BournemouthAirport
Part of Regional & City Airports

Bournemouth International Airport Airspace Change Proposal

Bournemouth Airport RNAV Approaches

Formal Submission Document

ACP-2018-40

Prepared by:

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Revision history

Version	Date	Author(s)	Description of the changes
1.0	28/09/2020	[redacted]	Formal Submission to the CAA Stage 4B

Approval

Date	Name	Signature	Role
28/09/2020	[redacted]		

Executive summary

Bournemouth Airport proposes to introduce new Required Navigation Performance (RNP) Instrument Approach Procedures (IAPs) for both runways 08 and 26. The proposed procedures will utilise satellite navigation technology.

The Instrument Landing System (ILS) serving runway 08 has been in operation for over 30 years, but the equipment has been increasingly difficult to maintain and has now reached the end of its economic and operating life. An unrecoverable failure of the ILS on Runway 08 will have serious operational consequences by denying easterly 3-dimensional approaches. The new proposed procedures will enable approaches with lateral and vertical guidance and will employ satellite navigation technology, removing the need for new equipment to be installed at the airport. With a new procedure, the runway 08 ILS is proposed to be decommissioned.

The new procedures will also support satellite approaches to Runway 26, providing an alternative 3-dimensional approach when the ILS is unavailable, increasing the resilience of operations for the main runway at the airport. It is noteworthy that implementation of Required Navigation Performance (RNP) approach procedures is necessary on all instrument runways by 2024, as stipulated by the EU PBN Implementing Rule (IR) 2018/1048.

The UK Civil Aviation Authority (CAA) requires the undertaking of an Airspace Change Proposal (ACP) for the proposed change, following the airspace change process described in Civil Aviation Publication (CAP) 1616[1]. As a result, the ACP Sponsor, in this case Bournemouth International Airport (BIA), has developed and assessed options for implementation of RNP IAPs, as well as conducting a public consultation with airspace and airport users and other organisations who may be affected directly, or indirectly, by the change.

The scope of public consultation was limited to the proposed implementation of new instrument approach procedures, anticipated to replace the existing runway 08 ILS instrument approach procedures and complement the Runway 26 ILS. Other existing operational procedures and instructions given by Air Traffic Control (ATC) to arriving aircraft, will not be impacted by the proposed change. The consultation was launched on 13th December 2019 and concluded on 15th May 2020; 33 admissible responses were received in total.

After detailed and careful consideration of the responses to the consultation, BIA has decided to progress Sub-Option 3d: Limited T Bar with two Initial Approach Fixes. No additional change to the proposed design in the formal ACP is required. This document presents the formal submission of an ACP for implementation of the Bournemouth Airport RNP approaches.

[1] https://publicapps.caa.co.uk/docs/33/CAP1616_Airspace%20Change_Ed_3_Jan2020.pdf

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1 Introduction

This document is the formal submission of ACP-2018-40 for the implementation of RNP approaches at BIA and is presented to the CAA for approval. This proposal is the main deliverable of Step 4B of the airspace change process. In line with the requirements of CAP1616, this document includes, among others, a description of the current situation, statement of need, development of options, operational assessment, environmental assessment, consultation feedback, and safety assessment. Supplementary Annex documents should be viewed in parallel to this document, in addition to previous key deliverables of the airspace change process which are listed in the references table at the beginning of this document and can be found on the CAA Portal.

Organisation of the document

This document is presented with the following core chapters and supplementary appendices and Annexes as necessary. The structure followed and tables presented in Chapters 9 through 14 have been prepared to be compliant with the requirements of Appendix F to CAP 1616.

Chapter 1 **Introduction:** this section introduces the document and provides a brief overview of its structure and content.

Chapter 2 **Current airspace description:** presents an overview of the current airspace, including types of operation, structure and routes, airspace usage and summary of key issues relevant to the proposal.

Chapter 3 **Statement of need / justification:** contains the statement of need, as was presented in the *Airspace Change Design Options* document produced at Stage 2A of the airspace change process.

Chapter 4 **Proposed airspace description:** presents the airspace change that is subject of this proposal.

Chapter 5 **Engagement, consultation and impact overview:** provides a detailed overview of stakeholder engagement during Stage 1 *Define* and Stage 2 *Develop and Assess* of the airspace change process.

Chapter 6 **Design principles:** summarises ten design principles developed during Stage 1B of the airspace change process.

Chapter 7 **Options development:** describes, at a higher level, the three initial options developed during Stage 2A of the airspace change process.

Chapter 8 **Analysis and impact of options:** presents analysis of options and explains why the proposed option was selected.

Chapter 9 **Airspace description requirements:** presents a compliance matrix for airspace description requirements.

Chapter 10 **Safety assessment:** describes, at a high level, the safety assessment process.

Chapter 11 **Operational impact:** presents a compliance matrix for the description of operational impacts.

Chapter 12 **Supporting infrastructure and resources:** presents a compliance matrix for supporting infrastructure and resources.

Chapter 13 Airspace and infrastructure requirements: presents a compliance matrix for airspace and infrastructure requirements.

Chapter 14 Environmental requirements: presents a compliance matrix for environmental requirements.

Appendix A Draft instrument approach procedure charts for UK AIP: contains the draft instrument approach procedures as still pending review and comment from UK PANS-OPS regulator and data that would be expected to be packaged as part of the AIP amendment.

Appendix B WebTAG analysis: contains WebTAG noise workbook results, greenhouse gases workbook results, and conclusion for the preferred option.

The following supporting documents should be referenced in parallel to this ACP formal submission. All Annexes presented here are self-contained documents accompanying this submission:

Annex A **Letter of Agreement between Southampton and Bournemouth:** contains details of the airspace delegation between SOU and BIA that supports the airspace and operational constrains under which the RNP Approach implementation is proposed.

Annex B **IFPD Report for Runway 08:** contains the full design information as already submitted to the CAA by the APDO for runway 08. This includes comparison of the RNP missed approach against the conventional missed approach as exists today.

Annex C **IFPD Report for Runway 26:** contains the full design information as already submitted to the CAA by the APDO for runway 26. This includes comparison of the RNP missed approach against the conventional missed approach as exists today.

Annex D **Consultation document:** contains the complete consultation document submitted for public consultation. This includes analysis on traffic patterns and traffic numbers, details on the noise assessments and impacts on the local community

Annex E **Safety assessment:** contains the full safety assessment report for the implementation of the RNP Approach, including safety argument, hazard identification table and proposed mitigations / safety requirements.

Annex F **Consultation response document:** contains the analysis of the responses received during the consultation.

Annex G **Final options appraisal:** contains the final analysis comparing each of the options benefits and impacts of each from both aviation and non-aviation impacts including on the local community.

Annex H **Drop-in session slides:** provides the copy of the presentation available to attendees of the drop in sessions held during the consultation.

2 Current airspace description

2.1 Types of operation

BIA provides a service to the following types of operation:

- Commercial Air Transport operations providing scheduled and charter services; and
- Non-Commercial operations, that include Business Aviation, Private and Commercial Pilot training and skill testing, and private recreational flying.

Commercial Air Transport operations at Bournemouth are primarily conducted in Boeing 737 (Ryanair and TUI), Airbus A320 (EasyJet) and Embraer 135/145 (Loganair) aircraft types.

The table below provides data on aircraft movements for BIA for categories of operation that are defined by and required to be reported to, the CAA for the calendar years 2018[2] and 2019[3].

Note: an aircraft movement is defined as either an aircraft landing or departing from either runway.

Type of operation		No of movements 2018	No of movements 2019
Commercial	Air Transport	4,081	4,992
	Of which Air Taxi	2	6
	Positioning flights	254	194
	Local movements	0	0
Non-commercial	Test and training	18,562	19,176
	Other flights by Air Transport Operators	5,878	4,828
	Aero Club	2,362	1,955
	Private	6,648	5,430
	Military	397	322
	Business Aviation	1,704	1,643
Total		**39,886**	**38,540**

Table 1: Bournemouth Airport aircraft movements by type of operation 2018-2019

The data shows that between 2018 and 2019, there was a decline in the number of total movements by approximately 3%, although there was a significant increase in the number of commercial flights by almost 20%.

In 2019, BIA served 803,307 passengers compared to 674,972 in 2018, which represents a 19% year-on-year increase. The following table provides data on passenger numbers for different categories of operation for calendar years 2018 and 2019.

[2] https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Airports/Datasets/UK-Airport-data/Airport-data-2018/

[3] https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Airports/Datasets/UK-Airport-data/Airport-data-2019/

Type of operation		No of passengers 2018			No of passengers 2019		
		Terminal	Transit	**Total**	Terminal	Transit	**Total**
Scheduled services	UK Operators	18,737	-	18,737	17,152	180	17,332
	Other EU Operators	450,703	-	450,703	564,960	-	564,960
	Other Overseas Operators	12,732	-	12,732	10,936	-	10,936
Charter flights	UK Operators	184,203	-	184,203	187,893	-	187,893
	Other EU Operators	2,588	-	2,588	10,359	-	10,359
	Other Overseas Operators	6,009	-	6,009	11,827	-	11,827
Total		674,972	-	**674,972**	803,127	180	**803,307**

Table 2: Bournemouth Airport passengers by type of operation 2018-2019

The most significant movement category at BIA is Non-Commercial, Test and Training operations. This is due to the Approved Training Organisations (ATOs) that are based at BIA, as well as those training organisations which use BIA but are based at other airfields including Oxford, Wycombe and Blackbushe. BIA is an important training airport as it offers full ATC services (Radar Approach and Aerodrome Control services) and offers a wide range of instrument procedures. Bournemouth is also one of the few airports in the south of England that has the capacity to accept training operations[4]. Meeting the requirements of training organisations is therefore of high commercial importance.

The majority of the flights undertaken by training organisations are conducted under Visual Flight Rules (VFR), where the pilot navigates the aircraft by looking at terrain features, rivers, roads, buildings, etc. Each VFR flight will be unique as flights may have different objectives and different pilots will have their own preferred routings and visual features. This individual preference on routings and destinations results in a random pattern of flights covering the entire area, making it impossible to distinguish individual flight profiles or types of flights without filtering the track data.

2.2 Structures and routes

2.2.1 Airspace Structure

The airspace around BIA is relatively complex, and due to the proximity of Bournemouth and Southampton airports, the airspace is shared under the terms of the LOA presented in Annex A.

[4] Statement reflects the pre-pandemic training situation and is expected to return as traffic movements increase.

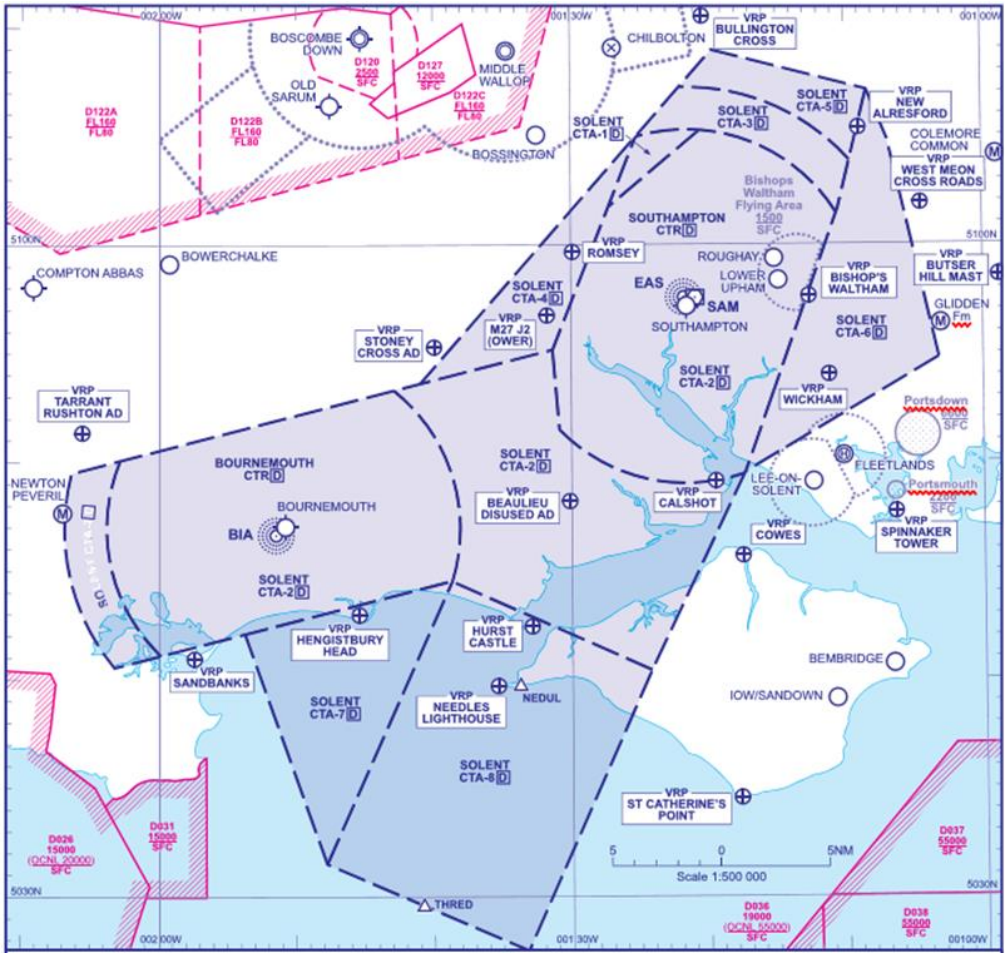

Figure 1: Controlled Airspace surrounding Bournemouth Airport[5]

2.2.2 Arrival Routes

Aircraft arriving at Bournemouth and Southampton airports initially follow identical standard arrival procedures. During this phase of flight, aircraft descend from the high-level airway systems, reduce their speed, and if required, enter Holding patterns located over Southampton Airport or to the west of the Isle of Wight (at SAM and NEDUL in Figure 1).

[5] Source: UK AIP ENR 6-38

Arrival routes to the BIA CTR are not defined by fixed 'lines on maps', and as such aircraft are radar vectored[6] by Air Traffic Control at Solent Radar[7]. In a radar vectored operation individual aircraft do not follow identical paths, but over a period of time, aircraft occupy a broad 'swathe' that focuses into a single track along the extended runway centreline defined by the final approach guidance system at the airport. This is demonstrated in the following sections.

During the operational hours of Bournemouth Radar service, aircraft are radar vectored to the extended runway centrelines at approximately 8 miles to start the Instrument Landing System (ILS) or Non-Directional Beacon (NDB) approaches.

Outside of operational hours when Bournemouth Radar service is not available, aircraft will follow the published charted approach procedure which starts overhead the airfield. The aircraft then follows an outbound course before turning to line up with the runway.

The tracks of aircraft following the published initial approach procedure are highlighted in Figure 2.

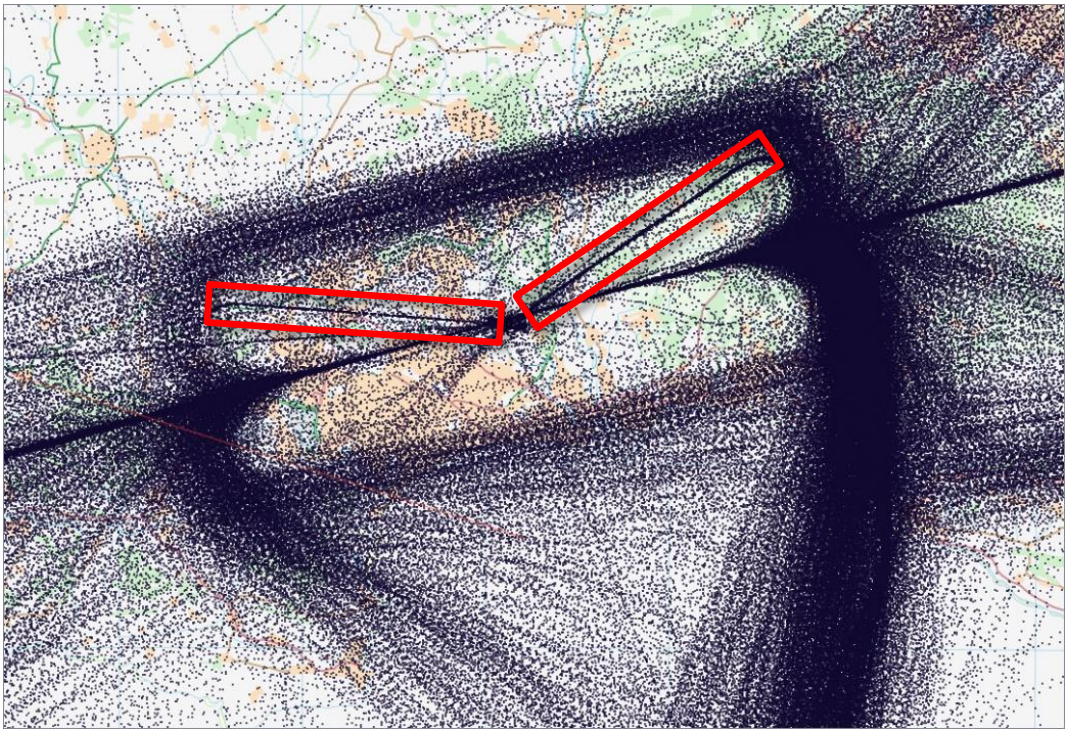

Figure 2: Commercial aircraft arrival tracks for 2017 / 2018[8] indicating those following the published procedure

[6] Radar Vectors (steering instructions) are provided to aircraft to remain separated from other aircraft within the airspace and to navigate to their destination.

[7] Solent Radar is an Air Traffic Control Unit located at Southampton Airport.

[8] Data source: Bournemouth WebTrak arrivals data sourced from radar for 2017 and 2018.

2.3 Approach Procedures

2.3.1 3-Dimensional approach

3-Dimensional approach guidance is provided by the ILS that defines both horizontal and vertical guidance to each runway, assisting pilots to fly a stabilised approach[9].

- **Runway 08:** This has an ILS CAT I allowing aircraft to descend to a minimum height of 200 feet above the runway to complete the landing visually.
- **Runway 26:** This has an ILS CAT III allowing suitably equipped aircraft to complete an automatic landing.

2.3.2 2-Dimensional approach

2-Dimensional approach guidance provided by an NDB and Distance Measuring Equipment (DME) provides horizontal guidance only. The pilot manages the aircraft's vertical descent based on aircraft altimetry to a minimum height of 432 feet on Runway 08, and 379 feet on Runway 26.

An NDB approach may be adversely affected by wind which can lead to imprecise aircraft track keeping, high cockpit workload and unstable approaches. For these reasons, there is a global programme to replace NDB approaches with RNP approaches which are based on satellite navigation positioning.

At Bournemouth, the NDB approach is used if the ILS is unavailable or for training purposes.

2.3.3 Missed Approach

The ILS and NDB approach procedures include a missed approach procedure that are required if the first approach is unsuccessful. The missed approach procedure is used to guide the aircraft back to the hold, or, as directed by ATC, to start a second approach.

The existing missed approach procedures for the ILS and NDB approaches are based on the NDB located at BIA, and leads to a hold over the airport as demonstrated in Figure 3: Existing hold and missed approach over/returning to the NDB extracted from the AIP as part of the existing ILS IAPs.

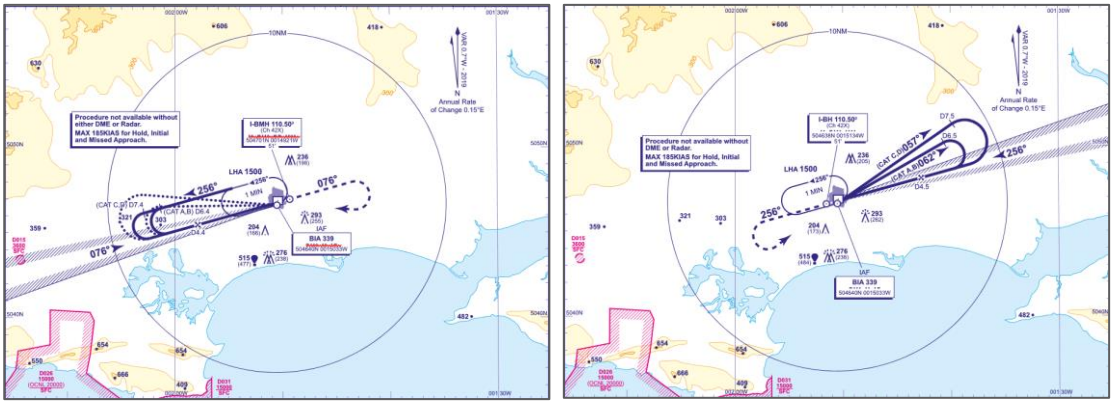

Figure 3: Existing hold and missed approach over/returning to the NDB extracted from the AIP as part of the existing ILS IAPs

[9] Source US Federal Aviation Administration: A stabilized approach is one in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway.

2.4 Airspace usage and proposed effect

BIA has a mix of commercial and general aviation traffic. The main commercial operators at the airport are TUI Airways, Ryanair and EasyJet, with the busiest air transport routes in 2019 to Palma, Mallorca and Faro.

Cobham Aviation operate special mission military support aircraft, based at BIA.

XLR is a Fixed Base Operator at BIA that provides support services to a number of business aviation operators. Gama Aviation has recently established an aircraft maintenance facility at BIA.

Air Training Organisations based at BIA include L3 Harris and Bournemouth Commercial Flight Training. The airport also regularly accepts non-based training flights from CSE Oxford, Redkite Oxford, Blackbushe, Booker Aviation Wycombe, and Shoreham.

The proposed airspace change is aimed to increase safety and airport availability on Runway 08, and resilience of operation, but it will not have any significant effect on how the airspace around the airport is used, or the type of operators using the airport.

2.5 Operational efficiency, complexity, delays and choke points

One of the main issues regarding operational efficiency at BIA is the impact of irrecoverable failure of Runway 08 ILS, which has serious operational consequences causing unavailability of the precision instrument approach to Runway 08. As a result, operators either have to land on Runway 26, if weather conditions permit, or utilise NDB approaches to Runway 08 instead, which require different procedures, increased track miles, and adverse noise impacts on the ground. In addition, an NDB approach does not provide vertical guidance and therefore arrivals are more likely to be unstable resulting in more missed approaches. In turn, this would increase operational inefficiency and contribute to increased noise due to aircraft flying at low altitude in the vicinity of the aerodrome.

In the case of concurrent Runway 26 ILS unavailability due to a failure or scheduled maintenance, there is no alternative 3D approach at BIA. This would impact the resilience of operations especially in adverse weather such as low visibility.

2.6 Safety issues

The ILS serving Runway 08 is obsolete and cannot be maintained in operational service. BIA operate NDB approaches and currently there are no other instrument approaches available. The ILS was installed second hand in the 1980s and both the equipment and maintenance support is at end of life. Unrecoverable failure of the ILS on Runway 08 will have serious operational consequences to arrivals at BIA, increasing dependence on Runway 26 and denying 3D approaches on Runway 08. The proposed RNP approaches will ensure availability of 3D approaches and thus potentially contribute to more predictable and safer operations.

As part of the final options appraisal, a full safety case was produced for proposed option 3d: RNP IAPs Limited T Bar with two Initial Approach Fixes; available as Annex E.

2.7 Environmental issues

As stated in the previous section, Runway 08 ILS is obsolete and well beyond its economic lifetime and at some stage it will fail and become unrepairable, most likely preceded by reduced runway availability. Without the ILS, Runway 08 operations will revert to the existing non-precision 2D NDB which do not provide vertical guidance requiring aircraft to operate

with higher levels of engine thrust and increased engine noise on approach. The increased operating minima of the Non-Precision Approaches are likely to result in a higher number of missed approaches and in increased aircraft noise from high thrust settings on the missed approach climb-out.

3 Statement of need / justification

3.1 General

The statement of need was produced to initiate the Bournemouth ACP at Step 1A of the airspace change process and was updated in March 2019. It states:

> *"Bournemouth Airport has RWY 08 and RWY 26, both providing precision approach capabilities via ILS. The preferential runway is RWY 26 handling 75% of all arrivals with the remainder utilising RWY 08. The ILS on RWY 26 is CAT III.*
>
> *The ILS (CAT I) serving RWY 08 is obsolete and needs to be replaced. The ILS was installed second hand in 1984/85 and the equipment and maintenance support is at the end of life. Unrecoverable failure of the ILS on RWY 08 will have serious operational consequences denying easterly Precision Approaches and increasing dependence on RWY 26.*
>
> *In addition, the publication of EU Implementing Rule (IR) 2018/1048 stipulates the implementation of PBN approach procedures to both RWY 08 and RWY 26 by 2024. By 2030 the IR emphasises the preference for PBN over conventional ILS CAT I."*

The scope of this change is limited to the proposed implementation of new RNP instrument approach procedures to runways 08 and 26. These RNP approach procedures will provide 3-Dimensional approaches to runway 08, allowing the obsolete ILS serving runway 08 to be withdrawn from service, and to provide a 3-Dimensional Approach to runway 26 providing operational resilience to the wind preferential runway.

The airspace in which flights may be impacted by the change, with potential for some variation of flight patterns, is highlighted on Figure 4 on the next page.

Bournemouth and Southampton airport operations are closely linked due to the proximity of the aerodromes and airspace. Figure 4 provides an overview of the Control Zones[10] for both airports. The area highlighted by a red box is the portion of airspace around Bournemouth that is considered in scope of this airspace change proposal including also that part of the airspace delegated to BIA under the terms of the LOA.

[10] A ***control zone*** is a volume of airspace, normally around an airport, which extends from the surface to a specified upper limit, established to protect air traffic operating to and from that airport.

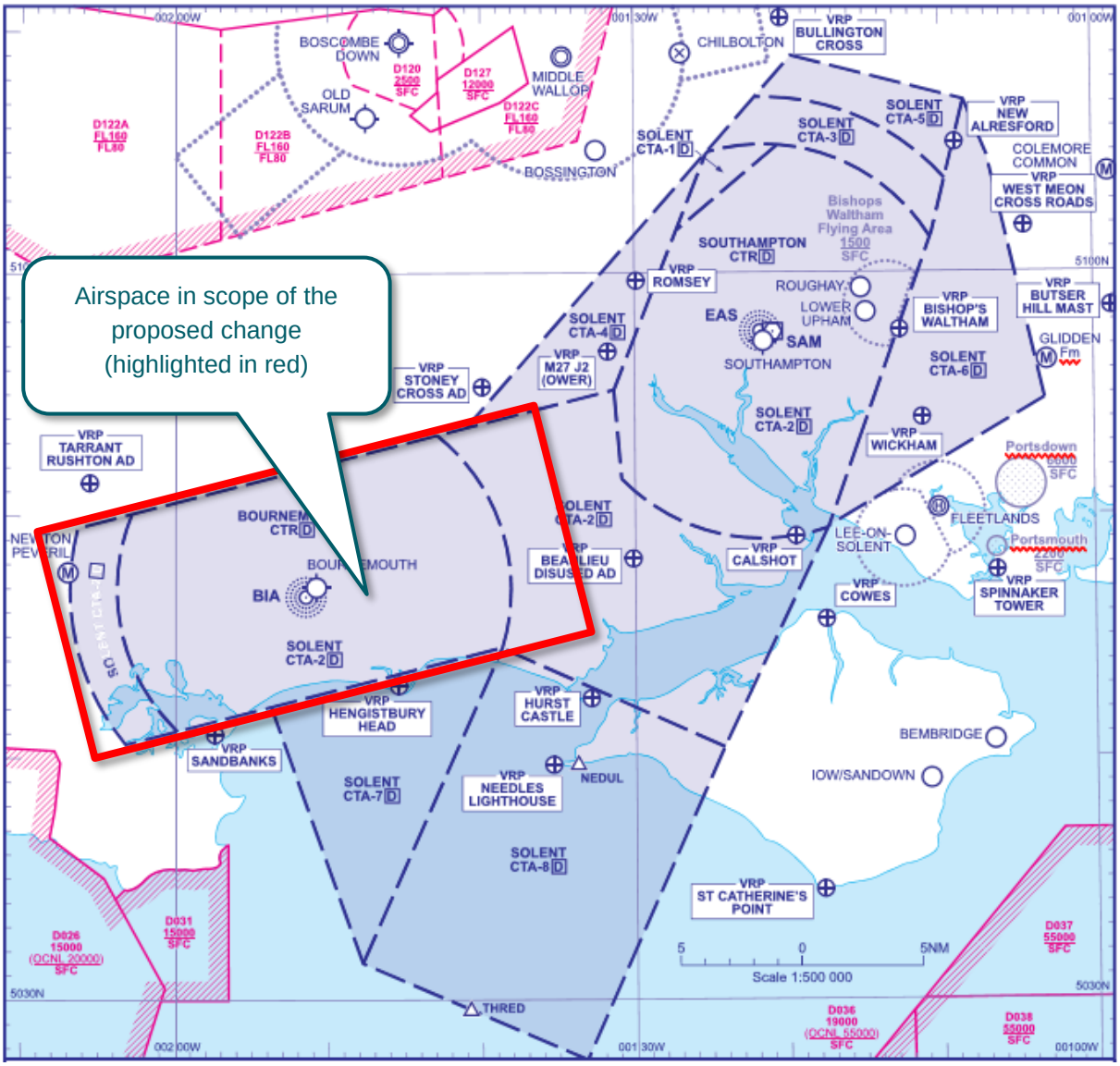

Figure 4: Airspace area and region containing the change on the AIP chart for Bournemouth and Southampton[11]

3.2 Airspace modernisation strategy

The Government and the Civil Aviation Authority believe that airspace modernisation is needed and are leading a programme to modernise and redesign UK airspace. The Civil Aviation Authority's Airspace Modernisation Strategy, published in December 2018, offers comprehensive non-technical guidance on the scope and objectives of the modernisation programme. The aviation industry is coming together to support the Government and the Civil Aviation Authority to deliver a coordinated airspace modernisation programme.

There are 17 airports working together with the Government to redesign UK airspace, including Bournemouth. Both Bournemouth and Southampton airports have initiated separate Airspace Change Proposals for arrival and departure operations as part of the United Kingdom Future Airspace System Implementation-South project (FASI-South). The

[11] Source: UK AIP ENR 6-38

airspace changes required by the FASI-South Project are in the design and development process and will be subject to separate Airspace Change Consultations at a future date.

This airspace change is fully compatible with the Airspace Modernisation Strategy as the arrival routes to be introduced by FASI-S are able to connect directly to the Initial Approach Fixes of the RNP instrument approach procedures.

4 Proposed airspace description

4.1 Objectives and requirements for proposed design

This sub-chapter describes why Bournemouth Airport wishes to introduce new RNP approaches and summarises the objectives and requirements for the proposed design.

4.1.1 Obsolete ILS on Runway 08

Bournemouth Airport is equipped with ILS serving Runways 08 and 26 providing 3-Dimensional precision approach capabilities.

Runway 26 is the most frequently used runway due to the prevailing south westerly airflow and is also the direction from which weather systems associated with low cloud and poor visibility originate. For this reason, the ILS serving Runway 26 is a Category III system that allows aircraft operations to continue in conditions with low visibility and cloud base. The Runway 26 ILS was recently replaced due to its greater importance to the operation of the airport.

The Category I ILS serving Runway 08 was installed second hand in 1984/85 and the equipment and maintenance support is now beyond the end of its technical and economic life. An unrecoverable failure of the ILS on Runway 08 would have serious operational impacts on the airport by removing the 3-Dimensional approach capability from Runway 08 that is used approximately 30 % of the time.

It is therefore essential that Bournemouth Airport considers how to continue to provide a 3-Dimensional approach capability to Runway 08 in the future in a cost-effective manner.

4.1.2 New navigation technologies

Satellite navigation technology has the capability to provide aircraft with Instrument Approach performance capabilities that are comparable to those of a Category I ILS.

In aviation terms ‘satellite navigation’ is known as the Global Navigation Satellite System (GNSS) and runway approach applications based on GNSS are classified as RNP Approach Procedures in accordance with the PBN concept defined by the International Civil Aviation Organisation (ICAO), the specialised aviation agency of the United Nations.

There is now a high level of aircraft equipage for GNSS operations, particularly in the business aviation sector where most aircraft have the capability to undertake an RNP approach.

Some older aircraft do not have RNP approach capability, although in many instances, upgrades or retrofit solutions are available, or the aircraft will be replaced by RNP capable aircraft in the coming years.

For an airport operator, RNP approaches are attractive as there is no requirement for navigation equipment to be provided at an airport level and therefore the implementation and maintenance costs are low.

4.1.3 International implementation of PBN

It has been recognised by standardisation and regulatory bodies that the provision of approaches with vertical guidance facilitating stabilised approaches offer the potential for increased aviation safety compared to 2-Dimensional approaches.

There are established global, regional and national objectives and programmes for the implementation of PBN, including for 3-Dimensional final approach operations.

- At the global level, this is detailed in the ICAO Global Air Navigation Plan[12] where PBN is a key component of the upgrade to the operation of the global aviation system.
- Within the European Region, the implementation of PBN is contained within the SESAR Air Traffic Management (ATM) Master Plan[13] and deployment mandated within the context of European Union Regulation 2018/1048[14]. The Implementing Rule requires the implementation of PBN approach procedures with vertical guidance at all instrument runways:
  - By December 2020 for runways that are currently only served by 2-Dimensional approaches.
  - By January 2024 for runways that are currently served by ILS.
  - By 2030 the IR emphasises the preference for PBN approaches over conventional ILS CAT I.

  The United Kingdom is expected to adopt the requirements and timescales for the implementation of PBN approaches as detailed in the PBN Implementing Rule.
- Within the UK, the implementation of PBN is contained within the Department of Transport's 2017 Air Navigation Guidance[15] document. The implementation of PBN is a fundamental element of the UK National Future Airspace System.

4.2 Proposed new airspace / route definition and usage

The proposed option of this ACP submission is Sub-Option 3d: Limited T Bar with 2 Initial Approach Fixes. Under this sub-option, the RNP approach would be provided with initial approach segments that would enable aircraft to join the approach in a similar position to that which they would do if being vectored by ATC. The implementation of sub-option 3d waypoints defining the approach is illustrated on Figure 5 and Figure 6 overlaid with traffic patterns for all commercial aircraft arrivals in 2017 and 2018, on which the Consultation was based.

Highlighted in red on each figure is an illustration of the anticipated alteration in traffic patterns which could be expected to occur for each runway if the implemented solution under this sub-option was selected. The net effect would be a general movement of aircraft to the west as a result of the aircraft navigation system anticipating turns more linked to the IAF. The illustration focuses on the southern join as this is likely to be the most impacted one. Joins from the North to Runway 08 and Runway 26 would be expected to lead to some concentration of tracks in the centre of the existing bands whilst direct arrivals as seen from the West to Runway 08 and East to Runway 26 would be unaltered due to their existing concentration on the central IAF.

Highlighted in yellow is the illustration of the northern shift to the IFR training joins from overhead the airport when the RNP approach is flown.

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[12] https://www.icao.int/airnavigation/Documents/GANP-2016-interactive.pdf

[13] https://www.atmmasterplan.eu/

[14] https://www.easa.europa.eu/document-library/regulations/commission-regulation-eu-no-20181048

[15] https://www.gov.uk/government/publications/uk-air-navigation-guidance-2017

For all hours of operation, the change to Runway 08 is expected to be realised due to the eventual removal of the existing ILS – even with ATC vectoring – due to aircraft turn anticipation. The concentration that is demonstrated for the southern approach applies also to the northern IAF. The central IF will be a combined IF/IAF allowing direct arrivals as today.

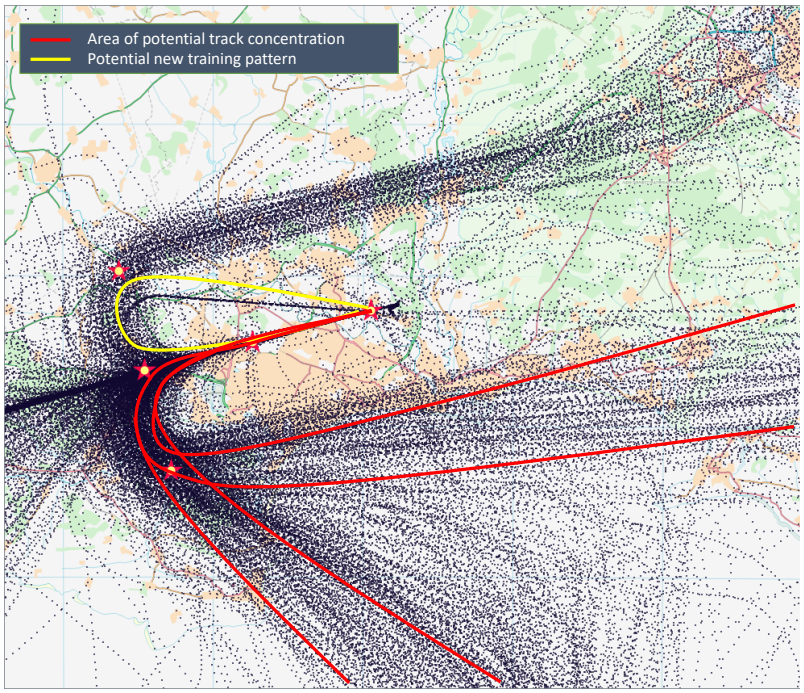


Figure 5: Sub-option 3d for Runway 08[16] aligned with radar tracks

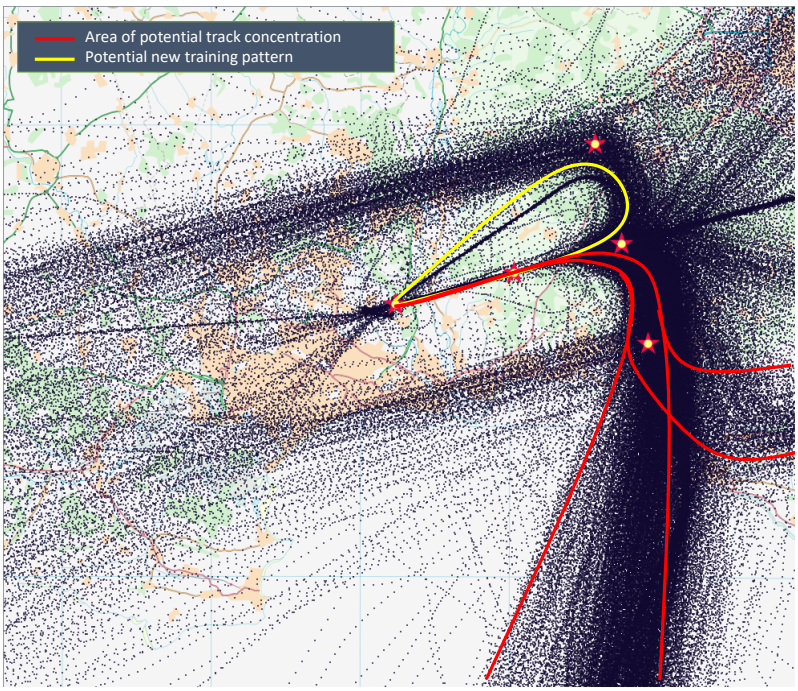


Figure 6: Sub-option 3d for Runway 26[17] aligned with radar tracks

[16] Data source: Bournemouth WebTrak arrivals data sourced from radar for 2017 and 2018.

[17] Data source: Bournemouth WebTrak arrivals data sourced from radar for 2017 and 2018.

For Runway 26, during normal operational hours, standard ATC vectoring control will continue to apply, and the ILS approach will continue to be the main approach solution for all IFR operations. The illustrated tightening of the flight distribution would be expected if the new procedure were the default for all aircraft. This is not the intention.

The primary benefit of this sub-option is that training operators will be able, on ATC clearance, to fly the whole procedure from the initial approach fixes as is required during training. It provides, in the case of Runway 26, an additional approach type for training operations. To replicate existing training which occurs today with joins from the North, only the northern IAFs would be approved for instrument flight training for aircraft based at Bournemouth.

Out of hours, this sub-option provides a full approach procedure which allows aircraft to join from the north or the south at optimal heights for noise dispersion and to increase flight efficiency resulting in reduced fuel burn.

4.2.1 Missed approach procedures

The proposed implementation for the arrivals has been selected to be as close to the existing tracks as possible. For the missed approach procedures, there are not aircraft tracks that can be used to demonstrate the replication of existing traffic patterns. This is due to very limited number of missed approach procedures needing to be flown and also by the tendency for radar vectoring to be used to control aircraft executing a missed approach rather than flying the published procedure. For this reason, a comparison has been undertaken by the APDO of the containment of the proposed RNP missed approach with the conventional missed approach against all proposed minimas. These are presented below showing that the containment areas for LNAV and LNAV/VNAV are slightly larger than the ILS whilst the LPV is slightly smaller. This is as close as the design is able to get whilst adhering to the objective of replicating existing traffic patterns – noting that the number of missed approaches flown as per the published chart is very small due to the preference for radar vectoring.

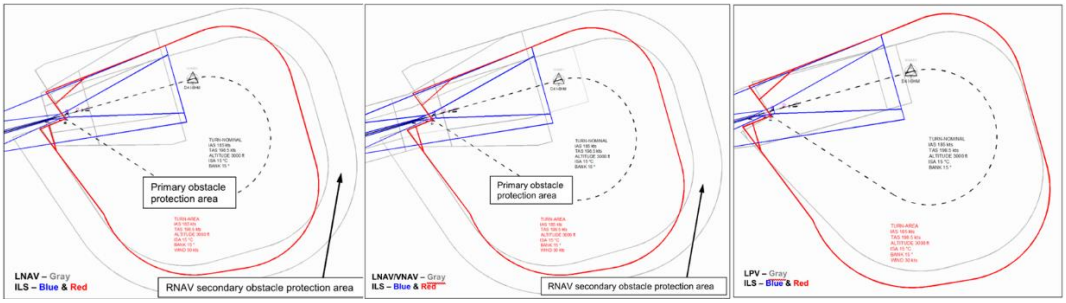


Figure 7: Missed approach protection area comparisons Runway 08

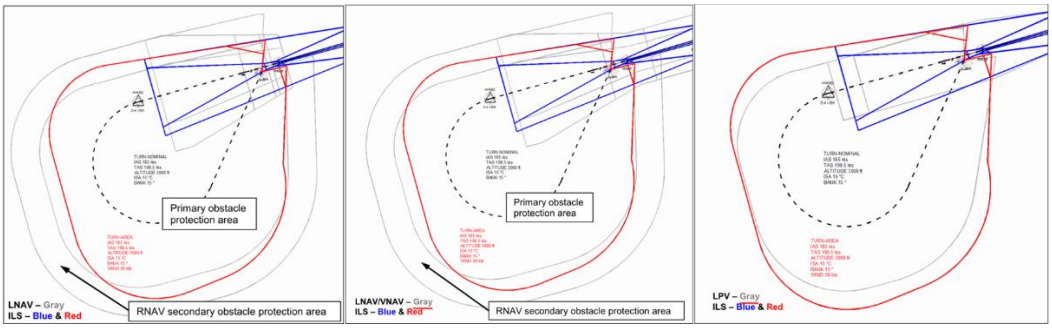


Figure 8: Missed approach protection area comparisons Runway 26

5 Engagement, consultation and impact overview

The following section summarises the engagement and consultation activities undertaken as part of this ACP and identifies key impacts of the proposal.

5.1 Engagement and Consultation

During Stages 1 and 2 of the ACP, Bournemouth Airport engaged with relevant stakeholders with the aim to define design principles, drawing up a comprehensive list of options, and appraise the impacts of those options. The engagement plan with stakeholders during Stage 1 and Stage 2 of the process is presented in Figure 9.

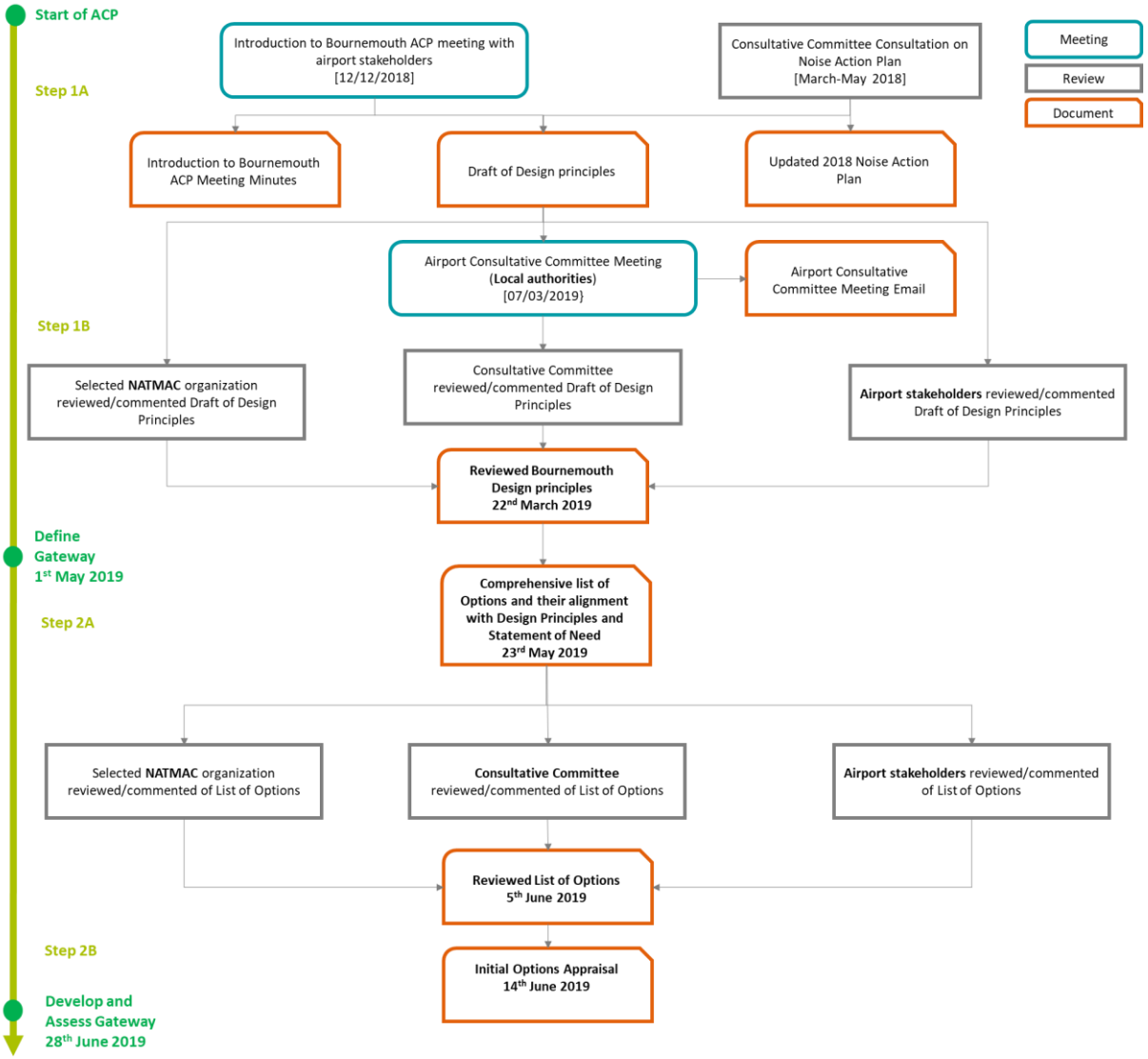


Figure 9: Engagement with stakeholders during Stage 1 Define and Stage 2 Develop and Assess

In Stage 3, Bournemouth Airport completed a 22-week consultation on the proposed RNP approaches. The total number of 91 Consultation invitations were sent out to aviation and non-aviation stakeholders. The full list of all stakeholders directly invited to participate in the Consultation is provided in the Consultation document – Annex D.

The consultation was launched on 13th December 2019 and concluded on 15th May 2020. The consultation was originally planned to conclude on 27th March 2020, however due to the COVID-19 pandemic the Bournemouth Consultation Team in agreement with the CAA extended the consultation for a further seven weeks, closing on 15th May 2020. A total of 33 admissible responses were received during this period and their preferences are presented in Section 8.2.

The summary of the benefits and concerns identified by stakeholders during the consultation is presented in Figure 10. A full summary of how the consultation was managed and a theming of all responses is presented in Annex F.

Figure 10: Summary of key benefits and concerns identified from consultation

5.2 Impacts of proposed change

5.2.1 Units affected by the proposal

This proposal affects only the BIA ATS Unit, although Solent Radar (Southampton ATC) was included from an early stage of the ACP process due to the proximity of Solent CTA to Bournemouth CTR.

One of the design principles was to support the continued use of radar vectors for arrivals by Solent Radar so retaining the current operational procedures at Bournemouth and Solent Radar ATC units to the greatest extent possible minimizing training requirements.

5.2.2 Military impact and consultation

The proposed change has no impact on military operations and the MOD was one of the stakeholders directly invited to participate in the Consultation. The MOD stated in their response that given the available information, they do not have any objections to the proposed changes.

5.2.3 General Aviation airspace users impact and consultation

The proposed change will have a positive impact on general aviation airspace users. Business and General aviation fleets have a high level of equipage for RNP approaches with LPV lines of minima. The provision of RNP approaches at Bournemouth is of particular interest to General Aviation operators with respect to instrument training. Flight training operators will be able to perform PBN training at Bournemouth Airport avoiding the need to increase transit times and fuel burn to undertake the same training at alternate aerodromes.

The AOPA response to the consultation was as follows:

> "*As part of the UK approach to modernisation of airport approach procedures this proposal will maintain the safety of instrument approach procedures and from an economic point of view the GNSS replacement of the. ILS on 08 is far more cost effective as it offers lower costs overall to the airport particularly when it comes to maintaining an old ILS. The French Government has a policy of replacing ILS with GNSS approaches as the ILS reaches the end of its operating life. BOH is also an important location for Pilot Training which underpins the commercial aviation sector in the supply of pilots. Looking at the issues around noise it appears that there may be a reduction in noise from night-time operations even if there is a slight increase in noise from daytime flights. We support this plan".*

5.2.4 Commercial Air Transport impact and consultation

An unrecoverable failure of the ILS on Runway 08 would have serious operational impact on the airport by removing the 3-Dimensional approach capability from Runway 08 that is used approximately 30% of the time. Commercial Air Transport would therefore benefit from an alternative precision approach should the ILS on Runway 08 fail. Without precision approach, the likelihood of a missed approach will increase.

Engagement with operators at Bournemouth during Stage 1 of the CAP 1616 process confirmed that their aircraft and crew are capable of LNAV and LNAV/VNAV operations. Given the recent publication of Regulation (EU) No. 1048/2018, it is expected that commercial operators will introduce LPV capabilities into their fleets. It was noted that EasyJet are the initial customer for LPV capability on the A320 NEO from circa 2022.

5.2.5 CO_2 environmental analysis impact and consultation

Under normal operations, where arrivals will be radar vectored by ATC at Solent Radar, there will be no change in relation to fuel burn, CO_2 emissions and air quality due to trajectories and heights being identical. However, during out of hours operations, a small proportion of arriving aircraft will benefit from the change due to reduced track miles, resulting in reduced fuel burn, lower CO_2 emissions, and improved air quality.

Following implementation of the proposed change, there may be reduced transit flying, by training organisations based at Bournemouth, to conduct RNP approach training elsewhere - currently Exeter, Cardiff, Bristol, and the Channel Islands have RNP approaches. This will result in minor reductions in fuel burn and subsequently CO_2 emissions.

The approach proposed will reduce the track miles also flown by arrivals for both Runway 08 and 26 as shown below. This is predominantly the case for out of hours operation or when the radar service is not available.

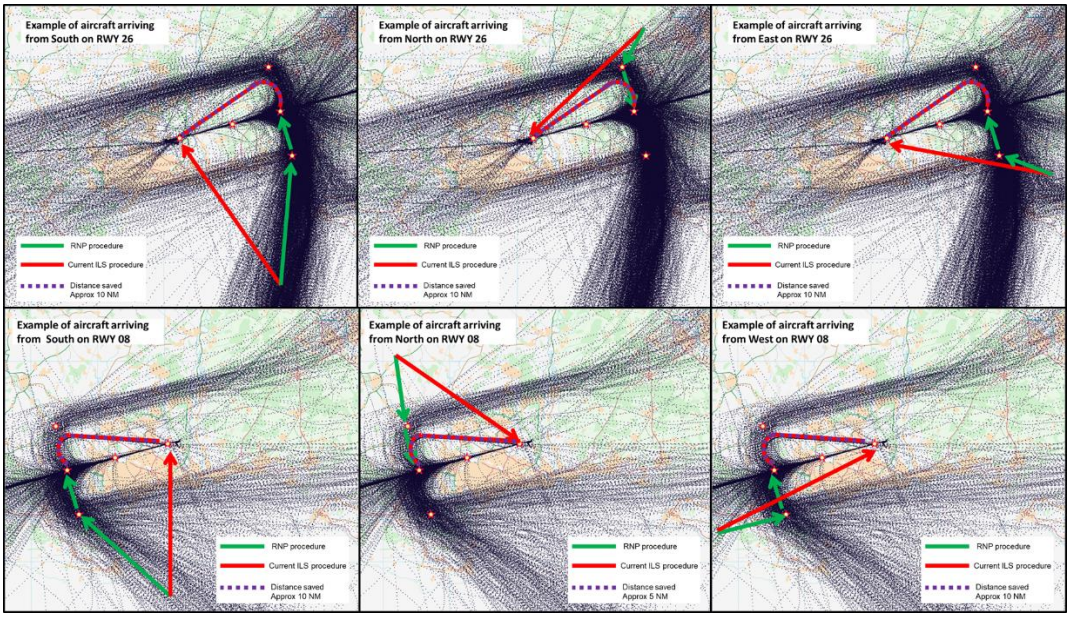


Figure 11: Estimation of track mile savings of RNP approach compared to published ILS

The calculations undertaken for this ACP estimate that the benefits for fuel and CO_2 savings can be estimated as summarised in Table 3 with additional details from the WebTAG analysis presented in Appendix B.

		Fuel saved (kg)	CO_2 saved (Kg)	Value of fuel savings
Runway 08	First year	16,640	52,417	£11,648
	Over ten years	259,696	818,043	£181,787
Runway 26	First year	44,436	139,973	£31,105
	Over ten years	693,491	2,184,495	£485,443

Table 3: Value of the fuel and CO_2 savings projected from the RNP approach

5.2.6 Local environmental impacts and consultation

5.2.6.1 Noise

Under normal operations where arrivals continue to be radar vectored to the approach, there is likely to be some concentration of flight tracks around the initial approach fixes compared to the ILS of today for both runways. Using WebTAG methodology, the noise contour maps confirm that even with the 10-year growth forecast, the proposed IAF points are outside the noise contours and therefore areas around IAFs will experience noise lower than 51 dB Leq during the day and lower than 45 dB Leq during the night. Given that this ACP only concerns location of the IF/IAF, any changes will not affect noise contours. It is also noted that the extent of the noise contours only extends to the FAF for both runway ends. The FAF is coincident with the FAP for the ILS for each runway end. Hence, there is expected to be no change close to the aerodrome with the introduction of the RNP Approach.

Figure 12 and Figure 13 illustrate the distinction of the noise contours from the proposed layout of the instrument approach procedures.

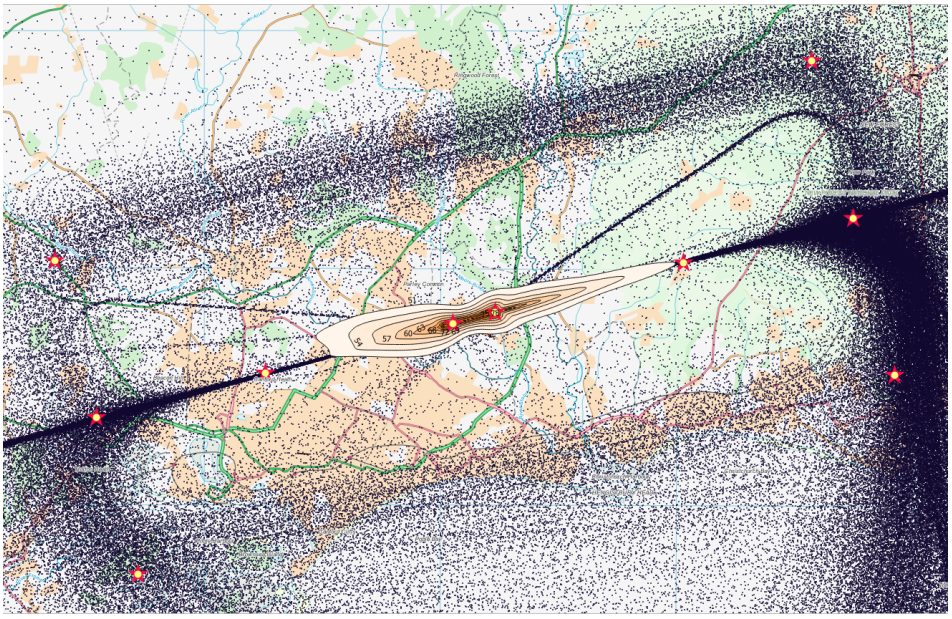


Figure 12: Overlay of the baseline LaEq 16hr day contours with the traffic and approximate waypoints

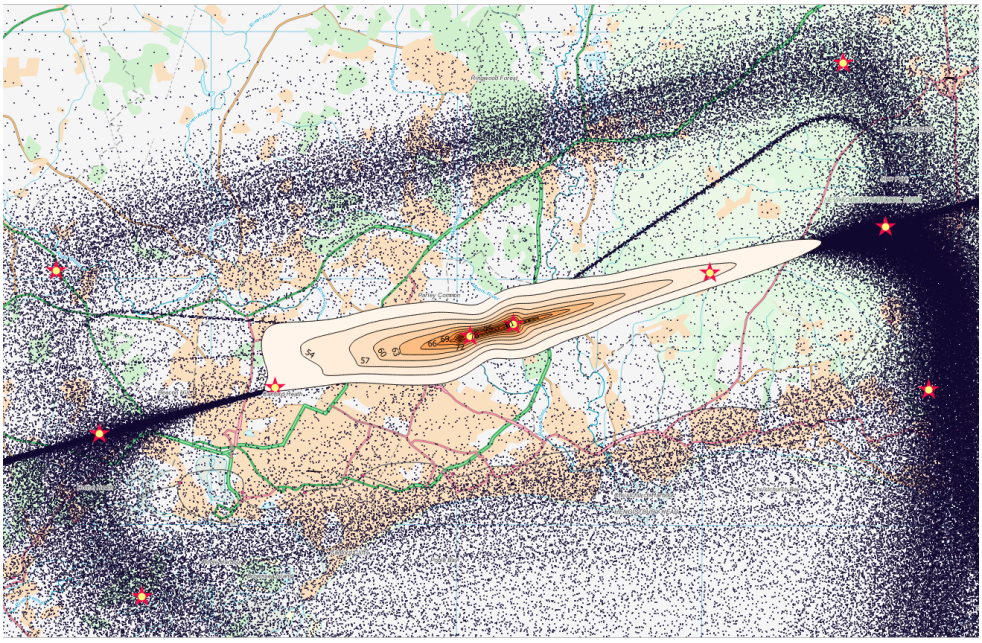


Figure 13: Overlay of the growth LaEq 16hr day contours with traffic and approximate waypoints

The precise guidance of the RNP approach will enable improved track keeping compared to an NDB approach, and therefore will maintain the noise footprint within the existing bounds. The RNP approach will have lower minima than the NDB approaches and so it would be expected that the RNP approach would also result in a net decrease in missed approaches or diversions, thus, lower levels of climb out noise following a missed approach.

One organisation, although supporting Sub-Option 3d, suggested three potential changes to the design of the RNP approach to Runway 26 to reduce noise further, including: an increase in vertical path angle from 3.0 to 3.2 or 3.3 degrees; implementation of Continuous Descent Approaches; relocation and increased height of the IF. These proposals were

analysed by the Bournemouth Consultation Team who concluded that, due to the airspace constraints on approach to Runway 26 and the complex airspace structure in the Solent CTA, the proposals could not be implemented as part of this ACP. Nevertheless, these suggestions could potentially be considered within the future airspace changes within the FASI - South programme. Further details of consultation feedback and subsequent analysis can be found in Annex F.

5.2.6.2 Tranquillity

The proposed implementation at BIA will not change the operational concept for air traffic operations or control at the airport. The vast majority of operations will be vectored by ATC in accordance with existing practice, and at similar altitudes. Analysis of the traffic arriving at BIA in 2017 showed that approximately 3% of instrument flight operations (including training) flew the published instrument approach procedure. The utilisation of the RNP approach will facilitate a more direct approach for aircraft flying the procedure from either the north or south (depending on IAF orientation) – especially out of hours – with reduced track miles compared to the existing procedures if optimised for southerly approaches. Of the other traffic at BIA approximately 50% of movements are visual flight rules (VFR) traffic which would not be flying the procedure and are typically lower than other traffic. Thus, it is estimated that the introduction of RNP Approach will result in slight improvement to no change in the levels of tranquillity.

It is noted that the change of this option will be the rerouting of aircraft arriving from the east that would have flown the published procedure overhead the aerodrome, to joining via the initial approach fix. Analysis of the traffic arriving over 2017 and 2018 showed that approximately 3% of instrument flight operations (including training) flew the published instrument approach procedure. This means that 97% of traffic continues to overfly the same communities as today's operations.

Given that the proposed routings will therefore not change the existing fleet of aircraft, frequency and altitudes at which aircraft are arriving, it is estimated that there will be no change in the levels of tranquillity.

5.2.6.3 Biodiversity

The implementation of the RNP Approaches are not expected to result in any changes to biodiversity given that the implementation will not require any ground works to support implementation. However, the ILS localiser for Runway 08 is located in an SSI. The impact of decommissioning the localiser will need to be discussed in detail with Hampshire County Council, Natural England and the New Forrest National Park on decommissioning to minimise any disturbance to local flora and fauna. This would have to happen regardless of any option given the end of life status of the RWY 08 ILS. An option might be to leave the antenna concrete plinth and sub surface cables and ducting in situ depending on the recommendation of the above organisations.

5.2.7 BEconomic impacts

The provision of RNP Approaches will provide capacity and resilience benefits and will have higher operational availability than can be provided by today's ILS, with minimal ongoing operational costs.

There are benefits to the GA and commercial training organisations through the inclusion of a full RNP approach and associated missed approach, as this increases the range of training scenarios available at Bournemouth. Without the option to undertake training on

PBN approach procedures, training will have to be undertaken away from Bournemouth increasing flight costs for ferrying to and from aerodromes with suitable procedures.

Commercial Air Transport would benefit from an alternative precision approach should the ILS on Runway 08 fail. In addition, Runway 08 would provide contingency for Runway 26 during periods when the ILS is unavailable (e.g. equipment unserviceability or aerodrome works). In both cases, this will reduce the need to utilise a 2D approach procedure or divert to an alternative aerodrome.

During operational hours, arrivals will continue to be radar vectored by ATC as today. This will not change the flight profiles hence there will be no change in relation to fuel burn. During out of hours operations, a small proportion of arriving commercial aircraft will benefit from the change due to reduced tack miles. This is reflected in the fuel savings which can be achieved by airlines. See Table 3.

The net result in all the cases above is increased costs for training and commercial operations at Bournemouth, without the RNP approach. Infrastructure (equipment), deployment and maintenance costs associated with the limited T-bar RNP approach are minimal compared to a conventional approach which requires the provision of ground navigation aid infrastructure and ongoing flight inspection activities.

6 Design principles

In the initial stage of the Design Process, Bournemouth Airport identified ten 'Design Principles' addressing Environmental, Regulatory, Operational and Economic issues, against which all viable options would be assessed. Bournemouth Airport Consultative Committee, airport stakeholders and selected members of NATMAC were engaged to review the proposed design principles and suggest if any additional design principles were necessary. These were subsequently approved by the CAA. The detailed stakeholders' engagement process is presented in Section 5.

The final Design Principles are:

- Community / Environmental
  - The new procedures should not increase the number of people overflown by aircraft participating in the approach.
  - The new procedures should not increase the noise footprint of the existing airport operation, for similar aircraft types and traffic levels, as detailed in the LAeq 16 Hr map in the current Noise Action Plan[18];
  - Implementation should minimise disturbance to the Moors River System Site of Special Scientific Interest (SSSI).
- Regulatory
  - The new approaches shall be standardised by ICAO and acceptable to EASA and CAA and the implementation shall be compliant with all applicable legislation and regulations.
  - The design shall be fully compliant with the design criteria stated in ICAO Doc 8168 (PANS OPS) and be flyable by all aircraft types in approach Speed Categories A through D.
- Operational
  - The approach procedures shall be of a type for which the majority of Bournemouth aircraft operators are equipped and authorised to fly.
  - The designs shall seamlessly integrate with extant instrument approach procedures at Bournemouth International Airport.
  - The procedures should address the needs of flight training operators at Bournemouth.
  - The design shall support continued use of existing radar vectored arrival procedures provided by Solent Radar.
- Economic
  - The new procedures shall be implemented in a cost-effective manner.

Table 4 presents all proposed design principles and the rationale behind the decision to adopt these principles.

[18] https://www.bournemouthairport.com/content/uploads/Attachment-to-Minutes-Noise-Action-Plan-Review-2018.pdf

No	Category	Design Principle	Rationale
1	**Community/ Environmental**	The new procedures should not increase the number of people overflown by aircraft participating in the approach.	The aim of the new procedures is to replicate existing aircraft tracks and to not overfly new areas or population to the maximum extent possible.
2	**Community/ Environmental**	The new procedures should not increase the noise footprint of the existing airport operation, for similar aircraft types and traffic levels, as detailed in the LAeq 16 Hr map in the current Noise Action Plan.	The aim of the new procedures is to replicate existing aircraft tracks and to remain within the existing noise footprint to the maximum extent possible.
3	**Community/ Environmental**	Implementation should minimise disturbance to the Moors River System SSSI.	The aim is to minimize disturbance to the Moors River System SSSI where the current ILS Localizer is located by avoiding replacement of the 08 ILS. Any ILS replacement construction works within would most likely involve significant disruption to local flora and fauna.
4	**Regulatory**	The new approaches shall be standardised by ICAO and acceptable to EASA and CAA and the implementation shall be compliant with all applicable legislation and regulations.	The new procedures are required to be standardized by ICAO and acceptable to EASA and CAA. The implementation shall be compliant with all applicable legislation and regulations.
5	**Regulatory**	The design shall be fully compliant with the design criteria stated in ICAO Doc 8168 (PANS OPS) and be flyable by all aircraft types in approach Speed Categories A through D.	The procedure is required to be designed by a CAA Approved Procedure Design Organization and it will be compliant with PANS – OPS criteria.
6	**Operational**	The approach procedures shall be of a type for which the majority of Bournemouth aircraft operators are equipped and authorized to fly.	The new procedures must be suitable to be flown by the majority of aircraft operators at Bournemouth. The aircraft have to be equipped with appropriate equipment compliant with EASA and CAA regulations.
7	**Operational**	The designs shall seamlessly integrate with extant instrument approach procedures at Bournemouth International Airport.	The aim is to minimize the impact on the current operation at Bournemouth, allowing Bournemouth ATC to interact with aircraft flying the current and new procedures in a common manner.
8	**Operational**	The procedures should address the needs of flight training operators at Bournemouth.	Flight training organizations at Bournemouth Airport perform more movements than commercial operators. Training of commercial pilots is an important business activity for the airport.
9	**Operational**	The design shall support continued use of existing radar vectored arrival procedures provided by Solent Radar.	The aim is to maintain the existing radar vector procedures and do the minimal changes in current Letter of Agreement between Solent Radar (Southampton ATC) and Bournemouth ATC. This will retain current operational procedures at Bournemouth and Solent Radar ATC units, thereby minimizing training requirements.
10	**Economic**	The new procedures shall be implemented in a cost-effective manner.	The aim is to replace the obsolete 08 ILS with new instrument approach procedures which have a positive economic business case. It is necessary to mention that the PBN Implementing Rule

No	Category	Design Principle	Rationale
			(IR) 2018/1048 requires RNP Approaches by January 2024. (If the 08 ILS fails irreparably, the RNP Procedures would be needed by December 2020). Beyond 2030 the IR foresees RNP approaches in preference to ILS CAT I operations.

Table 4: Rationale behind the decision to adopt specified Design Principles

7 Options development

Following successful completion of Gateway 1B, a number of options were identified in a workshop with subject matter experts and procedure designers. The options identified are presented in the following table:

Options	
Option 1	Do Nothing
Option 2	Install new CAT I ILS on Runway 08
Option 3	RNP IAP Missed Approach conventional or RNAV to be confirmed during ACP Stage 3

Table 5: Options identified at Step 2A of CAP 1616 process for both Runway end 08 and 26

7.1 Option 1: Do Nothing

The Runway 08 ILS is obsolete and well beyond its economic lifetime and at some stage it will fail and will be unrepairable, most likely preceded by reduced availability. Without ILS the Runway 08 will:

- Lose 3D precision approach capability (no vertical guidance).
- Have a higher obstacle clearance compared to ILS:
  - ILS obstacle clearance is 200 ft;
  - NDB/DME obstacle clearance is 470 ft;
- Cause higher workload for pilots and ATC.

Runway 08 operations will revert to the existing non-precision 2D NDB procedures, which are less precise, have higher aircraft minima, do not provide vertical guidance, will increase rates for Go-Arounds and diversions, and require aircraft to operate with higher levels of engine thrust and therefore increased engine noise on approach.

This option does not provide resilience to Runway 26 neither does it meet the requirements of PBN Implementing Rule (IR) 2018/1048 for PBN Approaches with Vertical Guidance with 3 lines of minima by January 2024.

7.2 Option 2: Install New CAT I ILS on Runway 08

New ILS CAT I will provide 3D approach capability with vertical guidance to Runway 08. Runway 08 operations and aircraft minima will be the same as currently achieved.

However, this option does not provide resilience to Runway 26 neither does it meet the requirements of PBN Implementing Rule (IR) 2018/1048 for PBN Approaches with Vertical Guidance with 3 lines of minima by January 2024.

PBN IR does not support business case for CAT I ILS beyond 2030, as after 2030 satellite-based approach procedures will be preferred over ILS.

The replacement of the ILS will require a significant civil works within the Moors River System SSSI and there is possibility in loss of service / disruption during installation of the new system. In addition, new ILS will be very expensive to install and maintain, with replacement costs likely to be higher than £1.5m. Annual operating costs, which include

maintenance, power, communications, WT Act licenses, and 6-monthly flight inspections are estimated at over £25,000 per annum.

7.3 Option 3: Implement RNP IAP

This option provides 3D approaches to both Runway 08 and Runway 26 with the following minima:

- LNAV;
- LNAV/VNAV; and
- LPV.

This option is relatively cost-effective with estimated implementation cost circa £100k. There are no annual operating costs as there is no associated physical infrastructure at the airport. Additional costs will be incurred due to the works for ILS decommissioning, including work in the Moors River System SSSI. The localiser decommissioning will be a small fraction of the work, compared to that required to install new ILS Localiser equipment.

This option will also provide increased resilience for Runway 26 in case of ILS failure or during regular maintenance. It is also fully compliant with the requirements of PBN Implementing Rule (IR) 2018/1048 for PBN Approaches with Vertical Guidance with three lines of minima by January 2024.

8 Analysis and impact of options

Each option mentioned in Section 7 was evaluated against the agreed Design Principles described in Section 6, with the results summarised in the following table. This formed part of the Design Principle Evaluation (Gateway 2A), from which a comprehensive list of options were taken forward.

Design Principle	Do Nothing	Replace ILS	RNP APCH
The new procedures should not increase the number of people overflown by aircraft participating in the approach.	NOK	OK	OK
The new procedures should not increase the noise footprint of the existing airport operation, for similar aircraft types and traffic levels, as detailed in the LAeq 16 Hr map in the current Noise Action Plan.	NOK	OK	OK
Implementation should minimise disturbance to the Moors River System SSSI	OK	NOK	OK
The new approaches shall be standardised by ICAO and acceptable to EASA and CAA and the implementation shall be in compliance with all applicable legislation and regulations,	NOK	NOK	OK
The design shall be fully compliant with the design criteria stated in ICAO Doc 8168 (PANS OPS) and be flyable by all aircraft types in approach Speed Categories A through D.	OK	OK	OK
The approach procedures shall be of a type for which the majority of Bournemouth aircraft operators are equipped and authorised to fly.	OK	OK	OK
The designs shall seamlessly integrate with extant instrument approach procedures at Bournemouth International Airport	OK	OK	OK
The procedures should address the needs of flight training operators at Bournemouth.	Partial	Partial	OK
The design shall support continued use of existing radar vectored arrival procedures provided by Solent Radar	OK	OK	OK
The new procedures shall be implemented in a cost-effective manner.	OK	NOK	OK

Table 6: Design principles evaluation against the three options

After evaluation against design principles and engagement with local aeronautical stakeholders, Airport Consultative Committee and selected NATMAC organisations, Options 1 and 2 were discounted in Step 2A and their exclusion was accepted by all stakeholders. Option 3 was retained and expanded to a list of feasible sub-options 3a, 3b and 3c, summarised in Table 7.

Options	
Option 3	RNP IAP Missed Approach conventional or RNAV to be confirmed during ACP Stage 3
a)	Full T-bar comprising Initial, Intermediate and Final Approach Fixes
b)	Limited T-bar with 1 Initial, Intermediate and Final Approach Fixes
c)	Straight-in with combined Initial/Intermediate and Final Approach Fixes

Table 7: List of Options after evaluation against design principles for both Runway 08 and 26

At Step 2B of CAP 1616 process - the Initial Options Appraisal - BIA discounted Option 3a for Runway 26. However, during this step a fourth option 3d (RNP IAP – Limited T-bar with 2 Initial Approach Fixes) was identified following review of the safety considerations.

Runway	Option 3: RNP IAP			
	OPTION 3a Full T-bar	OPTION 3b Limited T-bar: 1 IAF	OPTION 3c 'Straight-in'	OPTION 3d Limited T-bar: 2 IAFs
Runway 26	*Excluded after Initial Options Appraisal*	✓	✓	✓
Runway 08	✓	✓	✓	✓

Table 8: Options remaining after Stage 2 of CAP 1616 process

Following Step 3A Full Options Appraisal, Option 3a for Runway 08 was discounted due to the IAF being outside of controlled airspace. Similarly, Option 3b for both Runway ends was discounted due to limited T-bar with only 1 IAF having limited operational benefits and a potential for shift of noise contours. The following table presents remaining Options after Full Options Appraisal. Options 3c and 3d were taken into the consultation stage.

Runway	Option 3: RNP IAP			
	OPTION 3a Full T-bar	OPTION 3b Limited T-bar: 1 IAF	OPTION 3c 'Straight-in'	OPTION 3d Limited T-bar: 2 IAFs
Runway 26	*Excluded after Initial Options Appraisal*	Excluded due to limited benefits and potential for noise shift	**Retained for consultation**	**Retained for consultation**
Runway 08	Excluded due to IAF outside of controlled airspace	Excluded due to limited benefits and potential for noise shift	**Retained for consultation**	**Retained for consultation**

Table 9: Options remaining after Step 3A Full Options Appraisal

8.1 Options taken into the Consultation stage

Both remaining options are contained horizontally and vertically within airspace[19] under the control of Bournemouth Airport and there is no intention to change aircraft routings to and from Bournemouth airport.

The changes being proposed:

- Do not result in changes of aircraft flows to and from Bournemouth Airport.
- Do not result in an increase in movements over what is already within the agreed Bournemouth masterplan.

[19] The Bournemouth Airspace is formally the Bournemouth Control Zone (or Controlled Traffic Region CTR) and Bournemouth Control Area (CTA).

- Only impact aircraft arrivals.
- Do not result in aircraft arriving at lower altitudes.
- Do not make any changes to visual training flights that represent vast majority of flights at Bournemouth Airport.

The locations of the Intermediate and Final Approach Fixes in both sub-options are the same and define approach paths that are identical to the paths defined by the existing Instrument Landing Systems. Therefore, an observer on the ground would not be expected to be able to detect the difference in aircraft tracks along the final approach and intermediate approach segments for either RNP sub-option, compared to the existing ILS approach.

Due to the increased flexibility of sub-option 3d to support all of Bournemouth's aviation stakeholders' needs, specifically training and arrivals out of hours, this sub-option is the preferred solution.

8.2 Consultation results

During the consultation, the following options were presented to participants for each runway direction (i.e. 08 and 26):

- Do not support either proposal.
- Support Sub-Option 3c – Straight-in Approach with Combined Initial and Intermediate Fixes.
- Support Sub-Option 3d – Limited T-bar with two Initial Approach Fixes.
- No preference.

8.2.1 Analysis of responses by preferred option for Runway 08

Of the 33 received responses, 61% (20) gave their support to "Sub-Option 3d", 33% (11) had no preferred option ("No preference") and 6% (2) of respondents selected "Do not support either proposal". No respondents expressed their support for "Sub-Option 3c".

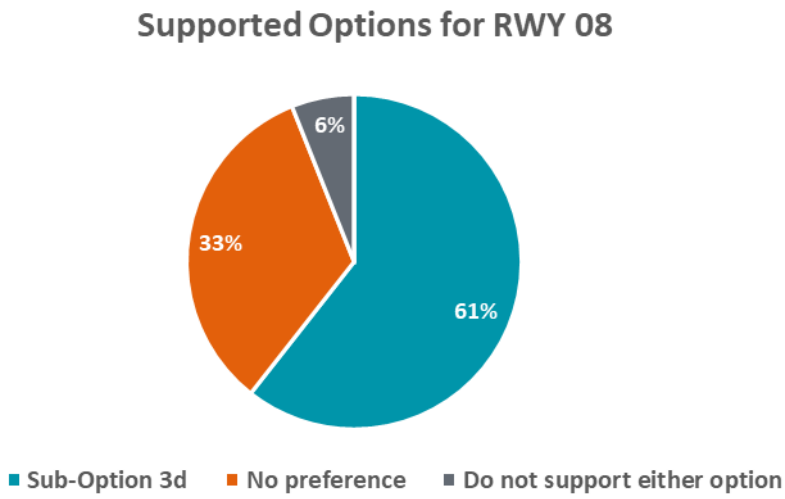


Figure 14: Supported options for Runway 08

8.2.2 Analysis of responses by preferred Option for Runway 26

Of the 33 received responses, 61% (20) gave their support to “Sub-Option 3d”, 36% (12) had no preferred option (“No preference”), whilst 3% (1) of respondents selected “Do not support either proposal”. Similarly, as for Runway 08, there were no responses that supported “Sub-Option 3c” for Runway 26.

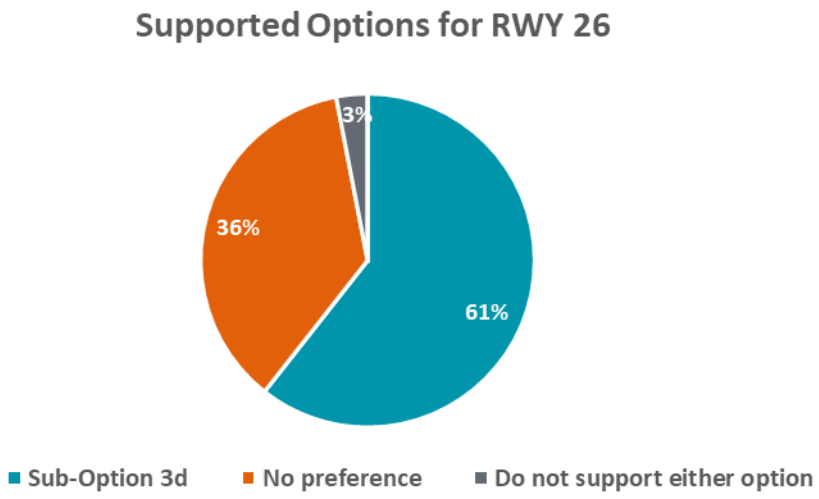


Figure 15: Supported options for Runway 26

The analysis of all consultation responses showed a clear preference for sub-option 3d for both runways with no one expressing a preference for 3c.

9 Airspace description requirements

According to CAP1616, the change sponsor must complete all relevant airspace description in the formal ACP submission document. The following table provides a summary of this description, and cross-references to other parts of this document where applicable, following the template suggested by CAA.

	The proposal should provide a full description of the proposed change including the following:	Description for this proposal
a	The type of route or structure; for example, airway, UAR, Conditional Route, Advisory Route, CTR, SIDs/STARs, holding patterns, etc.	RNP Instrument Approach Procedures to runways 08 and 26 with LNAV, LNAV/VNAV and LPV Lines of Minima. See Section 2.2.
b	The hours of operation of the airspace and any seasonal variations.	Normal hours of operation of Bournemouth Airport are 06:30 – 21:30, outside of these hours aircraft operations are permitted by prior arrangement.
c	Interaction with domestic and international en-route structures, TMAs or CTAs with an explanation of how connectivity is to be achieved. Connectivity to aerodromes not connected to CAS should be covered	The proposal is more about business continuity and regulatory compliance than the enhancement of connectivity. The existing networks as supported by Bournemouth Airport are described in Section 2.2.
d	Airspace buffer requirements (if any). Where applicable describe how the CAA policy statement on 'Special Use Airspace – Safety Buffer Policy for Airspace Design Purposes' has been applied.	Not applicable. There is no proposal to change any of the airspace classifications or sizes. All proposals are designed to fit within the existing airspace
e	Supporting information on traffic data including statistics and forecasts for the various categories of aircraft movements (passenger, freight, test and training, aero club, other) and terminal passenger numbers.	Details addressing these elements are presented in Section 2.1.
f	Analysis of the impact of the traffic mix on complexity and workload of operations	Details addressing these elements are presented in Section 2.2 and 2.6.
g	Evidence of relevant draft Letters of Agreement, including any arising out of consultation and/or airspace management requirements	A copy of the existing Letter of Agreement is provided in Annex A to this proposal.

h	Evidence that the airspace design is compliant with ICAO Standards and Recommended Practices (SARPs) and any other UK policy or filed differences, and UK policy on the Flexible Use of Airspace (or evidence of mitigation where it is not)	Full details on the Instrument Approach Procedure designs for Runway 08 and Runway 26 are provided in Annex B and Annex C respectively
i	The proposed airspace classification with justification for that classification	There is no change to current airspace classification.
j	Demonstration of commitment to provide airspace users equitable access to the airspace as per the classification and where necessary indicate resources to be applied or a commitment to provide them in line with forecast traffic growth. 'Management by exclusion' would not be acceptable	Bournemouth Airport provides equitable access to its airspace to all types of operators and this airspace change proposal is fully in line with the current situation. See also Section 2.4.
k	Details of and justification for any delegation of ATS	No change is proposed to any delegation of ATS as detailed in the current Letter of Agreement between NATS Southampton ATSU & Bournemouth ATSU.

10 Safety assessment

The safety assessment was conducted for the proposed option Sub-Option 3d: Limited T Bar with 2 Initial Approach Fixes, which was taken forward after detailed and careful consideration **as the proposed option for formal ACP submission to CAA**.

A hazard Identification (HAZID) workshop was held at Bournemouth where the following subject matter experts (SMEs) attended: BIA operations staff; BIA ATCOs; flight procedure, airport, safety and operational experts from Helios; and the airspace change project team.

The main aim of the safety assessment was to identify safety hazards and assess associated risks of any operational changes. Given that RNAV approaches at Bournemouth Airport have not yet been implemented, the approach has been to establish the operational concept, the associated operational hazards, how the associated risks can be mitigated and the effect of those mitigations on the overall operational risk.

The safety assessment has shown that the Safety Requirements identified in the Safety Case ensure that RNAV approaches at Bournemouth Airport are acceptably safe and that risks have been mitigated to be As Low As Reasonably Practicable (ALARP). The full Safety Assessment is available in Annex E to this proposal.

11 Operational impact

Operational impact assessment is summarised in the following table.

	The proposal should provide a full description of the proposed change including the following:	Description for this proposal
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area.	This is expected to be positive as described in Sections 5.2.3 and 5.2.4 of this proposal. Full details are expanded on in the Consultation Document material (Annex D) and the Final Options Appraisal (Annex G).
b	Impact on VFR operations (including VFR routes where applicable);	There is not expected to be any impact on VFR operations as the change impacts only IFR operations.
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds	The proposal is intended to enable seamless integration with the existing approach procedures. See Appendix A for illustrations.
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace	No specific impacts are anticipated. The proposed change takes into account known changes already proposed at Southampton.
e	Any flight planning restrictions and/or route requirements	To ensure consistency with today's operations and avoid unnecessary changes in flight tracks, training flights will be restricted to joins from the North. For more information see Safety Recommendation SR02 in Annex E (Safety Assessment).

12 Supporting infrastructure and resources

The following table summarises how requirements related to supporting infrastructure and resources were addressed by the change sponsor.

	General requirements	Evidence of compliance / proposed mitigation
a	Evidence to support RNAV and conventional navigation as appropriate with details of planned availability and contingency procedures	The likelihood of the Loss of GNSS availability is considered improbable, as the CAAs Integrity Reports detail robust requirements. The severity of this loss of continuity is considered negligible as the loss of availability will be flagged to the pilot as they will be unable to commence the approach. In case of GNSS unavailability, the aircraft executes a non-GNSS approach (ILS or NDB). For more information see Annex E to this proposal (Safety Assessment).
b	Evidence to support primary and secondary surveillance radar (SSR) with details of planned availability and contingency procedures	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged.
c	Evidence of communications infrastructure including R/T coverage, with availability and contingency procedures	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged.
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered	The implementation of PBN approach procedures places a dependency on GNSS. The technical and operational risks of this are addressed in detail in

		Annex E to this proposal. (Safety Assessment).
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out including details of navigation aid coverage, unit personnel levels, separation standards and the design of the airspace in respect of existing international standards or guidance material	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged and the proposed IFP implementation is in accordance with ICAO PANS-OPS and CAA guidelines, see Annexes B and C to this proposal.
f	A clear statement on SSR code assignment requirements	No Change to existing SSR code assignments.
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged.

13 Airspace and infrastructure requirements

The following table summarises how requirements related to airspace and infrastructure were addressed by the change sponsor.

	General requirements	Evidence of compliance/ proposed mitigation
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments.	The newly designed Instrument Approach Procedures imitate existing traffic patterns and stay within the current controlled airspace namely, the Bournemouth CTR or elements of the Solent CTA as delegated under the LoA – see Annex A to this proposal.
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer. This safety buffer shall be in accordance with agreed parameters as set down in CAA policy statement 'Safety Buffer Policy for Airspace Design Purposes Segregated Airspace'. Describe how the safety buffer is applied, show how the safety buffer is portrayed to the relevant parties, and provide the required agreements between the relevant ANSPs/ airspace users detailing procedures on how the airspace will be used. This may be in the form of Letters of Agreement with the appropriate level of diagrammatic explanatory detail.	Not applicable to this airspace change proposal.
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures.	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged. Full details are provided in Annex E to this proposal (Safety Assessment).

d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures.	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services or arrangements as agreed under the existing LoA (see Annex A) are envisaged. Changes to procedures necessary to enable the RNP Approach, are captured as safety requirements within the Safety Assessment – see Annex E
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable.	There is no change to airspace classification and therefore ability to access Bournemouth CTR for different types of airspace users will not be affected.
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation.	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services or airspace classification are proposed. Monitoring or airspace infringements and alerting will continue as today.
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified.	Loss of GNSS continuity, integrity and/or availability is notified to the pilot by FMS / GNSS equipment on board. As per flight planning requirements, assessments of RAIM holes is to be undertaken by flight crew and predicted or planned outages of the LPV procedures will be noted by NOTAM.

		Details are described in Annex A to this proposal (Safety Assessment).
h	The notification of the implementation of new airspace structures or withdrawal of redundant airspace structures shall be adequate to allow interested parties sufficient time to comply with user requirements. This is normally done through the AIRAC cycle.	No new airspace structures or withdrawal of existing airspace structures is needed. New IAPs will be notified via the usual AIRAC cycle.
i	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace.	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are proposed.
J	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered.	The option proposed avoids any conflicts with the adjacent Southampton CTR. Following consultation, no change is deemed required to the existing LoA between NATS Southampton ATSU & Bournemouth ATSU.
K	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests.	No other aviation activities, that would potentially conflict with the new proposed IAPs, where identified. Several GA organisations where consulted during the process, including the Microlight site at Newton Peveril (08 initial approach below western CTA overhang) and expressed their support for sub-option 3d during the public consultation.

	ATS route requirements	**Evidence of compliance/ proposed mitigation**

a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/Eurocontrol standards.	Not applicable. This proposal has no impact on the ATS route structure being limited in scope to the Bournemouth CTR or delegated airspace as defined in the LoA – see Annex A.
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task.	Not applicable. This proposal has no impact on the ATS route structure being limited in scope to the Bournemouth CTR or delegated airspace as defined in the LoA – see Annex A.
c	All new routes should be designed to accommodate P-RNAV navigational requirements.	Not applicable. This proposal has no impact on the ATS route structure being limited in scope to the Bournemouth CTR or delegated airspace as defined in the LoA – see Annex A.

	Terminal Airspace requirements	**Evidence of compliance/ proposed mitigation**
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas.	The proposed changes are fully contained within the Bournemouth CTR or airspace as delegated under the existing LoA. Further details are provided in Appendix A.
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs).	Arrival routes to Bournemouth Airport are not defined by fixed ATS routes but are radar vectored by BIA ACS ATCO to an IAF. For out of Bournemouth Radar hours arrivals, aircraft can self-

	Terminal Airspace requirements	Evidence of compliance/ proposed mitigation
		position for the instrument flight procedure to both runways using an IAF.
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure.	Not applicable. The proposed changes impact only the approach phase of flight and are fully contained within the Bournemouth CTR or airspace as delegated under the existing LoA. Further details are provided in Appendix A.
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace.	The IAPs have designed in full compliance with ICAO Doc 8168 (PANS-OPS) and CAA guidelines using an aerodrome and obstacle data from a survey in accordance with CAP 1732. Full details are provided in Annexes B and C to this proposal (IFP Reports).
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist).	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged. The proposed changes impact only the approach phase of flight and are fully contained within the Bournemouth CTR or airspace as delegated under the existing LoA. An operational limitation has been placed on training flights to only utilise the northern IAPs to maintain traffic patterns as today.

	Terminal Airspace requirements	Evidence of compliance/ proposed mitigation
		The mix of CAT and GA under this arrangement exists today based on the ILS and is therefore deemed of minimal impact. See SR02 in Annex E to this proposal (Safety Assessment).
f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged.
g	There shall be suitable availability of radar control facilities	The proposed change is already in controlled airspace and subject to radar control and vectoring. No changes to the ATS services are envisaged.
h	The change sponsor shall, upon implementation of any airspace change, devise the means of gathering (if these do not already exist) and of maintaining statistics on the number of aircraft transiting the airspace in question. Similarly, the change sponsor shall maintain records on the numbers of aircraft refused permission to transit the airspace in question, and the reasons why. The change sponsor should note that such records would enable ATS managers to plan staffing requirements necessary to effectively manage the airspace under their control	The proposed change is already in controlled airspace and subject to radar control and vectoring. Statistics on airspace utilisation are already undertaken by BIA but will be reviewed on implementation of the airspace change.
i	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure.	The airspace available for BIA is limited, and a CDA from outside BIA airspace to join the proposed change is not currently possible. The proposed IAPs have however been designed to facilitate CDA profile within the airspace constraints.

	Terminal Airspace requirements	Evidence of compliance/ proposed mitigation
		See Annexes C and D to this proposal (IFP Reports).

	Off-route airspace requirements	Evidence of compliance/ proposed mitigation
a	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered.	No change is required to the existing Letter of Agreement between NATS Southampton ATSU & Bournemouth ATSU..
b	Should there be any other aviation activity (military low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests.	No other aviation activities, that would potentially conflict with new proposed IAPs, where identified. Several GA organisations where consulted during the process including the Microlight site at Newton Peveril (08 initial approach below western CTA overhang) and expressed their support for sub-option 3d during the public consultation.

14 Environmental requirements

The following table summarises how environmental requirements were addressed by the change sponsor.

	Theme	Content	Evidence of compliance/ proposed mitigation
a	WebTAG analysis	Output and conclusions of the analysis (if not already provided elsewhere in the proposal)	Full details of the WebTAG analysis are presented in Appendix B. The analysis shows that there is a net positive contribution of the proposed change.
b	Assessment of noise impacts (Level 1/M1 proposals only)	Consideration of noise impacts, and where appropriate the related qualitative and/or quantitative analysis, including whether the anticipated noise impact meets the criteria for a proposal to be called-in by the Secretary of State (paragraph 5(c) of Direction 6 of the Air Navigation Directions 2017) If the change sponsor expects that there will be no noise impacts, the rationale must be explained	See Appendix B.1 for full details. There is not expected to be any increase in noise as a result of the proposed change. Some concentration in tracks is expected. However, given the modelling undertaken, the track concentration is outside of the noise contours which are dominated by the final approach track which is not changing under this proposal. See also Figure 12 and Figure 13.
c	Assessment of CO2 emissions	Consideration of the impacts on CO2 emissions, and where appropriate the related qualitative and/or quantitative analysis. If the change sponsor expects that there will be no impact on CO2 emissions impacts, the rationale must be explained	See Appendix B.2 for full details. The analysis shows that there is a net positive contribution in reduced CO2 as a result of the proposed change.

	Theme	Content	Evidence of compliance/ proposed mitigation
d	Assessment of local air quality (Level 1/M1 proposals only)	Consideration of the impacts on local air quality, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no impact on local air quality, the rationale must be explained	DfT's TAG UNIT A5.2 Aviation Appraisal states the following with respect to Air Quality impacts: *"Any appraisal of aviation schemes ought to take into account the impacts on local and regional air quality where these impacts are likely to be significant, such as for a major airport development"*. In addition, CAP1616, Appendix B (Environmental metrics and assessment requirements), paragraph B74 states: *"Due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet (amsl) are unlikely to have a significant impact on local air quality. Therefore, the impact of airspace design on local air quality is generally negligible compared with other factors such as changes in the volume of air traffic, and local transport infrastructures feeding the airport."* In our view this airspace change will therefore not generate

	Theme	Content	Evidence of compliance/ proposed mitigation
			'significant' change in Air Quality as it does not impact emissions from aircraft below 1,000 feet, and therefore we have decided to provide a high-level and qualitative assessment only. The proposed approach will have significantly lower minima than the NDB approaches on Runway 08. Under normal operations, when arrivals are vectored by ATC at Solent Radar to the final approach, it is expected there will be no change to air quality due to trajectories and heights being identical. During out of hours operations, the proposed approach will result in fewer track miles, compared to the ILS or NDB approaches today, which will result in reduced fuel burn, lower emissions and improved air quality. Following the implementation of the proposed approach at Bournemouth there may be reduced

	Theme	Content	Evidence of compliance/ proposed mitigation
			transit flying by training organisations based at Bournemouth to conduct RNP approach training elsewhere - currently Exeter, Cardiff, Bristol and the Channel Islands have RNP approaches. This will result in minor reductions in fuel burn, CO2 emissions.
e	Assessment of impacts upon tranquillity (Level 1/M1 proposals only)	Consideration of any impact upon tranquillity, notably on Areas of Outstanding Natural Beauty or National Parks, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no tranquillity impacts, the rationale must be explained	The proposed implementation of Option 3d at BIA will not change the operational concept for air traffic operations or control at the airport. The vast majority of operations will be vectored by ATC in accordance with existing practice, and at similar altitudes. The utilisation of the Option 3d approach will facilitate a more direct approach for aircraft flying the procedure from either the north or south (depending on IAF orientation) – especially out of hours – with reduced track miles compared to the existing procedures if optimised for southerly approaches. No change is anticipated for those

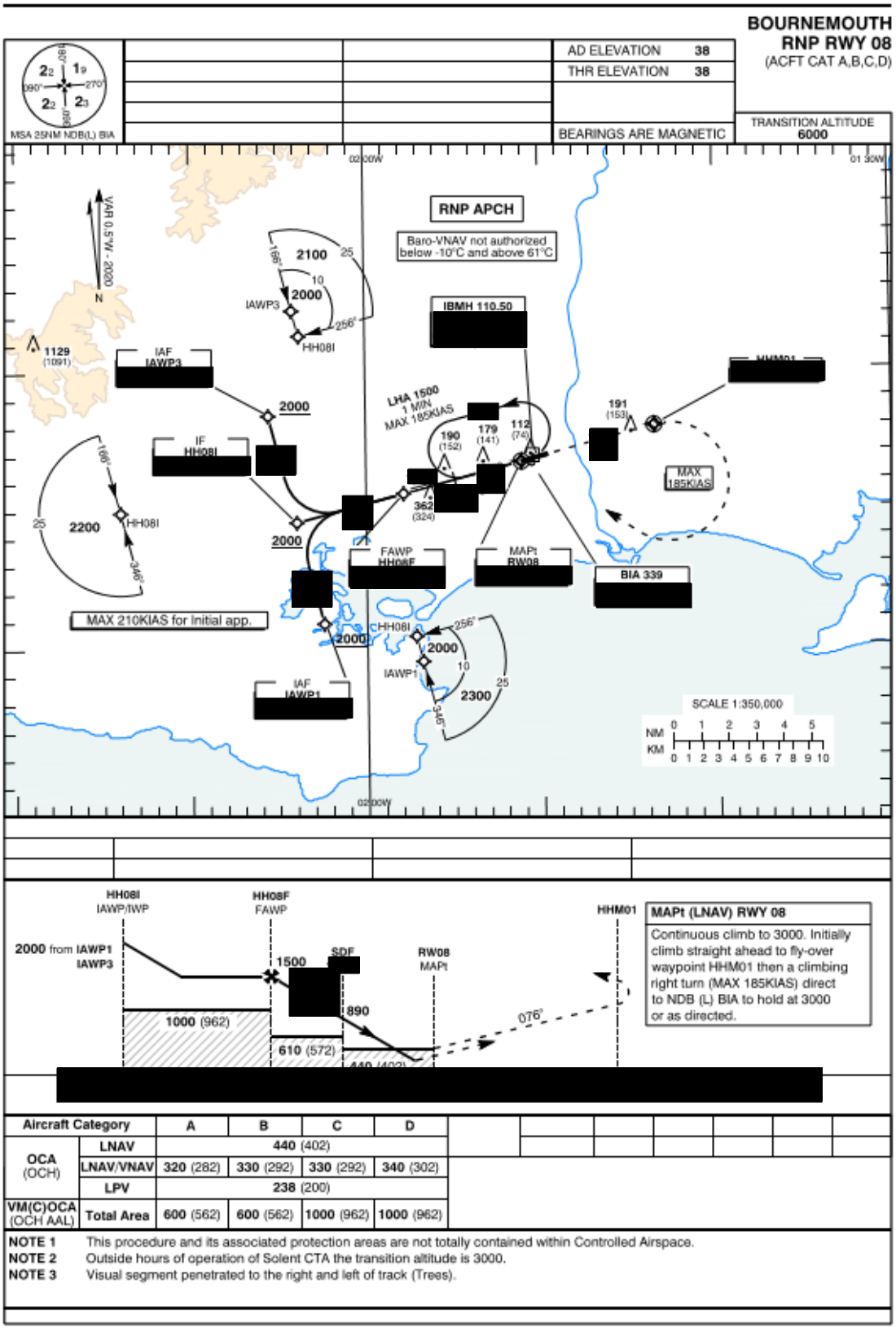
	Theme	Content	Evidence of compliance/ proposed mitigation
			joining straight in via the combined IF/IAF. Of the other traffic at BIA approximately 50% of movements are visual flight rules (VFR) traffic which would not be flying the procedure and are typically lower than other traffic. Thus, it is estimated that the introduction of sub-Option 3d will result in a slight improvement to no change in the levels of tranquillity. It is noted that the change of this option will be the rerouting of aircraft arriving from the east that would have flown the published procedure overhead the aerodrome, to joining via the IAF. Analysis of the traffic arriving over 2017 and 2018 showed that approximately 3% of instrument flight operations (including training) flew the published instrument approach procedure. This means that 97% of traffic continues to overfly the county parishes indicated in the consultation document (see Annex F) under today's operations.

	Theme	Content	Evidence of compliance/ proposed mitigation
			Given that the proposed routings will therefore not change the existing fleet of aircraft, frequency and altitudes at which aircraft are arriving to Runway 08, it is estimated that there will be no change in the levels of tranquillity and no quantitative assessment needed.
f	Operational diagrams	Any operational diagrams that have been used in the consultation to illustrate and aid understanding of environmental impacts must be provided	See Consultation document Annex D and slides prepared for Drop-In sessions during the consultation – Annex H.
g	Traffic forecasts	10-year traffic forecasts, from the anticipated date of implementation, must be provided (if not already provided elsewhere in the proposal)	Estimates on the traffic increase have been described in the Consultation Document (Annex D). The airport is proposing a return to 2008 traffic levels which were
h	Summary of environmental impacts and conclusions	A summary of all of the environmental impacts detailed above plus the change sponsor's conclusions on those impacts	This is detailed in Annex G to this proposal (Final Options Appraisal).

A Aeronautical Information Publication

A.1 Runway 08

A.1.1 Chart



Aircraft Category		A	B	C	D
OCA (OCH)	LNAV	440 (402)			
	LNAV/VNAV	320 (282)	330 (292)	330 (292)	340 (302)
	LPV	238 (200)			
VM(C)OCA (OCH AAL)	Total Area	600 (562)	600 (562)	1000 (962)	1000 (962)

NOTE 1 This procedure and its associated protection areas are not totally contained within Controlled Airspace.
NOTE 2 Outside hours of operation of Solent CTA the transition altitude is 3000.
NOTE 3 Visual segment penetrated to the right and left of track (Trees).

A.1.2 Coding Tables[20]

Serial # / Procedure designator	Navigational performance	Path descriptor	Waypoint identifier	Waypoint coordinates	Fly-Over	True track [°] / Magnetic track [°]	Distance [nm]	Turn direction	Upper limit [ft] / Lower limit [ft]	Speed [kts]	VPA [°] / TCH [ft]	Remarks
1 / R08R	RNP APCH	IF	IAWP1									
2 / R08R	RNP APCH	TF	HH08I									
3 / R08R	RNP APCH	TF	HH08F									
4 / R08R	RNP APCH	TF	RW08									
5 / R08R	RNP APCH	CF	HHM01									
6 / R08R	RNP APCH	DF	BIA									

Serial # / Procedure designator	Navigational performance	Path descriptor	Waypoint identifier	Waypoint coordinates	Fly-Over	True track [°] / Magnetic track [°]	Distance [nm]	Turn direction	Upper limit [ft] / Lower limit [ft]	Speed [kts]	VPA [°] / TCH [ft]	Remarks
1 / R08C	RNP APCH	IF	HH08I									
2 / R08C	RNP APCH	TF	HH08F									
3 / R08C	RNP APCH	TF	RW08									
4 / R08C	RNP APCH	CF	HHM01									
5 / R08C	RNP APCH	DF	BIA									

Serial # / Procedure designator	Navigational performance	Path descriptor	Waypoint identifier	Waypoint coordinates	Fly-Over	True track [°] / Magnetic track [°]	Distance [nm]	Turn direction	Upper limit [ft] / Lower limit [ft]	Speed [kts]	VPA [°] / TCH [ft]	Remarks
1 / R08L	RNP APCH	IF	IAWP3									
2 / R08L	RNP APCH	TF	HH08I									
3 / R08L	RNP APCH	TF	HH08F									
4 / R08L	RNP APCH	TF	RW08									
5 / R08L	RNP APCH	CF	HHM01									
6 / R08L	RNP APCH	DF	BIA									

Hold Identification:

Holding Fix	Latitude / Longitude	Inbound True Track (degrees)	Inbound Mag Track (degrees)	Maximum Indicated Airspeed (kts)	Minimum Holding Altitude/ Level (FL/ft)	Maximum Holding Altitude/ Level (FL/ft)	Outbound time / distance (min / nm)	Direction of Turn
BIA								

[20] Proposed 5-letter name codes (5LNCs) have been submitted to the CAA PANS-OPS inspector for the IAFs and combined IF/IAF

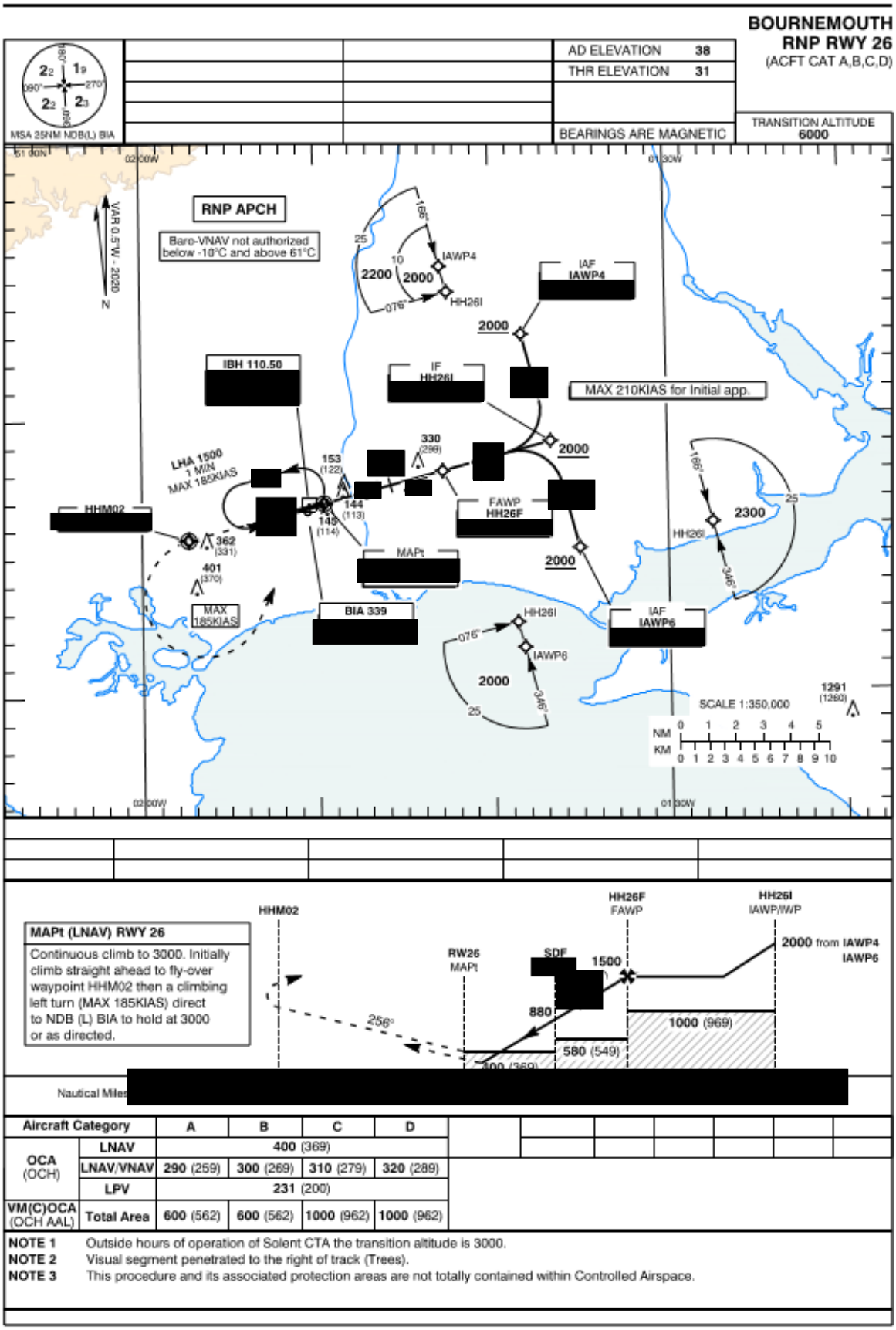
A.1.3 FAS Datablock inputs[21]

Input Data	[redacted]
Operation Type	
Service Provider	
Airport Identifier	
Runway	
Runway Direction	
Approach Performance Designator	
Route Indicator	
Reference Path Data Selector	
Reference Path Identifier	
LTP / FTP Latitude	
LTP / FTP Longitude	
LTP / FTP Ellipsoidal Height	
FPAP Latitude	
Delta FPAP Latitude	
FPAP Longitude	
Delta FPAP Longitude	
Threshold Crossing Height	
Glidepath Angle	
Course Width	
Length Offset	
HAL	
VAL	
Output Data	
Data Block	
Calculated CRC Value	
Required Additional Data	
ICAO Code	
LTP/FTP Orthometric Height	

[21] The VAL is to be set at 35 m as per the EGNOS SDD subject to confirmation from CAA PANS-OPS.

A.2 Runway 26

A.2.1 Chart



Aircraft Category		A	B	C	D
OCA (OCH)	LNAV	400 (369)			
	LNAV/VNAV	290 (259)	300 (269)	310 (279)	320 (289)
	LPV	231 (200)			
VM(C)OCA (OCH AAL)	Total Area	600 (562)	600 (562)	1000 (962)	1000 (962)

NOTE 1 Outside hours of operation of Solent CTA the transition altitude is 3000.
NOTE 2 Visual segment penetrated to the right of track (Trees).
NOTE 3 This procedure and its associated protection areas are not totally contained within Controlled Airspace.

A.2.2 Coding Tables[22]

Serial # / Procedure designator	Navigational performance	Path descriptor	Waypoint identifier	Waypoint coordinates	Fly-Over	True track [°] / Magnetic track [°]	Distance [nm]	Turn direction	Upper limit [ft] / Lower limit [ft]	Speed [kts]	VPA [°] / TCH [ft]	Remarks
1 / R26R	RNP APCH	IF	IAWP4									
2 / R26R	RNP APCH	TF	HH26I									
3 / R26R	RNP APCH	TF	HH26F									
4 / R26R	RNP APCH	TF	RW26									
5 / R26R	RNP APCH	CF	HHM02									
6 / R26R	RNP APCH	DF	BIA									

Serial # / Procedure designator	Navigational performance	Path descriptor	Waypoint identifier	Waypoint coordinates	Fly-Over	True track [°] / Magnetic track [°]	Distance [nm]	Turn direction	Upper limit [ft] / Lower limit [ft]	Speed [kts]	VPA [°] / TCH [ft]	Remarks
1 / R26C	RNP APCH	IF	HH26I									
2 / R26C	RNP APCH	TF	HH26F									
3 / R26C	RNP APCH	TF	RW26									
4 / R26C	RNP APCH	CF	HHM02									
5 / R26C	RNP APCH	DF	BIA									

Serial # / Procedure designator	Navigational performance	Path descriptor	Waypoint identifier	Waypoint coordinates	Fly-Over	True track [°] / Magnetic track [°]	Distance [nm]	Turn direction	Upper limit [ft] / Lower limit [ft]	Speed [kts]	VPA [°] / TCH [ft]	Remarks
1 / R26L	RNP APCH	IF	IAWP6									
2 / R26L	RNP APCH	TF	HH26I									
3 / R26L	RNP APCH	TF	HH26F									
4 / R26L	RNP APCH	TF	RW26									
5 / R26L	RNP APCH	CF	HHM02									
6 / R26L	RNP APCH	DF	BIA									

Hold Identification:

Holding Fix	Latitude / Longitude	Inbound True Track (degrees)	Inbound Mag Track (degrees)	Maximum Indicated Airspeed (kts)	Minimum Holding Altitude/ Level (FL/ft)	Maximum Holding Altitude/ Level (FL/ft)	Outbound time / distance (min / nm)	Direction of Turn
BIA								

[22] Proposed 5-letter name codes (5LNCs) have been submitted to the CAA PANS-OPS inspector for the IAFs and combined IF/IAF

A.2.3 FAS Datablock inputs[23]

Input Data	[redacted]
Operation Type	
Service Provider	
Airport Identifier	
Runway	
Runway Direction	
Approach Performance Designator	
Route Indicator	
Reference Path Data Selector	
Reference Path Identifier	
LTP / FTP Latitude	
LTP / FTP Longitude	
LTP / FTP Ellipsoidal Height	
FPAP Latitude	
Delta FPAP Latitude	
FPAP Longitude	
Delta FPAP Longitude	
Threshold Crossing Height	
Glidepath Angle	
Course Width	
Length Offset	
HAL	
VAL	
Output Data	
Data Block	
Calculated CRC Value	
Required Additional Data	
ICAO Code	
LTP/FTP Orthometric Height	

[23] The VAL is to be set at 35 m as per the EGNOS SDD subject to confirmation from CAA PANS-OPS.

B WebTAG analysis

B.1 Sub-Option 3d: WebTAG noise workbook results and conclusion

Noise Workbook - Worksheet 1

Proposal Name: BOH: Instrument Approach Procedure

Present Value Base Year	2010
Current Year	2019
Proposal Opening year:	2020
Project (Road, Rail or Aviation):	aviation

Net present value of change in noise (£):	£0

*positive value reflects a **net benefit** (i.e. a reduction in noise)

Net present value of impact on sleep disturbance (£):	£0
Net present value of impact on amenity (£):	£0
Net present value of impact on AMI (£):	£0
Net present value of impact on stroke (£):	£0
Net present value of impact on dementia (£):	£0

Quantitative results

Households experiencing increased daytime noise in forecast year:	0
Households experiencing reduced daytime noise in forecast year:	0
Households experiencing increased night time noise in forecast year:	0
Households experiencing reduced night time noise in forecast year:	0

Qualitative Comments:

Data Sources:

Figure 16: Sub-Option 3d WebTAG noise workbook results

Conclusion

Under normal operations where arrivals continue to be radar vectored to the approach, there is likely to be some concentration of flight tracks around the initial approach fixes compared to the ILS of today for both runways.

Runway 08

For direct arrivals from the west, there will be no change compared to today. For arrivals from the North, East and South vectored via the IAF, there is likely to be a merge of tracks concentrated over the Dorset AONB, Cranborne Chase AONB and the county parishes of Sturminster Marshall, Shapwick, Pamphill in the North and Arne, Corfe Castle, Wareham St. Martin, Lytchett Minster and Upton in the South. This traffic pattern will continue out of hours with aircraft routing direct to the IAF as opposed to self-positioning today.

Runway 26

The majority of arrivals are from the South and East. Arrivals from the West are predominantly vectored to join either from the North or South. This places all arrival traffic over the New Forest National Park. Arrivals from the East are expected to be unaffected by the change. North bound joins would expect to lead to some concentration over the county parishes of Ellingham, Harbridge and Ibsley and Minstead. Southern joins would expect to lead to some concentration over Milford-on-Sea, Hordle, Lymington and Pennington and Sway. There is potentially some change over Brockenhurst as a result of straight-in traffic direct to the IF/IAF.

The precise guidance of the RNP approach will enable improved track keeping compared to an NDB approach, and therefore will maintain the noise footprint within the existing bounds. The RNP approach will have lower minima than the NDB approaches and so it would be expected that the RNP approach would also result in a net decrease in missed approaches or diversions, thus, lower levels of climb out noise following a missed approach.

Use of the southerly IAF by training aircraft would result in a change in overflights for neighbourhoods south of the runway. Because of that, the use of IAF will be excluded for training flights, as it would result in a change in airport operations.

The LAeq 16hr and 8hr contours have been calculated, as well as longer-term noise impact, and they are presented on the following pictures.

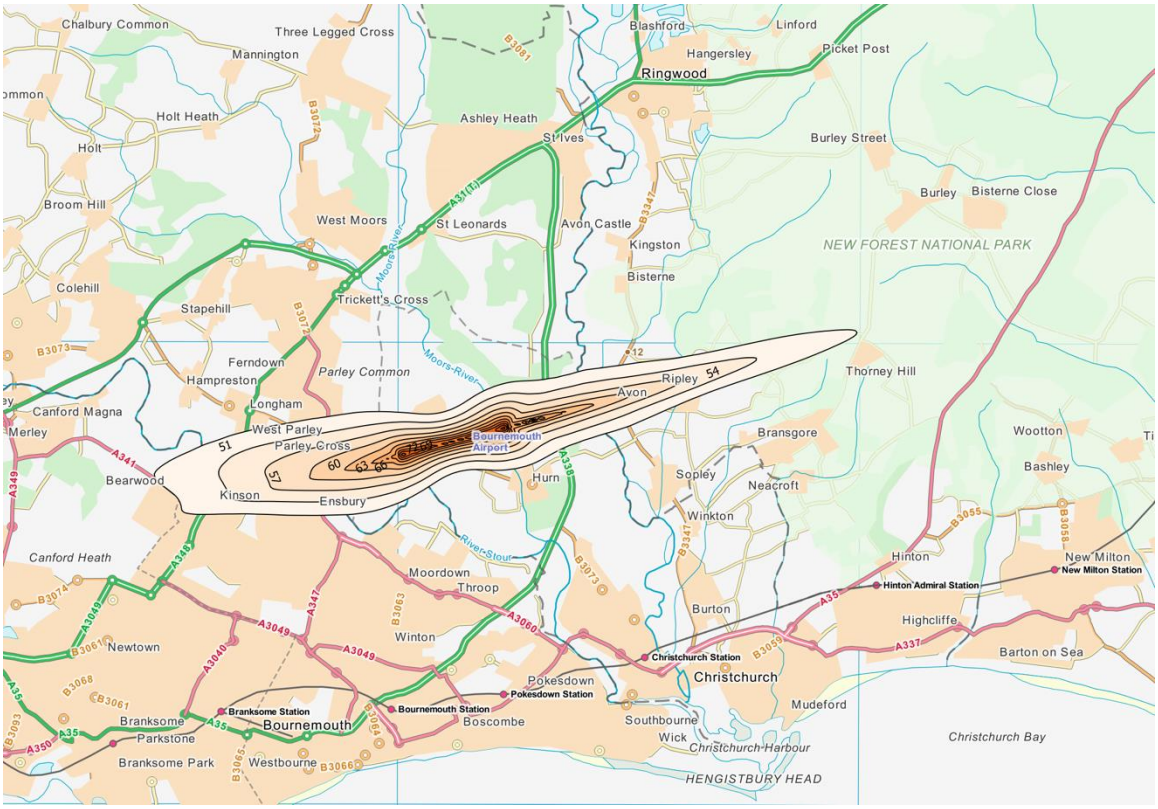


Figure 17: Noise contours: Day Nominal 16 hours LAeq

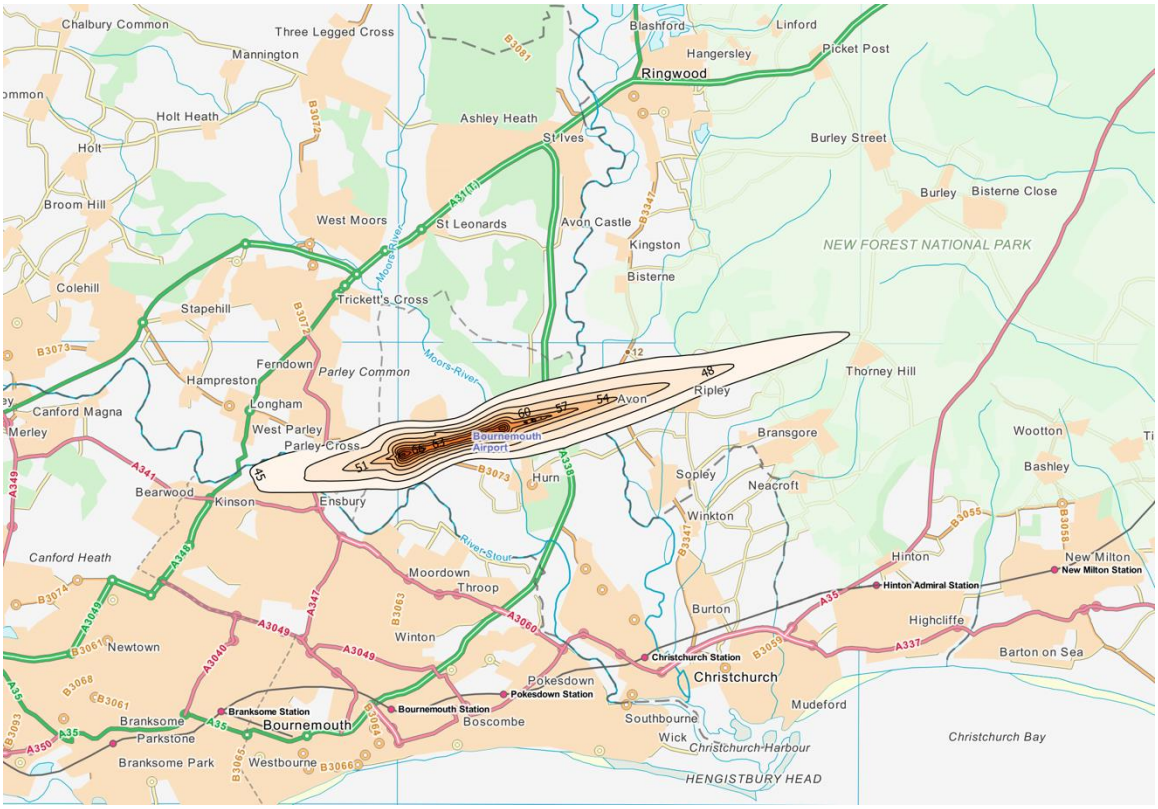


Figure 18: Noise contours: Night Nominal 8 hours LAeq

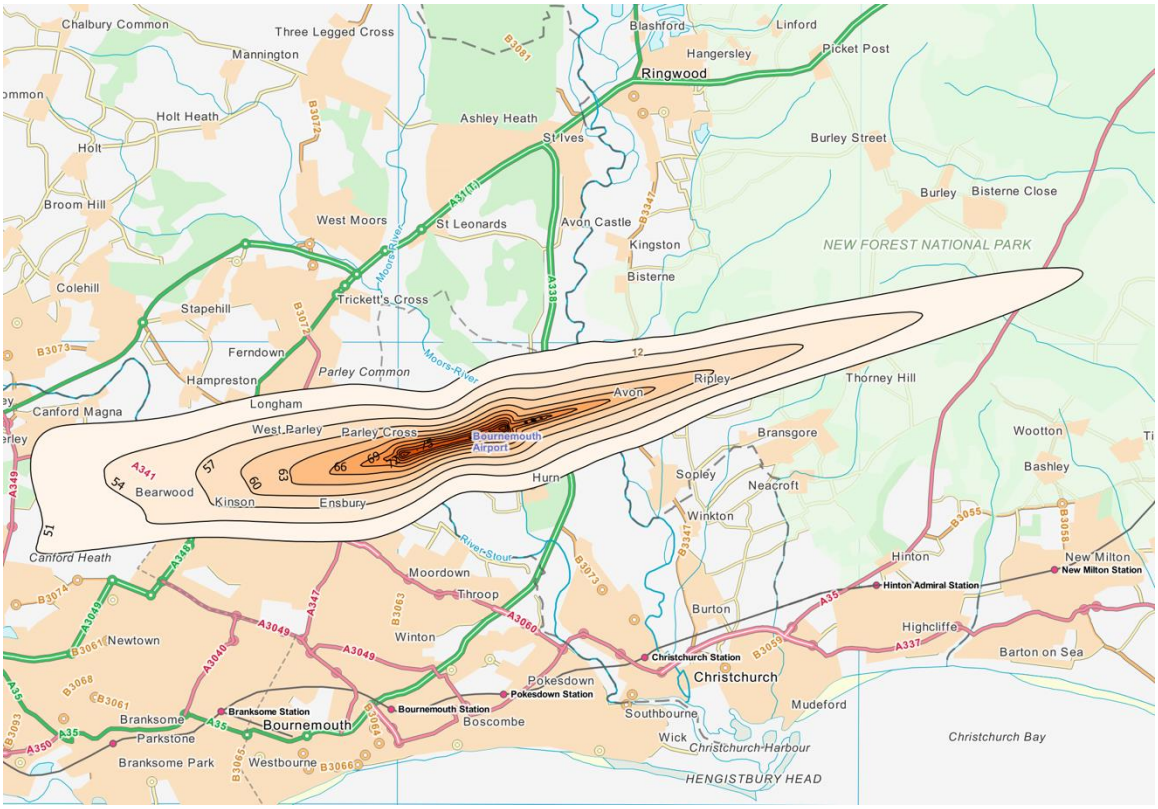


Figure 19: Noise contours: Day Forecast 16 hours LAeq

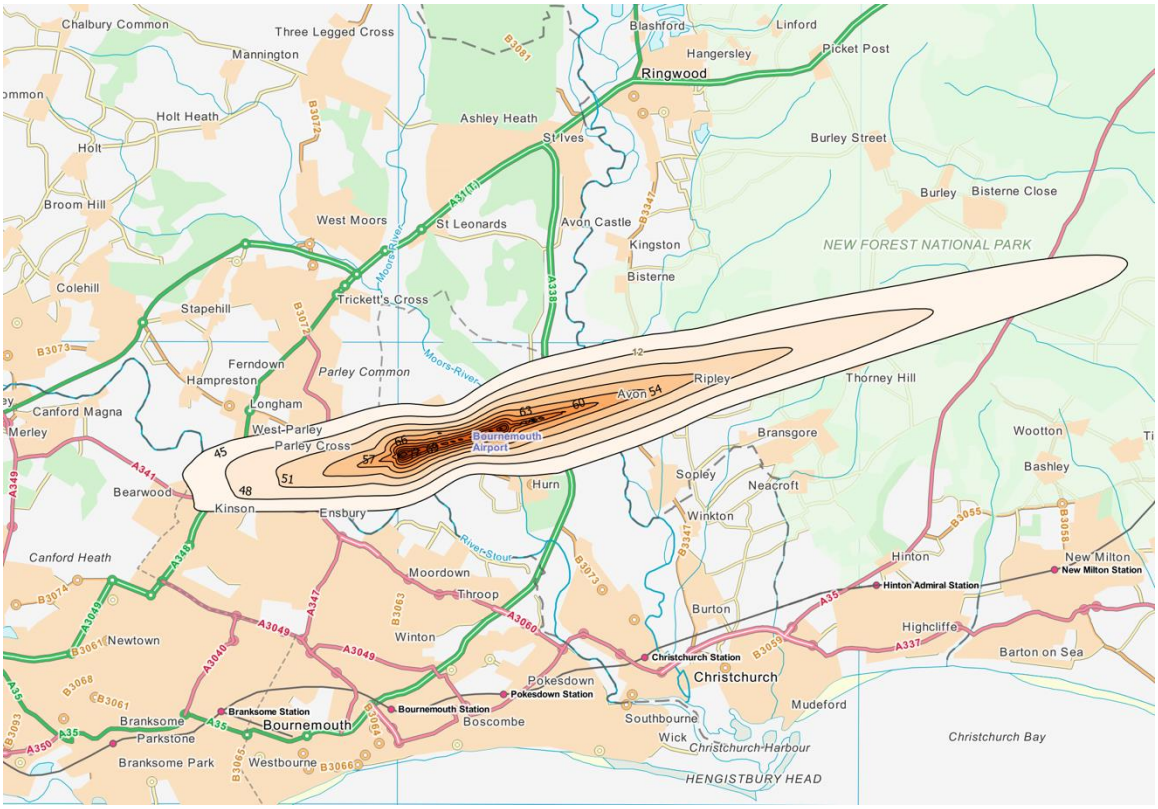


Figure 20: Noise contours: Night Forecast 8 hours LAeq

In accordance with CAP 1616, we assessed the number of households that are currently experiencing noise from arrivals to Bournemouth airport using the WebTAG Noise Assessment Workbook.

We used general WebTAG methodology with noise contours sequenced by 3 dB as the data from our noise modelling tool (AEDT) was produced in 3 dB steps.

In line with WebTAG template we quantified noise impact of Bournemouth arrivals for four cases (Figure 17-Figure 20):

- Opening year (proposed year of change – 2020):
  - 16 hour day
  - 8 hour night
- Forecast year (last year of the forecast – 2030):
  - 16 hour day
  - 8 hour night

The noise contour maps confirm that even with the 10-year growth forecast, proposed Initial Approach Fix (IAF) points are outside the noise contours, therefore areas around IAFs will experience noise lower than 51 dB Leq during the day and lower than 45 dB Leq during the night. Given that this ACP only concerns location of the IAFs, any changes will not affect noise contours.

'With' and 'without scheme' scenarios are therefore identical from noise point of view and result in £0 monetisation of the change.

B.2 Sub-Option 3d: WebTAG Greenhouse gases workbook results

As an input to the WebTAG Greenhouse Gasses workbook we used outputs from the CBA, which we conducted for this airspace change.

Under the normal operations, where arrivals will be radar vectored by ATC at Solent Radar, there will be no change in relation to fuel burn and CO2 emissions.

During out of the hours operations, there will be a small proportion of arriving commercial aircraft benefiting from the change thanks to distance reduction. The CBA was conducted to quantify these benefits for each sub-option.

B.2.1 Sub-Option 3d WebTAG: Greenhouse gases workbook results for Runway 08

The savings in terms of reduced emissions for proposed year of change 2020 from our CBA are:

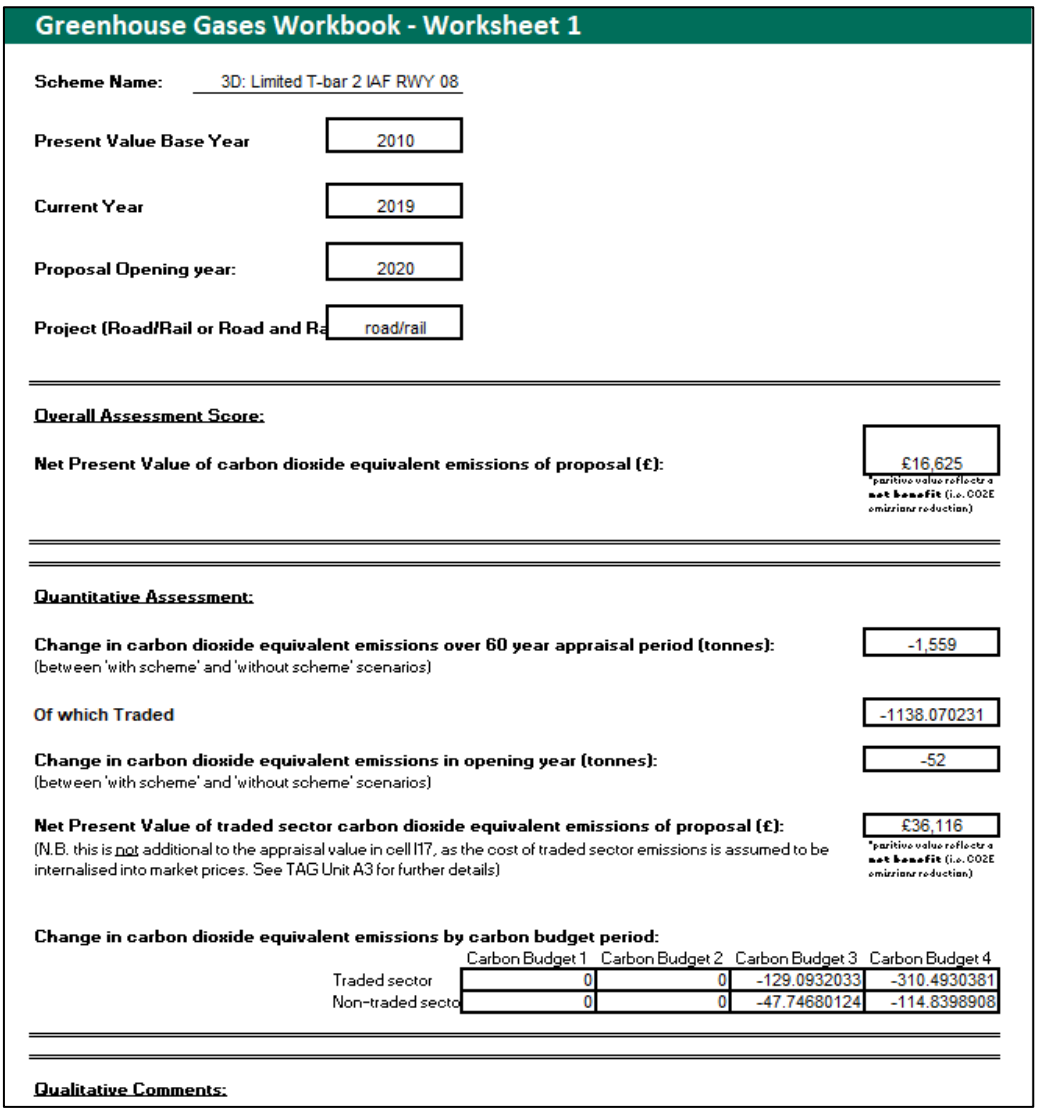
- CO2 emissions savings (kg) 52,417
- CO2 emissions savings (t) 52
- Tonnes of Carbon emissions (savings) 52

The savings in terms of reduced emissions for 10-year forecast scenario from our CBA are:

- CO2 emissions savings (kg) 818,043
- CO2 emissions savings (t) 818
- Tonnes of Carbon emissions (savings) 818

In accordance with CAP 1616, we assessed the impact of proposed option on Greenhouse Gas emissions.

We used WebTAG Greenhouse Gases workbook for the assessments and the results for Runway 08 are presented below.



Greenhouse Gases Workbook - Worksheet 1

Scheme Name: 3D: Limited T-bar 2 IAF RWY 08

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 2020

Project (Road/Rail or Road and Ra road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £16,625

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

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -1,559
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -1138.070231

Change in carbon dioxide equivalent emissions in opening year (tonnes): -52
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £36,116
(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 emission 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	-129.0932033	-310.4930381
Non-traded secto	0	0	-47.74680124	-114.8398908

Qualitative Comments:

Figure 21: Sub-Option 3d WebTAG Greenhouse gases workbook results for Runway 08

B.2.2 Sub-Option 3d WebTAG: Greenhouse gases workbook results for Runway 26

The savings in terms of reduced emissions for proposed year of change 2020 from our CBA are:

- CO2 emissions savings (kg) 139,973
- CO2 emissions savings (t) 140
- Tonnes of CO2e emissions (savings) 140

The savings in terms of reduced emissions for 10-year forecast scenario from our CBA are:

- CO2 emissions savings (kg) 2,184,495
- CO2 emissions savings (t) 2,184
- Tonnes of CO2e emissions (savings) 2,184

In accordance with CAP 1616, we assessed the impact of proposed option on Greenhouse Gas emissions.

We used WebTAG Greenhouse Gases workbook for the assessments and the results for Runway 26 are presented below.

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: 3D: Limited T-bar 2 IAF RWY 26

Present Value Base Year	2010
Current Year	2019
Proposal Opening year:	2020
Project (Road/Rail or Road and Ra	road/rail

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £44,394

*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): -4,163
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -3039.092573

Change in carbon dioxide equivalent emissions in opening year (tonnes): -140
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £96,445
(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	-344.7293363	-829.1378337
Non-traded secto	0	0	-127.5026312	-306.6674179

Qualitative Comments:

Figure 22: Sub-Option 3d WebTAG Greenhouse gases workbook results for Runway 26