be achieved within Europe through use of RNAV 1 and RNP 1 in terminal airspace and even RNAV 5 and RNP 1 in en-route airspace. Subpart PBN in PART-AUR should be amended to reflect actual European experience. **Justification:** European experience to date suggests that the benefits are derived from modernising airspace structures from conventional navigation to PBN. Having overly restrictive navigation specifications is counter-productive given the current and projected fleet equipage and may incur unnecessary additional costs for a proportion of airspace users.	
690	2.6. State aircraft	17	**Page No:** 17 **Paragraph No:** 2.6 **Comment:** The NPA acknowledges that one of the primary concerns of Member States is the continued access to the airspace for State and military aircraft when undertaking operations or training as General Air Traffic (GAT), and the associated cost incurred by governments to modify the military fleets. However, no specific exemption conditions or transitions are envisaged as the proposed regulation requires, subject to identified performance needs, that procedures and routes based on conventional navigation aids will be maintained. This will, therefore, permit non-PBN-capable State aircraft to continue to operate; however, their operations may be limited with respect to access times and may not always have the most direct routings. Delays and re-routes for routine flights and training will be acceptable but operationally essential flights cannot be delayed. This should be acknowledged within the NPA/CRD, and the Agency is invited to suggest the means by which this obligation may be met by Member States were the regulation to be adopted as proposed and without change.	

			In addition, citing Annex II to Regulation (EC) No 552/2004 and Article 1.2(a) of the Basic Regulation assumes, by merely requiring Member States to take due account of the objective as far as practicable for aircraft engaged in State activities, that such activities will be accommodated in the anticipated manner. It also anticipates that, where practicable, States will have aircraft and crew qualified for PBN operations. Such assumptions do not appear to have been reflected in the NPA's supporting RIA, nor is there any recognition that Member States have the financial, technical and personnel capacity and/or capability to ensure these assumptions can be realised. The Agency is invited to consider more widely the impacts the proposed regulation could have on military operations, as the assumptions contained within the NPA suggests that such impacts are the concern of the Member States and not the rulemakers. **Justification:** Clarification and justification.	
691	2.8. Summary of the RIA	19	**Page No:** 19 **Paragraph No:** 2.8.2 **Comment:** The argument for a benefit from qualifying the aircraft and crews to enable operations in accordance with a limited number of navigation specifications only applies if you can achieve a qualification to the highest standards, i.e., where other specifications are automatically included. **Justification:** Outside of Advanced RNP, RNAV 1/RNAV 2 and RNP 1 are practically identical and since release of EASA Opinion 03/2015 'Revision of operational approval criteria for Performance-Based Navigation (PBN) the crew qualification criteria has become more generic, thus making PBN in the broadest sense more accessible across all navigation specifications. **Proposed Text:** Amend Subpart PBN in PART-AUR to reflect the Opinion 03/2015 and the general nature of PBN crew qualification across multiple navigation specifications.	
692	Section I — Airspace AUR.PBN.2005 Routes and procedures	24	**Page No:** 24 **Paragraph No:** AUR.PBN.2005 (3) **Comment:** Mention is made of Standard Arrival Routes (STARs) but not of Transitions which typically across Europe provide connectivity between the Hold or sequencing Merge Point and the runway. The UK CAA proposes that provision be made within the NPA to provide connectivity with Linear Holding procedures by including Open and Closed Transition procedures within AUR.PBN.2005 (3) **Justification:** As part of the UK Airspace Management Plan, the UK CAA has plans to implement Linear Holding Procedures (Point Merge) to a number of major UK Airports by 2020. It would therefore be practicable to include such arrival procedures within the scope of AUR.PBN.2005 (3).	
693	AUR.PBN.2015 Performance and functionality	24 - 26	**Page No:** 24 **Paragraph No:** AUR.PBN.2015 (1), (2), (3) and (4).	

			Comment: It is not understood what “consistent with” means within the context of aircraft performance and functionality. Clarity is sought to explain the meaning of the expression ‘’consistent with’’ in the context of AUR.PBN.2015 (1), (2), (3) and (4). **Justification:** Clarity.	
694	AUR.PBN.2015 Performance and functionality	24 - 26	**Page No:** 24 **Paragraph No:** AUR.PBN.2015 **Comment:** Although AUR.PBN.2015 is titled performance and functionality, not all of the relevant requirements have been included. For example, the functional requirements for each sub-paragraph go far beyond what is listed e.g., path terminators. It is suggested that direct reference is made to the ICAO PBN specifications to which each paragraph relate such that clarity and completeness can be brought to the NPA and the requirement made explicit. **Justification:** EASA Opinion 03/2015 “Revision of operational approval criteria for Performance-Based Navigation (PBN)” makes extensive and direct reference to the ICAO PBN specifications; it is not clear why the same cannot be done here.	
695	AUR.PBN.2015 Performance and functionality	24 - 26	**Page No:** 25 **Paragraph No:** AUR.PBN.2015 (1) (b) (ii). **Comment:** It is unclear what performance standard is required for the vertical path. If a vertical performance standard is required UK CAA suggest that reference be made to ICAO Doc 9613 Vol II, Attachment A, Barometric VNAV (BARO-VNAV), paragraph 4.6 (System accuracy). **Justification:** UK CAA requests clarification on the performance standard required for the vertical path at AUR.PBN.2015 (1) (b) (ii).	
696	AUR.PBN.2015 Performance and functionality	24 - 26	**Page No:** 25 **Paragraph No:** AUR.PBN.2015 (1) (c). **Comment:** Under certain circumstances, obstacles prevent a vertical path being designed to an instrument runway end. Under these conditions an LP or LNAV approach may be the only alternative. UK CAA suggests that lines of minima be included with LNAV as a required reversion and LP where obstacles prevent implementation of LPV’. Furthermore, UK CAA suggests that where an RNP APCH procedure is implemented, minima lines be included for LNAV, LNAV/VNAV and LPV to maximise access to the airport for different fleet capabilities. **Justification:** The NPA should recognise that a vertical path cannot always be designed to a runway and that a 2D approach is an acceptable alternative under these circumstances.	
697	AUR.PBN.2015 Performance	24 - 26	**Page No:** 25	

	and functionality		**Paragraph No:** AUR.PBN.2015 (2) (b). **Comment:** It is unclear what performance standard is required for the vertical path. If a vertical performance standard is required we suggest that reference is made to ICAO Doc 9613 Vol II Part C Chapter 6 Implementing RNP AR Approach, paragraph 6.3.3.2.4 (Vertical accuracy). **Justification:** UK CAA requests clarification on the performance standard required for the vertical path at AUR.PBN.2015 (2) (b).	
698	AUR.PBN.2015 Performance and functionality	24 - 26	**Page No:** 25 **Paragraph No:** AUR.PBN.2015 (3) (b). **Comment:** The statement “the operations along a vertical path between two fixes” implies that the aircraft must have a VNAV function i.e., provide vertical flight path guidance on a SID and/or STAR or Transition. It is unclear whether this is the intention. Does EASA have data on how many European aircraft operations can support VNAV today and what level of retrofit might be required? UK CAA requests clarification of intent and revised text as appropriate. **Justification:** The regulation contains an implicit requirement for VNAV. This would have an unintended consequence of deterring implementation of PBN at regional airports where fleet mix is more diverse and less capable.	
699	AUR.PBN. 2020 Contingency	26	**Page No:** 26 **Paragraph No:** AUR.PBN.2020 **Comment:** The UK CAA believes that this is a “given” through the (Safety) Management Systems that airports and ANSPs are required to have in place and that this paragraph may be deleted. It will have to be addressed to the regulator (NSA) within any safety case submission. Opinion 03/2014 and its proposed ATM IR Annexes II and III will require that all notification and changes to procedures (within the Functional System) are subject to risk assessment and mitigation which will require the Competent Authority verifying the content of the change and any contingency measures in the event of infrastructure and equipment failures. **Justification:** Contingency is already addressed through other regulations. **Proposed Text:** Delete the text at AUR.PBN.2020, Contingency.	
700	Section I I— Operations AUR.PBN. 3005 Mixed operations	26	**Page No:** 26 **Paragraph No:** AUR.PBN.3005(1) **Comment:** It is the view and experience of the UK CAA that that mixed operations (PBN and non-PBN) compromise both efficiency and safety of airspace, especially in more dense traffic environments. The UK CAA recommends that AUR.PBN.3005 be deleted and the decision as to what level of mixed operation can be tolerated be left to the airspace controlling authority and their supporting airspace designers to decide, based on the fleet mix.	

			Justification: The requirement to continue to support conventional procedures supporting airports will impact plans for rationalisation of conventional navaids and require additional investment for new facilities. This does not seem to have been factored in the Regulatory Impact Assessment (RIA). The need for mixed operations is something best decided by the airport and ANSP and not something that requires a “shall” statement in an EASA regulation. The experience at Schiphol, London and Paris is that mandates for airspace usage are sometimes necessary, albeit on a (potentially) limited basis, for exempted operations e.g., State aircraft.	
713	Section I I— Operations AUR.PBN. 3005 Mixed operations	26	**Page No:** 26 **Paragraph No:** AUR.PBN.3005(1) **Comment:** It is unclear whether an airport that has implemented an APV procedure has to also provide a conventional (non-PBN) back-up. This may be uneconomical for a small airport with limited IFR movements having likely made the investment decision to switch away from VOR and NDB procedures to those based on GNSS. UK CAA requires clarification on whether or not both types of approach procedure (PBN and non-PBN) need to be provided and maintained. **Justification:** There is a potentially large financial impact if airports are expected to operate both PBN and non-PBN based approaches at the same time.	
714	Section I I— Operations AUR.PBN. 3005 Mixed operations	26	**Page No:** 26 **Paragraph No:** AUR.PBN.3005(2) **Comment:** The regulation states that such approach procedures and routes may be limited. We understood from the workshop held on 09 March 2015 in Brussels that this limitation may be time based and could be permanent if so justified. The UK CAA believes that at the majority of airports, such time limited operations would be impracticable. The UK CAA requests clarification on the ‘limited’ use of such procedures and how this would be applied. **Justification:** Having noted from the workshop outcome that duality of procedures may be time limited or even permanent; the UK CAA view is that any duality is both impractical and costly.	
702	AUR.PBN. 3010 Coordinated deployment	26	**Page No:** 26 **Paragraph No:** AUR.PBN.3010 **Comment:** A coordinated deployment is something that all airports and ANSPs engage upon as a normal course of their business relationship with their customers. The UK CAA does not consider that a regulation is justified or proportionate. UK CAA recommends that AUR.PBN.3010 be deleted. **Justification:** In some cases 36 months is not sufficient notice of change. Consultations over London airspace changes in 2019 are	

			already taking place. Assuming that the regulation is not published until 2016, there is an inconsistency between the effective date (December 2018) and the requirement for 36 months' notice. The earliest that any procedures could be implemented is therefore 2019. **Proposed Text:** Delete AUR.PBN.3010.	
703	SUBPART PBN — Performance-Based Navigation	29 - 30	**Page No:** 29 **Paragraph No:** GM1 AUR.PBN.2010 **Comment:** Whilst recognising the common-mode failure linked to surveillance and navigation from loss of GNSS, the UK CAA is of the view that it is inappropriate to highlight the common dependency within an AUR Subpart PBN section. GNSS impacts not only surveillance and navigation but also data communications and safety systems such as TAWS. Consider removal of GM1 to AUR.PBN.2010 and move to an appropriate regulation addressing infrastructure as a whole e.g., ATM IR Part-CNS. **Justification:** GNSS is an important multi-modal infrastructure that could be better addressed by the proposed ATM IR's Part-CNS, rather than one specifically detailing PBN.	
704	SUBPART PBN — Performance-Based Navigation	29 - 30	**Page No:** 29 **Paragraph No:** GM1 AUR.PBN.2010 **Comment:** Within the table, it is unclear what constitutes high density and low density airspace operations. If terms such as high density and low density airspace are to be used within the GM, a definition should be either included or else referenced. **Justification:** Clarity.	
705	AMC1 AUR.PBN.2015 Performance and functionality	30 - 32	**Page No:** 31 **Paragraph No:** AMC1 AUR.PBN.2015 2. **Comment:** It is not understood why the published OCA has to support either Baro-VNAV or SBAS vertical guidance. **Justification:** The minima should be dependent on the selected approach and the obstacle clearance altitude supported by each approach system minima. It makes no sense to have a single value. **Proposed Text:** Delete AMC1 AUR.PBN.2015 2.	
706	AMC1 AUR.PBN. 2020 Contingency	32	**Page No:** 32 **Paragraph No:** AMC1. AUR,PBN.2020 **Comment:** It is unclear what is meant by "adequate missed approach procedures are provided". Terminology such as "adequate Navaid infrastructure for suitably equipped aircraft" is considered vague and imprecise and provides	

			little direction or clarity within proposed AMC material. Opinion 03/2014 and the proposed Annex 11 will require that all notification and changes to procedures (within the Functional System) are subject to risk assessment and mitigation which will require the Competent Authority verifying the content of the change and any contingency measures in the event of infrastructure and equipment failures. UK CAA proposes that the text at AMC1 AUR.PBN.2020, Contingency is removed. **Justification:** The requirement is already addressed through other regulations.	
707	4. Regulatory Impact Assessment (RIA) - 4.1 Issues to be addressed	34	**Page No:** 34 **Paragraph No:** 4. Regulatory Impact Assessment (RIA) **Comment:** To be consistent with the approach taken by EUROCONTROL in the PBN IR RAD and ANNEX E, Preliminary Economic Impact Assessment, the UK CAA believes that this RIA should also factor retrofit costs in the assessment. The UK CAA suggests that ANNEX E from the EUROCONTROL RAD, including the current levels of equipage in paragraph E.3.2.4, the projected levels of equipage in paragraph E.3.2.5 and the aircraft retrofit costs in E.3.2.7 are accounted for in the RIA. **Justification:** The proposed equipage requirements will introduce costs to operators using aircraft that are not RNP 1 and RF or Advanced RNP and FRT compliant from December 2018. Insisting on Mixed Operations is both inefficient and costly and will likely not be the outcome proposed by ANSPs. Therefore the cycle between aircraft operators and airspace change will not be broken and an unintended consequence will be a delay until a cost benefit for RNP 1 and RF or Advanced RNP and FRT can be shown.	
708	Option 1	40 - 43	**Page No:** 41 **Paragraph No:** 4.3 **Comment:** Within the 'Harmonised PBN implementation' document there is a minimum requirement for RNAV Holding with RNP 1 SIDs and STARs. RNAV Holding is not included as a function within the RNP 1 or RNP APCH navigation specifications in the PBN Manual and only appears as "Required" under the Advanced RNP specification. UK CAA recommends that text be added stating that RNAV holding is an additional requirement for association with RNP 1 and RNP APCH and amend AUR.PBN accordingly. **Justification:** The inconsistency between the minimum requirement for RNAV Holding and the definitions of RNP 1 and RNP APCH according to the navigation specifications in the ICAO PBN Manual requires reconciliation.	
709	4.5.4. Social impact	50	**Page No:** 50 **Paragraph No:** 4.5.4 **Comment:** Contrary to the statement that no social impacts are	

			expected from the application of the proposed regulatory provisions, the UK experience is that any IFP changes arising from the implementation of PBN are likely to encounter opposition on environmental impact grounds and that this could limit the ability of an airport or ANSP to meet local performance objectives. If the regulation is to become a measure of how PBN is deployed throughout the EATMN, the social impact of airspace change should be acknowledged, even if only as a local consideration. Concentration of traffic is a feature of PBN operations (through better track keeping performance) and, at lower altitudes, this negates the positive impact of noise dispersion on effected communities. The potential for legal challenge against IFP changes may limit the ability of the ATSP to implement PBN procedures either at all, or in the required timescale. The regulation should identify the potential adverse environmental impact associated with implementation of PBN and in particular, from changed tracks over the ground. **Justification:** To allow ANSPs to gain an accurate perspective of the impact of PBN. **Proposed Text:** Amend paragraph 4.5.4 to read: “There is potential for local opposition to any IFP on environmental impact grounds arising from the introduction of PBN routes. Consideration is to be given to these issues during the consultation and planning phases of any airspace change.”	
710	4.5.5.3 Operations within SIDs and STARs - 4.5.5.3.1 Benefits of implementing PBN in SIDs and STARs	56 - 57	**Page No:** 56 **Paragraph No:** 4.5.5.3 **Comment:** It is not clear from the NPA whether or not EASA considered the comparative costs and benefits associated with implementing both RNAV 1 and RNP 1. The UK CAA view is that the majority of airspace efficiency, safety and capacity benefits can be realised through implementation of RNAV 1. The UK CAA view is formed from its own impact assessment conducted for London airports before mandating RNAV 1 from November 2017 in support of airspace changes in winter 2019 (see UK Aeronautical Information Circular (Y) 092/2014 ‘Introduction of RNAV 1 Mandate at London Airports’ dated 18 December 2014. **Justification:** Given current widespread aircraft fleet compliance to RNAV 1 standard, benefits can be achieved through application of this PBN specification. The majority of airspace efficiency, safety and capacity benefits can be realised through implementation of RNAV 1. Whilst recognising that RNP 1 and RF offers benefits at certain locations and especially at high density airports, the cost to operators in the short term (i.e., before 2020) has to be factored in any terminal airspace design.	
711	4.5.5.3.2 Cost of implementing PBN in SIDs and STARs	57	**Page No:** 57 **Paragraph No:** 4.5.5.3.2 **Comment:** The UK CAA disagrees with the NPA statement that non-harmonised PBN implementation is more costly. What is more costly is the requirement to support Mixed operations, retain conventional navaids and fail to meet local performance objectives from sub-	

			optimal airspace structures. Within the UK it has been estimated that redesign work needed to render the NATS LAMP project compliant with the NPA's RNP requirements would increase design costs by approximately 33% to just under £1m. Not included in this estimate are the costs of procedure flight validation, any additional NATS adaptation requirements, aircraft equipage and flight crew training. The UK CAA offers the above cost information to highlight that without changing the local performance objectives in the London area in the 2015 to 2019 timeframe, there are considerable costs to the ANSP. Costs for aircraft equipment retrofit will dominate the overall cost benefit analysis and reference should be made to the EUROCONTROL RAD E. It is recommended that EASA take account of these costs in their RIA. **Justification:** Additional cost of changing from current planned RNAV 1 implementation to RNP 1 is considerable and in any case, redesign may not be practicable within the proposed timescales, given limited procedure design resource throughout Europe.	
712	4.5.5.4.2 Cost of implementing ATS PBN routes	58	**Page No:** 58 **Paragraph No:** 4.5.5.4.2 **Comment:** It is unclear whether any costs for retrofit have been factored, especially considering fleet capability regarding Advanced RNP and FRT in December 2018. Costs for aircraft equipment retrofit will dominate the overall cost benefit analysis and reference should be made to the EUROCONTROL RAD ANNEX E. It is recommended that EASA take account of these costs in their Regulatory Impact Assessment (RIA). **Justification:** The UK CAA notes that RNAV 5 has been required across European ATS routes since 1998 and therefore the need to make available to airspace users ATS routes based on conventional navigation is unnecessary.	