Southampton Airport FASI-S Airspace Change Proposal

Step 2A
Design Principle Evaluation

Date:	December 2022
Document Version:	V1.0
Status:	Public
Document History:	Submitted to the CAA December 2022

Table of Contents

Appendices and Annexes

Introduction

Following the publication of the strategic rationale for airspace modernisation[1], the Government directed the Civil Aviation Authority (CAA) to "prepare and maintain a coordinated strategy and plan for the use of UK airspace up to 2040, including its modernisation". As a result, in 2018 the CAA published the Airspace Modernisation Strategy (AMS)[2], which replaced the earlier 2011 Future Airspace Strategy. The AMS sets out the initiatives required to modernise the existing Airspace System by upgrading the airspace design, technology and operations. The CAA is in the process of reviewing the AMS and expects to publish an updated version of the strategy in Q4 2022.

One of the most important initiatives required to achieve the AMS objective is known as FASI (Future Airspace Strategy Implementation). 22 airports in the UK comprise FASI and Southampton Airport is one of them. This FASI initiative is considered the UK's Airspace Change National Infrastructure Programme (the Programme). The Programme encompasses the requirement to fundamentally redesign the National Airspace System at lower altitudes and in the terminal airspace that serves commercial air transport across the busiest regions of the UK, making the most of the capabilities of modern aircraft and satellite-based navigation technology. These airspace design projects are sponsored by the 22 airports (for the local arrival and departure routes below 7000ft) and by NERL (for the airspace structures and route network above 7000ft).

Today's national route network is designed with reference to a grid of ground navigation beacons distributed across the UK. Some of these beacons are outdated and reaching their end of life. Meanwhile, 99% of the current commercial air transport fleet operates almost exclusively using avionics that rely on satellite navigation. Aircraft are able to follow routes designed to satellite navigation standards (known as Performance-based Navigation or PBN) with greater precision than conventional ground navigation. The widespread deployment of routes designed to satellite navigation standards is a cornerstone of airspace modernisation. The opportunity to design a new network of PBN routes with far greater accuracy and flexibility offers the potential to address many of the issues set out in the Government's strategic rationale. Significant improvements in airspace capacity and efficiency can be achieved by positioning routes so that they are safely separated and optimised by design.

Whilst more precise routes can be used to avoid noise sensitive areas, they may also concentrate the impacts of overflight. For this reason, the use of route options that can distribute the impacts more equitably, or be configured to offer relief from noise, must be considered in consultation with local stakeholders when routes are being developed for deployment at lower altitudes.

The number, complexity and overlapping scope of the individual Airspace Change Proposals (ACPs) needed to deliver the Programme requires a strategic coordination mechanism in the form of a single joined up implementation plan or Masterplan.

[1] Upgrading UK Airspace Strategic Rationale
[2] UK Airspace Modernisation Strategy, CAA CAP1711, 2018

Given the large number of organisations involved (22 airports and NATS EnRoute Limited (NERL)), the CAA and Department for Transport (DfT) also required NERL to set up an impartial body, The Airspace Change Organising Group (ACOG) to develop a Masterplan, coordinate the Programme and lead the necessary engagement with external stakeholders. In this context, ACOG was established in 2019 as a unit within NERL, separate and impartial from the organisation's other functions.

Masterplan Iteration 2[3] was accepted by CAA on 27th January 2022. The purpose of Iteration 2 is to provide a system-wide view of the scope of the constituent ACPs and identify the potential interdependencies between the proposals. Collectively, the ACPs that are included in the Masterplan are referred to as the 'constituent airspace change proposals'. Each individual ACP is developed following the same detailed process steps laid out in the CAA's guidance for changing the airspace design – known as CAP1616[4]. The CAA evaluates the progress of every ACP through each stage of the process, via a series of (seven) regulatory gateways and make decisions on whether to approve further development and ultimately the implementation of the proposed changes. A summary of the CAP1616 process is available in the next section.

Iteration 2 places Southampton Airport in the 'LTMA[5] regional cluster' alongside Biggin Hill, Bournemouth, Heathrow, Gatwick, London City, Manston, RAF Northolt, Southampton, Southend and Stansted airports. In September 2022, Farnborough Airport were also accepted into the Masterplan and we would expect Farnborough Airport will now form part of the LTMA regional cluster going forwards.

Southampton Airport began their ACP to modernise their airspace in January 2019 and passed through Stage 1 of CAP1616 in August 2019. In April 2020, the project and much of the wider Programme was paused due to COVID-19 pandemic whilst the aviation industry focussed on managing the pandemic and its recovery from it. The Programme was remobilised in March 2021 following the provision of DfT grant funding, allowing Southampton Airport to recommence their ACP in June 2021.

This document forms part of Southampton Airport's Stage 2 submission to the CAA. It sets out how Southampton Airport has developed its Comprehensive List of Options for the ACP and how it tested those options and their development with their stakeholders. It then explains the methodology used to evaluate the options against the Design Principles as well as containing a summary of that evaluation.

All airspace design options in this document are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation with all our stakeholders.

[3] Link to Iteration 2
[4] CAA CAP 1616, edition 4, March 2021
[5] London Terminal Manoeuvring Area

The CAP1616 Airspace Change Process

In December 2017 the Civil Aviation Authority (CAA) published CAP1616[6] Airspace Design: Guidance on the regulatory process for changing airspace design, including community engagement requirements. The guidance sets out the process for the airspace change process, which a change sponsor of any permanent change to the published airspace design must follow. The airspace change process is split into 7 Stages;

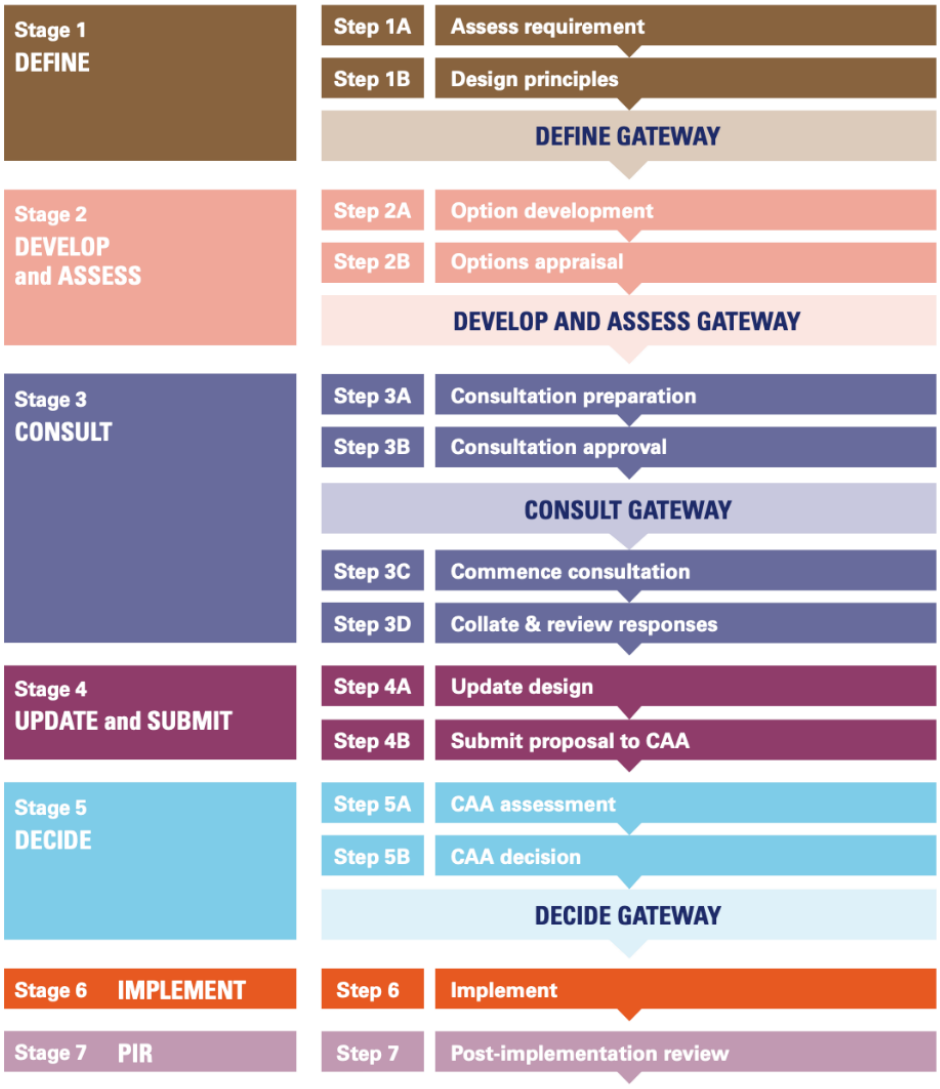

Figure 1: CAP1616 Process

[6] CAP1616

Where Southampton Airport is in their Airspace Change Proposal

This Airspace Change Proposal is required to follow the CAP1616 process detailed in the section above. Table 1 below summarises the CAP1616 stages already undertaken for this ACP and the stage where we are at now, providing links to previous submission documents with further information.

Airspace Change Stage	Summary	Link to Documents (Also available on the ACP portal)
Stage 1A	In January 2019, Southampton Airport submitted their Statement of need (SoN) to the CAA	Statement of Need on CAA's Airspace Change Portal
	Southampton Airport participated in an assessment meeting with the CAA on the 22nd January 2019 as part of Step 1A of the CAP1616 process. The purpose of the assessment meeting is for the change sponsor to present and discuss their SoN and to enable the CAA to consider whether the proposal falls within the scope of the formal airspace change process.	Assessment meeting minutes
Stage 1B	At Stage 1B Southampton developed a set of design principles with identified Stakeholders. The aim of the design principles is to provide high-level criteria that the proposed airspace design options should meet. They also provide a means of analysing the impact of different design options and a framework for choosing between or prioritising options. The final design principles outlined within the Stage 1B submission, are also shown here in this document.	Stage 1B Design Principle Submission Report
Stage 2A	Stage 2A requires change sponsors to develop and assess options for the airspace change. In Stage 2A, the change sponsor develops a comprehensive list of options that address the Statement of Need and that align with the design principles from Stage 1. We then share those options with our Stakeholder representatives (the same ones engaged with on the Design Principles). Feedback from the engagement may then be used to refine and/or generate further options where feasible at this stage or later in the process. Finally, we qualitatively assess all options developed against the Design Principles and produce a Design Principle Evaluation. This is where we are now. The following sections of this document outline how we have developed airspace change options, engaged with Stakeholders, and then assessed the options against the design principles developed at Stage 1B.	This Document

Table 1: Southampton ACP to date

Southampton's Design Principles for this ACP

The design principles were set following engagement with representative stakeholder groups as part of CAP1616 Stage 1. The table of design principles and their relative priorities is shown in Table 2 below:

#	Airspace design principle
DP1	**Top priority:** Be as safe or safer than today for both commercial air transport and general aviation users that are affected by the airspace change.
DP2	**Second priority:** The SOU ACP accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it.
DP3	Avoid introducing additional complexity and bottlenecks into controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.
DP4	Minimise tactical intervention by Air Traffic Control (ATC) below 7000ft.
DP5	Ensure sufficient airspace capacity to accommodate SOU's master plan traffic forecasts while providing for the integration of GA traffic.
DP6	Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts.
DP7	Minimise and where possible reduce, the total adverse effects on health and quality of life from aircraft noise.
DP8	Ensure a predictable, fair and equitable share of traffic across all routes, through multiple route options and respite routes.
DP9	Avoid overflying densely populated residential areas, national parks, AONBs, noise sensitive buildings and other areas prized for tranquillity.
DP10	Maximise operational efficiency for commercial air transport and general aviation users affected by the airspace change.
DP11	Ensure that aircraft operating at SOU climb and descend continuously to/from at least 7000ft.
DP12	Adopt the most beneficial form of enhanced navigation standards for arrival and departure routes.
DP13	Avoid increasing the overall volume of controlled airspace and where deemed necessary, mitigate the impact by including measures that improve access to GA and do not increase airspace segregation.
DP14	Consider the use of electronic conspicuity to improve airspace integration where possible.
DP15	Take into account the combination of effects on the operations at neighbouring airports that are affected by the airspace change.
DP16	Offer flexibility in the route structure to strengthen resilience against adverse weather and network issues that may affect operations at SOU.

Table 2: Design Principles

UK Airspace Change Masterplan Iteration 2

The number, complexity and overlapping scope of the individual airspace ACPs needed to deliver the Programme requires a strategic coordination mechanism in the form of a single joined up implementation plan or Masterplan. In their capacity as co-sponsors of the AMS, the Department for Transport and CAA commissioned NERL to create the Masterplan.

Airspace modernisation is a long and complex process. Larger ACPs with many interdependencies can take several years longer to develop than smaller ones with fewer interactions. As a consequence, ACOG proposed (and the co-sponsors accepted) that the final Masterplan is developed through a series of iterations. The iterative approach recognises that different information and levels of detail will be available at different times. ACOG may have an insufficient level of detail about some ACPs to make firm conclusions and need to make assumptions that are refined in later iterations. It also means that the Masterplan remains flexible and responsive to accommodate the evolving context for airspace modernisation, such as changes arising from the AMS review, new policy directions or unanticipated events.

ACOG envisages a minimum of four iterations of the Masterplan. The iterations broadly align with the regulatory gateways of the CAP 1616 process. Each iteration must be accepted separately into the AMS, except Iteration 1, which was a high-level plan that has already been assessed and published[7].

The purpose of Iteration 2 is to provide a system-wide view of the scope of the constituent ACPs and identify the potential interdependencies between the proposals. The assessment of the interdependencies between the constituent ACPs remains at a high level in Iteration 2 because most of the sponsors were yet to produce a comprehensive list of airspace design options at the time of its creation.

The Masterplan becomes, together with the CAP 1616 process, the legal basis against which individual airspace change decisions are made by the CAA. Therefore, the CAA's decisions on airspace change proposals will need to ensure that there is no misalignment with the Masterplan. The CAA must apply its airspace change decisions in accordance with the Masterplan and therefore in the best interests of the overall Airspace System and not just in the interests of the individual ACP sponsor.

The timeline and sequencing of the Masterplan ACPs are complex issues. It is not considered feasible for all the constituent ACPs in the Programme to be developed and deployed at the same time. The Masterplan takes a modular approach to deployment and requires coordination and strong programme management discipline to mitigate the risks of design conflicts, technical misalignments and a lack of transparency for external stakeholders. To help with this, the Masterplan has placed each of the ACPs into a regional cluster and Iteration 2 places Southampton Airport in the 'LTMA regional cluster' alongside Biggin Hill, Bournemouth, Heathrow, Gatwick, London City, Manston, RAF Northolt,

[7] Airspace Masterplan Iteration One (Southern UK): co-sponsor assessment, CAA CAP 1884, February 2021.

Southampton, Southend and Stansted airports. As previously mentioned, we would expect Farnborough Airport will now form part of the LTMA regional cluster going forwards.

Large scale ACPs are usually difficult to develop and deploy because of the complexity of the existing airspace design, the intensity of the current operation and the potential impacts on communities, the environment and other airspace users. The Masterplan ACPs bring additional deployment challenges associated with airspace design interdependencies and the widespread introduction of PBN routes, which will replace well established ATC procedures based on controller vectoring with the comparatively new concept of systemisation. Other factors being equal, the greater the complexity of the existing airspace design, and the more interdependencies, the more difficult the ACPs will be to deploy.

Iteration 2 advises that that the LTMA cluster will require a minimum of three separate 'core LTMA' deployment windows to implement the full set of proposed changes (within the LTMA) because of the very large size, high complexity and extensive interdependencies of the constituent ACPs.

As a result, Iteration 3 has identified that core LTMA deployments that include Heathrow, must be divided into a minimum of three windows, separated by 12-month intervals and cannot begin before Spring 2027. Noting Southampton's dependencies with Bournemouth, Farnborough and to a lesser extent Heathrow (that are explored more here in this document), this means that any change to Southampton's route structure that has dependencies on those airports are not expected before this date. Southampton's deployment date could therefore be somewhere between 2027 and 2029, subject to the wider programme remaining on track.

Southampton's Potential Interdependencies Identified within Iteration 2

The Masterplan identifies the interdependencies between the constituent ACPs based on an analysis of the broad sections of airspace where a flight path could 'conceivably be positioned' below 7000ft within the scope of each proposal. Based on this broad assessment, the Masterplan identifies that Southampton Airport has potential dependencies below 7000ft with flight paths to and/or from Bournemouth airport and to a lesser extent Heathrow airport.

Iteration 2 pre-dates Farnborough airport's acceptance into the Masterplan however ACOG have updated the interdependency analysis conducted for Masterplan Iteration 2 to incorporate Farnborough. This analysis confirmed interaction with Farnborough airport's routes are likely to be prevalent in future designs. This is as we would expect, as explained in the next section of this document.

Southampton's Existing Airspace Arrangements (Baseline)

Runway and Local Geography

Southampton airport is located in Eastleigh, Hampshire, 3.5 nautical miles (6.5km; 4mi) North-North-East of central Southampton. The airport is owned and operated by AGS Airports which also operates Aberdeen and Glasgow airports.

Southampton has one runway (20/02) and with prevailing winds in the UK from the South-west, in 2019, Runway 20 was in operation 72% of the time (westerly operations) and Runway 02 was in operation 28% of the time (easterly operations).

There are multiple areas of dense population within the local vicinity of the airport as illustrated in Figure 2.

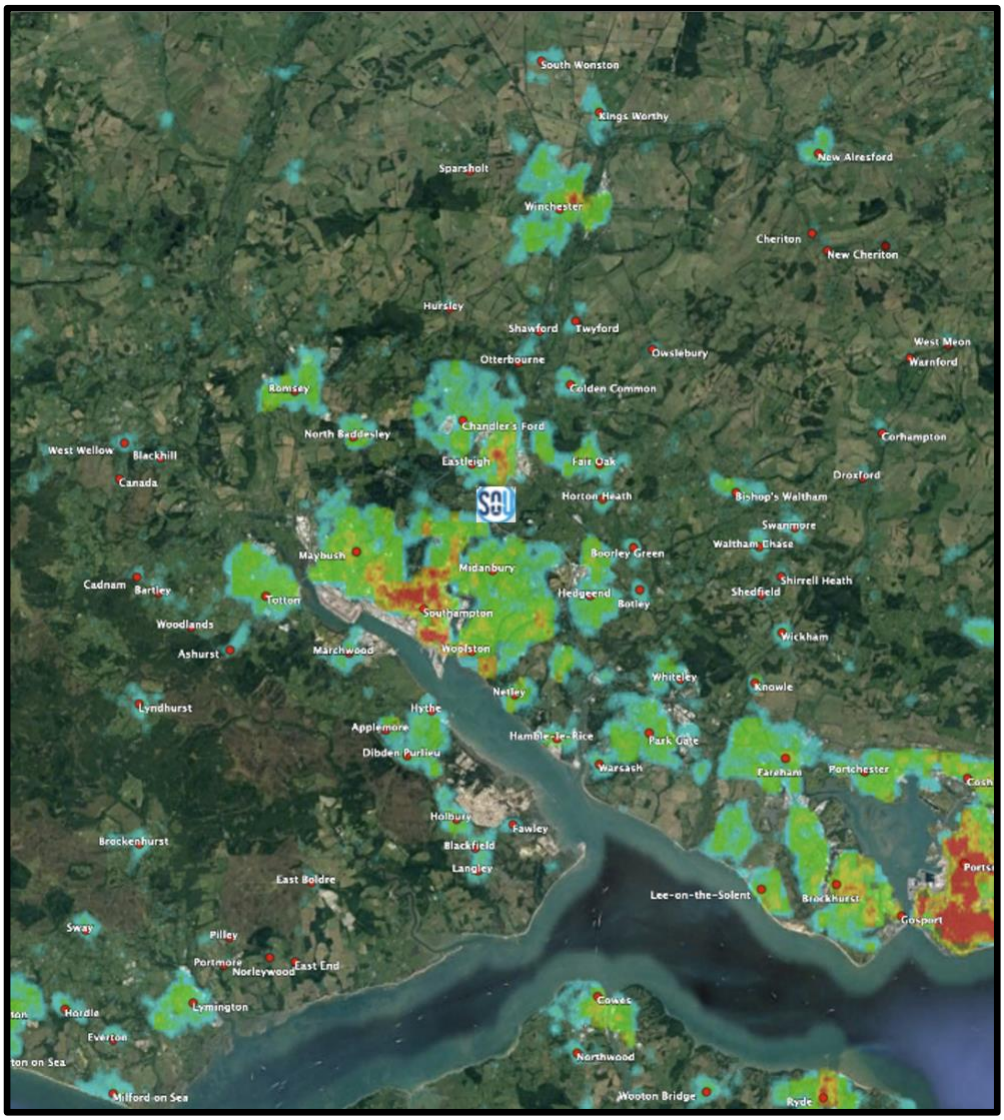

Figure 2: Local population centres

To the South and South-West of the airport is The New Forest National Park and to the North-East of the airport is the South Downs National Park, as shown in Figure 3.

Figure 3: New Forest and South Downs National Parks

Controlled Airspace Arrangements and Adjacent Airports

Southampton Airport is tightly confined by surrounding airspace and airspace users. The Solent Control Area (CTA) and Southampton Control Zone (CTR) are classified as Class D Airspace. The CTR extends from the surface to 2000 feet and the base of the CTA varies from 1500 feet to 3000 feet. The upper level of the CTA is 5500 feet. The airways R41 and R8 are contiguous with the upper level of the CTA. The control area and control zone are shown in figure 4 below.

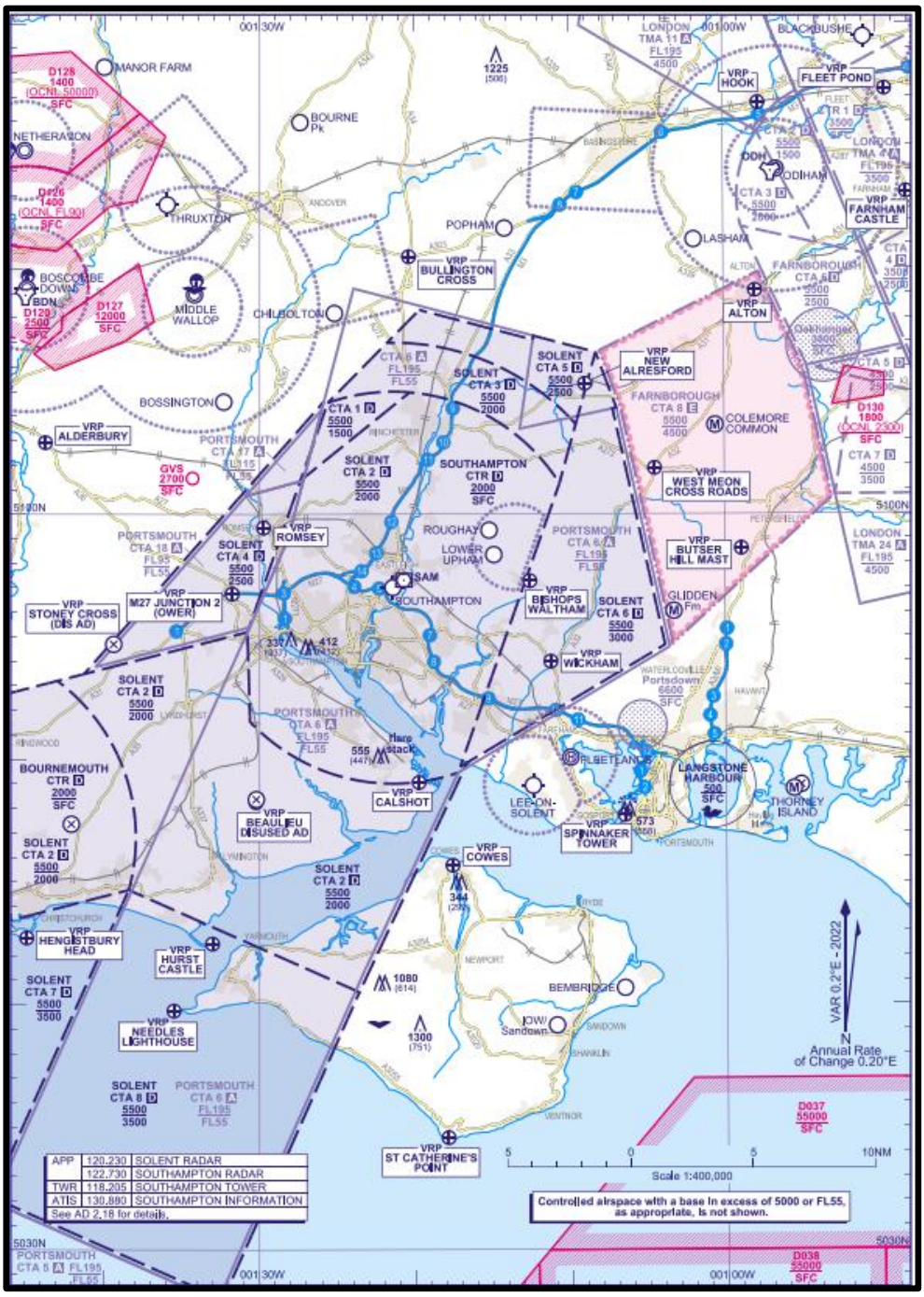

Figure 4:SOU control zone and control area chart

To the north of the CTA, the class G airspace (6500ft to ground level (N) and 5500ft to ground level (NE)), is heavily utilised by the general aviation community operating from various airfields located within these areas. The military bases of MoD Boscombe Down, and AAC Middle Wallop are located to the north west of the CTA, and RAF Odiham is also to the north east.

To the east, Solent CTA-6 is located adjacent to Farnborough's new CTA-8 4500-5500ft Class E with TMZ airspace. There is a delegated function for SOU's Air Traffic Control team (Solent Radar) who coordinate some Farnborough traffic.

The south east area adjacent to SOU's CTA includes Solent Airport, and the MoD Fleetlands airbase. The south east, south and south west areas around the Solent and over the New Forest are also heavily used by general aviation traffic, typically operating below the base of controlled airspace (CAS) and within the areas of Class G airspace.

To the west, SOU's CTA-2 is adjacent to Bournemouth's CTR boundary and sits above Bournemouth's CTR from 2000ft to 5500ft. Southampton Airport's ATC team, Solent Radar, provide an Approach Radar Control Service to Southampton Airport but also provide ATC services to some Bournemouth traffic owing to the combined STARs and interactions with Bournemouth's departures to the north, east and South.

Alongside various GA sites located outside of the CTR/CTA, the following landing strips are situated within the Southampton Control Zone:

Longwood Farm, Owslebury, Winchester
Lower Upham, Winchester
Hill Street Farm, Durley, Botley
Roughay Farm, Upham, Winchester

Data from 2020 showed that the Southampton CTA was the second most[8] infringed[9] airspace in the UK and there is a high priority on improving safety by decreasing airspace infringements. This has been reflected in the design principle '*Avoid introducing additional complexity and bottlenecks into controlled and uncontrolled airspace and contribute to a reduction in airspace infringements'*.

Figure 5 illustrates the CAS infringements recorded in April, May and June 2022. It can be seen that they tend to materialise in the Northeast and Southeast of the Solent CTAs/CTR.

[8] Report from the Airspace Infringement Working Group's Causal Factors Working Group 2020.
[9] An airspace infringement is the unauthorised entry of an aircraft into controlled or temporarily restricted airspace, or an active Danger Area.

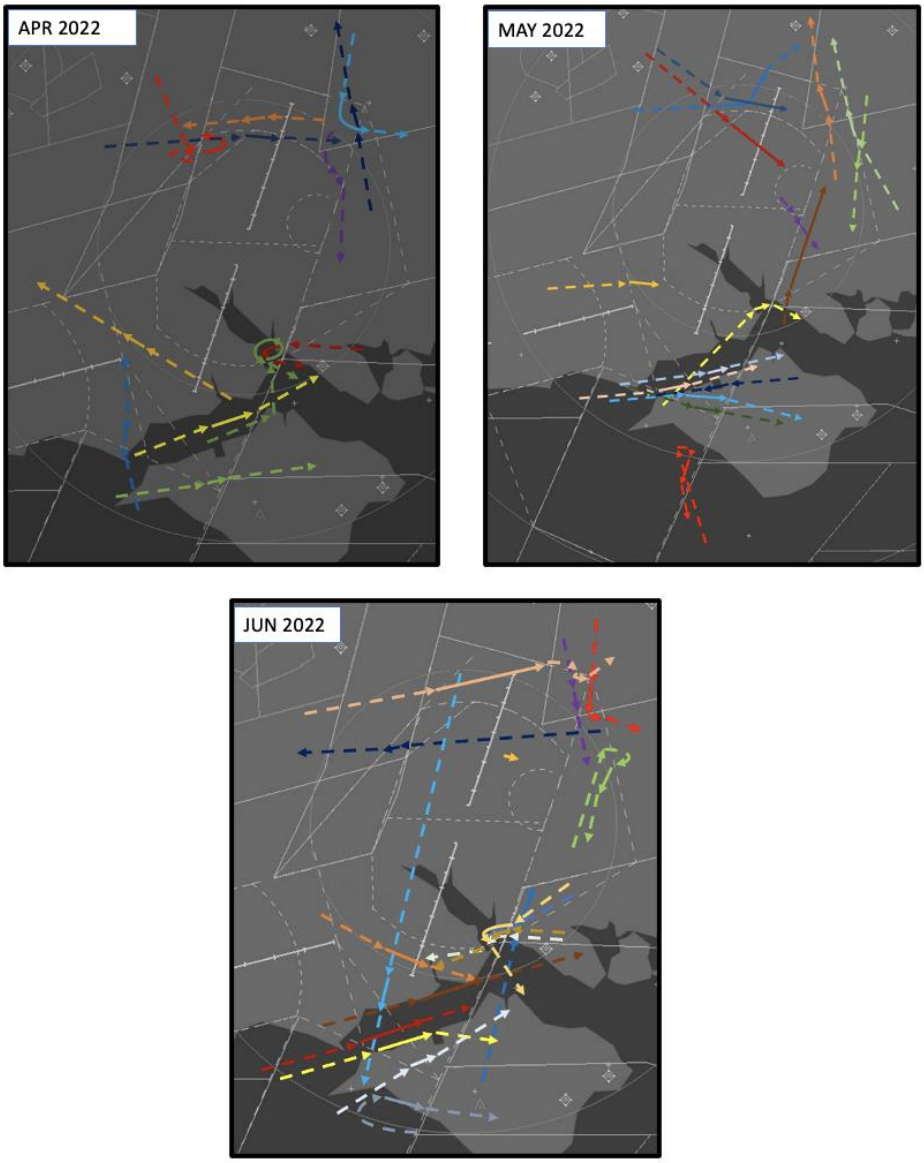

Figure 5: Solent CTR/CTA infringements Apr-Jun 2022

General Aviation

Overall, the class G airspace surrounding Southampton Airport is widely used by general aviation traffic. As part of preparatory work for Stage 2 of this ACP process, research was undertaken into the airspace usage surrounding SOU including within and outside of CAS.

The research supported the understanding that the airspace around Southampton Airport is heavily used by general aviation and this is illustrated in figures 6 and 7 which show the conspicuous GA activity over the period between 27th August and the 10th September 2019. Note this data was recorded ahead of the implementation of Farnborough's CAS and also does not include Primary-only (non-transponding), ADS-B only or Pilot Aware data but it still gives a very good indication of GA traffic density and activity in the region.

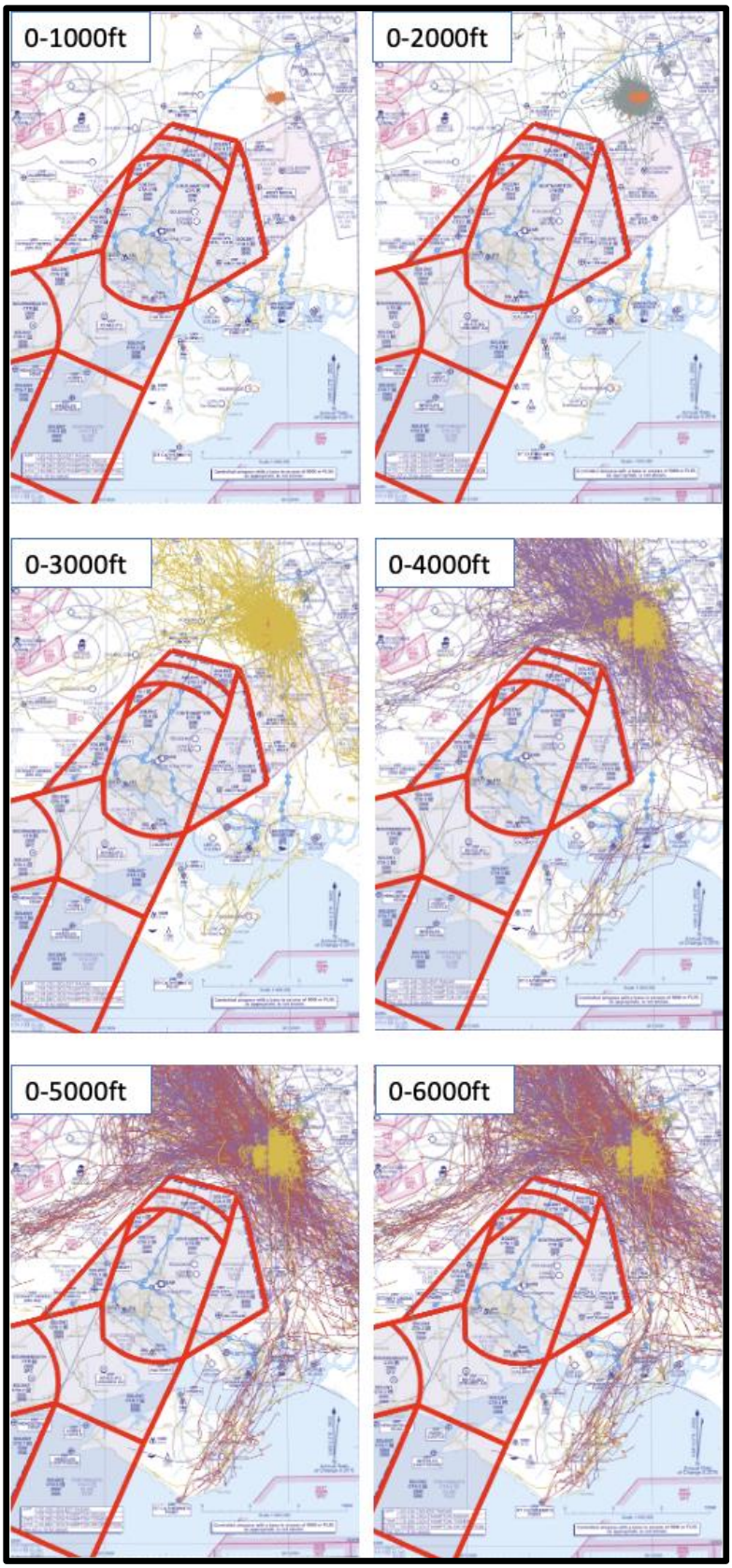

Figure 6: FLARM data from surface to 6000ft, 27/08/19-10/09/19

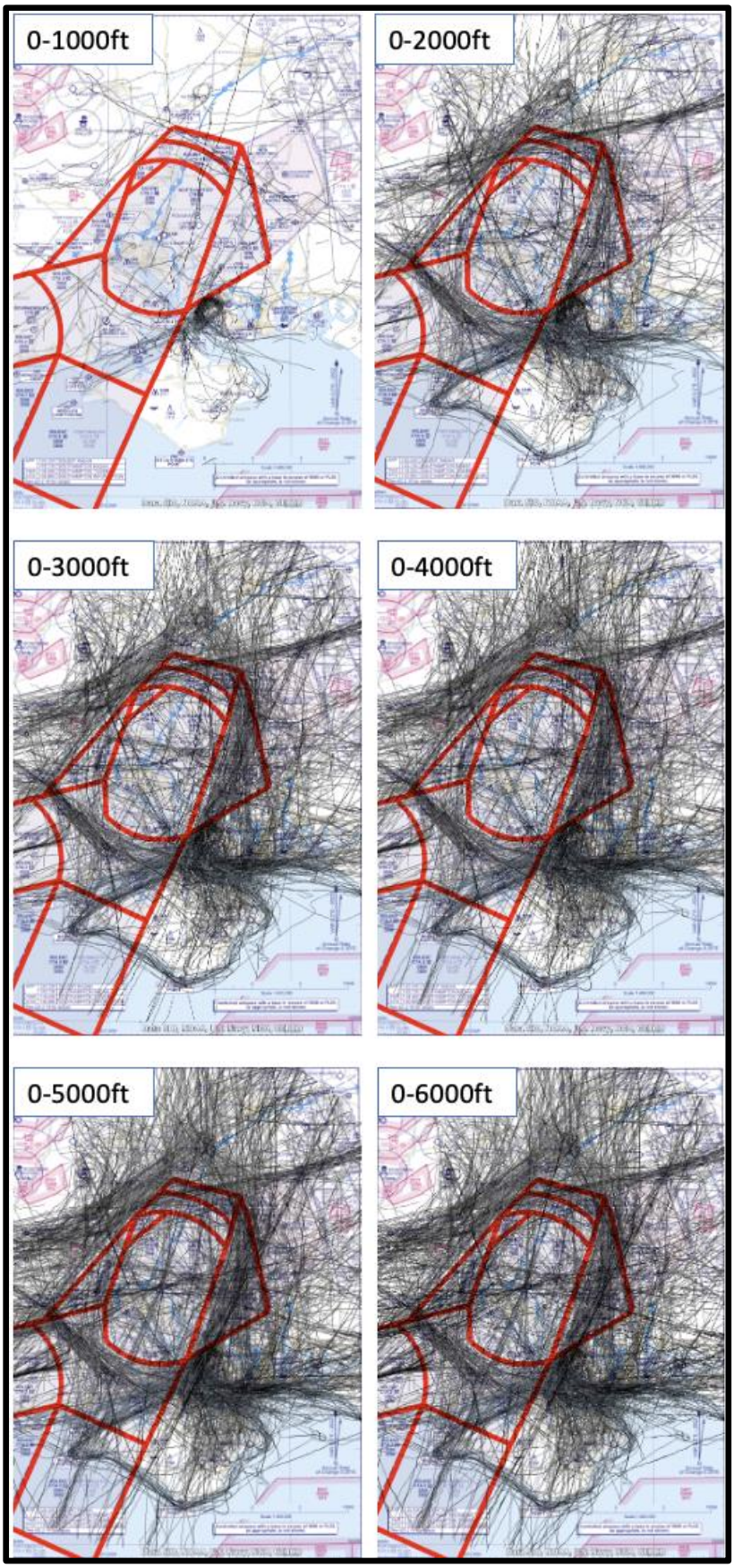

Figure 7: Secondary Radar data excluding commercial traffic 31st May – 6th Jun and 23rd – 29th Jun 2019

In 2017, Airspace4All published a piece of work on VFR Significant Areas (VSA). The term VFR Significant Area denotes a volume of airspace which has been identified as being particularly important to VFR operations i.e. General Aviation (GA). A VSA might take the form of a route, a zone or an area chosen for its particular importance to its GA users. These areas do not have any official status but are intended to highlight the importance of a particular area so that any future airspace development plans can take due account of the GA activity.

Of relevance to Southampton are the 'Boscombe Down & Ranges/Brize Norton/Southampton VSA', the 'Bournemouth-Southampton Gap, the 'Southampton-Gatwick Gap', the 'Heathrow-Southampton Gap', the 'Isle of Wight – Gatwick area' and the 'Isle of Wight - ORTAC Route' which are all illustrated in Figure 8.

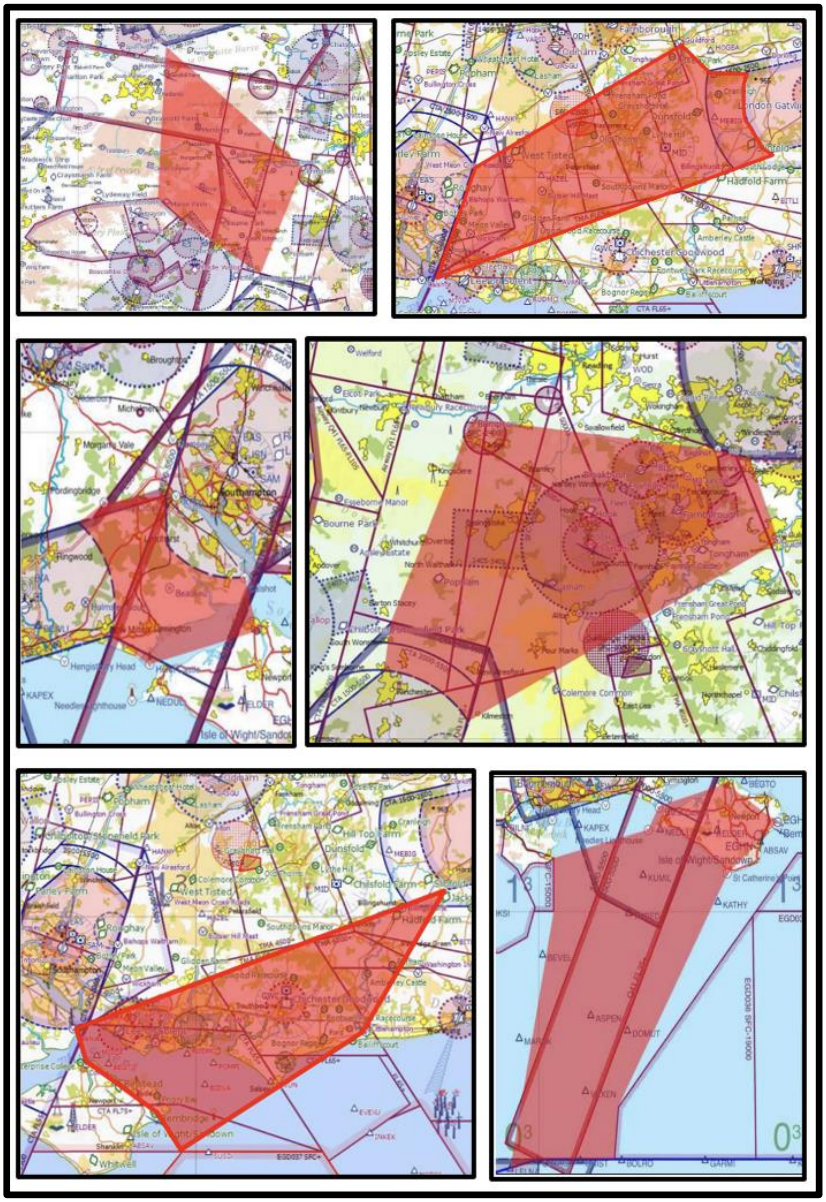

Figure 8: The VSAs around Southampton Airport identified by Airspace4All

These six areas identified by A4A surround the Solent CTR/CTAs and help demonstrate the prevalence of GA activity in the region. Note that this work was produced by A4A ahead of the changes to airspace made as a result of the Farnborough ACP implemented in February 2020.

CAA Airspace Classification Review Consultation

In December 2019 the CAA launched a consultation to ask respondents to identify volumes of controlled airspace, where the classification could be amended to better reflect the needs of all airspace users on an equitable basis.

The key points raised by GA stakeholders to CAA with regards to controlled airspace in the vicinity of the Southampton/Solent airspace were:

- Respondents mention “choke points” between Southampton and Salisbury Plain Danger Area and between Southampton and Farnborough. They have expressed concern about Southampton traffic growth and potential need for more controlled airspace in the future.
- Glider “choke points” mentioned between Popham and Middle Wallop and the edges of Solent CTA 3 & 5.
- Base levels over water are very low for cross-channel flights.
- Solent CTA 2 base level could be raised since it no longer needs to support operating Trislander type aircraft.
- Several responses claim most controlled airspace areas around Solent CTA are under utilised, especially CTA 3, CTA 5 & CTA 6.

One response suggests a more flexible use of controlled airspace around Southampton/Solent where controlled airspace would only be active during the operating hours of Southampton airport.
Another response suggests raising the base level of airspace over the sea to allow safer cross-channel flights in case of engine failure. It has also been suggested to release airspace / raise base levels of Solent CTA 3 & 5 to fit modern day aircraft climb performance, and also help alleviate the choke points between Popham and Widdle Wallop.

Arrivals into Southampton

The en-route network is the airspace above 7000ft which is controlled by NATS En Route Limited (NERL). Southampton's arrivals follow standard arrival routes (STARS) which terminate in the en-route network when the arriving aircraft are at approximately 7,000ft. There are no defined flight paths routinely used by ATC for arriving until aircraft are established on the final approach.

ATC manage the traffic flow, monitor surrounding conditions, and separate all aircraft within the airspace to determine the safest and most efficient routing for aircraft. ATC do this by instructing pilots where to fly using headings, speed controls and altitudes; this is often referred to as 'tactical vectoring'. From the STARs, ATC vector arrivals onto the final approach procedures. Unlike systemised PBN, where aircraft follow specified routes within typically 1nm of the route centreline, tactical vectoring causes larger swathes of aircraft tracks across the airspace, as each aircraft's route is determined by the airspace conditions at the time. Examples of Southampton's swathes for both runway ends are shown in Figure 9 below. These figures were generated using 92 days' worth of data between 16 June and 15 September 2019.

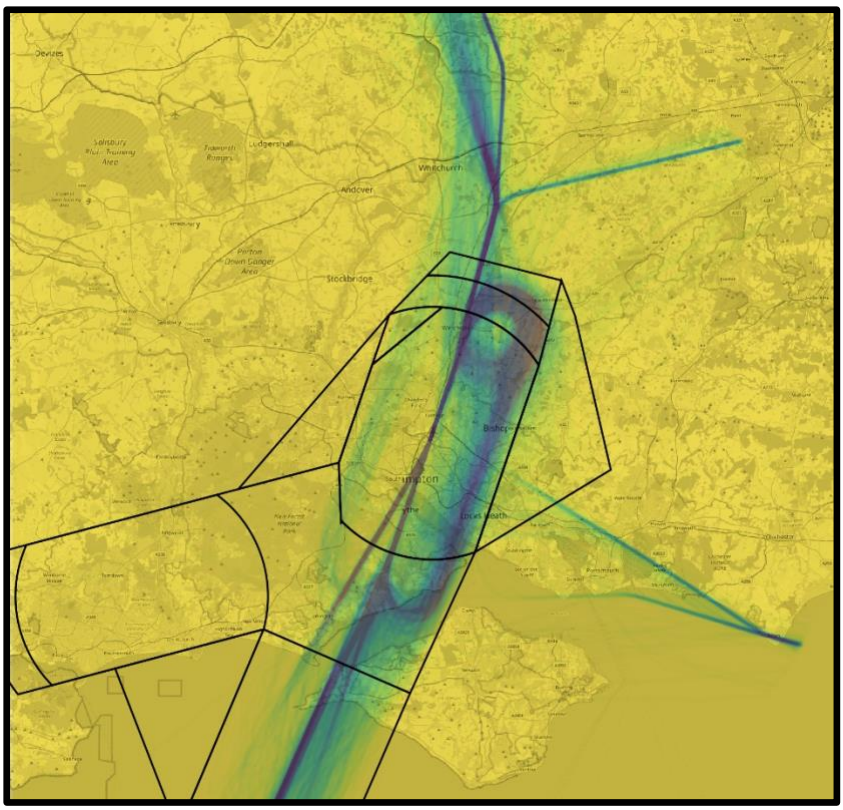

Figure 9: Southampton Heat Map

The airport operates conventional approaches and departures to/from runway 20 including a Category 1 (CAT I) Instrument Landing System (ILS) approach. Runway 02 has conventional approaches and departures, as well as a PBN RNP approach which was introduced in April 2018. A PBN RNP approach was not implemented to Runway 20 at that time, as it cannot be contained within the existing Controlled Airspace boundaries. As described in our Statement of Need, a PBN approach to Runway 20 is one of the issues to be addressed by this ACP.

Aircraft arriving onto runway 20 (arriving from the north), either undertake an Instrument Landing System (ILS) 3.0˚ approach, or a visual approach. All turbo jet and all aircraft with a maximum take off weight (MTOW) of 5700kg or greater must follow the Noise Abatement Procedures. Aircraft flying an ILS approach will join the standard approach path from no less than 8 nautical miles and at a constant 3° angle of approach. Aircraft making a visual approach will be aligned with the centre line of the runway from not less than 2 nautical miles when arriving from a southerly point of origin, and at 5 nautical miles when from northerly, easterly or westerly directions.

Vectoring of arrivals to Runway 20 generates high ATC workload involving four turn and descent instructions in relatively quick succession. ATC need to ensure that these turns are given to pilots in a timely manner to ensure CAS containment, with vectoring close to the edge of CAS a common occurrence. This necessary practise, combined with the high volume of CAS infringements in the Northeast corner of the airspace generates a very strong desire for a PBN approach transition to systemise arrivals to Runway 20. Such a systemised approach would greatly reduce ATC and pilot workload, providing ATC with capacity to monitor and take action against any CAS infringements. The significantly lower workload would also enhance service provision to other airspace users, enabling improved integration. For this reason, each of our options all contain the presence of such a PBN approach transition to Runway 20.

Aircraft arriving onto runway 02 (arriving from the south), can undertake a PBN based approach (RNP APCH), or utilise the Non Directional Beacon (NDB), the Very High Frequency Omni-directional Range Finder with Distance Measuring Equipment (VOR/DME) or undertake a visual approach. All turbo jet and all aircraft with a MTOW of 5700kg or greater must follow the noise abatement procedures. Aircraft flying an VOR/DME, GNSS, NDB or visual approach must align with the centreline of the runway from not less than 5 nautical miles except when flying a visual approach from the north when they must align by 4 nautical miles.

Aircraft will typically elect to use the ILS for runway 20 and the RNP APCH for runway 02, if suitably equipped. Both of these approaches are aligned with the extended centreline of the runway. Arrivals to Runway 02 that are not capable of flying the RNP APCH will typically fly the VOR/DME or NDB/DME approach. These conventional arrivals are not aligned with the runway's extended centreline which result in different final approach paths compared to the RNP APCH, as shown in Figure 10 below.

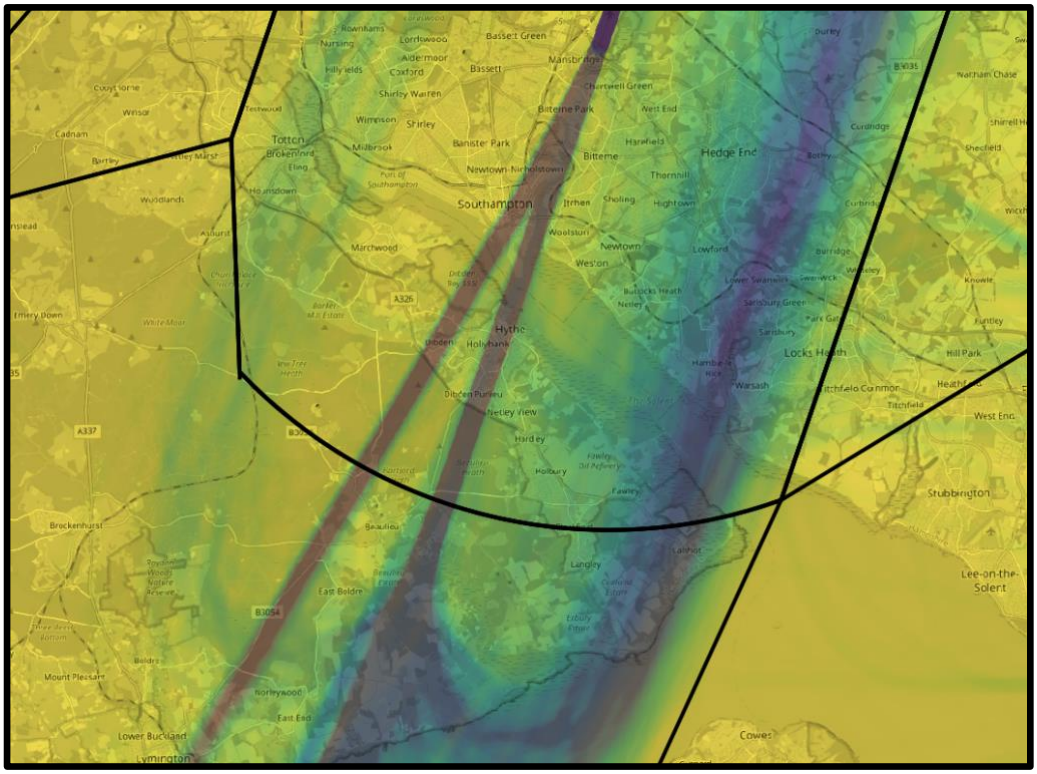

Figure 10: Runway 02 GNSS and VOR Approaches

As a contracting state, the UK has airspace modernisation obligations under the ICAO Global Air Navigation Plan (GANP). That includes adherence to ICAO Assembly Resolution A37-11: implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV-only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches.

Departures from Southampton

Traffic departing Southampton Airport is required to follow noise abatement procedures (NAPs), however there are currently no published standard instrument departures (SIDs) at SOU. Departures are therefore tactically routed to the network entry points by ATC.

The NAPs form part of the existing[10] Section 106 agreement with Eastleigh Borough Council and are agreed with the airport's Consultative Committee. The NAPs dictate the routes for departing aircraft at lower levels, typically to around 2000ft, before they are vectored to the network via a series of waypoints. The NAPs are specified in the UK AIP (UK Aeronautical Information Publication) and are applicable to all turbo jet aircraft and all aircraft with a MTOW of 5700 kg or greater.

The details of the published NAPs in the UK AIP are included in the table below;

[10] A new S106 comes into force when the runway extension is in operation (planned for summer 2023) and includes provision for this ACP which may review the existing NAPs as part of the process.

Take-off Runway	NPR
02	Climb straight ahead until 2.5 DME SAM If VOR SAM is unserviceable, climb straight ahead until 2.5 DME ISN
20	As soon as possible after passing 500 ft ALT, turn right to intercept VOR SAM RDL 217. Maintain RDL 217 until 2000 ft ALT If VOR SAM is unserviceable, as soon as possible after passing 500 ft ALT, turn right to maintain a track 217 MAG until 2000 ft ALT

Table 3: Published NAPs

The point at which an aircraft turns after the NAP adherence varies on a number of factors including the aircraft type, weight, weather conditions on the day, position of arriving aircraft and of the next point in the flight plan. The next point in the flight plan is dictated by the departure direction and the associated Preferred Departure Routes (PDRs) as shown in **Error! Reference source not found.**

Departing to	Route
North/Northwest	NORRY/TABEN (right turn from RWY 20)
East	GWC
South	NEDUL (left turn from RWY 02)
West	As directed by ATC (usually GIBSO)

Table 4: Preferred Departure Routes from Southampton

The use of PDRs and absence of Standard Instrument Departures (SIDs) means that flight paths are less defined at low level than for some other airports. Figure 11 shows the departure swathes from Summer 2019.

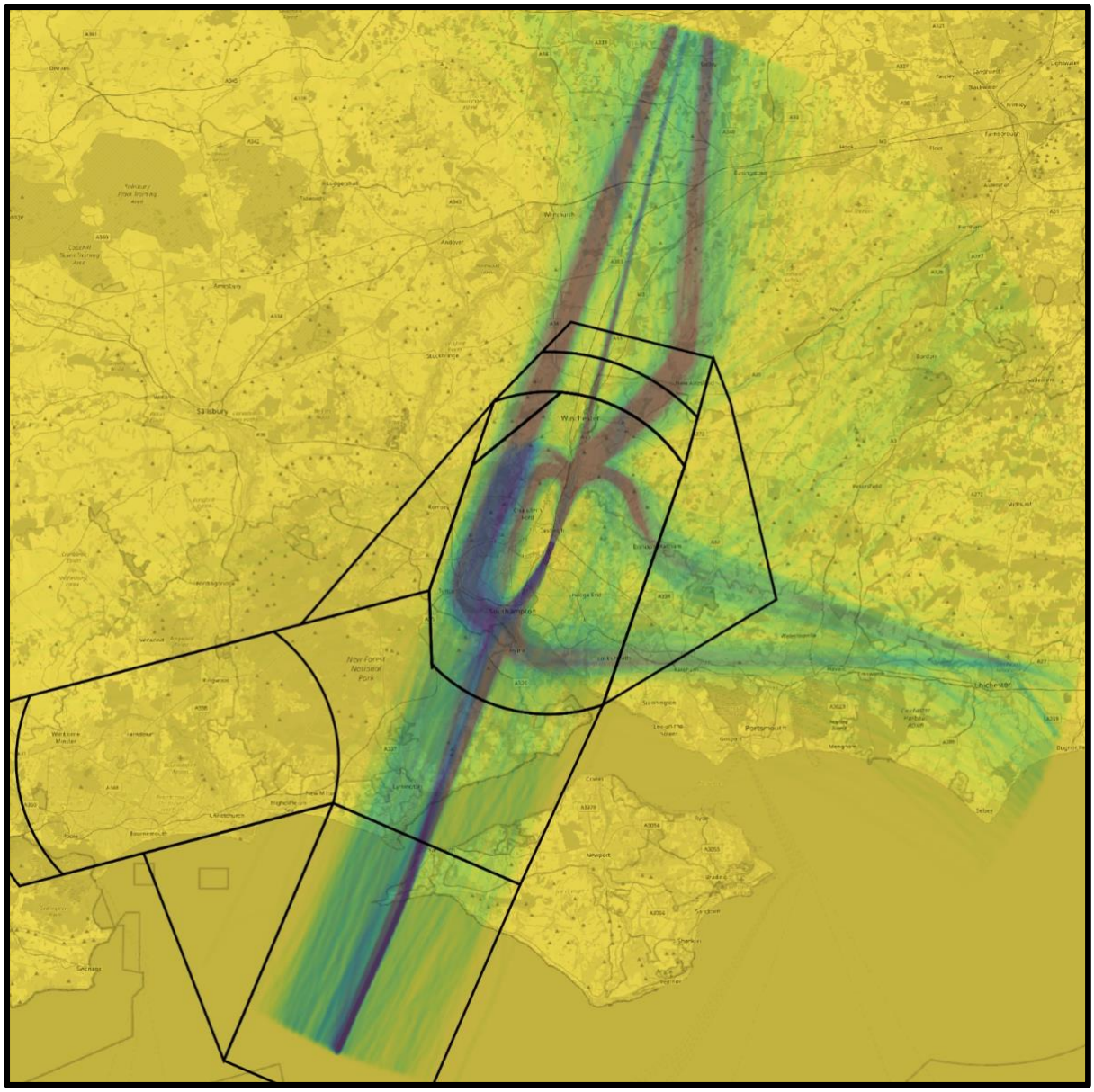

Figure 11: SOU Departure Swathes

Traffic flows and weighting

In 2019, 41% of Southampton's commercial departures were to destinations north of the airport (normally NORRY), 36% to the South (NEDUL), 21% to the south east (GWC) and the remaining 2% to the west (normally GIBSO) as illustrated in Figure 12.

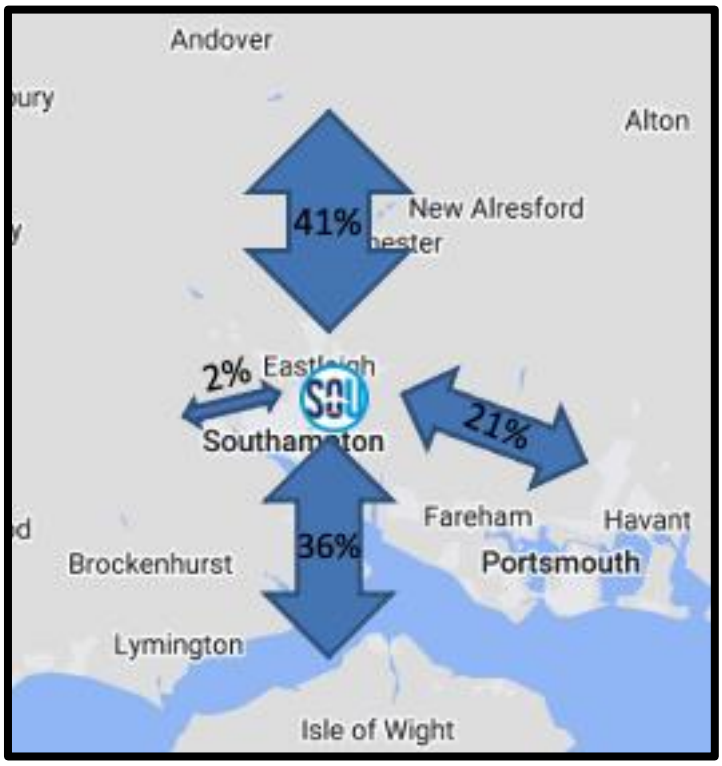

Figure 12: Typical movement flows to/from Southampton airport in 2019

Figure 13 shows how the movements were distributed, on average, throughout the day.

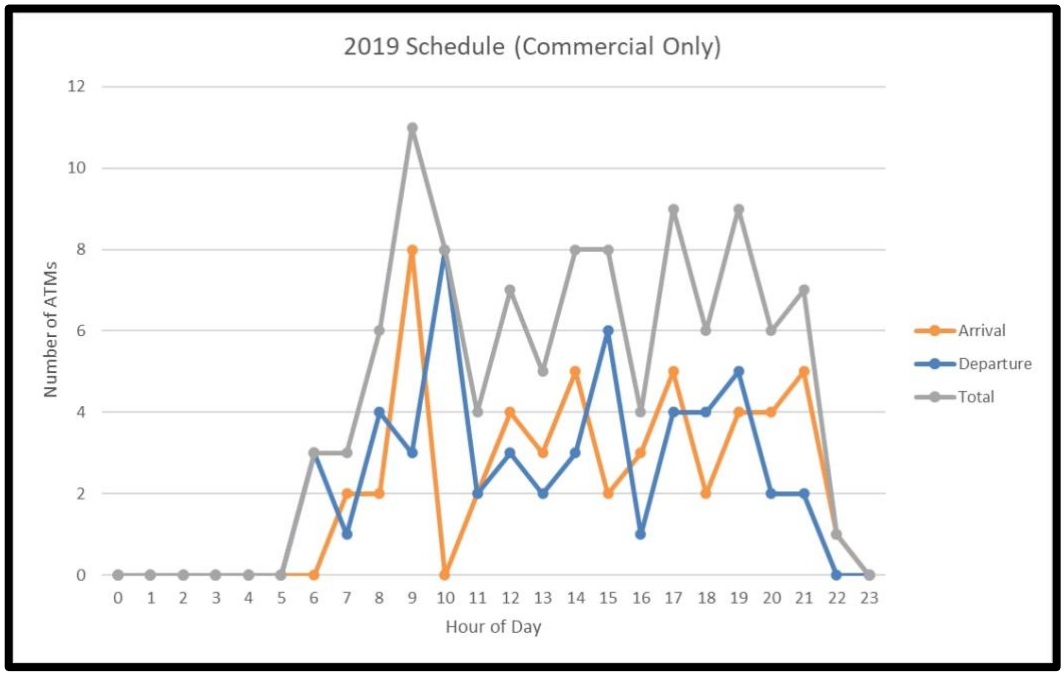

Figure 13: Southampton average daily commercial movements in 2019

Transition Altitude

Even with a redesign and modernisation of the airspace there is a significant and fixed constraint to consider, the Transition Altitude (TA). This is 6,000ft. This section will not explain what the TA is in detail, other than to say the way aircraft reference their height above ground changes above 6,000ft compared to at or below 6,000ft. At or below 6,000ft, they fly at an altitude. Above 6,000ft they fly at a Flight Level (FL).

Whenever aircraft are not laterally separated, they are kept at least 1000ft apart vertically. 5,000ft is obviously 1,000ft below 6,000ft. Similarly, FL70 is 1,000ft below FL80. However, due to the transition altitude, 6,000ft and FL70 are not always at least 1,000ft apart. In fact, sometimes 6,000ft and FL80 are not always at least 1,000ft apart.

This means that the requirement to separate Southampton's own arrivals and departures as well as those to/from other airports means that trade-offs may be required in any future design and CCO/CDO to/from 7000ft may not always be guaranteed.

Runway Extension

On 10th April 2021, Eastleigh Borough Council voted to approve Southampton Airport's runway extension planning application. This will see construction of a 164 metre runway extension at the northern end of the existing runway with works expected to commence in early 2023 and be complete during summer 2023. The extension provides more runway length for RWY 20 departures however, it doesn't change the Thresholds or either Departure End of Runway (DER) locations.

From an airspace and Instrument flight procedure (IFP) design perspective, the runway extension has no impact and is therefore not related to the options development process in Stage 2. However, the extension enables some of Southampton Airport's larger aircraft to fly to destinations further away[11]. As a result we expect to see an increase in the frequency of A320 family movements to destinations to the South. This may change the extant Northbound bias to a Southbound bias in future and will have an effect on the environmental impact assessments and forecasts associated with this ACP.

Southampton's Existing Noise Environment[12]

There are a range of metrics which are used to describe sound and inform policy relating to aircraft.

The most common international measure of noise is the L_{Aeq}, meaning 'equivalent continuous sound level'. This is a measurement of the total sound energy over a period of time. It is easiest to think of this as an average, but important to note that all the sound energy in the time period is captured by this metric. In the UK, daytime aircraft noise is typically measured by calculating the equivalent continuous sound level in decibels (dB) over 16 hours (07:00 to 23:00) to give a single daily figure ($L_{Aeq,16h}$). Night-time aircraft noise is most typically measured over an eight-hour night period (23:00 to 07:00).

As part of the CAP1616 process, the average noise exposure is calculated for the 92-day summer period from 16 June to 15 September. The summer day period is used because people are more likely to have their windows open or be outdoors, and because aviation activity is generally at its most intense during the summer periods. Separate assessment for day and night recognises that daytime and night-time noise can lead to quite different effects (principally daytime annoyance and night-time sleep disturbance) and thus it is better to define and measure daytime and night-time noise separately.

Southampton have a requirement as part of the S106 agreement and noise action plan to publish daytime noise contours on an annual basis. The latest contours generated are based on 2021 movement data. Typically, as part of Stage 2 of an ACP, a sponsor would publish the most recent noise contours available in order to help define the baseline environment. In the case of Southampton, we know that at the point of implementation of the ACP, the airport's runway extension will have been built and will be in operation. This means that if we were to use 2021 noise contours, they would not reflect any changes that may occur as a result of the runway extension. Due to the impacts of Covid-19, the 2021 contours are also significantly smaller, and are not representative of a scenario where the airport has recovered from the impacts of Covid-19. Subsequently for this section we will show the 2021 contours, which are based on actual movement data in 2021, and the 2033 contours published as part of the runway extension application. These 2033 contours are modelled based on the anticipated changes to fleet mix and movement numbers as a result of the runway extension.

[11] It will also mean existing operators are less susceptible to changing wind conditions which can limit their take-off capability and generate delays waiting for calmer winds.
[12] See Glossary for definitions.

Generating noise contours is extremely detailed work and at this stage in the project it is not proportionate to generate such contours for a 2027 baseline (and then for every potential system combination of new design options) which would likely need to be re-done for Stages 3 and 4[13].
For the purposes of Stage 2A we will therefore use the 2033 contours as a basis for assessing potential impacts to the $L_{Aeq\ 16h}$ area (Day) and $L_{Aeq\ 8h}$ area (night) contours as a result of the different design options. These will be updated to inform the assessment of the shortlisted options against the baseline in Stage 3[14] but the existing contours are considered a suitable benchmark against which to help qualitatively appraise options in Stage 2.

The *size* of these contours are determined largely by four main factors:
The type of aircraft using the airport
The number of aircraft using the airport
The frequency of use of each flight path and runway end
The height of aircraft on those flight paths

The *shape* of these contours are directly influenced by the position of the flight paths, especially at c.3,000-4,000ft and below.

Figure 14 and Figure 15 show Southampton's published contours based on actual data in 2021 and modelled runway extension in 2033. Note the 2021 contours are based on annual movement data rather than a 92 day summer period.

[13] CAP1616 Para 146
[14] Noise modelling will be performed to CAP2091 Category C in Stage 3 onwards

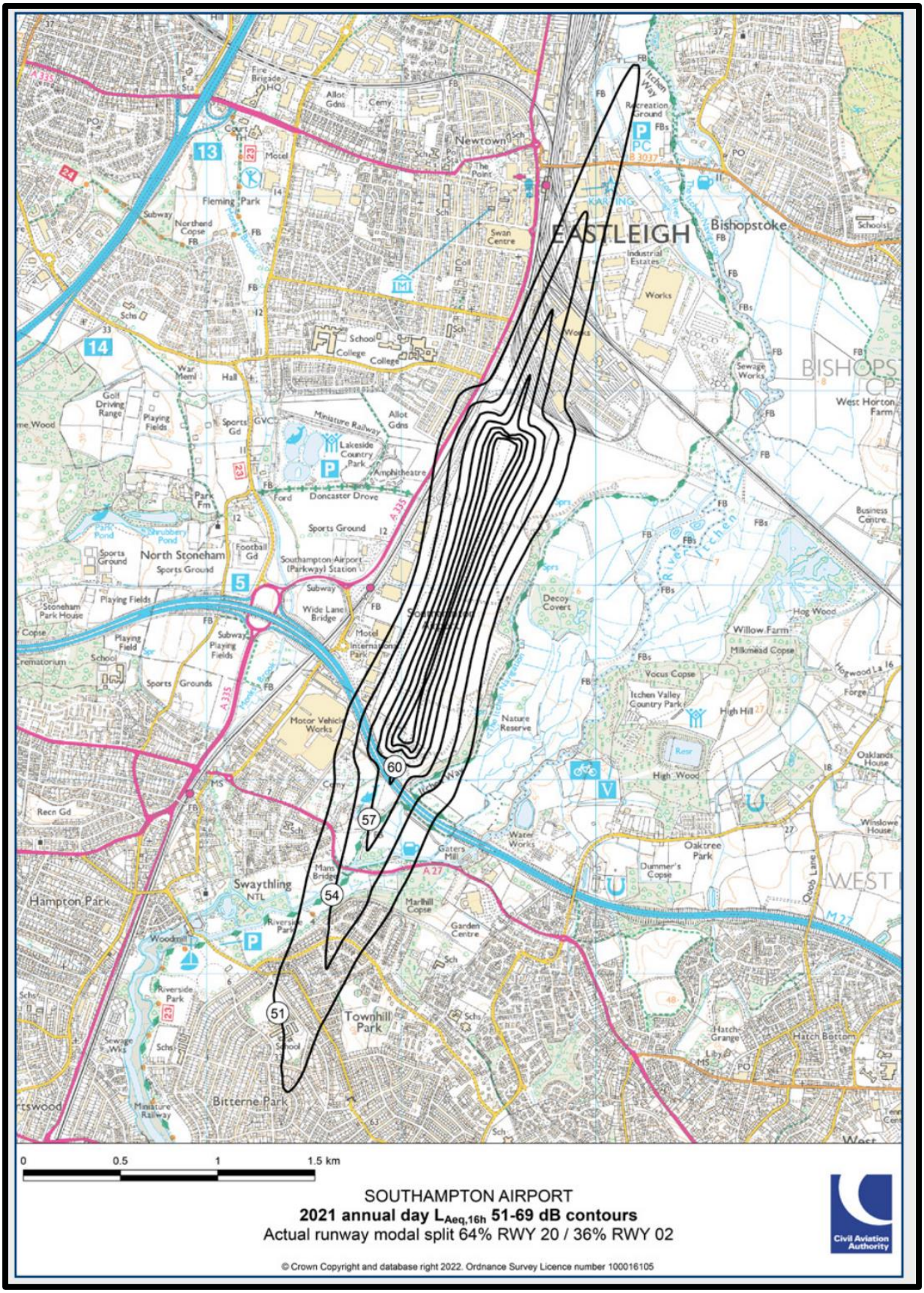

Figure 10: 2021 Annual $L_{Aeq\ 16hr}$ (day) contours. (Runway split: Rwy 20 64% / Rwy 02 36%)

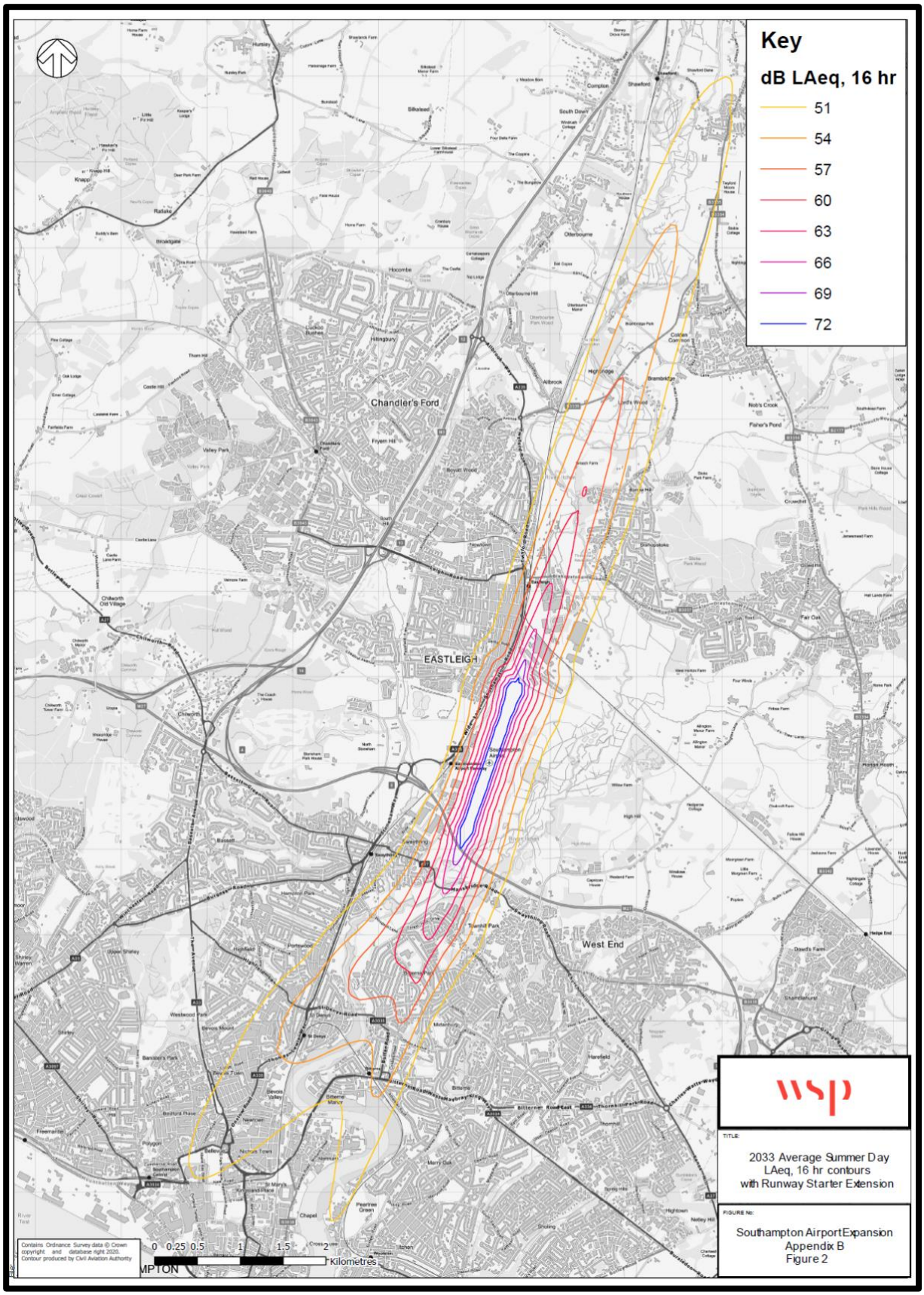

Figure 15 2033 Average Summer $L_{Aeq\ 16hr}$ (day) contours (with Runway Starter Extension)

Contour Population Counts

CAA use population density within certain contours to help inform their decision making. The population numbers are used to help determine the scale of any adverse effects from aircraft noise. Southampton's dwelling and population counts are given for the 2021 daytime contours in Figure 16 and 2033 in Figure 17 below. Population data and household estimates are given to the nearest 100 and are based on data supplied by CACI Information Solutions.

Annual $L_{Aeq,16h}$ (dBA)	Area (km^2)	Population	Households
> 51	2.3	2,000	800
> 54	1.2	100	< 100
> 57	0.7	0	0
> 60	0.4	0	0
> 63	0.3	0	0
> 66	0.2	0	0
> 69	0.1	0	0

Figure 16: : 2021 Annual $L_{Aeq\ 16hr}$ (day) contours. Estimated areas, population and households

Contour Level $L_{Aeq,\ 16\ hr}$ dB(A)	*2016 ESA Baseline (2 mppa) without development*		*2020 Baseline (1 mppa) without development*		*2033 results (3mppa) with-development*	
	Population	***Households***	***Population***	***Households***	***Population***	***Households***
> 51	19,550	8,500	11,450	4,750	46,050	18,050
> 54	9,000	3,800	4,100	1,650	18,250	7,700
> 57	3,100	1,250	1,600	650	7,200	2,900
> 60	800	350	50	< 50	2,400	1,000
> 63	0	0	0	0	450	200
> 66	0	0	0	0	0	0
> 69	0	0	0	0	0	0
> 72	0	0	0	0	0	0

Figure 11 2023 Average Summer LAeq 16hr (day) contours (with Runway Starter Extension)

Continuous Climb/Continuous Descent Performance

There are a number of factors that can influence Continuous Descent and Continuous Climb performance to/from an airport. These can be operational restrictions, interactions with other traffic flows to/from the same airport or another airport and also Controlled Airspace restrictions.

For example, departures will initially be cleared to climb to 3,000ft by the tower, then transferred to Solent Approach who will give further climb, to FL70 or FL80, but subject to any conflicting arrivals, then they are transferred to Swanwick (Terminal Control) for further climb. The time taken between the transfer across the three frequencies can result in aircraft levelling off at those altitudes.

For arrivals, the airspace constraints and high ATC workload, particularly for RWY 20, can result in aircraft frequently unable to achieve Continuous Descent.

The traffic volume affects workload which can also affect Continuous Descent and Continuous Climb performance. Due to Covid and the airspace being much quieter, 2020/2021 data would not be representative of typical performance, therefore data for April 2018 and March 2020 is provided below.

Southampton's performance for continuous descent performance is measured between 7,500ft and 2,500ft due to surveillance coverage limitations below that altitude. Between April 2018 and March 2020, 66% of arrivals performed a Continuous Descent on approach to Southampton.

Southampton's performance for continuous climb performance is measured between the runway and FL100. Between April 2018 and March 2020, 90% of departures climbed continuously on departure to at least FL100.

Options Development and Stakeholder Engagement

This section describes the stakeholder engagement conducted by Southampton Airport for Step 2A of the ACP process and aims to:

- Provide evidence that engagement with stakeholders has created a good understanding of the options development process, including the need for the options to be aligned with the Design Principles in a fair and consistent manner.
- Demonstrate how the stakeholder engagement conducted by Southampton Airport and the feedback received has helped to influence the options development process.

Following the announcement in March 2021 from The DfT and CAA of short-term financial support for the next phase of the FASI programme, Southampton Airport restarted its ACP in September 2021. In that month, we contacted our stakeholders to inform them that the ACP was restarting and that stakeholder engagement for Stage 2 would begin early 2022.

Stakeholder qualification

During Stage 1, Southampton Airport undertook a stakeholder mapping exercise to identify stakeholders that are affected by current airport operations and those that could be affected by any changes associated with the ACP.

Given the breadth of stakeholders potentially affected by any future ACP, the following approach to stakeholder selection in Stage 1 was adopted:

- Involving representatives of communities currently affected by the flightpaths
- Involving representatives of communities that could be affected by future flight paths
- Proactively engaging the representatives of any relevant seldom heard/hard to reach groups, including equalities groups
- Targeting interested parties and/or those with a willingness to engage through future phases as per CAP1616 guidance
- Qualifying participants to ensure we have the right representative

All stakeholders that were identified during Stage 1 as affected by current operations or as potentially affected by future changes, were carried forward into our Stage 2 stakeholder database.

As the ACP process was paused because of COVID-19, and a significant period of time passed, some stakeholders from Stage 1 changed for a variety of reasons (retirement, redundancy, leaving post etc.). As such, before inviting stakeholders to participate in an engagement process for Stage 2, Southampton Airport carried out another qualification exercise to confirm and/or update stakeholder data inherited from Stage 1, which included:

- A desktop update of the stakeholder database where new contact information was available publicly or through the airport (e.g. operational airlines, newly elected MPs).
- Contacted all Stage 1 stakeholders asking them to confirm that they remain the relevant contact or, alternatively, confirm a replacement contact.
- Endeavoured to establish a replacement contact within an organisation if required (e.g. where stakeholders asked to be removed from our database or if previous contacts were generating failed delivery notices, and there was no other organisational contact in our database).
- Mapped qualified stakeholders against our stakeholder categories (as outlined in Appendix C of CAP1616 for Stage 1B engagement and the CAA's engagement plan template), to ensure all stakeholder categories had active contacts that could participate in engagement.

Regardless of whether Stage 1 stakeholders had confirmed if they were the appropriate contact, all Stage 1 stakeholders were retained in our Stage 2 database and received correspondence throughout the Stage 2 process. Evidence of this exercise and engagement is available at Appendix B

The only stakeholders that were removed from engagement and from our database were those that requested to be removed or those contacts that were consistently generating failed delivery notices. In the latter case, we endeavoured to establish an alternative contact for the organisation.

In line with CAP1616, Southampton Airport intends to bring stakeholders on the ACP journey. Using the methods and approach to stakeholder identification and qualification outlined above, Southampton was able to ensure that every effort was made to involve as many Stage 1 stakeholders as possible in Stage 2, and re-engage them ahead of future stages.

Overview of our approach to engagement

Methodology

Our approach to engaging stakeholders is based on the Inform, Listen and Adapt model:

- *Inform* stakeholders of the background, drivers, issues, and opportunities associated with the ACP and the factors that influence options development as outlined in the Design Principles.
- *Listen* to the feedback from stakeholders about the options development process and if it has been guided by the Design Principles.
- *Adapt* the Comprehensive List of Design Options if stakeholder feedback indicates that this is necessary.

CAP1616 makes it clear that the CAA is not seeking detailed discussion on the plusses and minuses of individual design options at Step 2A. Rather, it is looking for sponsors to test their hypotheses with stakeholders, with a view to ensuring the design principles have been met as far as possible.

As such, it was important that we delivered an engagement process that mitigated against the potential for detailed commentary on individual options, and instead promoted reflection on the approach to

options development. To achieve this, we held 'stakeholder briefing sessions' offering appropriate time for feedback and Q&A, as opposed to a workshop style session.

Maximising participation

We hosted five briefing sessions in total during February and June 2022. Two of these were initial briefing sessions to industry: with the first specific to general aviation stakeholders and the second specific to airlines. The latter three in June 2022 open to all stakeholders.

Southampton Airport decided to hold early and separate briefing sessions for general aviation and for airlines at an early stage, prior to the development of design options, to outline to these industry specialists what stage the airport is at in the ACP process and the next steps to deliver Stage 2.

Held on Teams, the virtual briefing included a 20-minute presentation, after which there was an opportunity for discussion and questions of particular interest. While 29 individuals registered for the general aviation session and 5 individuals registered for the airline briefing session, not all these individuals attended. A copy of the presentation given in the February briefing sessions can be found in Appendix E.

In June 2022, Southampton Airport held three stakeholder briefing sessions on its initial design options, which were open to all stakeholders. One of these was held in-person, while the other two were held virtually, using GoToWebinar software.

Stakeholders could sign up to attend the latter three briefing sessions on initial design options through Southampton Airport's dedicated ACP website, or by emailing or phoning the ACP engagement team. We aimed to maximise participation in the briefing sessions using the following measures:

- Issued an initial invite via email to all stakeholders four weeks in advance of the first session.
- Issued a reminder to register via email to all stakeholders three weeks in advance of the first session.
- Mapped registrants against our stakeholder categories, and continued follow up contact with organisations of any stakeholder categories that were under-represented.

The full list of invitees to the briefing sessions can be found in Appendix A. The attendees at each briefing session are outlined in Tables 5-9.

British Microlight Aircraft Association General Aviation Safety Council	Netheravon Airfield
Bath, Wiltshire, and North Dorset Gliding Club	NATS
Goodwood Aerodrome	Sky Surfing Club
Popham Airfield	Ministry of Defence
Phoenix Aviation	Lasham Gliding Society
Hampshire Aerodrome Club	Gatwick Airport

Western Air (Thruxton)	Longwood Airfield
British Helicopter Association	Southern Flyers
Solent Airport	

Table 5: Attendees at Session 1: General Aviation (15 February 2022)

NATS	Signature Flight

Table 6: Attendees at Session 2: Airlines (15 February 2022)

Boultbee Flight Academy	Loganair
Allbrook Parish Council	Ministry of Defence
Hampshire County Council	Lisa Hayes
AXO SOU	Natural England
Southampton City Council	Airspace4All
New Forest District Council	Eastleigh Borough Council
Solent Airport	Bournemouth Airport
Eastern Airways	Flybe

Table 7: Attendees at Session 3: All Stakeholders (23 June 2022)

Southern Flyers	Wessex Local Airspace Infringement Team
Colden Common Parish Council	Hampshire Aeroplane Club
Goodwood Aerodrome	RAF Boscombe Down
Otterbourne Parish Council	Twyford Parish Council
Chandler's Ford Parish Council	Winchester City Council
New Forest National Park Authority	Sky Surfing Club
Western Air (Thruxton)	Vantage Aviation (at Thruxton)

Table 8: Attendees at Session 4: All Stakeholders (27 June 2022)

Bournemouth Airport	Gatwick Airport
Lasham Gliding Society	easyJet
CPRE Hampshire	South Down Gliding Club
Hampshire and Isle of Wight Air Ambulance	Bath, Wiltshire, and North Dorset Gliding Club
Eastleigh Borough Council	Winchester City Council
NATS	Sky Surfing Club
British Helicopter Association	

Table 9: Attendees at Session 5: All Stakeholders (28 June 2022)

Engagement with MPs

We took the decision to engage with MPs on a separate one-to-one basis, as we did in Stage 1. This was to account for the fact that these stakeholders represent multiple communities, possibly with conflicting interests. In May 2022, Southampton Airport emailed Members of Parliament for the local area, offering opportunities to meet with members of the project team to discuss airspace change, Stage 2 engagement, and receive feedback.

Three MPs expressed an interest in these meetings, which resulted in an engagement session with Royston Smith MP in July 2022 and a session with Steve Brine MP, which took place in October.

At the request of Mr Brine, it was agreed that an 'AskTheAirport' event would be held by Southampton Airport for the Winchester community, which is currently scheduled for February. Further to the parliamentarian's request, this event will allow Southampton Airport to engage on a number of issues of relevance to the community, from airspace change to the upcoming runway extension construction and the ongoing Noise Action Plan consultation.

Southampton Airport was subsequently approached by the Office of Flick Drummond, MP for Meon Valley, seeking a meeting with the airspace project team to discuss the ACP. A December date was proposed for this engagement meeting, however other commitments arose for Mrs Drummond, who asked for a cancellation. At the time of writing, Southampton Airport has offered to reschedule the discussion for the New Year, but a date has yet to be agreed.

Additional stakeholder engagement with districts in response to demand

In addition to the agreed programme of stakeholder engagement, Southampton Airport was also approached by its established contacts at Winchester City Council, Southampton City Council, and Eastleigh Borough Council, requesting that its officers receive a further briefing to better understand the design options material presented at the June 2022 briefing sessions.

This was a direct response to a request made by key local stakeholders and demonstrates Southampton Airport's willingness to engage constructively, when asked to do so.

Following receipt of an email on 8th July 2022, Southampton Airport arranged an in-person briefing session with the designated officers of the three local authorities on Wednesday 20th July 2022. The meeting enabled these stakeholders to ask questions of clarification, which Southampton Airport understand helped officers formulate their organisations' response to the Stage 2A engagement.

Additional stakeholder engagement with councillors in response to demand

Following the close of the feedback window on Southampton Airport's Stage 2A engagement, an email was received by officers of Winchester City Council on 27th July 2022, seeking a meeting between the project team and relevant councillors on the local authority.

Consequently, a meeting was arranged between the airspace project team and councillors from Winchester City Council (WCC), which took place at Southampton Airport on Wednesday 21st September 2022. The particular attendees at this meeting were chosen by officers at Winchester City Council and thus included the below:

- WCC Portfolio Holder for Place and Local Plan
- WCC Portfolio Holder for Climate Emergency
- WCC Ward Members for Colden Common and Twyford ward
- WCC Delegate to the Airport Consultative Committee
- WCC Ward Members for Badger Farm and Oliver's Battery ward
- Two Officers from WCC's Public Protection Team
- Representative from Otterbourne Parish Council

The meeting was an opportunity to brief councillors on the airspace change, answer questions, and take feedback.

As part of the session a representative from Otterbourne Parish Council repeatedly raised feedback that was submitted as part of the Comprehensive List of Options engagement in July 2022. This was a demand for all Stage 2 activity to return to the start of the process and for stakeholders to be involved in the detailed design process for developing the comprehensive list of options.

As part of the session on the 21st of September, we explained how the CAP1616 process requires sponsors to engage stakeholders with the options they have created and seek feedback on those options and their relationship to the design principles. It does not request sponsors to design options alongside community groups (or any other stakeholder), most likely as this would result in options biased to that particular stakeholder's interests.

We reassured that any constructive feedback that could be used to develop further options or amend existing options would be considered and we encouraged stakeholders to send information and feedback to our FASI-S email account where we will incorporate it into the most appropriate stage of the process.

Stage 2A briefing sessions and stakeholder feedback

Overview of briefing sessions

During the briefing sessions, stakeholders were given a presentation on the background to Southampton Airport's ACP to date and the approach to options development. They were also presented the options themselves, as well as information on possible changes to the Controlled Airspace Volume. At the time of the briefing sessions, four options were under consideration and stakeholders had an opportunity to ask questions on all of them. They were also informed about the next steps in the process, including how to provide feedback on whether our initial Comprehensive List of Design Options is aligned with the Design Principles.

Participants had opportunities to ask questions throughout the presentation, as well as at the end of the presentation. During the online briefing sessions, questions could either be typed in a Q&A box or asked verbally. All responses to questions were provided verbally to ensure a full answer, and stakeholders were encouraged to follow up over email or telephone if they required more information.

The presentation slides can be found in Appendix E. Table 10 outlines the questions asked during the briefing sessions and Southampton Airport's responses to those questions.

Question	Answer
Will the changes affect the noise preferred routes?	We do have some options that adhere to the noise abatement procedures (sometime known as noise preferential routes) and we have some options that do not adhere to the noise preferential routes. We do not know yet, which ones are going forward, but we are considering both
How important is the prevailing wind for determining runway direction	Very important. The wind direction dictates the runway is use.
Presumably you want approaches and climbs to be as steep as possible?	There are pros and cons of steeper climbs and descents. There becomes a point, where with a steeper approach, for example it can result in more noise because it requires more drag. A steeper climb can be good for noise slightly further away from the airport, because the aircraft is higher, but that can sometimes result in a higher thrust closer to the airport, making it noisier. The optimal gradient depends very much on the type of the aircraft.
Will the runway extension which results in larger aircraft and new destinations affect the assumptions about the flight paths?	No. The runway extension makes very little difference to airspace design. However, it will have an effect on our environmental impact assessments for both with and without a change. The movement and fleets forecasts will look different with a runway extension, compared to without.
Why do aircraft have to hold so close to the airport? Can they not hold over the sea?	When there is a delay, aircraft might be required to hold which could be for a variety of reasons including due to weather conditions. There are holds over the water, but there is also one to the north and one in the overhead. Holding closer to the airport enables aircraft to benefit from a quick

	change in weather conditions enabling them to land sooner.
You helpfully outlined how some options are affected by the extent of the controlled airspace. Is there an opportunity to expand the geographical extent of the controlled airspace to allow options to fit better.	There are options that ignore controlled airspace boundaries and some that try and limit additional airspace. There is opportunity to expand controlled airspace however the Airspace Modernisation Strategy expects a reduction in controlled airspace.
What is the process for changes to controlled airspace?	It's this process, the Airspace Change Process and the stakeholders affected would be the airspace users in that area e.g. local flyers, the military and gliding clubs.
How do you propose to protect populated areas that are overflown by both arrivals and departures, as would be the case in Option 1?	It is not always possible to avoid overflying somewhere with arrivals and departures such as under final approach and climb out from the runway. Other options, such as Option 2 has a northbound SID from Runway 02 that turns away from Runway 20 final approach for this reason. Our Design Principle Evaluation will start to explore the extent to which the options achieve this (DP8).
Will more precise routes lead to higher noise levels for people below those routes and if so, how will you mitigate those impacts	More precise routes lead to increased frequency of overflight for fewer people. This can increase their average exposure to noise. When Southampton Airport decide on their preferred option(s), they will then look at ways of mitigating any adverse impacts.
How will the 4 options that you have presented affect the residents that live closest to the airport i.e. within a 3 mile radius. Will these residents be invited to a consultation?	Absolutely they will be invited to a consultation. There will be a public consultation across all affected areas up to 7,000 feet underneath or in the vicinity of the routes. As for the first part of the question, we cannot answer that now as we haven't done the detailed noise analysis modelling. When we decide on the preferred option(s) there will be a full noise modelling impact assessment done with the impacts presented in the consultation material.
What is the process for deciding which of these options will be taken to the next stage?	The Design Principle Evaluation may result in a shorter list of options followed by the Initial Options Appraisal. After the Initial Options Appraisal, Southampton will state their preferred option(s) and which ones have been discontinued. We could even take some parts

	from different options and combine into a final proposed solution. In stage 3 we will do a Full Options Appraisal on these options and Southampton Airport will then generate a final option to be taken to consultation with all stakeholders.
How much change might still be possible at stage 3?	In the rest of Stage 2 and Stage 3 the options can, and most probably will, change.
When I receive the email with the information from this webinar, can I share it with the people that I represent and can I share the information on a closed social media account.	You are welcome to share the information with members of the group you represent to get their thoughts, so we can get the best possible feedback.
Design principle 5 talks about the airspace accommodation in the masterplan. I remember the then director of airspace policy saying that if you add up all the masterplans in the UK, you end up with many times more aircraft than can ever be fitted in the airspace. Is that actually a driver in deciding the places the aircraft are going to fly over or is it just something that you have to accommodate in the plan.	It's not a driver for where flight paths are positioned, it just means that we have to ensure that the system of routes, the controlled airspace arrangements and operating procedures can accommodate the forecasts of traffic.

Reference slide 16, this only shows conspicuous traffic but I would expect to see more aircraft at low level over the New Forest.	The data received is based on the number of receivers in the area and those receivers are generally hosted at the homes of aviation enthusiasts. It is likely that low level coverage over the New Forest is less optimal than in populated areas where there are more receivers
How do you take account of increased movements to and from Southampton Airport in the future?	We are required to assess based on the traffic forecasts for the year of implementation and then 10 years beyond that date. The modelling in Stage 3 also takes account of population growth forecasts and we have to provide an indication of the future both with and without the change.
What's the existing passenger movements now, compared to 2019?	In 2019 it was c.2 million then with COVID it reduced to 200,000. This year we are hopeful for 650,000. Projections imply that if[15] the new runway extension is built over this winter/spring we may

[15] At the time of this presentation the runway decision was under appeal

	be up to 1 million in 2023, rising to 3 million by 2030-33 timescale. Regardless of our ambitions, we have agreed a passenger cap with Eastleigh Borough Council of 3 million passengers from 2029 onwards.
Do you take account of the seasonality of air traffic in your noise assessments or are they averaged over the year?	CAP1616 requires noise assessments to be based on the 92 day summer schedule not annually.
How do you balance the competing priorities?	Under 4,000 feet we are looking to mitigate and minimise the adverse effects – this starts by trying to limit the population numbers exposed to noise. Between 4,000-7,000 feet, noise is still the priority but so long as there is not a disproportionate effect on CO_2. For example. if the routes are avoiding populations but then you're going in completely the wrong direction and it's having a disproportionate effect on CO_2 emissions, then you can put the emphasis the other way and above 7,000 feet CO_2 is the priority. Note that disproportionate is not defined within policy. In practise it's not always that clear cut which is why you need to look at lots of different options and find out which is the most effective and/or balanced proposal.
How many options do you expect to be presented in the public the consultation?	We don't know yet but it needs to be a manageable number of options. Somewhere between 1 and 4 perhaps. In Stage 3 we have to submit consultation material to the CAA prior to going forward to consultation, where the CAA ensure the material is complete and accessible.
Will there be any potential changes at Farnborough in line with the changes you make at Southampton?	Yes there could be. At this time Farnborough are in Stage 1 of the process thought we expect it is likely that there will be dependencies with Southampton Airport and therefore our ACPs will have to align in Stage 3, if this is the case.

What's the accuracy of aircraft on the flight paths?	Officially it's plus or minus 1 nautical mile 95% of the time. In reality if it's a straight track, then its closer to plus or minus 0.1 nautical miles. On turns it's dependent on the aircraft type, speed, weight, turn angle etc. You would see some sort of spread but you would expect everything to be within in a nautical mile of the centre line.
Has the loss of EGNOS had any impact on your thinking or designs?	No. Southampton have lost their LPV approach on runway 02 so at this time we are just considering LNAV and VNAV as well as PBN to ILS. Whether you have LPV approach as well as a LNAV/VNAV makes little difference to the track over the ground. If a UK EGNOS equivalent came back we could add the LPV line of minima to our arrival designs with no impact on the ground.
Are you aware that exactly where you have your purple additional controlled airspace blobs *[on the PowerPoint]* are the infringement hotspots around the Solent – especially since Farnborough have started to funnel everything to the North East side of the zone and Farnborough itself.	That is an infringement hotspot and still is. The amount of controlled airspace required is dependent on the CAA's controlled airspace containment policy requirements. Today air traffic control is really busy, they are constantly turning left, they have to get every call in to make sure the aircraft turn on time and therefore if there is an infringement the risk of loss of standard separation is high, Benefits of a PBN approach to Runway 20 is that Controller workload is lower, the radio frequency workload is lower and the pilot workload is lower. So if there is an infringement then the controller has more capacity to spot it earlier and make the necessary interventions. The controlled airspace policy is that there is normally a larger piece of airspace around it to protect the route than is currently required by vectoring.

Can you provide greater granularity on the areas you are overflying in the options?	At this stage, we are trying to avoid granularity as we are focussing on explaining our process in creating the options rather than debating the pros and cons of the options. At consultation in the preferred option(s) you will have really detailed maps, where you can zoom in together with a variety of information.
In terms of departures are there prescribed altitudes that you have to get to before you get to the edge of controlled airspace?	There will be, depending on what those boundaries are. If we avoid increasing controlled airspace, then we would need to increase the climb gradients. Routes need to be at least 500 ft above the base of the controlled airspace.
If you were to lower the base of controlled airspace, are you taking into account that you'll get an increase in GA at a lower altitude as a result of this?	Yes that will be a consideration.
How do you assess the impact of air quality?	CAP1616 states that unless you're changing a route below 1,000 ft you're unlikely to have an impact on air quality. At this stage we are saying that if any of these options change a route below 1,000 ft then there could be an impact on air quality – if there is an impact, it could be positive or it could be negative – depending on the air quality of the places that we are flying over now. Stage 3 will require a more detailed air quality assessment.
Have you considered closing the airport down as an option?	No
Are the design principles prioritised/weighted differently?	Not for Southampton. In Stage 1, we asked stakeholders if they should be prioritised but there was not a consensus. The principles are numbered for ease of reference. Design principle DP1, regarding the safety of commercial air transport and general aviation (GA) operations takes top priority, over all other principles. Subject to this overriding principle of maintaining a high standard of safety, the second highest priority principle for our ACP that cannot be discounted is that it accords with the published AMS (CAP 1711) and any current

	or future plans associated with it (DP2). Beyond DP1 and DP2, the other principles are not organised into a priority order.
Can you give assurance that the straight in approach to Runway 20 is not discounted at this stage? Because the other options all have a satellite-based orbit approach so you're still going to have a 'Winchester Orbit'.	No, we can't say yet which options will or won't be discounted in Stage 2.
Is do nothing an option?	Yes it is an option. In Stage 2 we have to evaluate doing nothing against the design principles and we also compare all our options against the Do Nothing scenario. Bearing in mind that doing nothing means nothing has changed in terms of safety and meeting the AMS, we would suspect that the doing nothing option will be discontinued – meaning we've got to do something.
Why do none of these options reduce controlled airspace?	We have only indicated where an option would require additional airspace, not where it can be given away. The purpose of the CTAs and CTR are to contain the instrument flight procedures and vectoring practices. So we need real detail and have an understanding of what those vectoring practices are before you can say the exact volume and dimensions of airspace required. Ideally there is an overall reduction in volume and also a simplification – but a simplification doesn't always mean a reduction.
What's the fallback if navigation systems fail?	Short answer is that there still needs to be fallbacks. The airport may choose to get rid of any conventional approaches that aren't required but they will also keep enough for the resilience of the operation.
When the Southampton VOR is withdrawn will the VOR approaches go too?	Yes we would expect this.
Are you looking at lowering the base of CTA 2 or extending the CTR to the South because from a flight safety point of view the smaller you make	The way the instrument flight procedure is currently designed doesn't ensure 500 ft above the base of the controlled airspace.

that gap the more issues you are likely to have with airspace configuration and airproxes.	We need to look at if we could design it slightly differently to not need that CAS increase but we also need to consider the risks of increasing the CAS versus living with the current containment. Especially, considering there wouldn't be any commercial flights going into the additional controlled airspace.
What relationship have you got with Bournemouth? Are they expanding their controlled airspace to the east? If so this gap that you're talking about is going to get narrower.	Bournemouth are still in stage 1 of the process and haven't got into stage 2 yet, they are coming to the next session online in the next few days. We understand that they haven't got any options yet because they are not in that stage yet. However, both airport's consultation have to be 'aligned' so stakeholders can understand the cumulative impact of proposals. Masterplan Iteration 2 requires this. This is the same for any other sponsor of airspace change within the Masterplan.

Do some of the options only address some and not all of the design principles?	We try to address them all, but there are some options, which by addressing those design principles score less favourably on others. For example, if we avoid the New Forest national park on some routes, it will add on 5 miles to the journey, which is poor for CO_2.
Do take-offs produce more CO_2 emissions than landings?	The thought generally is that yes, they do, because they are using more thrust and fuel in the departure phase of the flight, but you also must consider the entire profile of the flight, from arrival to destination.
Is there any likelihood of the CAA reviewing the plus or minus 3-mile controlled airspace containment on routes?	The policy says that the primary protection area around a route centre line should be contained within controlled airspace. If you have a straight route, the lateral protection area decreases, if you have a curved route the protection area increases, since there will be more variation. Where the primary area cannot be contained the policy says that 3nm is required unless alternative mitigations can be provided.
What is the issue with flying over national parks? The population density is usually much lower, so the noise issues will be less intrusive.	That is one argument. Air navigation guidance 2017 says that you should avoid flying over

	national parks and AONBs where practical. It also says noise is the priority below 4,000 feet. Note that these areas are often given these statuses to preserve their tranquillity, so that members of the public can go and enjoy this tranquillity.
Are any of the options that put routes west of Southampton and towards the National Park more likely to conflict with Bournemouth operations?	Yes. If we put arrivals over the New Forest National Park, we would expect this to have increased interactions with Bournemouth Airport's routes.
Are aircraft stacking or holding areas being considered as part of this programme?	Yes, they are. There is currently one to the north, there is also one over the English Channel to the South East and in the overhead of the airport. The outer holds could change. Part of our discussions with NATS are about where the best place for the holding areas are.

Table 10: Questions asked and answers provided during the Stage 2A briefing sessions on 23,27 & 28 June 2022

Whilst none of these comments, influenced changes or additions to the options, the questions did inform our understanding of areas of concern stakeholders have with certain options.

Generating further feedback

Southampton Airport wanted to ensure that all stakeholders had an opportunity to provide feedback on its options development process, regardless of whether or not they had attended one of the briefing sessions. We achieved this by making all the relevant information (presentation slides, Design Principles and the Comprehensive List of Design Options) and a recording of one of the June 2022 briefing sessions available to view on Southampton's dedicated ACP website. This enabled stakeholders to submit informed feedback, even if they did not attend a live briefing session.

All stakeholders in our database received an email after the briefing sessions asking them to submit feedback via an online feedback form, regardless of whether or not they had attended a briefing session. We also offered to post hard copies of the feedback form or email Microsoft Word versions if required. No such requests were received.

To ensure that we heard from as many stakeholders as possible, we used the following methods to maximise the response rate:

- Issued an email to all stakeholders explaining how they can provide feedback (including stakeholders that did not attend a briefing session).
- Issued a reminder email to all stakeholders asking them to provide feedback (including stakeholders that did not attend a briefing session).

- Provision of briefing session materials and recording of the briefing session on a dedicated Southampton ACP website.
- A dedicated Southampton ACP email address and freephone information line to encourage and coordinate correspondence.
- Bilateral engagement between the sponsor and individual stakeholders, where this was requested.
- Extended the feedback window from four weeks to six weeks (from a deadline of 26th July 2022 to a deadline of 9th August 2022) to encourage additional stakeholders to provide feedback (an additional reminder email was issued).

After the feedback period closed, we issued correspondence to all stakeholders (including those who did not attend the briefing sessions) to outline the next steps in the ACP process.

Stakeholder engagement log

Table 11 sets out the chronology of the engagement activities conducted to develop our design principles. A full engagement log that records all forms of engagement with our stakeholders during the course of the engagement is provided in Appendix B, with copies of all of the correspondence in Appendix C.

Engagement activity	Date
ACP restart	September 2021
Emails issued to all Stage 1 stakeholders advising of the restart to Southampton's ACP	Monday 13th September 2021
Email issued to MPs advising of the restart to Southampton's ACP	Wednesday 15th September 2021
Email issued to all general aviation stakeholders on the list at this time, inviting them to register for a specific and early briefing session on Tuesday 15th February 2022.	Thursday 20th January 2022
Email issued to all airline stakeholders on the list at this time, inviting them to register for a specific and early briefing session on Tuesday 15th February 2022.	Friday 21st January 2022
Email distributing Teams meeting link to general aviation stakeholders who had registered for their early and specific briefing session.	Tuesday 8th February 2022
Email distributing Teams meeting link to airline stakeholders who had registered for their early and specific briefing session.	Tuesday 8th February 2022
Email reminding general aviation stakeholders to attend their early and specific briefing session.	Monday 14th February 2022

Email reminding airline stakeholders to attend their early and specific briefing session.	Monday 14th February 2022
Email sharing the materials presented at the 15th February briefings to all general aviation and airline stakeholders on the list at this stage.	Wednesday 16th February 2022
Email issued to all Stage 1 stakeholders, plus those added to the list, asking them to confirm or nominate a point of contact for their organisation.	Friday 13th May 2022
Email issued to all Stage 2 stakeholders, inviting them to register to attend one of the three June 2022 briefing sessions.	Wednesday 25th May 2022
Email issued to all MPs, offering an opportunity to meet the project team and discuss Southampton's ACP.	Wednesday 25th May 2022
Email issued to all Stage 2 stakeholders, reminding them to register to attend one of the three June 2022 briefing sessions.	Monday 6th June 2022
Email issued to those who had registered for a June 2022 Stage 2 briefing session, sharing advance reading ahead of the meeting.	Tuesday 21st June 2022
First June 2022 Stage 2 stakeholder briefing session (Virtual).	Thursday 23rd June 2022
Email issued to stakeholders who registered for the 23rd June Stage 2 briefing session, containing instructions on how to leave feedback.	Monday 27th June 2022
Second June 2022 Stage 2 stakeholder briefing session (In-Person).	Monday 27th June 2022
Email issued to stakeholders who registered for the 27th June Stage 2 briefing session, containing instructions on how to leave feedback.	Monday 27th June 2022
Third June 2022 Stage 2 stakeholder briefing session (Virtual).	Tuesday 28th June 2022
Email issued to stakeholders who registered for the 28th June Stage 2 briefing session, containing instructions on how to leave feedback.	Tuesday 28th June 2022
Email issued to all stakeholders (including those who did not register for a briefing session) providing a link to the briefing session materials on the ACP website and inviting feedback by Tuesday 26th July 2022.	Tuesday 28th June 2022
Email issued to all stakeholders, reminding them to submit feedback on Southampton's ACP by Tuesday 26th July 2022.	Tuesday 12th July 2022
Email issued to all stakeholders, advising them of an extension to the feedback period by two weeks, and highlighting the new deadline of Tuesday 9th August 2022.	Tuesday 19th July 2022
Email issued to all stakeholders, reminding them to submit feedback on Southampton's ACP by Tuesday 9th August 2022.	Thursday 4th August 2022

Email issued to all stakeholders, reminding them to submit feedback on Southampton's ACP by Tuesday 9th August 2022.	Monday 8th August 2022

Table 11: Chronology of engagement activities

In total, 43 organisations provided feedback on Southampton's approach to options development. All the responses from stakeholders are provided in Appendix D.

The following sections summarise the feedback received and provides responses to that feedback.

Community, Business, and Local Government Stakeholder Feedback

Southampton Airport received written responses from 23 community, business, and local government stakeholders. Full copies of all the feedback received are in Appendix D.

Stakeholder	Summary of Feedback	Southampton Response
Hampshire Chamber of Commerce	Pleased to see that the Design Principles adopted include a need to enable the airspace to be capable of accommodating the growth predicted within the airport's masterplan whilst also aiming to minimise and where possible reduce adverse impacts on health and quality of life from aircraft noise, degradation of air quality and impacts on ecology and recognition of the impact on residents' health and well-being. The use of varied and multiple options is supported to ensure an equitable split of traffic, whilst it is also important to balance the importance of the region's superlative natural environmental assets with the airport's ongoing growth. As such we support the use and order of the design principles.	Noted although this engagement is not about the order of the Design Principles.
New Forest District Council	Positive view of the engagement undertaken, in view of video and webinar presented.	Noted.
Twyford Parish Council	Queried who produced the Design Principles, and who would judge the ACP against these. Suggested that the translation from Design Principles to Operating Concepts, and from Operating Concepts to draft	The design principles were evolved through stakeholder engagement in Stage 1 of the ACP. The Stage 1 report can be found here. This report explains that the design principles are not weighted, other than principles 1 and 2 taking priority. Note that Policy (such as the Air Navigation Guidance 2017 and DfT's Altitude Based Priorities takes priority over the design principles).

	routes had been undertaken without community involvement. Suggested that the process for determining the weighting of Design Principles should be transparent. Suggested that the Design Principles omit consideration of the regulated rule of noise prioritisation below 4,000ft. Proposed the creation of a Winchester-focused stakeholder group to consider the development of Operating Concepts, the formulation of routes and the implementation of airspace change.	The CAP1616 process requires sponsors to engage stakeholder with the options they have created and seek feedback on those options and their relationship to the design principles. It does not state sponsors are to design options alongside community groups (or any other stakeholder). That would likely prejudice options to the benefit of those communities.
Allbrook Parish Council	No additional feedback beyond questions answered.	Noted.
Hursley Parish Council	Hursley Parish Council believe that Southampton Airport took all the important decisions alone in Stage 1, without the communities affected having a fair say on how the Design Principles should be weighted and applied. Hursley Parish Council supported Otterbourne Parish Council in its concerns.	The design principles were evolved through stakeholder engagement in Stage 1 of the ACP. The Stage 1 report can be found here.
Otterbourne Parish Council	Otterbourne Parish Council wrote a joint letter with Compton and Shawford Parish Council: Suggested that the translation from Design Principles to Operating Concepts, and from Operating Concepts to draft routes had been undertaken without community involvement.	See response to Twyford Parish Council.

	Suggested that the process for determining the weighting of Design Principles should be transparent. Suggested that the Design Principles omit consideration of the regulated rule of noise prioritisation below 4,000ft. Proposed the creation of a Winchester-focused stakeholder group to consider the development of Operating Concepts, the formulation of routes, and the implementation of airspace change.	
Compton and Shawford Parish Council	Argued that a special educational facility (Shepherds Down Special School) is affected by aircraft at low altitudes and that less populated routes are available. Suggested that aviation industry and general aviation are over-represented, with commercial interests taking priority over local pollution and quiet enjoyment. Compton and Shawford Parish Council wrote a joint letter with Otterbourne Parish Council: Suggested that the translation from Design Principles to Operating Concepts, and from Operating Concepts to draft routes had been undertaken without community involvement.	The existing RWY 02 southbound departures appear to routinely overfly Compton and Shawford. We have options that continue to do this but also options that turn earlier and would avoid the area. This may result in more overflight of other areas such as Otterbourne and Chandlers Ford. Detailed overflight analysis will take place in Stage 3. In line with the CAA's guidance in CAP1616, Southampton Airport has engaged with a broad range of representative stakeholders regarding its airspace change. These range from users of airspace, such as general aviation and commercial airlines, to representatives within communities who can speak to local issues, notably parish councils, community associations, district councils, and the county council. Over the course of this ACP engagement, various groups have requested to become formal stakeholders, resulting in new general

	Suggested that the process for determining the weighting of Design Principles should be transparent. Suggested that the Design Principles omit consideration of the regulated rule of noise prioritisation below 4,000ft. Proposed the creation of a Winchester-focused stakeholder group to consider the development of Operating Concepts, the formulation of routes, and the implementation of airspace change.	aviation groups and parish councils becoming engaged between Stage 1 and Stage 2. Southampton Airport continues to consider and take account of feedback from all stakeholder groups. See also response to Twyford Parish Council.
Colden Common Parish Council	Wrote of concerns that no information was given about how the airport prioritised airspace Design Principles and no opportunity was given for comments on the prioritisation of the Design Principles.	The design principles were evolved through stakeholder engagement in Stage 1 of the ACP. The Stage 1 report can be found here.
Steve Brine, MP for Winchester and Chandler's Ford	Communities in Winchester should not be excluded, but fully engaged with SIA in all decision making steps from the translation of the design principles into draft route and airspace change options. To facilitate appropriate community engagement, investigation and decision making for the airspace changes over Winchester district, should involve representatives from WCC, HCC and affected Parish Councils As there are likely to be post implementation issues, the	Stage 2 requires that sponsors engage with the same stakeholders that were involved in creation of the design principles in Stage 1. In line with the CAA's guidance in CAP1616, Southampton Airport has engaged with a broad range of representative stakeholders regarding its airspace change, including community representatives. During Stage 1, communities in Winchester were represented by the County Council, the City Council and parish councils within the district. During Stage 2, additional parish councils requested to become stakeholders. Communities in Winchester have therefore not been excluded during this process in either stage, with Stage 2

	engagement of the communities should continue beyond initial implementation so communities can ensure all future decision making considers the Winchester community viewpoints fairly.	offering even greater representation for Winchester communities than Stage 1. These stakeholders will continue to be stakeholders during the course of this ACP and throughout the implementation of the airspace change
Cllr David Fuller, Member of Southampton City Council	Please ensure that, whatever decision is taken, it doesn't make the situation worse for those who live directly under the flightpath in Southampton.	Noted
New Forest National Park Authority	We expect impacts on the New Forest National Park to be transparently assessed and reported on as the airspace change proposal progresses. The inclusion of design principle 9 is a positive start and the aim of avoiding overflying at low levels our National Parks – which are enjoyed by millions of people of each – should be key in the airspace development process.	Noted. Our evaluations and appraisals will be published on the CAA's Airspace Change portal once complete.
Winchester City Council	Stated that now is not the appropriate time to comment on the merits, or otherwise, of the options developed to this point. Expressed hope that sufficient exploration and explanation will be given to the Design principles that address flying over less populated areas, such as the Itchen navigation, whilst appreciating that a fair and equitable share of traffic across all routes will need to be considered. The council will want to carefully assess the noise impacts on our residents including in the	Our evaluations and appraisals will be published on the CAA's Airspace Change portal once complete. Please note these may not include detailed noise models, those will be produced in Stage 3 as part of the Full Options Appraisal of the shortlisted options. These appraisals, which will be initially undertaken at Stage 2B, and then in further quantitative detail in Stage 3 and Stage 4, will include reviewing potential impacts to the S106 agreement and the Noise Abatement Procedures (NAPs). The consultation at Stage 3 will include details of the options, how they may alter the NAPs, and any proposed new NAPs (sometimes referred to as NPRs).

	settlements of Twyford, Shawford, Otterbourne, Colden Common and Winchester. Expressed hope that any CAA agreed routes will be enshrined in Noise Preferred Routings (NPRs) that extend to cover the Winchester District as well as Eastleigh's area	
Damian Hinds, MP for East Hampshire	No comments left on submission.	N/A
Flick Drummond, MP for Meon Valley	Wrote to say that she has no comments to make on the engagement.	N/A
Cllr Tony Bronk, Member of Winchester City Council	Stated that what is missing is an indication about how the competing desires within the Design Principles will be prioritised when designing options. Stated that he would like to see whether a route over the Itchen could be an option and an assessment of which Design Principles this would fulfil and which it would not. For each potential route, he would like to see how they meet the Design Principles and why different routes might be proposed. He is concerned that flexibility for the airport and flight operators will have the greatest weight. Concerned that the public consultation will not include a southern approach, where the narrowest route is used thus	Design principles 3-16 are not prioritised. The purpose of the design principle evaluation is to understand the extent to which each of the options meets each of the design principles. It is unlikely that a single option will fully meet all the design principles but we will be seeking to take forward and evolve those options that best meet the majority of the design principles. The River Itchen meanders considerably however we do have options that overfly part of it on both runway ends. We also have options that specifically fly over the Solent. All options will be evaluated fairly and transparently with details of those evaluations and appraisals published on CAA's Airspace Change Portal.

	minimising the wide distribution of noise and pollution but concentrating it to sites that can the focus of meaningful mitigation.	
Eastleigh Borough Council	Stated that while the Design Principles have been taken into account in devising 4 options, the Council has yet to give a view on the balance of those principles and the optimum outcome for Eastleigh residents. Suggested that the main issues of concern for Eastleigh Borough Council beyond safety are noise (volume, type, frequency, intensity, duration), climate change and air pollution. Underlined an expectation that the Airport needs to fulfil its obligations as set out in the s106 agreement in relation to the runway extension.	The design principle evaluation will set out the extent to which each option meets each design principle and this will be published on CAA's Airspace Change Portal.
Natural England	No feedback beyond answers to the questions.	N/A
Southampton City Council	The Council is keen that any changes to the airspace have a beneficial and demonstrable impact to reduce noise and air pollution for residents and contribute to sustainable economic growth as well as a net zero Southampton by 2035.	Noted.
A resident	Queried how can it be that the noise preferred route is over local communities such as Southampton, which is made up of so many families with children.	Noted although these are comments about the existing operation and not to the options proposed.

	Stated that the two schools in Bitterne are regularly distributed by the now larger and more intrusive flights. Stated that quality time at home with families is disturbed by excessive flights at the weekends, some of which start as early as 07:00 on a Sunday morning.	
AXO SOU	Requests that minimising noise (DP7) is given priority above environment (DP6) and preferably higher still. This is because although we are obviously concerned about climate change emissions and pollution, aircraft noise from Southampton Airport is excessively high. AXO feels that Southampton should take this opportunity to reduce the burden of noise on local people. Concerned that there was no indication of possible respite routes in the options presented. The wording of principle 7 ('to minimise and where possible reduce') implies that noise impacts may not necessarily be reduced compared with current routes. Queried whether there are plans to introduce an equivalent noise cap once the new airspace is decided. Unsure what the purpose of the formal public consultation is, given that you stated in response to one of the questions that little	The design principles were evolved through stakeholder engagement in Stage 1 of the ACP. The Stage 1 report can be found here. This report explains that the design principles are not weighted, other than principles 1 and 2 taking priority. Note that Policy (such as the Air Navigation Guidance 2017 and DfT's Altitude Based Priorities takes priority over the design principles). At this stage, options have been created and will be assessed on the extent to which the options reduce overflying the same communities with multiple routes in both easterly and westerly configurations. Achieving this will in itself provide relief from noise for some communities. In Stage 3 when we have fewer options, we will consider whether multiple routes are required and/or possible in order to further mitigate the impacts of concentration. Schedule 5 of the airport's Section 106 agreement states: 4.1.2 in the event that a new airspace design is adopted for the airspace surrounding the Airport or in adjacent airspace that affects the operation of Aircraft in the airspace surrounding the Airport by the Civil Aviation Authority or the Secretary of State: (a) the Council and the Owner shall agree an alternative cap or noise control which reflects the revised airspace and

	change would be possible following the consultation. Protest the claim in the video showed about the benefits of aviation, that it brings in £20m from inbound tourism. Stated that this ignores the £30m taken out of the economy by outbound tourism.	following such agreement the Owner must Comply with the alternative cap or noise control (as appropriate); and (b) thereafter, and subject to the agreement referred to in sub-paragraph (a) above, the Noise Contour Cap shall cease to apply. 4.2 In agreeing an alternative cap or noise control in accordance with paragraph 4.1.2(a), the Council and the Owner must have regard to: 4.2.1 the effect of the revised adopted airspace design; 4.2.2 projected future demand at the Airport; 4.2.3 latest Government and Civil Aviation Authority Guidance on the management and assessment of aircraft noise; 4.2.4 the economic and health effects of any alternative cap or control; and 4.2.5 comments of the Noise Forum. The public consultation allows the airport to gather information and to understand views about the impact of the proposal. It allows consultees to provide relevant and timely feedback to the airport. Change is possible as a result of the consultation. In this circumstance, there may be a requirement for further consultation if the impacts presented in the original consultation are now different as a result of the change.
Wickham Society	Supports the design principles developed in Stage 1 of the Airspace Change Proposal and the approach taken using 2019 data. However, notes that none of the 4 options mention DP14, DP15 or DP16 Queries whether these aspects within the statement of need be addressed at a later stage in the process.	This is correct. Design principles 14-16 cannot be addressed at this stage based on the available information. DP14 and DP16 applies to the operation of the airspace design rather than to the construct of the designs itself. Combination effects (DP15) will be taken into account in the Initial and Full Options Appraisals and also explored in the design principle evaluation. Note that Bournemouth do not have any designs against which we can consider combined

		effects in detail. Masterplan Iteration 2 requires that our consultation material in Stage 3 will have to provide details on such combination effects.
Southampton Commons Parks and Protection Society	SCAPPS supports seeking ways to reduce adverse effects on tranquillity of the National Parks. SCAPPS asks that consideration is given to seeing if the changes can be so-arranged as to keep to a minimum over-flying of The Common by aircraft approaching & departing from Southampton Airport.	Assessment of the impacts on Historic Parks and Gardens is required by CAP1616 and will form part of the Full Options Appraisal in Stage 3.
Eastleigh Borough Council	Stated that while the Design Principles have been taken into account in devising 4 options, the Council has yet to give a view on the balance of those principles and the optimum outcome for Eastleigh residents. The main issues of concern for our Council beyond safety are noise (volume, type, frequency, intensity, duration), climate change and air pollution. We expect the Airport to fulfil its obligations as set out in the s106 agreement in relation to the runway extension; the Council will only consider variations to that agreement that would see improvements for our Parish area (e.g. noise impacts and quality of life for residents).	Southampton are required to undertake an ACP in order to meet the Government's Airspace Modernisation Strategy (AMS), which aims to 'Deliver quicker, quieter and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace'. As part of this ACP we will appraise our options against the 'do nothing' pre-implementation baseline. This appraisal covers a broad range of potentially impacted areas including noise, emissions, and air quality. This allows us to identify the benefits and impacts of the proposed option against the 'do nothing'. These appraisals, which will be initially undertaken at Stage 2B, and then in further quantitative detail in Stage 3 and Stage 4, will include reviewing potential impacts to the S106 agreement. The information from which will inform discussions with the council around any potential changes to the agreement.

Table 12: Summary of Stage 2A Community feedback

General Aviation, Airlines, and Industry Stakeholder Feedback

Southampton Airport received written feedback from 16 general aviation, airlines, and industry stakeholders. Full copies of all the feedback received are in Appendix D.

Stakeholder	Summary of Feedback	Southampton Response
British Helicopter Association	No additional feedback beyond answers to each question.	N/A
Popham Airfield	Stated that remodelling the airspace involving an extension, laterally or vertically, of the existing pattern will impact detrimentally on general aviation operation and safety to the NE & SW of the EGHI centrelines, as well as impacting, certainly, the E centreline at EGHH. In none of the 2A presentations was any indication given as to any trade-off suggestions which may improve safety by alleviating airspace pressure on these pinch points (e.g. raising base of CTA2 or changing its extent laterally, or indeed stepping what is a very large area to the SW of CTA2). The area around Popham and Lasham, already 'squeezed' by Farnborough ACP, has become, and will become more of a funnel to the detriment of the DP1 (& DP13). I would like to have seen a further option explored which is not based on and illustrated by the existing controlled airspace. The routings used to define inbound and outbound STARs and SIDs are all based within the confines of this CAS, no attempt is made to	Concerns of CAS increased are noted. Feedback will be used to inform the design principle evaluation and initial options appraisal. As advised in the briefing sessions and in the slides "Appreciating that all reduction in CAS are welcome, this slide only aims to highlight the general areas where more CAS would be required to enable feedback on the potential impacts to GA in those areas" although the slides do make suggestions as to where there could be scope for reductions in CAS. All the options consider flight paths that ignore the existing CAS construct. For example, the straight in approach to Runway 20 from the north, the RNP-AR arrivals to RWY 02 from the SE over the Solent, RWY 20 departures which follow the Solent and Runway 02 departures to the North and West – none of these options 'fit in' the existing controlled airspace. i.e. The routings used to define inbound and outbound STARs and SIDs are NOT all based within the confines of existing CAS but some options do look to minimise the changes to CAS required. The design options on the face of it may appear generally aligned to existing traffic flows and that is because the points in the upper airspace network

Stakeholder	Summary of Feedback	Southampton Response
	'blue sky' the whole potential airspace areas. More mention should be made of future technologies, given the timescale of the ACP. Flexibility should be built into the detailed consultation to allow for, nae assume, that capabilities of both GA and CAT in conspicuity and operational capability will change rapidly (e.g. DP14).	where those aircraft are going to/coming from are not going to change significantly i.e. the interfaces between the UK and adjacent Flight Information Regions will remain broadly intact and constraints such as the Boscombe Down Danger Areas will continue to exist. DP14 applies to the operation of the airspace design rather than to the construct of the designs itself.
Hampshire Microlight Flying Club & Thorney Island Microlight Flying Club & British Microlight Flying Club	Stated a belief the activity map published, showing GA activity in summer 2019, under-represents the amount of this activity because there is a significant amount of traffic which is not FLARM/ADSB, or indeed any form of EC equipped. This comprises, amongst others, a significant proportion of the microlight fleet, and also vintage aircraft. Noted that all of the options presented show an increase in controlled airspace, and given the increase in precision to be expected from the use of PBN, would challenge discounting the 'do nothing' option - particularly as all presented options are contrary to DP13 (avoid increasing the overall volume of controlled airspace). Concerned that the reduction in base of controlled airspace to 1500' both over the New Forest (the Southampton/Bournemouth 'gap'), and also to the north west	Agree, the GA activity map shown only includes ADSB and FLARM data but does now provide Primary only radar data and it could therefore understate the levels of GA activity. Note, we did show the map to highlight the very dense GA activity in the region, we weren't trying to suggest it's not that busy. i.e. this showed a best-case scenario. As advised in the briefing sessions and in the slides "Appreciating that all reduction in CAS are welcome, this slide only aims to highlight the general areas where more CAS would be required to enable feedback on the potential impacts to GA in those areas" although the slides do make suggestions as to where there could be scope for reductions in CAS. It is true to say that each option does require additional CAS to contain any form of PBN arrival to RWY 20 and we also highlighted the area to the South of the CTR with reference to the existing RNP APCH. The way the instrument flight procedure is currently designed

Stakeholder	Summary of Feedback	Southampton Response
	of the airfield where the current CTA base starts at 2500' and drops to 2000' would contradict DP13, as they increase the amount of controlled airspace in these areas. These proposals also contradict DP7 and DP9 specifically with respect to GA traffic noise – this would be more concentrated at a lower level (and in the case of DP9, over the New Forest). In summary, the BMAA/HMFC/TIMC would strongly oppose any options which reduce the base of controlled airspace below 2000'. Additionally, where that base is over water, reducing the base adds an additional safety risk as glide clear opportunities are worsened. Emphasised the need to cooperate and discuss impacts with Bournemouth and Farnborough.	doesn't ensure 500 ft above the base of the controlled airspace. We need to look at if we could design it slightly differently to not need that CAS increase but we also need to consider the risks of increasing the CAS versus living with the current containment. Especially, considering there wouldn't be any commercial flights going into the additional airspace and the potential increase in risk to GA that has been suggested. The opposition to any base of CAS below 2,000ft is noted and the feedback will inform our evaluations and options development.
Western Air (Thruxton)	Argued that change can be a combination of some additional controlled airspace balanced by a reversion of some current Class D airspace to Class G, the latter being accomplished by a raising of certain current CTA lower limits. Specifically, we envisage that such changes will be practicable in CTA 2 (between Bournemouth and Southampton CTR), CTA 6 and CTA 8, albeit possibly by sub-division of current CTA sub-sections (as shown in the UK AIP Control Zone and Control	As advised in the briefing sessions and in the slides "Appreciating that all reduction in CAS are welcome, this slide only aims to highlight the general areas where more CAS would be required to enable feedback on the potential impacts to GA in those areas" although the slides do make suggestions as to where could be scope for reductions in CAS. Thank you for your additional suggestions.

Stakeholder	Summary of Feedback	Southampton Response
	Area/CTR Chart at page ENR 6-38). It is further considered that the Southampton CTR lateral limits to the east and west of the airport could be contracted, being replaced by CTA with a lower limit of 1500 FT. It would appear that any additional controlled airspace will need to be focussed on areas to the north-east and south-west of the CTR in order to protect aircraft on or shortly before intercepting the final approach track for either runway. From what we perceive from the limited design requirements already disclosed we currently have no concern.	
Vantage Aviation (at Thruxton)	Our main concerns are the likely changes required to lower the base of controlled airspace of CTA2 to 1,500'; CTA3 +5 to 1,500' and to extend the CTR South Westerly towards Bournemouth. Our concerns apply to all four options. We consider these likely changes are not in line with Design Principles DP1; DP3; DP5; DP13 and DP15. DP1. General Aviation users will NOT be as safe as they are today. GA traffic routing beneath CTA2 eg Stoney Cross – Beaulieu – Cowes etc will need to fly no higher than 1,300' QNH (vide 1,800' today) to avoid infringement.	Thank you for highlighting the concerns with such detail, there are some common themes to those provided from other GA stakeholders. These concerns will be taken into consideration and options development in our evaluations as well as in Stage 3 when developing proposals for CAS boundaries. As advised in the briefing sessions and in the slides "Appreciating that all reduction in CAS are welcome, this slide only aims to highlight the general areas where more CAS would be required to enable feedback on the potential impacts to GA in those areas" although the slides do make suggestions as to where could be scope for reductions in CAS.

Stakeholder	Summary of Feedback	Southampton Response
	GA traffic crossing the Solent towards the IoW will have insufficient altitude to glide clear of the Solent. GA traffic routing beneath CTA3 and 5 will need to fly no higher than 1,300' (vide 1,800'/2,300' today). The minimum safe altitude for this area VFR is approximately 1,300' allowing for unmarked obstructions. GA traffic flying in opposite directions will be in conflict. DP3. Lowering the base of CTA2 will create a vertical bottleneck to GA traffic. This bottleneck will also be narrowed laterally if the Southampton CTR is extended South West towards Bournemouth. This will lead to a significant increase in airspace infringements by GA traffic. DP13. All four Options increase the volume of controlled airspace. There appears to be no useful benefit to GA of any of the possible increased volumes mentioned in the Report. DP15. Overall, GA access to the IoW and onward to the Channel Islands and Europe will be made less attractive and less safe.	
South Down Gliding Club	Argues that the reduction in movements after the collapse of Flybe means that additional controlled airspace cannot be justified.	Concerns on any CAS increases particularly to the East, North and West, particularly to the East between Southampton and Farnborough are noted.

Stakeholder	Summary of Feedback	Southampton Response
	GA & Gliding traffic mostly go around the East, North and West of the existing airspace as you show in the density plot. Any changes to the lateral boundaries of that airspace would be a disaster for the Club. Expressed safety concerns about the existing chokepoint between Southampton and Farnborough airspace and urged no expansion to this controlled airspace. Requests that Southampton designs airspace routes based on a climb gradient that is higher than 8% and thus reduces CAS required. Stated Southampton's ACP should be delayed so as to be co-ordinated with all the other ACPs in progress in the South of UK.	Southampton Airport's ACP is part of the Masterplan and fully integrated with the ACPs being co-ordinated by ACOG.
Bath, Wilts, and North Dorset Gliding Club	Disagrees that more controlled airspace is needed, suggesting that Southampton should leave no stone unturned to reduce controlled airspace. Opposes the reduction of height available for GA in the region and hopes for a reduction of controlled airspace. Expressed an expectation that modern flight profiles and instrumentation will allow commercial traffic to operate higher and closer to the airport, rejecting the idea that more low-level aircraft needs to be	Unfortunately, changes to CAS boundaries are required for any PBN arrival to RWY 20. Had they not have been, the airport would have implemented them at the same time as the RNP APCH RWY 02 some years ago. Some of our other options would require changes to CAS due to the CAA policy on Controlled Airspace containment.

Stakeholder	Summary of Feedback	Southampton Response
	incorporated. Argues that saving fuel on flights is not a good reason to damage the rights and freedoms of GA.	
Lasham Gliding Society & British Gliding Association	Stated that the group would oppose, on safety grounds, any increase in the amount of Class D airspace in the area from the north west of Winchester, all the way around to the south east, near Portsmouth. Stated that he would like the movement data for 2021 / 2022 to be included within the ACP submission. Stated that Southampton Airport should review the traffic levels in the areas underneath CTA-3 and CTA-5 and carry out a safety analysis of the risks of lowering these stubs. Stated that a reduction in the size, and an increase in the height of CTA 6, would be very welcome, as this triangle of airspace tends to funnel VFR traffic around it and through a corridor that been created by the implementation of Farnborough's TMZ CTA 8. Additional points via email: Stated that Option 4 would result in the closure of Lasham Gliding club. Stated that the traffic figures you used were for just before Flybe stopped operations, suggesting	Unfortunately, changes to CAS boundaries are required for any PBN arrival to RWY 20 even one where every effort is made to remain within the existing confines. As part of the detailed proposals, this will include analysis of the GA traffic levels in the areas underneath CTA-3 and CTA-5. Note that low level primary radar coverage in the area may inhibit the analysis where EC devices are not utilised by GA aircraft at those altitudes. Southampton's movements for 2021 and 2022 are available on the CAA website. Comments on CAS increase are noted including taking into consideration the airspace created for Farnborough's operation. The Airspace Modernisation Strategy does expect a benefit to be a reduction in the volume of Controlled Airspace but this does not mean that any increases in some areas are not aligned with the strategy. As advised in the briefing sessions and in the slides "Appreciating that all reduction in CAS are welcome, this slide only aims to highlight the general areas where more CAS would be required to enable feedback on the potential impacts to GA in those areas" although the slides do make suggestions as to where could be scope for reductions in CAS.

Stakeholder	Summary of Feedback	Southampton Response
	that more relevant figures are needed. Stated that airspace "modernisation" should mean LESS controlled airspace. Requested that when planning extra CAS please take into consideration the huge increase in CAS around Farnborough and the reduction of safety to GA and gliders by producing pinch points and unsafe concentrations of light aircraft. Stated that any increase in CAS Around Southampton/Lasham/Basingstoke would not enhance safety.	
Airspace4All	Stated that lowering the controlled airspace base to the north would have a catastrophic impact on gliding, balloon operators, and general GA. Argued that it would not be possible to design any airspace structure to contain a standard PBN approach to 20 without closing the airspace to GA. Argued that the options developed should include options that do not expand controlled airspace and consider all the ways to enable the airport to operate efficiently in the cramped airspace available. Suggested that PBN may not be suitable for Southampton Airport.	Comments on developing options that do not expand CAS or options without PBN are noted although note that changes to CAS boundaries are required for any PBN arrival to RWY 20 even one where every effort is made to remain within the existing confines.
Light Aircraft Association	Concerned about the potential impact of increasing controlled	All concerns are noted and will inform our evaluations and options

Stakeholder	Summary of Feedback	Southampton Response
	airspace on the needs of VFR pilots. Concerned that reducing the glide clear and traffic avoidance capability and concentrating VFR traffic into smaller areas will create bottlenecks and increase risk of collision or infringements. Concerns about the reduction in the base of controlled airspace in the Southampton/Bournemouth gap generating more noise. Concerns about the impact upon the GA community of additional airspace to the north of the airport. Suggestion that offset or dog-leg routings could be considered to reduce the loss of Class G airspace for other users.	development. Please see responses above.
Aircraft Owners and Pilots Association (AOPA)	Regards the Design Principles as generally reasonable and fitting within the Government's guidelines. Concerns about how to achieve the integration of traffic within the orbit of SAMs airspace. Suggests that Southampton consider dedicated VFR routes through Southampton CAS, combined with EC / transponders and a radio may help reduce the impact on ATC and GA's ability to transit the airspace.	Thank you for the suggestion on dedicated VFR routes. We agree that increased use of transponders and communication with ATC would enhance access to CAS.
Peter Weinberg – pilot at Black Bushe Airport	Concerned about bottlenecks in airspace, particularly a serious bottleneck is between the western	All concerns are noted and will inform our evaluations and options

Stakeholder	Summary of Feedback	Southampton Response
	edge of the Solent CTA and the Middle Wallop MATZ and the narrow gap to the west of the Lee-on-Solent ATZ. Argued that attention needs to be paid to the width of these gaps. Argued that there is a potential to create a bottleneck if the base of the triangle of CTA at the eastern edge of the Solent zone is lowered. Concerned that the glide ratios of light aircraft travelling over water had not been taken into account when considering the minimum heights of controlled airspace.	development. Please see responses above.
Longwood Airfield	DP1: Realistically in order to provide efficient operations for traffic arriving from the North you need more airspace. It is then inevitable that there is less Class G airspace for existing GA aircraft to use. Sadly I cannot easily see how you will currently maintain the same level of safety for GA traffic outside controlled airspace. DP 3: Stated that if all traffic in the vicinity of Solent's airspace was encouraged to call and such calls were welcomed then infringements may well reduce. DP4: stated that GA traffic will always require tactical intervention. DP13: Stated that he sees a need to reduce the lower levels of your CTA to provide CDA opportunities for the medium turboprops and the jets. In order to achieve DP13 then	Thank you for the feedback and comments on the trade-offs faced.

Stakeholder	Summary of Feedback	Southampton Response
	you need to be far more proactive about letting GA aircraft into your CAS. Perhaps by utilising the flexibility that Class D airspace allows where IFR and VFR aircraft do not need to be separated. Unless CAS access is freely granted then GA traffic will have to fly lower and in more densely occupied remaining airspace. However, we can equally see that you are operating currently with a too small volume of airspace to operate commercial air transport effectively. He cannot see any specific problem with the reductions on the 3 quadrants discussed. However, as above, this generic danger to GA can be very much reduced by allowing access to GA traffic.	
Loganair	Any increase in track mileage for runway 20 departures, especially to NORRY to be avoided where possible. Especially as the Loganair schedule increases through Southampton, any increase to routings, particularly when departing from runway 20 would soon adversely affect trip fuel/ CO2 / payload under certain conditions. Any measures that reduce the need to have to complete the "Winchester Loop/orbit" are greatly appreciated. We believe that Option 4 with associated CTA amendments appears to be a good solution.	All noted.

Stakeholder	Summary of Feedback	Southampton Response
Ministry of Defence – Boscombe Down	Do not have any concerns with any of the proposals and do not believe it would impact any of their operations.	Noted
Ministry of Defence – DAATM	Concerned about the potential impacts of Options 3 & 4 on MOD operations, as they could lead to less Class G airspace being available to the south of Middle Wallop and push AFH aircraft further west into the area south of Salisbury. Observed that were the Solent CTA 4 (Class D from 2500 ft to 5500 ft) to be extended west to mirror the boundary of Portsmouth CTA 13 (Class A from FL65 to FL115), this would have lesser impact. Difficulty would be encountered if the boundary of Solent CTA 4 were moved further west than the current Portsmouth CTA 13 boundary. Options 3&4 may reduce the lower level of the controlled airspace between Bournemouth and Southampton CTRs from 2000 ft to 1500 ft. Although this does not directly affect SUAS/ BUAS (with no routine ops over The New Forest), it does increase the risk for GA and there may be a knock-on effect if more GA are forced closer to Bournemouth CTR to transit this area at 2000 ft. Any constriction in training airspace due to increasing CAS will increase traffic density and therefore	Noted. Feedback will be used to inform the design principle evaluation and initial options appraisal.

Stakeholder	Summary of Feedback	Southampton Response
	concentrate aircraft noise over a smaller area. Consequently this will increase the number of noise complaints from residents already motivated to have formed complainant groups in this already congested area.	

Table 13: Summary of Stage 2A General Aviation & Industry Feedback

Interdependent ACP sponsor feedback

Southampton Airport received written feedback from four ACP sponsors where interdependencies exist with Southampton Airport. Full copies of all the feedback received are in Appendix D.

Stakeholder	Summary of Feedback	Southampton Response
NATS / NERL	Queried whether it was the intention of Southampton Airport to remove the 'Winchester Orbit' procedure for arrivals. The key feature for network connectivity, at this stage of the process, is flexibility. Do these options individually represent complete systems or could routes from one option be combined with routes from another, thus presenting greater flexibility? Was it clear in your engagement that the options shown might require amendment in response to the requirements of other FASI South participants?	Removal of the Winchester orbit is desirable in order to reduce CO_2 emissions. We are looking at a number of options for RWY 20 arrivals some that would reduce this need, and some that don't. In order to reach the optimal solution, routes from one option could be combined with those from another and this was advised to our stakeholders. See Slide 26 "Later on in the airspace change process at Stage 3, we may combine various elements of these 4 options into a final system option if it will deliver greater benefits and/or better mitigate impacts. However, this is also dependent on changes to adjacent airspace by other sponsors of airspace change."
Gatwick Airport	Happy that the Design Principles have been met in developing the route options and do not believe there are further considerations relating to the Design Principles.	N/A
Solent Airport	One of the APC proposals was lowering and extending the controlled airspace to the south	You concerns are noted and will inform our evaluations and options development.

Stakeholder	Summary of Feedback	Southampton Response
	of SA. This would impact the future intentions and also cause a bottleneck between the IOW and the mainland for GA traffic.	
Bournemouth Airport	Happy that the Design Principles have been met in developing the route options and do not believe there are further considerations relating to the Design Principles.	N/A

Table 14: Summary of Stage 2A interdependent ACP sponsor feedback

In addition to the engagement above, we have also taken part in a number of technical working groups and bilateral workshops with ACOG, NERL, and FASI airports. Technical working groups and Programme co-ordination meetings allow sponsors within the LTMA regional cluster to discuss timelines, risks, deployment strategies, Masterplan integration as well as CAP1616 interpretations and different methodologies to meet CAP1616 requirements.

Response to Stakeholder Feedback

Our options development process, specifically its alignment with the Design Principles, was thoroughly tested through engagement with and feedback from a wide range of stakeholders that are potentially affected by the airspace change. The briefing sessions that we organised brought together a mix of representatives from different backgrounds and with different interests. All the sessions were attended by airport staff, technical specialists, and third-party facilitators to ensure that our engagement was effective.

We would like to thank all stakeholders that gave their time to consider the issues and opportunities associated with the airspace change and share their views on the options development process. We feel that the engagement has allowed us to thoroughly test our approach to options development to ensure it is aligned with the Design Principles.

We understand that there will never be unanimous agreement on all the airspace design options. We also acknowledge that some of the principles do come into conflict with one another and difficult trade-offs need to be made. We feel we have been transparent about these conflicts, which in turn has supported our stakeholders to give substantive feedback that will be used to inform trade-off decisions.

As can be seen above, there was significant feedback from General Aviation concerned with any increase to Controlled Airspace, some questioning the need for PBN at all if it will require more CAS than currently exists. There was particular concern of lowering bases of CAS below 2000ft as well as significant CAS expansion to the North and South East. Conversely, we also received feedback from community groups questioning why we would potentially limit environmental benefits to avoid increasing Controlled Airspace but also questioning the need for PBN if it will concentrate noise impacts. This highlights the trade-offs that ACP sponsors face and the need for finding solutions that best balances all the competing design principles, benefits (to all stakeholders) and impacts.

Based on this feedback, to ensure we are considering all potential solutions not just those that would deliver the perfect outcome for the Airport (a full suite of PBN arrival and departure flight paths) we created an additional system option; Option 5.

Option 5 considers a configuration with no PBN arrival transitions to RWY 02 but still contains PBN SIDs from both runways and PBN arrivals to RWY 20. Option 5, as with every option, still considers PBN arrivals to RWY 20 as vectoring arrivals in such a confined piece of airspace has been a long standing issue for Southampton ATC, heightened by the high frequency of CAS infringements that occur in the area. The addition of this option does not at this time indicate any preference by Southampton Airport for the option; preferences will be dictated by a fair and transparent evaluation and appraisals process.

We did consider another option which would not have any SIDs and the only new routes would be PBN arrival transitions and an RNP APCH to RWY 20. However, this option would not address the Statement of Need and has not been progressed at this time.

Southampton Airport's Comprehensive List of Options is set out in the next section. The route centrelines used for the illustration of the options will inform the DPE and IOA. However, those route centrelines are still likely to move as options are refined throughout the ACP. Refinement will be on the basis of integration with the wider airspace network below and above 7,000ft, reacting to ongoing stakeholder engagement, increasing environmental and operational performance and in accordance with more detailed IFP design and validation in Stages 3 and 4. This refinement could potentially include merging some elements of different options into a final design solution if that is considered to provide greater benefit to Southampton Airport, their stakeholders and/or the wider FASI programme.

Southampton's Airspace Design Options at Stage 2A

This section sets out Southampton Airport's Comprehensive List of Options at Stage 2A of the Airspace Change Process. Each option has a description of what it is trying to achieve and, for the purposes of enabling stakeholder engagement so far and allowing for analysis in the Initial Options Appraisal, provisional route centrelines. However, those route centrelines are likely to move as options are refined throughout the project. Refinement will be on the basis of integration with the wider airspace network below and above 7,000ft, reacting to stakeholder engagement, increasing environmental and operational performance and in accordance with more detailed IFP design and validation in Stages 3 and 4.

For a description of the methodology used to develop these options please refer to Slides 10-21 of our Stage 2A engagement slides in Appendix E.

As described previously, vectoring of arrivals to Runway 20 generates high ATC workload involving four turn and descent instructions in relatively quick succession. ATC need to ensure that these turns are given to pilots in a timely manner to ensure CAS containment, with vectoring close to the edge of CAS a common occurrence. This necessary practise, combined with the high volume of CAS infringements in the Northeast corner of the airspace generates a very strong desire for a PBN approach transition to systemise arrivals to Runway 20. Such a systemised approach would greatly reduce ATC and pilot workload, providing ATC with capacity to monitor and take action against any CAS infringements. The significantly lower workload would also enhance service provision to other airspace users, enabling improved integration. For this reason, each of our options all contain the presence of such a PBN approach transition to Runway 20.

Readers may note that none of the arrival options contain flight paths that approach Runway 20 from the West of the extended centreline. However, such route positioning was considered in our analysis of thousands of notional flights paths but approaching from the west would not align with our design principles for the following reasons:

- It would increase overflight of the densely populated Winchester City i.e. the "Winchester orbit" would result in significantly more overflight of Winchester at low altitude.
- It would increase CO_2 emissions for arrivals from the Southeast.
- It would require considerably more CAS in an area that GA and the MoD have advised is paramount to them. Even though such an arrival may provide the potential to release CAS to the Northeast of the CTR/CTA, the airspace to the Northwest was advised as more critical.

All our options have been developed as systems (Easterly and Westerly, arrivals and departures) as this was the only way to enable assessment of the design principles that can't be evaluated as individual routes (DP3, 8, 9, 10 and 13). Whilst they are presented as system options, we may merge some elements of different options into a final design solution if that is considered to provide greater benefit to Southampton Airport, their stakeholders and/or the wider FASI programme.

Do Nothing

This option represents the do-nothing scenario for Southampton Airport. More detail on the baseline is described in the section above.

Figure 18 shows Southampton's arrival and departure swathes up to 7000ft for summer 2019. The lack of IFP centrelines other than on final approach result in relatively large swathes of traffic from shortly after departure. The existing Solent and Bournemouth CTRs/CTAs are shown in yellow, National Park outlines in white as well as areas of population density.

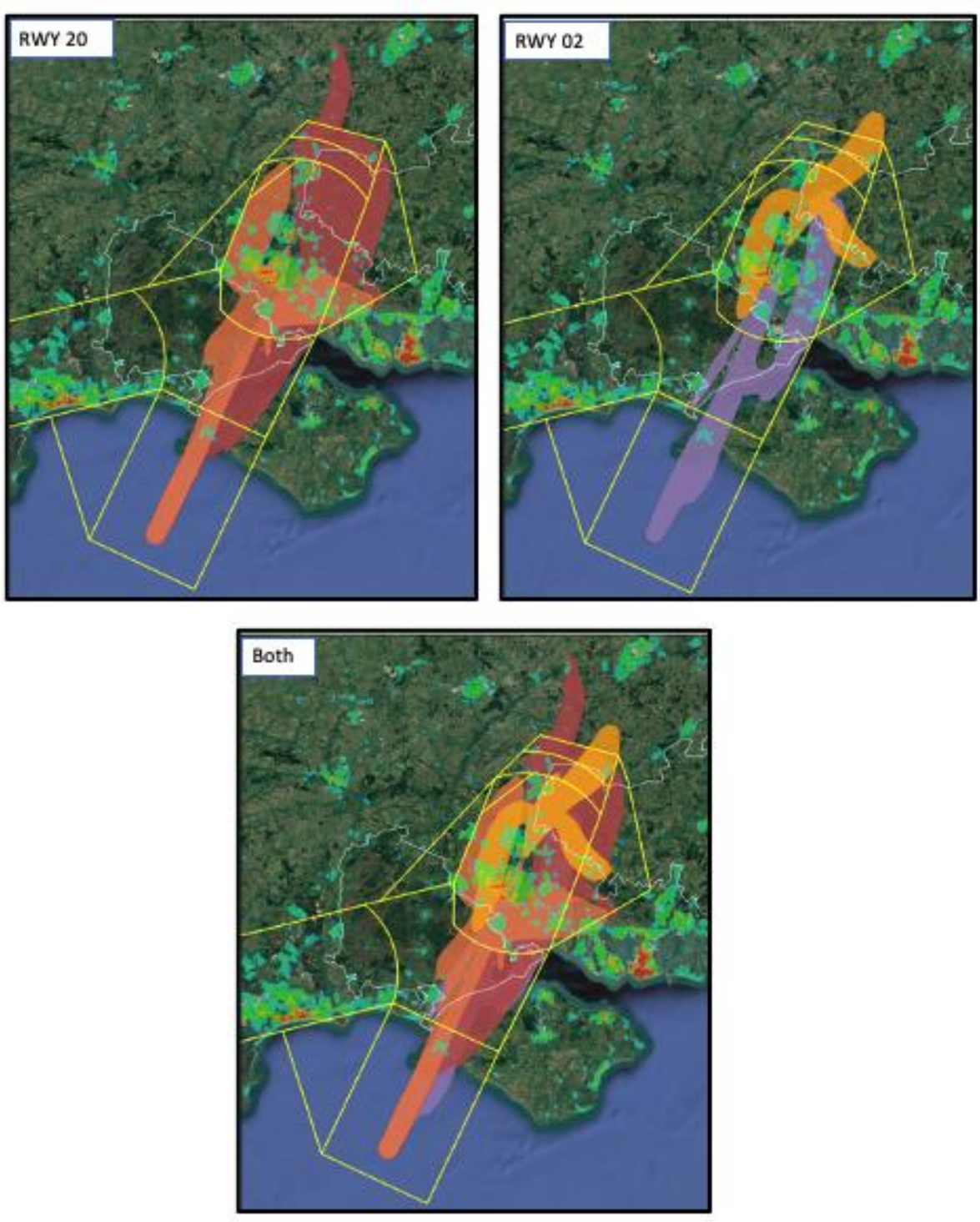

Figure 12: Do nothing: Existing arrival and departure swathes (2019)

Option 1

This option would see a suite of SIDs, PBN arrival transitions to each runway end plus an RNP APCH to RWY 20. Route centrelines generally follow the typical centrelines of today's vectored swathes.

Figure 19 shows the illustrative route centrelines up to 7000ft. The existing Solent and Bournemouth CTRs/CTAs are shown in yellow, National Park outlines in white as well as areas of population density. Actual centrelines are likely to change throughout the process.

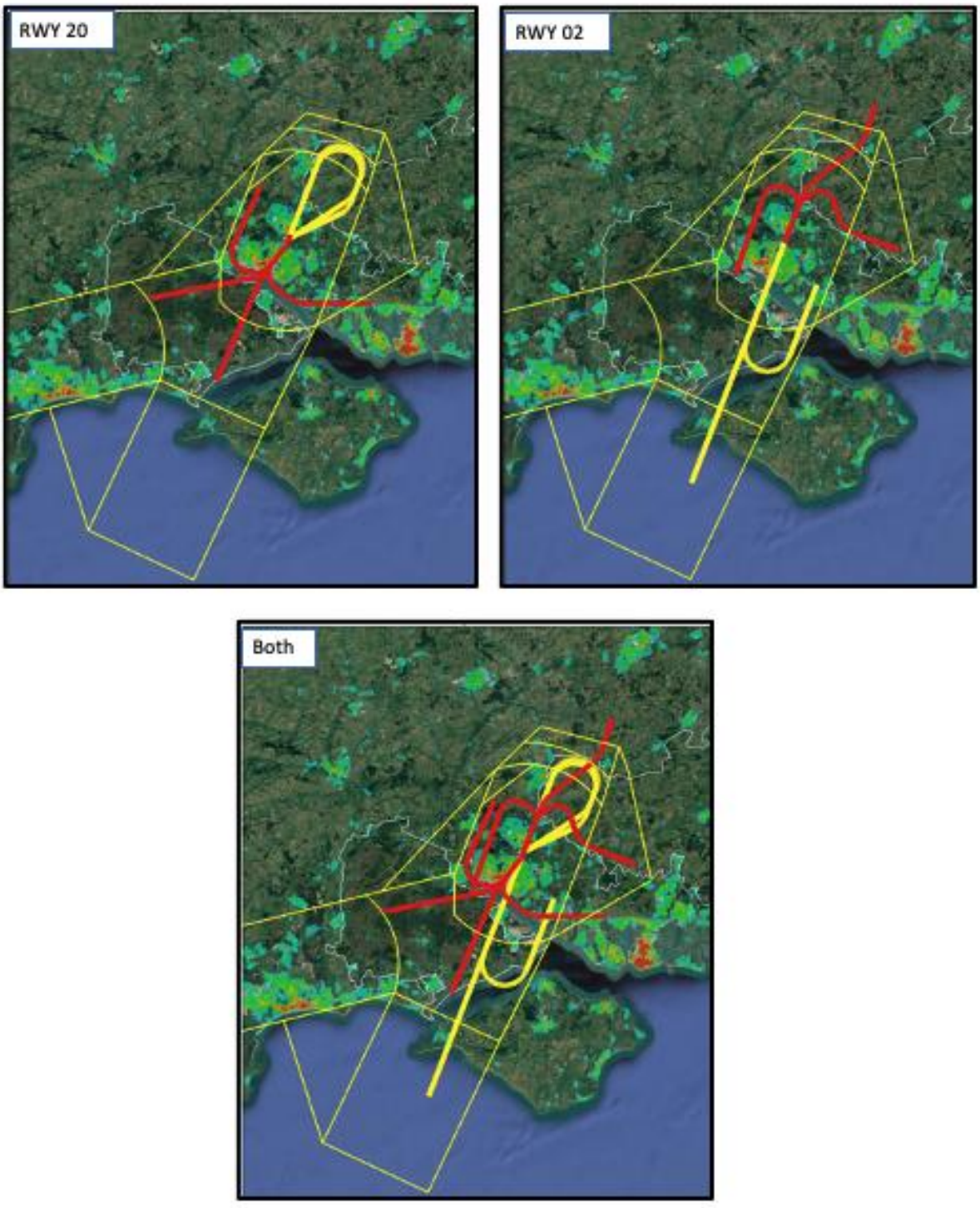

Figure 13: Option 1: Illustrative route centrelines

Option 2

This option would see a suite of SIDs, PBN arrival transitions to each runway end plus an RNP APCH to RWY 20. Similar to Option 1 but with the RWY 02 arrival transition positioned to the West of final approach, over the New Forest, to reduce the amount of CAS required compared to Option 1. The Northbound RWY 02 SID is positioned to the East of the existing swathe to generate more milage to reduce CAS requirement to cater for slower climbers. A tactical shortcut is shown, using the Farnborough CAS, as suggested by GA stakeholders in early engagement sessions.

Figure 20 shows the illustrative route centrelines up to 7000ft. The existing Solent and Bournemouth CTRs/CTAs are shown in yellow, National Park outlines in white as well as areas of population density. Actual centrelines are likely to change throughout the process.

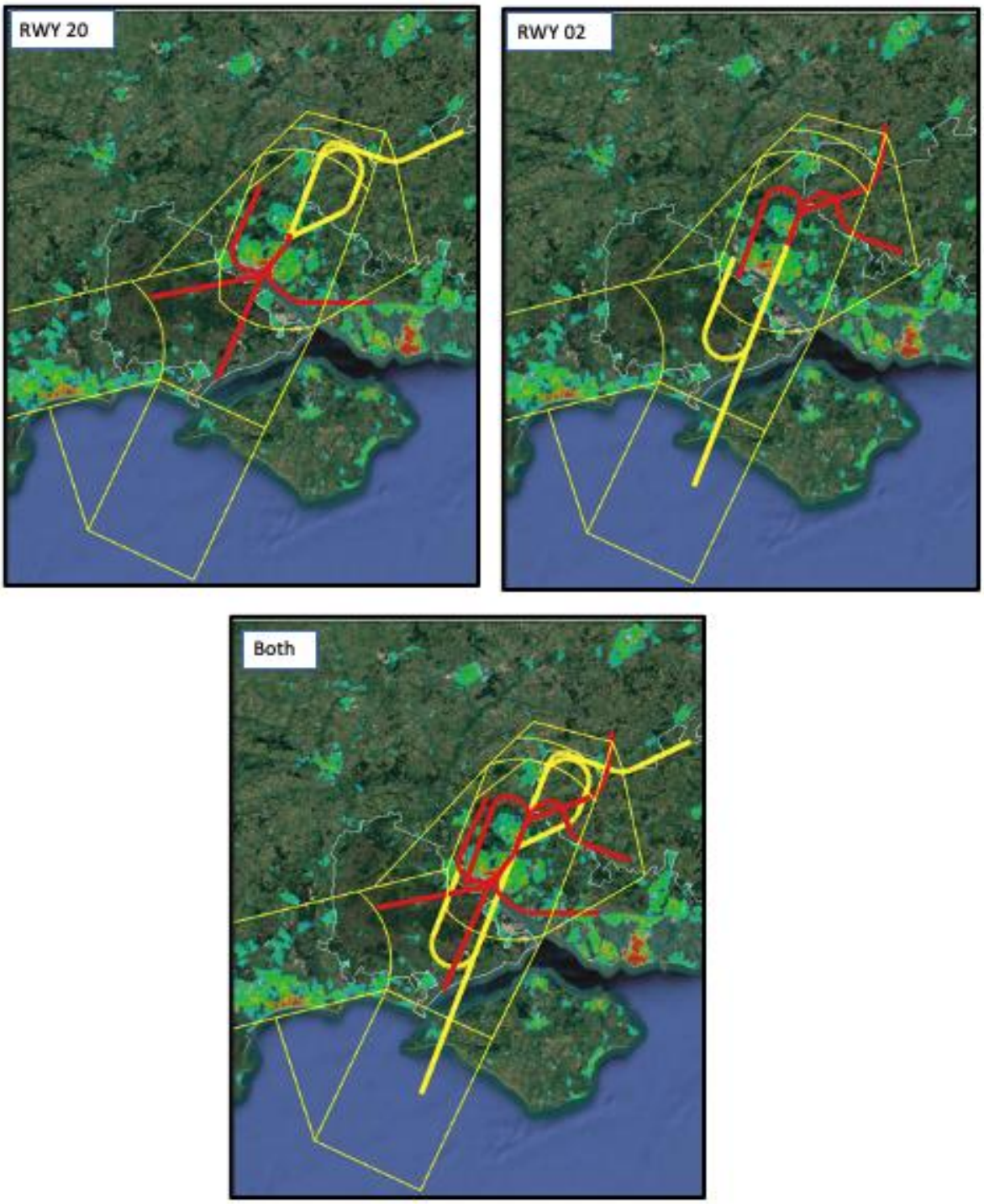

Figure 14: Option 2 Illustrative route centrelines

Option 3

This option would see a suite of SIDs, PBN arrival transitions to each runway end, an RNP APCH to RWY 20 as well as an RNP-AR curved arrival to RWY 02. This option maximises use of the Solent, seeks to avoid the New Forest and also has RWY 02 departure routes positioned to the west of Winchester.

Figure 21 shows the illustrative route centrelines up to 7000ft. The existing Solent and Bournemouth CTRs/CTAs are shown in yellow, National Park outlines in white as well as areas of population density. Actual centrelines are likely to change throughout the process.

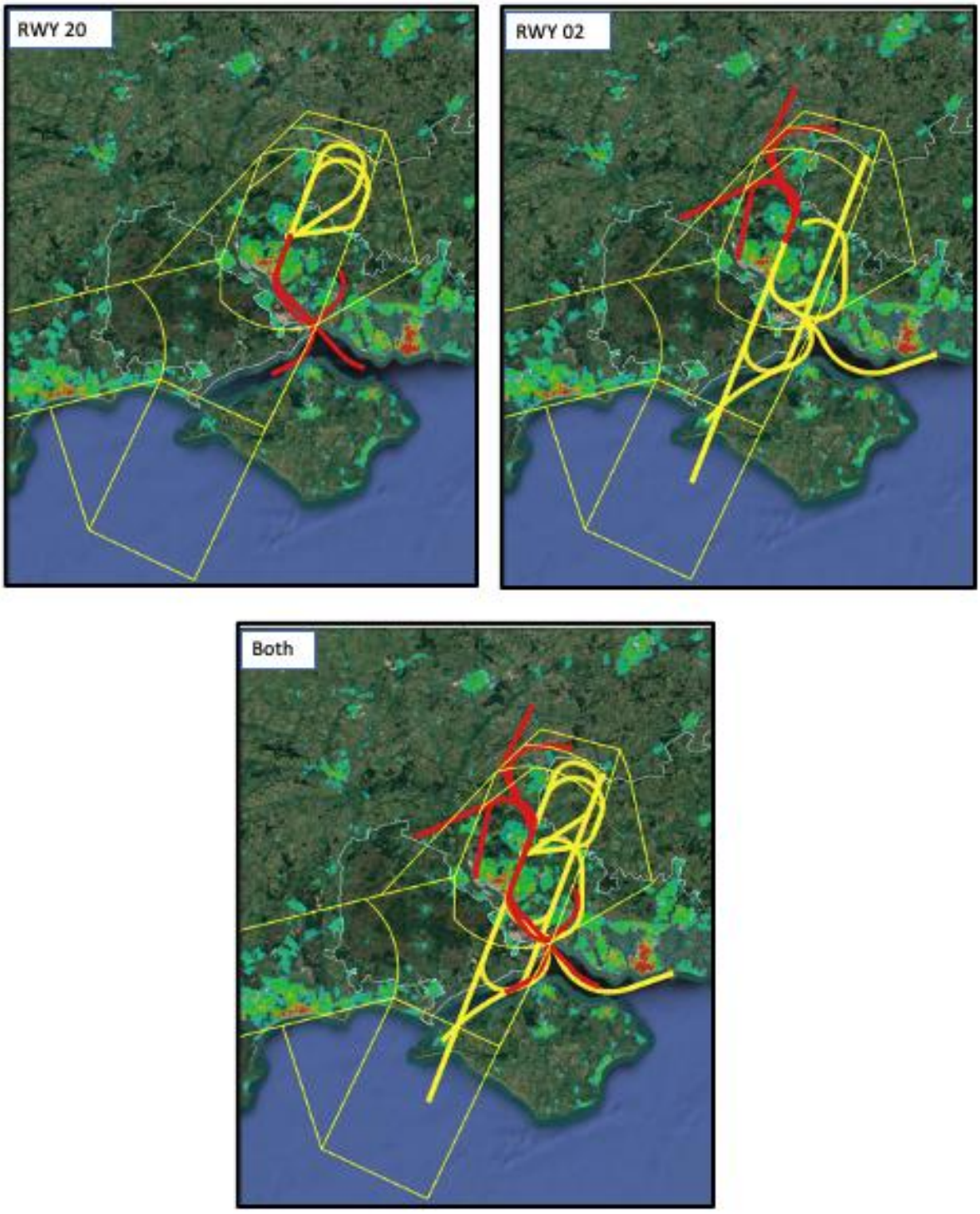

Figure 15: Option 3 Illustrative route centrelines

Option 4

This option would see a suite of SIDs, PBN arrival transitions to each runway end, an RNP APCH to RWY 20 as well as an RNP-AR curved arrival to RWY 02. This option also sees a straight in approach to RWY 20 to reduce CO_2 emissions and use of the 'Winchester Orbit'. SIDs from both runway ends turn to NORRY, GOODWOOD, THRED and GIBSO as soon as possible to reduce CO_2 emissions.

Figure 22 shows the illustrative route centrelines up to 7000ft. The existing Solent and Bournemouth CTRs/CTAs are shown in yellow, National Park outlines in white as well as areas of population density. Actual centrelines are likely to change throughout the process.

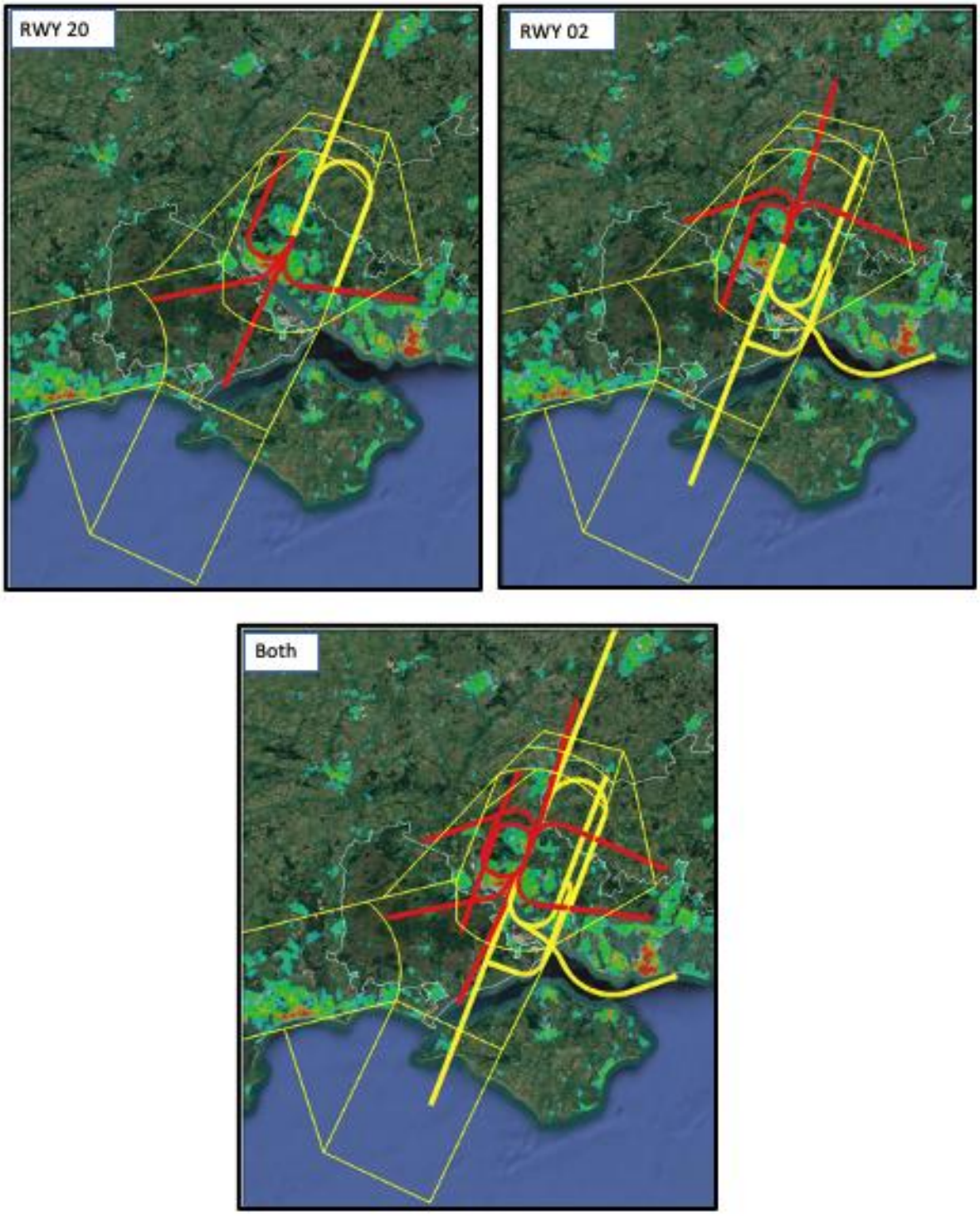

Figure 16: Option 4 Illustrative route centrelines

Option 5

This option was generated to address Stage 2A engagement feedback to try and mitigate the volume of additional CAS required with some other options. This option is similar to option 2 but excludes a PBN arrival transition to RWY 02 to reduce the requirement for CAS but whilst keeping overflight of the New Forest to a Minimum. The existing swathe is shown in figure 23 below however it's important to note that the existing RNP APCH to runway 02 will remain alongside the existing NDB approach. The existing VOR approach will be withdrawn as the SAM VOR is being removed as part of the NATS VOR rationalisation programme.

The RWY 02 Northbound SID follows a path more similar to today to avoid increasing numbers within the LOAEL but would still avoid Winchester by tracking to the East of RWY 20 final approach.

Figure 23 shows the illustrative route centrelines/swathes up to 7000ft. The existing Solent and Bournemouth CTRs/CTAs are shown in yellow, National Park outlines in white as well as areas of population density. Actual centrelines are likely to change throughout the process.

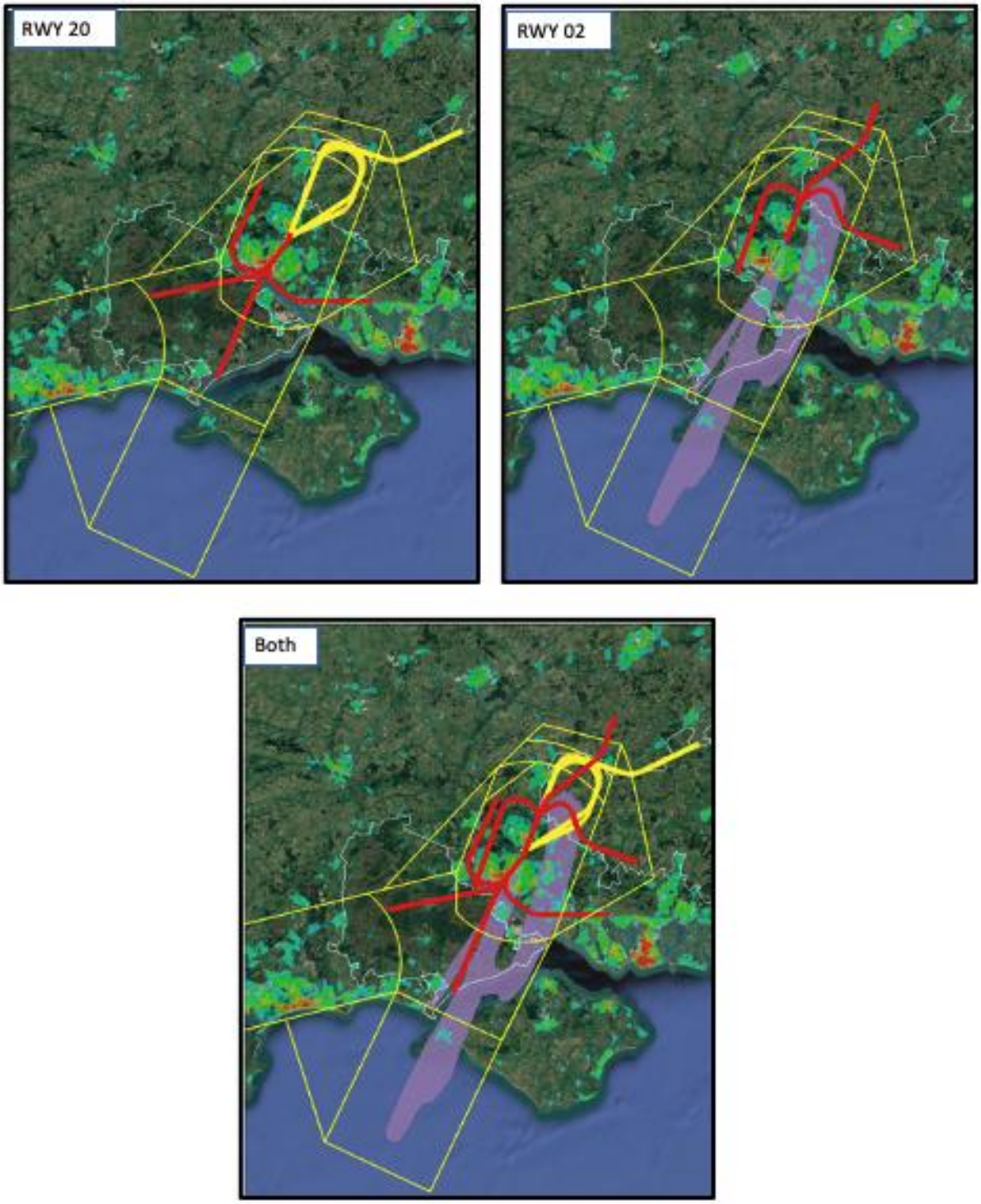

Figure 17: Option 5 Illustrative route centrelines/swathes

Options for Controlled Airspace and other Procedures

Options for CAS

Airspace containment of Instrument Flight Procedures (IFPs) is very closely related to the design characteristics as well as track performance (flyability) along the route centrelines. IFPs are all required to be contained inside Controlled Airspace in accordance with the CAA Policy for the Design of Controlled Airspace Structures. There is an expectation[16] that PBN can reduce the volume of CAS required owing to the smaller protection areas compared to conventional IFPs. However, where no IFPs exist to begin with, implementation of IFPs, even if PBN, can lead to an increase in the volume of CAS required.

As described previously, the illustrative route centrelines are likely to move as options are refined throughout the project. Refinement will be on the basis of integration with the wider airspace network below and above 7,000ft, reacting to stakeholder engagement, increasing environmental and operational performance and in accordance with more detailed IFP design and validation in Stages 3 and 4.

The CAS construct needs to be based on both easterly and westerly operations and there could be many differing CAS designs to support every combination of airspace design options being considered.

It is therefore not proportionate at this stage to design CAS structures to support each possible option and configuration, especially when the fine details of interactions, climb gradients and precise network connectivity are not known.

Our options include designs that aim to require as little additional CAS as possible as well as options that look to prioritise environmental performance, without being constrained by extant CAS structures. Even the options that aim to require as little additional CAS as possible will inevitably require changes to boundaries to ensure they can be appropriately contained. Whilst we haven't designed specific CAS structures, we did provide stakeholders with indications of where more CAS would be required to support each option in order to enable feedback. Figure 24 provides an example of this for one of our options, taken from our Stage 2A engagement material.

[16] CAP2298a (draft) Page 65 " Performance-based navigation (PBN) is an important element that provides highly accurate and repeatable flightpaths, reducing the need for large areas of containment through the use of controlled airspace."

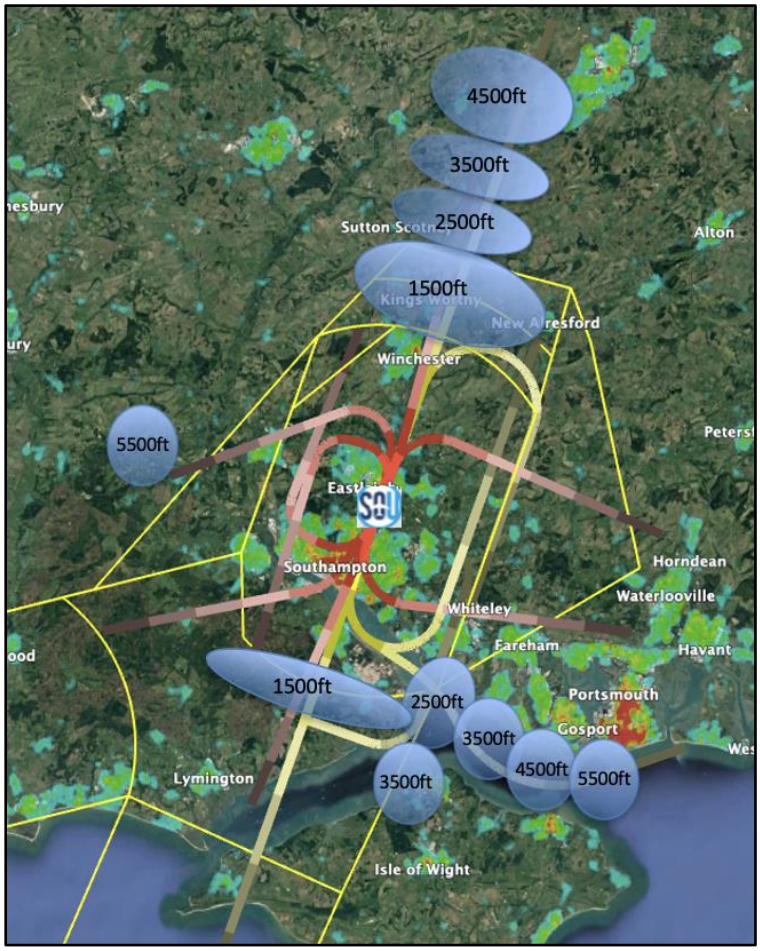

Figure 18: Indications of additional CAS requirements to support Option 4

In Stage 3 of the process when our preferred option(s) is/are being refined, we will generate CAS proposals and engage with GA stakeholders on those plans ahead of our public consultation.

Options for other Procedures

Missed Approaches

These procedures are part of an Instrument Approach Procedure and enable aircraft to safely reposition for another approach under certain circumstances if they are unable to land from their first approach. This is a safe and routine part of operations for all pilots and controllers. There are many reasons for a pilot, or a controller, to initiate a missed approach. Note that missed approaches are flown so infrequently that they are highly unlikely to have an material impact to the environmental metrics of CAP1616.

The design of the Missed Approach is very specific to the type of approach and the airspace construct and sometimes, the initial departure tracks. We do not yet know if we will need to change the Missed Approach procedures and if we do, cannot attempt to guess what they will look like due to all the variables and it would not be proportional to attempt to do so.

After the Full Options Appraisal concludes and Southampton Airport's preferred options are chosen, we can then consider the Missed Approaches to support the safe operation of the design and include the considerations in the consultation material in Stage 3.

Noise Abatement Procedures

Implementation of SIDs from Southampton's runways could lead to changes in the NAPs (sometimes referred to as Noise Preferred Routes (NPRs)). Options for NAP definitions have not been included in Options Development at this stage, but we will incorporate new dimensions for our NAPs in the public consultation material in Stage 3. As per the Section 106 agreement, any changes to the NAPs will need to be approved by the Civil Aviation Authority with the mechanism of approval being the airspace change process.

Alignment with the Masterplan

As set out in CAA's Assess and Accept Criteria, Sponsors will be unable to progress through the Stage 3 gateway of the CAP 1616 process until the system-wide airspace design of the proposed options, and the cumulative impacts of those options, are represented in an accepted Iteration 3 of the masterplan. To generate Iteration 3, ACOG will require "granular data from ACP sponsors' 'full' options appraisals" and furthermore, Iteration 3 will not be accepted by the CAA until ACOG has published a draft of it and conducted a public engagement exercise on some of its content. Southampton will not be able to progress through Stage 3B without NATS, Bournemouth, Heathrow and potentially Farnborough and Gatwick Airports if there are dependencies between the sponsors' proposals.

Masterplan Iteration 2 suggests LTMA implementation dates of between 2027 and 2029.

Design Principle Evaluation

The Design Principle Evaluation involves taking all of the options developed and qualitatively evaluating them against the Design Principles to understand how they respond. This helps to determine which options best meet the design principles and therefore proceed to the next stage of the airspace change process.

As part of the Airspace Change Process at Stage 1B, Southampton Airport developed a set of design principles with identified stakeholders. The aim of the design principles is to provide high-level criteria that the proposed airspace design options should meet. They also provide a means of analysing the impact of different design options and a framework for choosing between or prioritising options.

Design Principle Evaluation Methodology

At the DP Evaluation Stage, CAP1616 requires airspace change sponsors to qualitatively evaluate options against the design principles, and categorises each evaluation as either 'met', 'partially met' or 'not met'.

As part of this evaluation, sponsors must clearly set out the methodology that has been applied when evaluating each option. The below sub-sections of this document outline the methodology before providing a summary of the Design Principle Evaluation. The full Design Principle Evaluation is shown in Annex 1.

In the case of technical design principles, technical language or references may be used as part of the evaluation. Wherever possible, we have endeavoured to explain these technicalities as part of the earlier sections of this document, and within the assessment methodology itself, however we would also recommend reviewing the glossary pages at the end of this document.

Assessing against the Airspace Modernisation Strategy

The CAA has requested evidence that the Design Principle Evaluation includes an assessment of how the different Design Options respond to the relevant AMS Design Principle:

"Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it."

There are 5 known outcomes, or ends, that are expected from the Airspace Modernisation Strategy (AMS) as detailed in CAP1711 and Southampton's Design Principles already encompass 4 out of 5 of these objectives. Table 15 sets out which parts of our Design Principle Evaluation assesses against the 5 AMS known outcomes.

AMS known outcome	Southampton's design principle which assesses this outcome
Maintain and enhance high aviation safety standards	(DP1) Be as safe or safer than today for both commercial air transport and general aviation users that are affected by the airspace change.
Secure the efficient use of airspace and enable integration	(DP3) Avoid introducing additional complexity and bottlenecks into controlled and uncontrolled airspace and contribute to a reduction in airspace infringements. (DP5) Ensure sufficient airspace capacity to accommodate SOU's master plan traffic forecasts while providing for the integration of GA traffic. (DP13) Avoid increasing the overall volume of controlled airspace and where deemed necessary, mitigate the impact by including measures that improve access to GA and do not increase airspace segregation.
Avoid flight delays by better managing the airspace network	(DP5) Ensure sufficient airspace capacity to accommodate SOU's master plan traffic forecasts while providing for the integration of GA traffic.
Improve environmental performance by reducing emissions and by better managing noise	(DP6) Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts. (DP7) Minimise and where possible reduce, the total adverse effects on health and quality of life from aircraft noise. (DP8) Ensure a predictable, fair and equitable share of traffic across all routes, through multiple route options and respite routes. (DP9) Avoid overflying densely populated residential areas, national parks, AONBs, noise sensitive buildings and other areas prized for tranquillity. (DP11) Ensure that aircraft operating at SOU climb and descend continuously to/from at least 7000ft.
Facilitate defence and security objectives	We don't have a specific design principle to meet this objective. However, Stage 2A feedback from MOD DAATM and RAF Boscombe Down will be been used to inform this assessment.

Table 15: AMS known outcomes mapped against Southampton's Design Principles

Please see the assessment methodology section below, for information about the methodology applied to determine the overall outcome of the AMS Design Principle.

Design Principle Evaluation Methodology: Met, Partially Met and Not Met Categorisation

In order to evaluate each option in a fair and transparent way, we have followed the methodologies set out in Table 16 when evaluating against each design principle.

Design Principle			Method of assessment	Met	Partly Met	Not Met
DP1	**Top priority:** Be as safe or safer than today for both commercial air transport and general aviation users that are affected by the airspace change.		Qualitative assessment will be undertaken by SME. The assessment will state any potential safety concerns and indicate if additional safety case mitigation may be required ahead of ACP submission. Stage 2A feedback from other airspace users has been used to inform this assessment.	No reason identified as to why the option is less safe than today and cannot be operated within existing rulesets and separation standards	Additional work would be required to generate an acceptable safety case and/or new standards may be required.	Acceptable safety assurances are not likely to be met, therefore option discontinued.
DP2	**Second priority:** The SOU ACP accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it.	Maintain and enhance high aviation safety standards	The outcome of DP1 will be used to evaluate this AMS objective	Evaluated in DP1	Evaluated in DP1	Evaluated in DP1
		Secure the efficient use of airspace and enable integration	The outcome of DP3, DP5 and DP13 will be used to evaluate this AMS objective	Evaluated in DP3, DP5 and DP13	Evaluated in DP3, DP5 and DP13	Evaluated in DP3, DP5 and DP13
		Avoid flight delays by better managing the airspace network	The outcome of DP5 will be used to evaluate this AMS objective	Evaluated in DP5	Evaluated in DP5	Evaluated in DP5
		Improve environmental performance by reducing emissions and by better managing noise	The outcome of DP6, DP7, DP8, DP9 and DP11 will be used to evaluate this AMS objective	Evaluated in DP6, DP7, DP8, DP9 and DP11	Evaluated in DP6, DP7, DP8, DP9 and DP11	Evaluated in DP6, DP7, DP8, DP9 and DP11
		Facilitate defence and security objectives	An SME assessment of whether the option is expected to facilitate, not affect or impede defence and security objectives. Stage 2A feedback from MOD DAATM and RAF Boscombe Down has been used to inform this assessment.	Option expected to facilitate defence and security objectives	Option not expected to affect defence and security objectives	Option has potential to impede defence and security objectives
DP3	Avoid introducing additional complexity and bottlenecks into controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.	Complexity inside CAS	An SME assessment of whether the option could contribute to an increase in complexity within CAS and whether any increase is tolerable or not.	Option is likely to contribute to a reduction in complexity for SOU ATC inside CAS	Option is likely to stay the same or contribute to a tolerable increase in complexity for SOU ATC inside CAS	Option is likely to contribute to an intolerable increase in complexity for SOU ATC inside CAS
		Bottleneck outside CAS	An SME assessment of whether the CAS required to support this option could contribute to a reduction or increase in in bottle necks outside CAS. For the purposes of this assessment, we have made a direct link with any requirement for more CAS and potential to increase bottlenecks outside CAS, even in the absence of direct evidence to suggest bottlenecks could increase.	Option may contribute to a reduction in bottlenecks outside CAS	Option unlikely to affect bottlenecks outside CAS	Option has potential to contribute to an increase in bottlenecks outside CAS

		Infringements	It is not possible to assess whether an option would contribute to a reduction in airspace infringements without a proposed CAS design and GA stakeholder feedback on that design.	N/A It is not possible to assess whether an option would contribute to a reduction in airspace infringements without a proposed CAS design and GA stakeholder feedback on that design.	N/A It is not possible to assess whether an option would contribute to a reduction in airspace infringements without a proposed CAS design and GA stakeholder feedback on that design.	N/A It is not possible to assess whether an option would contribute to a reduction in airspace infringements without a proposed CAS design and GA stakeholder feedback on that design.
DP4	Minimise tactical intervention by Air Traffic Control (ATC) below 7000ft.		Qualitative SME assessment of whether the option is likely to reduce the amount of tactical intervention compared to the existing baseline scenario.	Option is expected to reduce the amount of tactical intervention compared to today	Option is expected to maintain the amount of tactical intervention compared to today	Option is expected to increase the amount of tactical intervention compared to today
DP5	Ensure sufficient airspace capacity to accommodate SOU's master plan traffic forecasts while providing for the integration of GA traffic		Qualitative SME assessment of whether the option is expected to degrade or enhance Southampton's operational performance in terms of providing sufficient capacity to handle future airline demand whilst handling VFR clearances/transits	Option is expected to generate sufficient ATC capacity to handle commercial forecasts whilst accommodating increased GA clearances/transits	Option is expected to generate sufficient ATC capacity to handle commercial forecasts whilst accommodating similar levels of GA access as today	Option is not expected to generate sufficient ATC capacity to handle commercial forecasts whilst accommodating GA clearances/transits
DP6	Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts.	Aircraft emissions	As aircraft emissions arise from the combustion of aviation fuel, the track mileage associated with each airspace design compared to the existing airspace design will be used to inform the qualitative evaluation of this principle.	Option will clearly contribute to an overall reduction in aircraft emissions	Option has potential to maintain or marginally reduce aircraft emissions	Option has potential to contribute to an increase in overall aircraft emissions
		Local Air Quality	A qualitative statement on whether the options could be expected to affect local air quality. ANG2017 states that due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet 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 to changes in the volume of air traffic and that of the local transport infrastructures feeding the airport. If an option has a change to flightpaths below 1000ft it will be evaluated as 'Partially Met' however further analysis will be required to determine the scale of change to local air quality. If an option has no change to flightpaths below 1000ft it will be evaluated as 'Met'.	Option is unlikely to affect local air quality	Option has potential to affect local air quality below 1000ft	N/A - Not possible to ascertain without detailed modelling
		Ecological Impacts	The effects of airspace change on ecology or biodiversity are expected to be minimal. CAA guidance states that "In general, airspace change proposals are unlikely to have an impact upon biodiversity because they do not involve ground-based infrastructure. As such they are unlikely to have a direct impact that would engage the Birds or Habitats legislation." Though there is limited research available on the effects of aircraft noise on wildlife, there is some evidence that disturbance effects associated with aircraft can occur during take-off and landing where aircraft are below around 500m (~1,640ft) . Consideration will therefore be given to the effects on ecology and biodiversity where aircraft overfly Special Protection Areas, Special Areas of Conservation, and Sites of Special Scientific Interest, particularly at altitudes below 2,000ft. For the purposes of our assessment ecology is equivalent to biodiversity as described in CAP1616. National Parks and AONBs are assessed in DP9.	The airspace design will not change or will reduce overflight of SPAs, SACs or SSSIs below 2000fts compared to the baseline	The airspace design could result in small changes to overflight of SPAs, SACs or SSSIs below 2000fts compared to the baseline.	The airspace design will result in increased overflight of SPAs, SACs or SSSIs below 2000fts compared to the baseline
DP7	Minimise and where possible reduce, the total adverse effects on health and quality of life from aircraft noise.		This principle is very difficult to evaluate qualitatively without full noise modelling. ANG states that the LOAEL is regarded as the point at which adverse effects begin to be seen on a community basis. At this stage we don't see any reason for an increase in the size of the LOAEL as typically, the airspace design and position of routes don't affect the size of the LOAEL (the size is driven more by movement numbers and fleet	Option has potential to reduce the population number within the LOAEL	Option is expected to maintain similar population numbers within the LOAEL	Option has potential to increase the population number within the day or night LOAEL

		mix) but it does affect the position of the LOAEL and therefore the population numbers within it. A qualitative SME assessment of whether the option has potential to increase adverse health effects by increasing the population count within the daytime LOAEL using the 2033 daytime 51dB LOAEL as the comparator				
DP8	Ensure a predictable, fair and equitable share of traffic across all routes, through multiple route options and respite routes	An assessment of the extent to which the route placement within the single mode or system mode provides for a fair and equitable share of traffic across the routes where this can be avoided i.e. excluding initial climb out and short final. Achieving this will in itself provide relief from noise for some communities. In Stage 3 when we have fewer options, we will consider whether multiple routes are required and/or possible in order to further mitigate the impacts of concentration.	Single mode (100% Easterly or 100% Westerly)	Routes in single mode do not overfly the same communities below 7000ft	N/A	Routes in same mode do overfly same communities below 7000ft
			System mode (30% Easterly/70% Westerly)	Routes in system mode do not overfly the same communities below 7000ft	N/A	Routes in system mode do overfly same communities below 7000ft
DP9	Avoid overflying densely populated residential areas, national parks, AONBs, noise sensitive buildings and other areas prized for tranquillity.	Densely populated areas	Qualitative assessment of the extent to which the option could be expected to reduce or increase overflight of densely populated areas where possible, compared to the baseline. By where possible we mean excluding final approach and initial climb out where overflight is unavoidable.	Option expected to reduce overflight of densely populated areas compared to the baseline	Option expected to maintain similar levels of overflight of densely populated areas compared to the baseline	Option expected to increase overflight of densely populated areas compared to the baseline
		AONB, national parks, historic parks and gardens	Qualitative assessment using GIS layers of the extent to which the option could be expected to reduce or increase the area (Km2) of AONBs, National Parks and Historic Parks and gardens overflown compared to the baseline	Option could be expected to reduce the area of The New Forest, South Down and/or Historic Parks and Gardens overflown	Option could be expected to maintain the area of The New Forest, South Down and/or Historic Parks and Gardens overflown	Option could be expected to maintain the area of The New Forest, South Down and/or Historic Parks and Gardens overflown
DP10	Maximise operational efficiency for commercial air transport and general aviation users affected by the airspace change.		Operational efficiency for Commercial Air Traffic (CAT) in terms of demand (delay) and track miles is being assessed through DP5 and DP6. The assessment of this DP focusses on operational efficiency for GA and whether aspects of the option could be expected to enhance, maintain or reduce it.	Option is expected to enhance operational efficiency for GA through either lower ATC workload to integrate VFR traffic or through CAS release which could enable more direct routings in Class G	Option is not expected to affect operational efficiency for GA	Option is expected to reduce operational efficiency for GA through either higher ATC workload which could inhibit integration of VFR traffic or through CAS increases that result in less direct routings in Class G
DP11	Ensure that aircraft operating at SOU climb and descend continuously to/from at least 7000ft.		An SME assessment of whether the option is likely to improve, maintain or degrade CCO/CDO performance	Option is likely to improve CCO/CDO performance	Option is unlikely to affect CCO/CDO performance	Option is likely to degrade CCO/CDO performance
DP12	Adopt the most beneficial form of enhanced navigation standards for arrival and departure routes.		A statement as to whether the option can be designed to at least an RNAV1/RNP1/RNP APCH specification which are the most widely available PBN specification for TMA operations	Option can be designed/ to at least an RNAV1/RNP1/RNP APCH specification	N/A- the option either can or can't be designed to at least an RNAV1/RNP1/RNP APCH	Option cannot be designed to at least an RNAV1/RNP1/RNP APCH specification
DP13	Avoid increasing the overall volume of controlled airspace and where deemed necessary, mitigate the impact by including measures that improve access to GA and do not increase airspace segregation.		A qualitative SME assessment of whether the volume of CAS required to support this option would be expected to increase or decrease and whether there could be mitigating measures that improve GA access to CAS	Option could be expected to support a decrease in the volume of CAS	Option could be expected to have an increase in CAS but with mitigation to improve access for GA	Option could be expected to have an increase in CAS but without sufficient mitigation to improve access for GA

DP14	Consider the use of electronic conspicuity to improve airspace integration where possible.	The existing CAS volumes of SOU's airspace are Class D which does not require Transponders for access but does require ATC clearances. If additional CAS is required and that option is taken to Full Options Appraisal and Consultation, we will consider whether Class E airspace + TMZ would help to mitigate the impact on GA to enable integration without individual ATC clearances. This includes consideration of whether a pressure altitude reporting CAA approved ADSB device could meet the requirements of such a TMZ. This statement does not infer Class E + TMZ would be an appropriate and acceptable solution for SOU ATC. In terms of this DPE, this is not possible to evaluate at this time.	N/A Not possible to evaluate at this time	N/A Not possible to evaluate at this time	N/A Not possible to evaluate at this time
DP15	Take into account the combination of effects on the operations at neighbouring airports that are affected by the airspace change.	Bournemouth or Farnborough have not yet developed any airspace design options however we have made an SME assessment of whether or not the option is likely to increase, maintain or decrease combination effects based purely on the proximity of the routes to Bournemouth and Farnborough Airports.. Ie. Whether SOU options are more or less likely to interact with Bournemouth or Farnborough flight paths at 7000ft or below	Option is expected to reduce interaction with Bournemouth or Farnborough traffic below 7000ft	Option is expected to maintain similar levels of interaction with Bournemouth or Farnborough traffic below 7000ft	Option is expected to increase interaction with Bournemouth or Farnborough traffic below 7000ft
DP16	Offer flexibility in the route structure to strengthen resilience against adverse weather and network issues that may affect operations at SOU.	Qualitative assessment of whether the option offers and more or less flexibility in the route structure compared to the baseline	Option offers more flexibility in the route structure compared to the baseline	Option offers the same amount of flexibility in the route structure compared to the baseline	Option offers less flexibility in the route structure compared to the baseline

Table 16: Design Principle Methodology

Assessment of Design Principles with multiple components

Within our DPE, we have chosen to break some Design Principles into components in order to fairly and transparently evaluate different aspects of the Design Principle. For example the assessment of Design Principle 6 ‘Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts’ has been broken down into three components; emissions, local air quality and ecological impacts. In order to assess an option’s overall performance against the Design Principle, the following methodology has been applied to all Design Principles that have been broken down into components:

Overall Met	**Overall Partially Met**	**Overall Not Met**
All components of the Design Principle are ‘Met’	All components of the Design Principle are ‘Partially Met’ or there is a broad mix of ‘Met’, ‘Partially Met’ and/or ‘Not met’	All components of the Design Principle are ‘Not met’ or the majority of the components are ‘Not met’

Working Example: Taking DP6 as an example:

			Example #1 Option Performance			
Design Principle		**Component**	Met	Partially Met	Not Met	**Overall Outcome**
12	*Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts*	Aircraft emissions				Met
		Local Air Quality				
		Ecological impacts				

			Example #2 Option Performance			
Design Principle		**Component**	Met	Partially Met	Not Met	**Overall Outcome**
12	*Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts*	Local Air Quality				Partially Met
		Ecological Impact				
		Climate Change				

			Example #3 Option Performance*			
Design Principle		**Component**	Met	Partially Met	Not Met	**Overall Outcome**
12	*Minimise, and where possible, reduce aircraft emissions, the degradation in air quality and adverse ecological impacts*	Local Air Quality				Partially Met
		Ecological Impact				
		Climate Change				

			Example #4 Option Performance			
Design Principle		**Component**	Met	Partially Met	Not Met	**Overall Outcome**
12	*Minimise the growth in aircraft emissions, the further degradation in local air quality and adverse ecological impacts to address growing concerns about the impact of aviation on climate change'*	Local Air Quality				Not Met
		Ecological Impact				
		Climate Change				

			Example #5 Option Performance			
Design Principle		**Component**	Met	Partially Met	Not Met	**Overall Outcome**
12	*Minimise the growth in aircraft emissions, the further degradation in local air quality and adverse ecological impacts to address growing concerns about the impact of aviation on climate change'*	Local Air Quality				Not Met
		Ecological Impact				
		Climate Change				

The outcome of the overall performance is shown in the 'Summary of the Design Principle Evaluation' section of this document below. The full DPE shown in Annex A shows the breakdown of the performance against each of the components.

Special case (Not Met): Using the methodology outlined above, in the context of the AMS the baseline scenario would be considered as partially met however a 'do nothing' scenario would not result in any Airspace Modernisation for Southampton and therefore would fundamentally not meet the AMS. This baseline option therefore is categorised as 'not met' for the AMS design principle.

Summary of the Design Principle Evaluation

The table below summarises the outcome of the Design Principle Evaluation based on the 'Assessment of Design Principles with multiple components' methodology section above. The full detail of the Design Principle Evaluation is available in Annex 1.

Design Principle	Do Nothing	Option 1	Option 2	Option 3	Option 4	Option 5
DP1						
DP2						
DP3						
DP4						
DP5						
DP6						
DP7						
DP8						
DP9						
DP10						
DP11						
DP12						
DP13						
DP14						
DP15						
DP16						
Proceed to IOA?	x	✓	x	✓	✓	✓

Table 17: Summary of Design Principle Evaluation

Discontinuing Methodology and DPE Outcome

The Design Principle Evaluation itself is considered the main methodology for discontinuing options; at this early stage it provides a broad overview of an option's overall performance against all of the Design Principles and allows us to identify any options that overall perform comparatively poorly.

With the exception of the DP1 (Safety) which is the top priority and DP2 (AMS) which comes second to safety, Southampton Airport's Design Principles are not prioritised or weighted. When reviewing the outcomes of the DPE, we therefore first looked to these two prioritised design principles when discontinuing options.

First looking at DP1 'Safety', Option 2 did not meet this design principle due to the conflict with the runway 02 arrivals and the southbound 02 departures which, when combined with the increase in interactions with Bournemouth, is expected to increase ATC workload to an unacceptable level. The result would be delays to ensure departures and arrivals do not conflict. On this basis, we have discontinued option 2.

The other options, with the exception of the baseline, partially met DP1. Where an option was categorised as 'Partly Met', this is not grounds for discontinuation at this stage, but it does flag that further consideration is necessary in the Stage 2B Initial Options Appraisal (IOA) or beyond. It might be that the further consideration of the hazards associated with an option in the IOA means the option could be discontinued. We will not then go back and update this DPE to a "Not Met" as that would mean the IOA would not have taken place. i.e. Chronologically, the IOA follows the DPE.

Next looking to DP2 'The SOU ACP accords with the CAA's published Airspace Modernisation Strategy (AMS) (CAP 1711) and any current or future plans associated with it'. The baseline 'do nothing' scenario does not meet this Design Principle, as it does not offer the opportunity for the airspace to be modernised, nor does it address the statement of need or enable any environmental, CAS or operational benefits; on this basis, the baseline 'do nothing' option has been discontinued. The 'do nothing' scenarios will however remain present throughout the ACP for baseline comparative purposes only.

All of the remaining options partially meet the AMS design principle. This is because there are many competing factors within the parameters of the AMS, and there is inevitably a balance to be achieved between these. We therefore decided to not discontinue any further options on the sole basis of the AMS, until we understood more detail about their benefits and impacts at the IOA.

Looking to the remainder of the Design Principles to understand if there are any options that overall performed comparatively poorly against the remaining 14 Design Principles, we found a mix of performance across the options. Given the design principles themselves are not prioritised, all options remaining options will proceed to the Initial Options Appraisal.

Next steps

The next stage of the ACP process involves undertaking an Initial Options Appraisal (IOA) of the remaining options, to understand in further detail the benefits and impacts. The IOA is the first of three phases of appraisal undertaken as part of the Airspace Change. It forms part of the iterative process of CAP616 whereby the detail of analysis builds as options progress through the process. As part of our DPE, we noted that some elements of some options may require further investigation, and this will form part of our Initial Options Appraisal.

This step of the process will help us to generate a shorter list of preferred options to take into Stage 3.

Glossary

Acronym	Term	Description
ACOG	Airspace Change Organising Group	Established in 2019 at the request of the Department for Transport and Civil Aviation Authority to coordinate the delivery of key elements of the UK's Airspace Modernisation Strategy.
ACP	Airspace Change Proposal	To carry out any permanent change to the published airspace, the Civil Aviation Authority (CAA) requires the change sponsor to carry out an airspace change proposal in accordance with CAP1616.
ADS-B	Automatic Dependent Surveillance Broadcast	A means by which aircraft can automatically transmit and/or receive data such as identification, position, and additional data, as appropriate in a broadcast mode via a data link.
AIP	Aeronautical Information Publication	A publication which contains details of regulations, procedures and other information pertinent to the operation of aircraft in the particular country to which it relates.
AMS	Airspace Modernisation Strategy	UK Government has tasked the aviation industry to modernise airspace in the whole of the UK. The long-term strategy of the CAA and the UK Government is called the Airspace Modernisation Strategy (AMS). Its CAA document reference number is CAP1711.
AMSL	Above Mean Sea Level	
ANSP	Air Navigation Service Provider	An organisation that provides the service of managing the aircraft in flight or on the manoeuvring area of an airport and which is the legitimate holder of that responsibility.
AONB	Area of Outstanding Natural Beauty	
ATC	Air traffic control	The ground-based personnel and equipment concerned with controlling and monitoring air traffic within a particular area.
ATZ	Aerodrome Traffic Zone	An airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.
CAA	Civil Aviation Authority	The UK Regulator for aviation matters
CAP1616	Civil Aviation Publication 1616	The airspace change process regulated by the CAA
	Capacity	A term used to describe how many aircraft can be accommodated within an airspace area without compromising safety or generating excessive delay
CAS	Controlled Airspace	Generic term for the airspace in which an air traffic control service is provided as standard; note that there are different sub classifications of airspace that define the particular air traffic services available in defined classes of controlled airspace.
-	Centreline	The nominal track for a published route

Acronym	Term	Description
-	Concentration	Refers to a density of aircraft flight paths over a given location, this generally refers to high density where tracks are not spread out; this is the opposite of dispersal
CCO	Continuous Climb Operations	An aircraft operating technique facilitated by the airspace and procedure design and assisted by appropriate ATC procedures, allowing the execution of a flight profile optimised to the performance of aircraft, leading to significant economy of fuel and environmental benefits in terms of noise and emissions reduction
CDO	Continuous Descent Operations	An aircraft operating technique in which an arriving aircraft descends from an optimal position with minimum thrust and avoids level flight to the extent permitted by the safe operation of the aircraft and compliance with published procedures and ATC instructions
-	Conventional navigation	The historic navigation standard where aircraft fly with reference to ground-based radio navigation aids
-	Conventional route	Routes defined to the conventional navigation standard, i.e. using ground based radio navigation beacons to determine their position.
CTA	Control Area	Controlled airspace extending upwards from a specified limit above the earth. Control Areas are situated above the Aerodrome Traffic Zone (ATZ) and afford protection over a larger area to a specified upper limit.
CTR	Control Zone	Controlled airspace extending upwards from the surface of the earth to a specified upper limit. Aerodrome Control Zones afford protection to aircraft within the immediate vicinity of aerodromes
dB	Decibels	A unit used to measure the intensity of a sound (or the power level) of an electrical signal by comparing it with a given level on a logarithmic scale.
DER	Declared End of Runway	
-	Dispersal	Refers to the density of aircraft flight paths over a given location, this generally refers to lower density – tracks that are spread out; this is opposite of Concentration
DPE	Design Principle Evaluation	A evaluation of each option against each design principle which forms part of Stage 2A of the CAP1616 process
-	Easterlies	When a runway is operating such that aircraft are taking off and landing in an easterly direction
-	Final Approach	The final part of an arrival flight path that is directly lined up with the runway
FL	Flight Level	The Altitude above sea-level in 100 feet units measured according to a standard atmosphere. A flight level is an indication of pressure, not of altitude. Only above the transition level (which

Acronym	Term	Description
		depends on the local QNH but is typically 4000 feet above sea level) are flight levels used to indicate altitude; below the transition level feet are used.
FLARM	Flight Alarm	FLARM (an acronym based on 'flight alarm') is the proprietary name for an electronic device which is in use as a means of alerting pilots of small aircraft, particularly gliders, to potential collisions with other aircraft which **are similarly equipped.**
FUA	Flexible Use Airspace	Airspace which is not solely designated for a single purpose, but can be allocated flexibly according to need, or switched entirely on/off according to a schedule or agreed process.
-	Flight-path	The track flown by aircraft when following a route, or when being directed by air traffic control
ft	Feet	The standard measure for vertical distances used in air traffic control
FASI	Future Airspace Implementation Strategy	Under the Government's Airspace Modernisation Strategy (AMS, ref 15) airports in the UK are required to update their airspace and routes in a coordinated way.
GA	General Aviation	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights, balloons, and private corporate jet flights.
IFP	Instrument Flight Procedures	A published procedure used by aircraft flying in accordance with the instrument flight rules, which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.
ILS	Instrument Landing System	An ILS operates as a ground-based instrument approach system that provides precision lateral and vertical guidance to an aircraft approaching and landing on a runway, using a combination of radio signals to enable a safe landing even during poor weather.
IOA	Initial Options Appraisal	A qualitative appraisal of an option against a baseline 'do nothing' scenario, as required at Step 2B of CAP1616
L_{Aeq}		The most common international measure of noise, meaning, 'equivalent continuous sound level'. This is a measurement of sound energy over a period of time.
$L_{Aeq\ 16h}$		The A-weighted Leq measured over the 16 busiest daytime hours (0700-2300) is the normal time-period used to develop the Airport Noise Contours for day-time operations.

Acronym	Term	Description
$L_{Aeq\ 8h}$		The A-weighted Leq measured over the 8 night-time hours (2300-0700) is the normal time-period used to develop the Airport Noise Contours for night-time operations.
-	Lower Airspace	Airspace in the general vicinity of the airport containing arrival and departure routes below 7,000ft. Airports have the primary accountability for the design of this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency
NAP	Noise Abatement Procedures	Noise abatement procedures are designed to minimise exposure of residential areas to aircraft noise, while ensuring safety of flight operations
NATS (ATC)		NATS ATC - the air navigation service provider at Southampton Airport under commercial contract for the aerodrome control provision.
NATS NERL		NATS NERL - The UK's licenced air traffic service provider for the en route airspace (upper network) that connects airports with each other, and with the airspace of neighbouring states.
nm	Nautical Mile	Aviation measures distances in nautical miles. One nautical mile (nm) is 1,852 metres. One road mile ('statute mile') is 1,609 metres, making a nautical mile about 15% longer than a statute mile.
-	Network Airspace / Upper network	En route airspace above 7,000ft in which NATS has accountability for safe and efficient air traffic services for aircraft travelling between the UK airports and the airspace of neighbouring states.
NTK	Noise Track Keeping	A system that monitors and records radar data to monitor aircraft operations and report statistics focused around noise.
PANS OPS	Procedures for Air Navigation Services Aircraft Operations	PANS-OPS is contained in an ICAO Document 8168 which sets out the design criteria and rules for instrument flight procedures which include approach and departure procedures.
PBN	Performance Based Navigation	Referred to as PBN; a generic term for modern standards for aircraft navigation capabilities including satellite navigation (as opposed to 'conventional' navigation standards)
RMA	Radar Manoeuvring Area	An ATC operational area articulated as a volume of airspace by the ANSP. It facilitates the close-in radar vectoring by ATC that is required to take the aircraft safely from a holding stack and established onto final approach.
RNAV RNAV 1	/aRea NaVigation	This is a generic term for a particular specification of Performance Based Navigation. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline of the route 95% or more of the time. In practice the accuracy is much greater than this.

Acronym	Term	Description
RNP-RF	Required Navigation Performance – Radius to fix	An advanced navigation specification under the PBN umbrella. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline 95% or more of the time, with additional self-monitoring criteria. In practice the accuracy is much greater than this. The RF means Radius to Fix, where airspace designers can set extremely specific curved paths to a greater accuracy than RNAV1.
RNP-AR	Required Navigation Performance – Authorisation required	An advanced navigation specification under the PBN umbrella. 'Authorisation required' refers to aircraft and operators complying with specific airworthiness and operational requirements. RNP-AR allow airspace designers to set extremely specific curved paths to a greater accuracy than RNAV1, these can be designed before and after the Final Approach Fix.
-	Separation	Aircraft under Air Traffic Control are kept apart by standard separation distances, as agreed by international safety standards. Participating aircraft are kept apart by at least 3nm or 5nm lateral separation (depending on the air traffic control operation), or 1,000ft vertical separation.
SID	Standard Instrument Departure	Usually abbreviated to SID; this is a route for departures to follow straight after take-off.
	Tactical Intervention	Air traffic control methods that involve controllers directing aircraft for specific reasons at that particular moment (see Vector)
TMA / LTMA	Terminal Manoeuvring Area (Terminal Airspace) / London Terminal Manoeuvring Area	An aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of traffic.
TMZ	Transponder Mandatory Zone	Airspace of defined dimensions where the carriage and operation of transponder equipment is mandatory.
VFR	Visual Flight Rules	Visual Flight Rules (VFR) are the rules that govern the operation of aircraft in Visual Meteorological Conditions (VMC) (conditions in which flight solely by visual reference is possible)
VMC	Visual Meteorological Conditions	Visual meteorological conditions (VMC) are the meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima
VSA	VFR Significant Area	A volume of airspace which has been identified as being particularly important to VFR operations. A VSA might take the form of a route, a zone, or an area chosen for its particular importance to GA users. These areas do not have any official status but are intended to highlight the importance of a particular area so that future airspace development plans can take account of the GA activity.

Acronym	Term	Description
-	Vector / vectoring	An air traffic control method that involves directing aircraft off the established route structure or off their own navigation – ATC instruct the pilot to fly on a compass heading and at a specific altitude. In a busy tactical environment, these can change quickly. This is done for safety and for efficiency.
-	Westerly operation	When a runway is operating such that aircraft are taking off and landing in a westerly direction