Exeter Airport Airspace Change Proposal

Initial Options Appraisal

Document Details

Reference	Description
Document Title	Exeter Airport Airspace Change Proposal
	Initial Options Appraisal
Document Ref	71189 033
Issue	Issue 3
Date	3rd March 2023
Client Name	Exeter & Devon Airport Ltd

Issue	Amendment	Date
Issue 1	Initial Issue	19th November 2021
Issue 2	Re-submission: Minimum Standards of Noise Modelling updated; updated traffic forecast information.	19th August 2022
Issue 3	Re-submission: Minimum Standards of Noise Modelling updated.	3rd March 2023

Table of Contents

Table of Tables

Table of Figures

Glossary

Acronym	Meaning
ACP	Airspace Change Proposal
AIP	Aeronautical Information Publication
AQMA	Air Quality Management Area
ATC	Air Traffic Control
ATM	Air Transport Movement
ATS	Air Traffic Service
ATZ	Aerodrome Traffic Zone
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CAT	Commercial Air Transport
DfT	Department for Transport
FASI S	Future Airspace Strategy Implementation - South
ft	feet
GA	General Aviation
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
ILS	Instrument Landing System
NDB	Non-Directional Beacon
nm	nautical mile
PBN	Performance Based Navigation
RNAS	Royal Naval Air Station

Acronym	Meaning
SID	Standard Instrument Departure
SRA	Surveillance Radar Approach
VFR	Visual Flight Rules

1 Introduction

1.1 Introduction

The Exeter Airport Airspace Change Proposal (ACP) is currently at Stage 2 – Develop and Assess – of the Civil Aviation Publication (CAP) 1616 Airspace Design process. Step 2B requires the change sponsor to carry out an Initial Options Appraisal of the impacts of each of the options identified in Step 2A.

This document provides a narrative explanation of steps taken in Step 2B. The full analysis of the options is contained in the Initial Options Appraisal Table Issue 1, that can be found alongside this document on the Civil Aviation Authority (CAA) airspace portal:

https://airspacechange.caa.co.uk/PublicProposalArea?pID=62

1.2 Background

The principal area of concern regarding current operations at Exeter Airport is one of limited protection currently afforded to commercial aircraft, including passenger-carrying airliners, operating near the airport. In order to maintain levels of safety and enhance airspace efficiency, whilst causing minimal disruption to all aviation stakeholders, Exeter propose to establish new airspace around the existing Exeter Airport Aerodrome Traffic Zone (ATZ) that will:

- Safeguard routinely utilised flights operating under Instrument Flight Rules (IFR) at Exeter Airport.
- Ensure safe separation between the IFR traffic and promote proactive coordination of traffic operating under Visual Flight Rules (VFR) near the Airport.
- Protect aircraft operating within the Visual Circuit at Exeter Airport that routinely need to extend beyond the boundary of the ATZ.
- Enhance efficiency by providing airspace that will reduce the instances of avoiding action.
- Reduce traffic delays on the ground and in the air.

1.3 CAP1616 Airspace Change Process

The implementation of any changes to UK airspace is subject to the guidance contained in CAP 1616. CAP 1616 is a seven-stage process published by the CAA that provides guidance on the process to follow when seeking to change the way airspace is used. The seven stages of the process are as follows:

- Stage 1 – Define
- Stage 2 – Develop and Assess (current stage)
- Stage 3 – Consultation
- Stage 4 – Update and Submit
- Stage 5 – Decide
- Stage 6 - Implement
- Stage 7 – Post-Implementation Review

The project is currently at Stage 2 which requires the development of options that seek to meet the original Statement of Need. The options are required to align, where practicable, with the Design Principles generated in Stage 1. These options are then assessed to understand the positive/negative impacts before progressing to the Stage 2 Gateway.

1.4 Progress So Far

In June 2018, Exeter Airport submitted a Statement of Need to the CAA. This is the formal explanation as to why the Airport wishes to make changes within the airspace surrounding the Airport. The CAA indicated that an airspace change was an appropriate mechanism to achieve the objectives in the Statement of Need. A copy of the Statement of Need and other associated documentation can be viewed on the CAA airspace portal.

In November 2019, the first stage in the change process was successfully completed when the Airport's submission passed through the CAA's Stage 1 DEFINE Gateway.

The work undertaken during Stage 1 helped to establish a prioritised shortlist of Design Principles to act as a framework against which Design Options have been drawn up. The prioritised list of Design Principles can be found in the documents uploaded at Stage 1B on the portal.

1.5 Step 2A – Options Development

During Step 2A, Exeter Airport developed a list of design options for the new airspace and procedures that seek to meet the original the Statement of Need and are aligned with the Design Principles.

1.6 Step 2A – Design Principle Evaluation

Each of the options developed have been assessed against the prioritised list of Design Principles developed in Stage 1. The Design Principles Evaluation shows to what extent the options meet the Design Principles and whether the options are being taken forward to Step 2B or rejected at this point. The Design Principles Evaluation document can be found at Step 2A on the CAA airspace portal.

1.7 Step 2B – Initial Options Appraisal

At Step 2B, the long list of options was tested against the criteria contained in CAP 1616, Appendix E, Table E2 ,with the addition of a Qualitative Safety Assessment as required for a Level 1 change at this stage.

The methodology used for the Initial Options Appraisal is discussed in Section 2.

The Initial Options Appraisal resulted in a shortlist of options to be taken forward to Stage 3 for detailed technical design and consultation. The shortlist, together with a summary of the Initial Options Appraisal, is contained in Section 4.

2 Guidance and Methodology for Options Appraisal

2.1 CAP 1616 Options Appraisal Requirements

The Options Appraisal process was carried out in accordance with the guidance in CAP 1616, and in conjunction with The Green Book[1] and the Department of Transport's TAG[2], which constitute best practice in options appraisal.

Options Appraisal is used as an iterative tool throughout the CAP 1616 process to help refine the options from an initial longlist, down to a short list and a final set of preferred options.

The appraisal process typically consists of the following elements:

- High-level objective and assessment criteria.
- Baseline definition – current operations.
- Longlist of options (including a do-nothing option).
- Shortlist of options.
- Preferred or final option(s).

The Options Appraisal requirement of CAP 1616 evolves through three iterations with the CAA reviewing at each phase as follows:

1. 'Initial' appraisal at Step 2B with the CAA review at the Stage 2 – Develop and Assess gateway;
2. 'Full' appraisal at Step 3A with the CAA review at Step 3B and the subsequent Consult gateway;
3. 'Final' appraisal at Step 4A, with the CAA review after the formal submission of the Airspace Change Proposal at the end of Stage 4.

Iteration 1, Initial Options Appraisal, is the subject of this document to be submitted to the CAA as part of Step 2B.

2.2 IOA Minimum Requirements

CAP 1616 prescribes that the following should be included within an IOA as a minimum:

- A Comprehensive List of Viable Options (including the 'Do Nothing/Minimum' option which will act as a baseline for analysis).
    - A description of the change proposal.

[1] The Green Book: Appraisal and Evaluation in Central Government;
https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government

[2] DfT transport analysis guidance TAG:
https://www.gov.uk/guidance/transport-analysis-guidance-tag

  - An indicator of likely noise impacts.
  - A high-level assessment of benefits and costs involved.
- The criteria for assessing the list of options and the application of these criteria to determine a shortlist of options.
- What evidence the change sponsor will collect, and how it will be collected in order to fill in its evidence gaps and to develop the FOA, during Stage 3 (See Section 2.3).

There is a minimum requirement within CAP 1616 to conduct qualitative analysis within the IOA. However, change sponsors can choose to supplement this with quantitative analysis if they so choose. For this ACP, Exeter Airport will conduct qualitative analysis only for the Initial Options Appraisal. Quantitative analysis will be conducted at Stage 3 of the process.

2.3 CAP 2091 Minimum Standards or Noise Modelling

CAP 2091 – CAA Policy on Minimum Standards for Noise Modelling states that where some noise calculation is required, then the minimum level of sophistication of the modelling process should depend on the size of the current or proposed noise effect of an airport on its local community. CAP 2091 defines the thresholds of population exposed, which will require the use of the more sophisticated categories of noise modelling; once the likely number of residents reaches the minimum recommended threshold, a stakeholder should consider upgrading its noise modelling to that Category. The thresholds for noise modelling categories are shown in Table 1 below:

Category	Lower Threshold	Recommended Minimum Threshold	Mandated Minimum Threshold	Maximum Threshold
A	0	400,000	500,000	none
B	0	160,000	200,000	500,000
C	0	20,000	25,000	200,000
D	0	1,600	2,000	25,000
E	0	0	0	2,000

Table 1 – Thresholds for Noise Modelling Categories

The same thresholds have been set for population in the day and night contours for each of the noise Categories since the different Lowest Observed Adverse Effect Levels for day and night already capture the difference in noise perception between day and night noise.

As part of Gateway 2 for ACPs, CAP 2091 requires the change sponsor to justify to the CAA which Category its noise modelling methodology is required to fall into from the definitions contained in CAP 2091 and summarised in Table 2 below, and which Category it currently falls into.

Aircraft noise			Aircraft tracks (arrival and departure routes)		
Category	**Noise data**	**Flight profiles**	**Centreline (mean track)**	**Dispersion (variation around centreline)**	**Usage (allocation of traffic to routes)**
A	ICAO dataset modified for local noise monitor data for all aircraft types	Local track-keeping data	Local track-keeping data	Local track-keeping data	Local track-keeping data
B	ICAO dataset validated by local noise monitor data for major aircraft types	Local track-keeping data	Local track-keeping data	Local track-keeping data	Local track-keeping data
C	ICAO dataset	Local track-keeping data	Local track-keeping data	Local track-keeping data	Local track-keeping data
D	ICAO dataset	ICAO dataset	Local data from airport	ECAC guidance or data from airport	Local data from airport
E	ICAO dataset	ICAO dataset	Local data from airport	ECAC guidance or data from airport	Local data from airport

Table 2 – Summary of Noise Modelling Categories

The CAA consider that a stakeholder's noise modelling can only be declared to be in a particular Category if it meets ***all*** the criteria in the table for that Category.

The population within the 51dB noise contour shows that Exeter Airport currently falls into Category E, but would fall into Category D in the future. This means that Exeter Airport will conduct quantitative noise modelling analysis in accordance with Category D standards, based on the criteria set out in CAP 2091. Category D standards of modelling are yet to be defined and as such, Category D is the same as category E. Category E noise modelling as defined in CAP 2091 is shown below:

- Category E – There is no adaptation of the noise model and standardised reference values only are used. The standard ICAO dataset is used (flight profiles, noise data), with no amendments for local effects. Data reported from the modelled airport (rather than track-keeping data) is used to identify the usage of arrival and departure routes for a typical day. The track over the ground for each arrival and departure route is derived from the published coordinates in the UK AIP or as advised by the airport. Dispersion around the nominal track of each such route is based on the dispersion guidance contained in the latest version of ECAC Doc. 29.

2.4 Full Options Appraisal (FOA) Evidence Capture

Consistent with the requirements of CAP 1616, the IOA is a qualitative analysis of each option against a defined baseline. This is expanded on within the FOA, which is conducted at Stage 3, to include quantitative analysis. The FOA, requires change sponsors to assess

each of the design options against each other in relation to the criteria defined in CAP 1616, Appendix E using primarily quantitative metrics. These metrics include the assessment of the environmental impacts of the proposed change.

As defined in CAP 1616a, the FOA requires change sponsors to collect quantitative environmental metrics that describe the baseline scenario and conduct a series of modelling activities for each of the design options, to enable an environmental comparison. The required metrics include:

- 10-year traffic forecasts.
- Standard noise metrics (to Category E standards):
    - LAeq noise contours
    - 100% noise mode contours
    - Nx contours
    - Difference contours
    - Lmax spot point levels
- Operational diagrams.
- Overflight (based on the CAA definition of overflight found in CAP 1498 – Definition of Overflight.
- Fuel/CO_2 modelling analysis using the most recent appropriate version of Eurocontrol's Base of Aircraft Data (BADA) as the data source.

Data for the modelling will be provided by Exeter Airport and will be based on 2019's air traffic data since this is the most recent 'typical' year for air traffic.

The results will be subsequently assessed using the Government's transport analysis tools to provide a monetised output; these are known as TAG.

The modelling is intended to provide a comparison between today's operation (the baseline), in order to show the impact of the proposed change at the point of implementation and also 10 years post-implementation. Modelling is also required to show the situation at the proposed implementation date and 10 years post-implementation without applying the proposed change. More information regarding these metrics shall be provided during the FOA at Stage 3.

A cost-benefit analysis will be performed, and a preferred option (or combination of options) will be stated. Compromises and trade-offs may be necessary between airports taking part in the FASI-S regional airspace change. These will be guided by the advice and tools provided by the Airspace Change Organising Group ACOG, the independent team tasked with coordinating the redesign of the UK's airspace.

2.5 High Level Objectives and Assessment Criteria

For a Level 1 Airspace Change, the criteria against which the appraisal options must be assessed are contained in Table E2 in Appendix E of CAP 1616. Table 3 below describes these with the addition of the Safety Assessment, Tranquillity and Biodiversity (as defined in CAP 1616, Appendix B) criteria at the bottom.

Affected Group	Impact	Description
Communities	Noise impact on health and quality of life	Requires consideration of noise impact on communities including residents, schools, hospitals, parks and other sensitive areas.
Communities	Air Quality	Any change in air quality is to be considered.
Wider Society	Greenhouse Gas impact	Assessment of changes in greenhouse gas levels in accordance with WebTAG is required.
Wider Society	Capacity and resilience	A qualitative assessment of the impact on overall UK airspace structure. Quantitative methodologies may be required that allows monetisation of the impact.
General Aviation (GA)	Access	A qualitative assessment of the effect of the proposal on the access to airspace for GA users. Quantitative methodologies may be required that allows monetisation of the impact
General Aviation / commercial airlines	Economic impact from increased effective capacity	Forecast increase in air transport movements and estimated passenger numbers or cargo tonnage carried
General Aviation / commercial airlines	Fuel burn	The change sponsor must assess fuel costs based on its assumptions of the fleets in operation
Commercial airlines	Training costs	An assessment of the need for training associated with the proposal
Commercial airlines	Other costs	Where there are likely to be other costs imposed on commercial aviation, these should be described
Airport / Air navigation service provider	Infrastructure costs	Where a proposal requires a change in infrastructure, the associated costs should be assessed
Airport / Air navigation service provider	Operational costs	Where a proposal would lead to a change in operational costs, these should be assessed
Airport / Air navigation service provider	Deployment costs	Where a proposal would lead to a requirement for retraining and other deployment, the costs of these should be assessed

Wider Society	Tranquillity	The impact upon tranquillity need only be considered with specific reference to Areas of Outstanding Natural Beauty (AONB) and National Parks (NPs) unless other areas for consideration are identified through community engagement.
Wider Society	Biodiversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.
Safety Assessment	Safety Assessment	CAP 1616 requires a safety assessment of the proposal to be undertaken in accordance with CAP 760

Table 3 – Assessment Criteria for Level 1 Change

2.6 Method

The Initial Options Appraisal was carried out by comparing all of the options side by side against the CAP 1616 criteria in tabular form. The Appraisal also included the results of a Qualitative Safety Assessment. The assessment is based around a qualitative assessment at this stage of the CAP 1616 process, with a Full quantitative appraisal being conducted during Stage 3. At this point, for the purpose of the economic assessment required for the Full Options Appraisal, each of the procedure designs will be considered in combination with other procedures to assess the holistic options that deliver the operational requirement at Exeter Airport. Each option will include arrival and departure procedures that work for each runway direction.

The Options Appraisal compared the implementation of each of the proposed procedures against the Do Nothing Option, defined in Section 3, which represents the current-day scenario. The full analysis of all the options is described in Appendix A1 and included as a separate MS Excel spreadsheet.

3 Exeter Airport Baseline Definition

3.1 Baseline Definition

In accordance with CAP 1616, a baseline will be required for all environmental assessments. This will allow the change sponsor to conduct an assessment to understand the current impacts so that a comparison can be made with the impacts of the options. In most cases, the baseline will be the 'Do Nothing' option and will largely reflect the current-day scenario.

3.2 The Do Nothing Option

The Do Nothing option represents the current situation at Exeter Airport and will be used as the baseline against which all other options are measured. The only regulated airspace currently at Exeter Airport is an Aerodrome Traffic Zone (ATZ). The Exeter Airport ATZ is the airspace extending from the surface to a height of 2,000 ft above the level of the aerodrome within the area bounded by a circle centred on the mid-point of the runway and having a radius of 2.5 nm. There are no conventional departure or arrival procedures published. Arriving and departing aircraft are to follow the procedures published in the Aeronautical Information Publication (AIP), which includes noise abatement procedures. Exeter Airport has a surveillance capability and is able to provide aircraft with an Air Traffic Service (ATS). Aircraft operating to or from Exeter Airport can receive an ATS appropriate to their flight conditions (IFR or VFR) in Class G airspace. Exeter ATC can also provide an ATS to other air traffic operating in the vicinity of the airport if the aircraft captain requests such a service. Basic Service and Traffic Service is available to flights in Class G airspace operating under both IFR and VFR, whereas a Deconfliction Service is only available to flights in Class G airspace operating under IFR.

Aircraft departing IFR from Exeter Airport will follow the published noise abatement procedures before routing direct to their nominated airways joining point. Aircraft arriving at Exeter Airport are routed towards the holding fix at NDB(L) EX before being vectored to join the requested approach procedure.

Runway 26 is the dominant runway, used approximately 67% of the time, due to aircraft normally taking-off and landing into the prevailing westerly wind. The predominant flow of traffic is to/from the north towards EXMOR (44%), with the remaining traffic split approximately evenly between the south (BERRY HEAD), east (GIBSO) and west (LANDS' END) of the airport. The routes are generally evenly split between UK domestic destinations and European short-haul destinations. There are no long-haul flights operated out of Exeter Airport.

The baseline operational environment includes the following list of conventional approach procedures:

- ILS/DME/NDB(L) to Runway 08 and Runway 26
- LOC/DME/NDB(L) to Runway 08 and Runway 26
- NDB(L)/DME to Runway 08 and Runway 26
- SRA RTR 2 NM to Runway 08 and Runway 26
- RNP to Runway 08 and Runway 26
- NDB(L) to Runway 26

In 2019, the majority of arriving aircraft followed the ILS procedure (78%), followed by the RNP procedure (18%). NDB and SRA procedures account for approximately 4% of approaches.

Exeter Airport, prior to the onset of the COVID-19 pandemic, had a passenger operation of just over one million passengers per annum (2019), this was an increase of 9% versus 2018 passenger numbers. During the same time period commercial Air Transport Movements (ATMs) increased by 7% to approximately 14,000 movements. The airport has seen year-on-year growth in passenger numbers since 2013. There was a total of 26,000 non-commercial movements during 2019. Like all other airports across the UK, COVID-19 had a severe impact on traffic movements at Exeter Airport. There was a total of 23,000 movements in 2020, of which 3,000 were commercial air transport movements.

Forecast aircraft movements are shown in Table 4 below. Implementation is expected in 2025 hence, in accordance with the requirements of CAP 1616, traffic forecasts have been included for a period of at 10 years from the intended year of implementation.

Forecast Aircraft Movements	FY24[3]	FY25	FY26	FY27	FY28	FY29
Commercial Movements	9508	9724	10678	11442	12250	12618
Non-Commercial Movements[4]	27261	27308	27308	27308	27308	27308
Total Movements	36769	37032	37986	38750	39558	39926
Forecast Aircraft Movements	**FY30**	**FY31**	**FY32**	**FY33**	**FY34**	**FY35**
Commercial Movements	13454	13778	14734	14854	15374	15494
Non-Commercial Movements	27308	27308	27308	27308	27308	27308
Total Movements	40762	41086	42042	42162	42682	42802

Table 4 – Forecast Aircraft Movements

[3] FY24 – Financial Year April 2024 - March 2025
[4] Mostly domestic GA, training, military and business aviation.

Figures have been provided by Exeter Airport from their Business Management Case and show a year-on-year growth in traffic movements. Whilst post-COVID-19 growth in commercial ATMs is anticipated to be greater than normal initially (13% in FY24), growth in later years is expected to vary between 1% and 7%. Non-commercial movements are not expected to vary greatly over the ten-year period.

Exeter Airport's future projections for traffic growth include both an increase in passenger numbers and commercial ATMs. There is a degree of uncertainty in any projections as a result of recovery from the COVID-19 pandemic.

3.3 Noise Impact for Communities

Aircraft arriving at and departing from Exeter Airport generate a level of noise on the ground that may have an impact on local communities. The published noise abatement procedures are adequate for maintaining a noise footprint that does not unduly impact the lives of residents. The current noise abatement procedures require that aircraft operators should ensure at all times that aircraft are operated in a manner calculated to cause the least disturbance practicable in areas surrounding the airport, particularly the City of Exeter. Specifically for departing aircraft:

- Aircraft departing on Runway 26 should climb on runway heading at the maximum rate compatible with safety to 1,000 ft above aerodrome level and then turn as soon as possible to avoid the City of Exeter.
- Aircraft departing on Runway 08 should climb at the maximum rate compatible with safety to 1,500 ft above aerodrome level before turning.

The area immediately to the east of the airport is a rural part of Devon with no large built-up areas and a few small villages and hamlets. There is no significant impact on local communities in this area. To the west of the airport, the upwind end of Runway 26 lies approximately 1.85 nm from the densely populated eastern limits of the City of Exeter. There is a small impact on local communities in this area, but this is not considered significant and the airport has historically received very few noise complaints from residents beneath the current departure tracks that pass close to the City boundary. A noise assessment of the Do Nothing option will be undertaken as part of the Full Options Apprasial at Stage 3.

3.4 Air Quality

Government guidance says that aircraft flying higher than 1,000ft are unlikely to have a significant impact on local air quality. Today, arriving aircraft descend through 1,000ft between 3 and 2 nm (about 6 - 4 km) from touchdown at either end of the runway. This is close to landing, in the very final stages of the approach. Departing aircraft will generally climb above 1,000 ft within 2 nm of the airport and turn as soon as possible to avoid the City of Exeter. Any impact on local air quality is therefore likely to be within 3 nm of the airport.

There are three Air Quality Management Area's (AQMA) local to the airport:

- Exeter City AQMA Order 2010 declared by Exeter City Council, covering most of the main traffic routes in the city.

- Crediton AQMA declared by Mid-Devon District Council, covering the majority of the built up area of Crediton.
- Cullompton AQMA declared by Mid-Devon District Council, covering the entire built up area of the town of Cullompton.

There is no impact on the Crediton and Cullompton AQMAs due to their location relative to the airport.

Although the Exeter AQMA, shown in Figure 1 below, is within 3 nm of the airport, it is considered there would be little or no impact due to aircraft emissions on the AQMA. Exeter City Council declared the AQMA as a result of exceedances of Nitrogen Dioxide concentrations which were identified as being caused by traffic emissions.

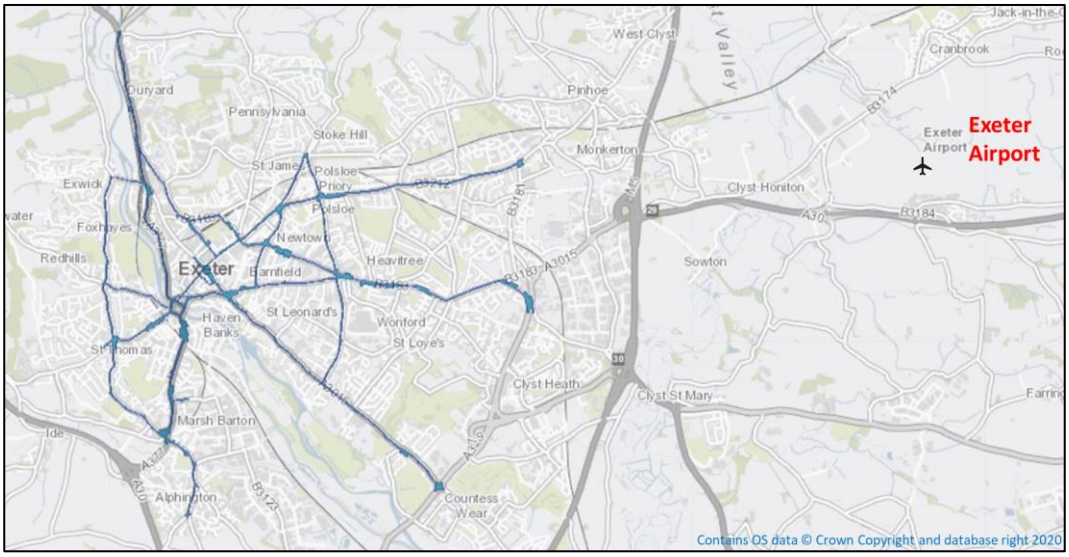

Figure 1 – Exeter AQMA Order 2010

3.5 Tranquillity

Dartmoor National Park and Blackdown Hills and East Devon Areas of Outstanding Natural Beauty will be impacted by current operations. The impact from departing aircraft is likely to be insignificant as aircraft are likely to be approaching, or above, 7,000 ft over these areas. The current approach procedures are likely to result in aircraft overflying these areas, with some impact on tranquillity.

3.6 Biodiversity

Airspace changes are unlikely to have an impact on biodiversity because they do not normally involve changes to ground based infrastructure (habitat disturbance).

Maintaining the current airspace and operating procedures would not require any ground-based infrastructure work so the Do Nothing option is not predicted to have any impact on biodiversity.

3.7 Emissions

Extant operating procedures do not support optimum performance of aircraft and will have an impact on emissions due to parameters that contribute to higher engine power settings, more track miles and greater emissions:

- routes are unpredictable in length and rely on intervention from ATC in terms of height clearances and radar vectoring;
- aircraft may be restricted in height waiting for clearance to join the airways;
- aircraft may not be able to perform continuous climb or descent operations;
- radar vectoring of aircraft arriving from the airways to join the approach procedure mean that aircraft do not always follow the most expeditious route;
- there is the increased likelihood of avoiding action in relation to other airspace users operating in Class G airspace

3.8 Capacity and Resilience

Continuing to use extant procedures would maintain current capacity however resilience would be significantly affected. The Do Nothing option is an ineffective way of managing airspace. Exeter Airport would not meet the airspace modernisation priorities, including the coordination with other airspace users as part of the FASI-S programme. There is a high likelihood of aircraft being tactically vectored by ATC to avoid unknown aircraft close to their flight paths which could lead to flight delays both on the ground and in the air. This could have a significant impact on the resilience of the airport.

3.9 General Aviation Access

The only form of regulated airspace around Exeter Airport currently is the Aerodrome Traffic Zone (ATZ). Any aircraft wishing to fly inside the ATZ must get prior permission from ATC. The airspace around the ATZ is Class G airspace which has no restrictions on access to GA aircraft.

3.10 Economic Impact: Commercial Airliners and GA

No increase in effective capacity is anticipated at Exeter Airport for the continued use of current operating procedures and therefore no additional economic benefit expected for commercial airliners or GA users.

3.11 Fuel Burn: Commercial Airliners and GA

Fuel burn predicted to be greater (and less predictable) due to:

- Potential extended track miles in level flight due to:
  - height restrictions and clearance delays;
  - avoiding action in Class G airspace
- Unpredictable routes due to:
  - variation in airways joining and leaving positions;
  - tactical ATC intervention, including radar vectoring of arrivals onto final approach.

- The opportunity to optimise aircraft performance through continuous climb and descent operations is unsupported by the current operational procedures.

3.12 Infrastructure Costs

The existing infrastructure will remain in place and will incur no additional costs apart from routine maintenance. No additional infrastructure is required to maintain extant conventional procedures.

3.13 Operational Costs

No changes to operational costs are attributable to maintaining the extant operational procedures except where linked to maintenance of infrastructure.

3.14 Training Costs

There will be no additional training costs associated with the Do Nothing option.

3.15 Other Costs

The lack of protection afforded to aircraft arriving at and departing from Exeter Airport could lead to an increased cost to commercial airlines due to the higher likelihood of aircraft being tactically vectored by ATC to avoid unknown aircraft close to their flight paths. Extra costs would include additional fuel usage and costs associated with flight delays both on the ground and in the air.

3.16 Deployment Costs

There will be no additional deployment costs associated with the Do Nothing option.

3.17 Safety Assessment

The principle area of concern regarding current operations at Exeter Airport is the limited protection currently afforded to commercial air transport (CAT) aircraft flying final approach and initial departure routes through Class G airspace, within 10 nm of the airport. ATC tactical intervention is repeatedly required for CAT aircraft on final approach or initial departure routes in order to maintain separation from local and transitory general aviation users.

There have been a number of reportable safety events between unknown aircraft and aircraft arriving at and departing from Exeter Airport. These incidents create a significant increase in workload for pilots and distract ATC from the task of ATS provision. Additionally, the arrival and departure phase of flight is a particularly busy time on the flight deck, when unexpected ATC interventions (often at very short notice) add significantly to pilot workload.

While current operations are tolerably safe, a disproportionate amount of controller capacity is consumed ensuring this is the case. There have also been occasions where the

prevalence of unknown traffic operating within the vicinity of the airport could have led to a degradation of safety margins.

4 Design Options Shortlist

4.1 Shortlist of Options Taken Forward

Table 5 presents the shortlist of options carried forward to Stage 3 along with a summary of the Initial Appraisal Outcome for that option. The original options were reduced to fifteen preferred options and four less attractive but viable options.

Shortlist Option		Initial Appraisal Outcome
S1	Runway 08 SID (north – direct)	This option has minimal noise impact and represents the shortest track miles for aircraft routing to the north. This route passes close to North Hill and Dunkeswell airfields.
S2	Runway 08 SID (north – dogleg)	Preferred Option This option has minimal noise impact but represents further track miles than the previous option. However, this route is further from North Hill and Dunkeswell airfields. The alignment of the northern track with the en-route airways structure above will make integration with the new airspace structure easier to achieve. The position of the track can be moved laterally to fit in with the new airways structure above.
S6	Runway 08 SID (south – direct)	Preferred Option This option has minimal noise impact and represents the shortest track miles for aircraft routing to the south
S7	Runway 08 SID (south – dogleg)	Preferred Option This option would only be available outside of the operating hours of the EG D012 Lyme Bay North and EG D013 Lyme Bay Danger Areas and represents a good option for aircraft routing to the south-east. This is not the most direct route to NOTRO. However, the initial part of the route is aligned with the southern departure route until over the sea, and will have minimal noise impact.

Shortlist Option		Initial Appraisal Outcome
S10	Runway 26 SID (north-east)	Runway 26 departure options will have a significantly worse noise impact than the Do Nothing option due to the design requirements. There will also be an increase in track miles and therefore emissions. This option will be taken forward so that a full environmental impact assessment can be made at Stage 3. Exeter Airport will not look to introduce procedures at any cost, and if it is considered that the impact of this option is too great, the option will be removed.
S12	Runway 26 SID (south)	Runway 26 departure options will have a significantly worse noise impact than the Do Nothing option due to the design requirements. There will also be an increase in track miles and therefore emissions. This option will be taken forward so that a full environmental impact assessment can be made at Stage 3. Exeter Airport will not look to introduce procedures at any cost, and if it is considered that the impact of this option is too great, the option will be removed.
S13	Runway 26 SID (south-east)	This option would only be available outside of the operating hours of the EG D012 Lyme Bay North and EG D013 Lyme Bay Danger Areas and represents a good option for aircraft routing to the south-east. Runway 26 departure options will have a significantly worse noise impact than the Do Nothing option due to the design requirements. There will also be an increase in track miles and therefore emissions. This option will be taken forward so that a full environmental impact assessment can be made at Stage 3. Exeter Airport will not look to introduce procedures at any cost, and if it is considered that the impact of this option is too great, the option will be removed.
S17	Runway 26 Extended SID (north-east)	Preferred Option Runway 26 departure options will have a significantly worse noise impact than the Do Nothing option due to the design requirements. There will also be an increase in track miles and therefore emissions. This option will be taken forward so that a full environmental impact assessment can be made at Stage 3. Exeter Airport will not look to introduce procedures at any cost, and if it is considered that the impact of this option is too great, the option will be removed.

Shortlist Option		Initial Appraisal Outcome
S19	Runway 26 Extended SID (south)	Preferred Option Runway 26 departure options will have a significantly worse noise impact than the Do Nothing option due to the design requirements. There will also be an increase in track miles and therefore emissions. This option will be taken forward so that a full environmental impact assessment can be made at Stage 3. Exeter Airport will not look to introduce procedures at any cost, and if it is considered that the impact of this option is too great, the option will be removed.
S20	Runway 26 Extended SID (south-east)	Preferred Option This option would only be available outside of the operating hours of the EG D012 Lyme Bay North and EG D013 Lyme Bay Danger Areas and represents a good option for aircraft routing to the south-east. Runway 26 departure options will have a significantly worse noise impact than the Do Nothing option due to the design requirements. There will also be an increase in track miles and therefore emissions. This option will be taken forward so that a full environmental impact assessment can be made at Stage 3. Exeter Airport will not look to introduce procedures at any cost, and if it is considered that the impact of this option is too great, the option will be removed.
T1	Runway 08 Transition (north)	Preferred Option Designed to be flown at optimum aircraft performance in a continuous descent and minimal track miles. This option has minimal noise impact.
T4	Runway 08 Transition (south)	Preferred Option Designed to be flown at optimum aircraft performance in a continuous descent and minimal track miles. This option has minimal noise impact.
T6	Runway 26 Transition (north)	Preferred Option Designed to be flown at optimum aircraft performance in a continuous descent and minimal track miles. This option has minimal noise impact. This route passes close to North Hill, Dunkeswell and Merryfield airfields and may impact RNAS Yeovilton Instrument Flight Procedures.

Shortlist Option		Initial Appraisal Outcome
A5	Airspace Option A5	Whilst this option protects the final approach and initial climb out paths and could provide connectivity to the airways structure, it would not contain the full departure and transition procedures and CAT would not remain inside Controlled Airspace (CAS) when arriving or departing from the Airport. This option would only be implemented without SID or Transition procedures.
A10	Airspace Option A10	This option protects the final approach and initial climb out paths and provides connectivity to the airways structure. It would contain departure and transition procedures to the south of the airport, ensuring that CAT would remain inside CAS when arriving or departing from the Airport.
A14	Airspace Option A14	Although originally considered unviable due to the impact this option would have on local airfields, it was considered that this option could also provide protection for North Hill and Dunkeswell airfields. This would require agreement with these airfields to ensure satisfactory operating procedures within any new airspace. This option protects the final approach and initial climb out paths and could provide connectivity to the airways structure. It would contain departure and transition procedures to the south of the airport, ensuring that CAT would remain inside CAS when arriving or departing from the Airport.
A17	Airspace Option A17	Preferred Option This option offers more protection for the approach procedures and departure routes and provides connectivity to the airways structure. It would contain the departure and transition procedures, ensuring that CAT would remain inside CAS when arriving or departing from the Airport. The complexity of the airspace boundary and wrap-around of Dunkeswell and North Hill airfields may lead to unauthorised incursions and create choke points. The lower airspace portion of this option can be amended to be the same as Option 15, notwithstanding the necessary arrangements required with North Hill and Dunkeswell airfields to ensure satisfactory operating procedures within the new airspace. With this amendment to the design, this option will be taken forward.

Shortlist Option		Initial Appraisal Outcome
A19	Airspace Option A19	This option offers more protection for the approach procedures and departure routes and provides connectivity to the airways structure. It would contain the departure and transition procedures, ensuring that CAT would remain inside CAS when arriving or departing from the Airport. Although the design may be considered complex and may lead to unauthorised incursions, the multiple areas are designed to minimise the amount of CAS required to ensure traffic remains inside CAS.
PE1	Airspace Option PE1	Whilst this option protects the final approach and initial climb out paths and could provide connectivity to the airways structure, it would not contain the full departure and transition procedures and CAT would not remain inside CAS when arriving or departing from the Airport. This option is considered to be the minimum acceptable solution but is not ideal from the airport's point of view. This option would only be implemented without SID or Transition procedures.
PE2	Airspace Option PE2	This option offers more protection for the approach procedures and departure routes and provides connectivity to the airways structure. It would contain the departure and transition procedures, ensuring that CAT would remain inside CAS when arriving or departing from the Airport.
PE3	Airspace Option PE3	This option protects the final approach and initial climb out paths and provides connectivity to the airways structure. It would contain departure and transition procedures to the south of the airport, ensuring that CAT would remain inside CAS when arriving or departing from the Airport

Table 5 – Shortlist of Options Carried Forward to Stage 3

4.2 Next Step - Full Options Appraisal

4.2.1 CAP 1616 Requirement

A Full Options Appraisal of each of the shortlist options is required during preparation for consultation in Stage 3 to provide a fully developed quantitative assessment of the relevant costs and benefits associated with each option. This analysis will inform the selection of the Preferred Option(s) and form part of the Consultation materials.

4.2.2 Proposed Method Overview

The Initial Options Appraisal (this document) will be developed into a more quantitative assessment i.e. the costs and benefits of each option e.g. in terms of greenhouse gasses, noise, fuel burn etc. will be monetised using quantitative estimates from the Department for Transport's (DfT) appraisal guidance[5] for health impacts associated with noise, and for the other impacts where possible. The DfT's Transport Analysis Guidance (TAG) and toolkit will be used to quantify and analyse the costs and benefits of each **combined** shortlist option (see 4.2.3 below).

Data for the modelling will be provided by Exeter Airport and will be based on 2019's air traffic data since this is the most recent 'typical' year for air traffic.

4.2.3 Combining the Procedures for the Full Options Appraisal

For the purpose of the assessment required for the Full Options Appraisal, we will consider each of the procedure designs in combination with other procedures and airspace options to assess the holistic options that deliver the operational requirement at Exeter Airport. Each option will include arrival and departure procedures that work for each runway direction.

The SIDs and Transition to Approach procedures are combined in various ways to create an 'operational picture' of where aircraft arriving and departing Exeter Airport will fly. Figure 2 below illustrates an example 'option' for combining arrivals (Transitions and Approaches) and departures (SIDs) for each runway that work together. Figure 2 is for illustrative example only and not indicative of any actual proposed option.

Although only one runway direction will be used at any given time, the combined options will need to consider the use of both runway directions in a proportion that would be representative of the amount of time each runway direction would be expected to be used, given the local meteorological conditions. The precise methodology for assessment and combination of options will be discussed with the CAA prior to Full Options Appraisal being carried out.

[5] https://www.gov.uk/guidance/ transport-analysis-guidance-tag

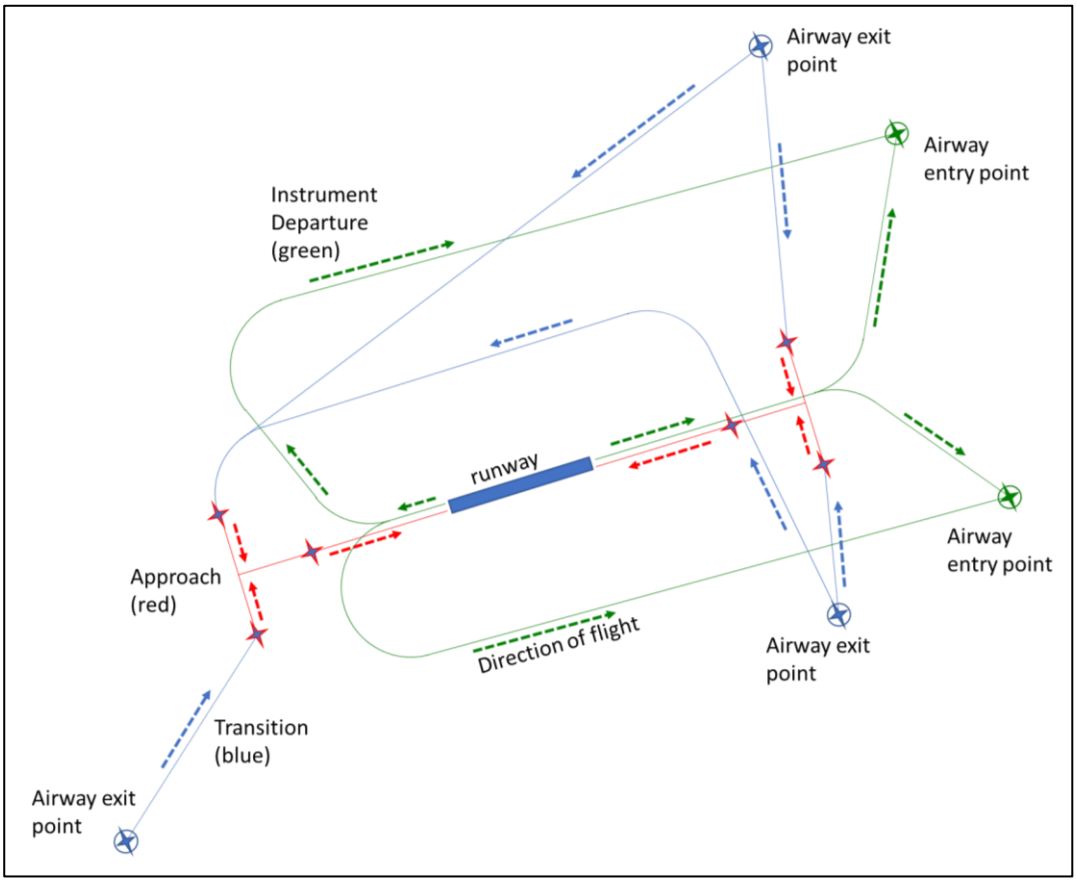

Figure 2 – Illustrative Example of Combined Arrivals and Departures

A1 Initial Options Appraisal (Full Table Analysis)

A1.1 Initial Options Appraisal Table

This Appendix is delivered as a separate MS Excel based file which contains the full analysis carried out on the long list of Options considered during CAP 1616 Stage 2 – Develop and Assess. The full analysis of the options is contained in the Initial Options Appraisal Table Issue 1, that can be found in PDF format alongside this document on the CAA airspace portal.