

**ACP-2021-006**

**ENABLING BVLOS RPAS OPERATIONS FROM KEEVIL  
AIRFIELD, WILTSHIRE**

**STAGE 3 – OPTIONS APPRAISAL  
(PHASE 2 – FULL)**

**V1**



Ministry  
of Defence

## Responsible Authors of this Document

The Sponsor for this Airspace Change Proposal is the Ministry of Defence and will be managed under Project LOVERIDGE. The project team is drawn from Joint Helicopter Command, specifically the Watchkeeper Force and 47<sup>th</sup> Regiment Royal Artillery.

Only responsible authors may implement amendments via the Project LOVERIDGE lead. All revisions will be listed and detailed in the table below.

Revision Number	Affected Part	Revised By	Notes
Initial Issue 0.1		Project LOVERIDGE lead	
V0.2	Whole document	Project LOVERIDGE lead	Additions made in red
V1	Whole document	Project LOVERIDGE lead	Incorporation of additional actions from CAA post-Gateway

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## Introduction

### Scope

0.1 This document forms part of Stage 3 of the Airspace Change Proposal ACP-2021-006, which aims to facilitate Beyond Visual Line of Sight (BVLOS) take-off and landing of Remotely Piloted Air System (RPAS) from Keevil Airfield, Wiltshire in order to operate within the Danger Areas over Salisbury Plain Training Area.

0.2 The aim of this document is to provide evidence to the CAA that the Change Sponsor has adhered to the process laid out in CAP 1616 for Stage 3 prior to the Consult Gateway. It aims to build upon the work undertaken during the Initial Options Appraisal in Stage 2 and develop the remaining airspace options in greater detail.

### Summary of Stage 2 Initial Options Appraisal

0.3 The Initial Options Appraisal appraised (against the 'do nothing' baseline) the existing airspace structures at Keevil (Drop Zone) and two Danger Area designs (simple and multi-sectored). As per CAP 1616 the Sponsor also provided a preferred option and the simple Danger Area design option was chosen at that stage.

0.4 Following CAA feedback on Option 1 - the use of the existing airspace structures to facilitate BVLOS operations (Ref. D) the Sponsor will cease development of this option.

0.5 The Options being taken forward are:

	<b>Stage 2B</b>		<b>Stage 3A</b>
Option 0 -	Do nothing	→	Option 0 - Do nothing
Option 1 -	Use existing airspace structures	→	Option 1 - <b>Discounted</b>
Option 2 -	Danger Area (simple shape)	→	Option 2 - Danger Area (simple shape)
Option 3 -	Danger Area (multi-sectored complex)	→	Option 3 - Danger Area (multi-sectored complex)

## Section 1

### Context

#### Supplementary Evidence

1.1 After completing the Initial Options Appraisal the Sponsor identified additional data that would allow the options to be developed in greater detail at Stage 3. Noting the fact that the airspace sits wholly within Class G it was determined at Stage 2 that a quantitative environmental assessment would not be possible to achieve. However, it was determined that the following data would be useful to inform the Full Options Appraisal:

1.1.1 Monitor air traffic movements using electronic conspicuity data<sup>1</sup> over a set period in order to:

- Assess traffic patterns and the impact on the funnelling effect between Salisbury Plain and the Bristol CTR.
- Better determine the number of movements around Keevil in order to understand current aircraft behaviours.

1.1.2 Look to utilise the 'Airspace4All' VFR heatmap and BGA ladder data to further assess the current funnelling of aircraft in and around Keevil and understand current trends for how the airspace is utilised.

1.2 The following data has been successfully compiled in order to inform the development of the environment assessment and the appraisal of the 'do nothing' option in order to better determine the effects different airspace structures may have.

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<sup>1</sup> ADS-B, FLARM and MLAT

## UK Airprox Board Airprox Locations

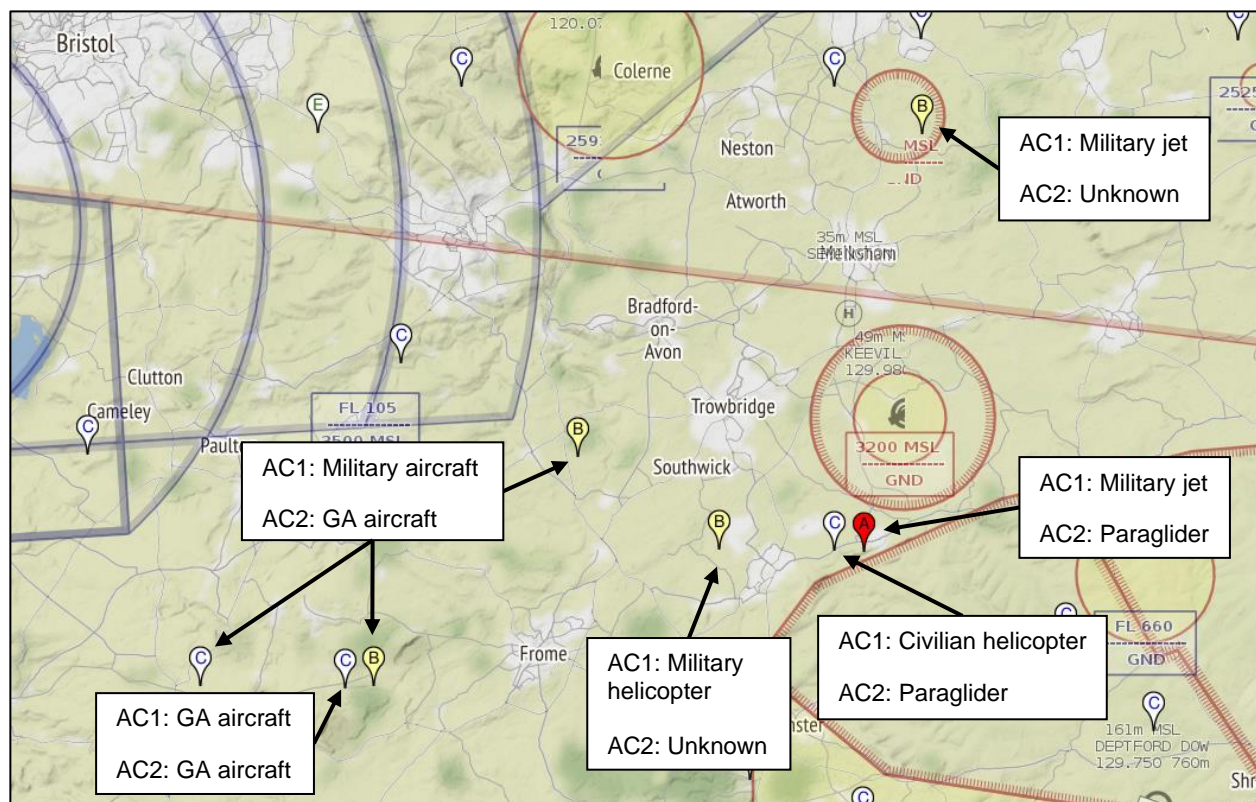


Image 1 – Airprox Board data. Source: Mr C Fox, Airprox Board

1.3 This graphic was obtained from the UK Airprox Board website<sup>2</sup> and depicts all filed airprox incidents between 1<sup>st</sup> January 2011 and 8<sup>th</sup> April 2022 to the UK Airprox Board. The aim of this analysis is to understand the extent of the funnelling effect of GA aircraft that currently exists between Bristol CTR and Salisbury Plain Danger Area in order to inform the ‘Do Nothing’ option and then compare how new airspace structures may affect this.

1.4 The data presented in the graphic is for all air traffic (military and civilian) operating VFR or IFR. Commercial air transport aircraft have been omitted.

1.5 Whilst the use of airprox data alone cannot conclude whether or not funnelling exists, it can be deduced that, based on the current volume of air traffic, this ‘pinch-point’ does not present an air safety risk.

<sup>2</sup> <https://www.airproxboard.org.uk/reports-and-analysis/interactive-map/>

## Airspace 4 All Heatmap

1.6 The Future Airspace Strategy VFR Implementation Group (FASWIG) register of VFR Significant Areas<sup>3</sup> lists the Brize Norton/Boscombe Down/Bristol Gap as a 'busy VFR area with a wide range of local and transit traffic'.

1.7 It also states that the gap is only 'moderately constrained by Bristol Class D in the West but any increase of CAS would increase the density of traffic...and place a further major obstruction to non-CAS pilots as rerouting is not a practical option because of Bristol and Brize Norton CAS and Salisbury Plain ranges'<sup>4</sup>.

1.8 From the VFR heatmaps it can be concluded that:

- The 'Bristol gap' is more congested towards Salisbury Plain than Bristol CTA.
- The gap between the Keevil and the boundary of Salisbury Plain DA is not as widely utilised as operating to the North of Keevil between Frome, Westbury and Trowbridge.

1.9 However, the data does not factor in the transit altitude that aircraft are operating around Keevil so this data must be used in conjunction with ADS-B and glider data.

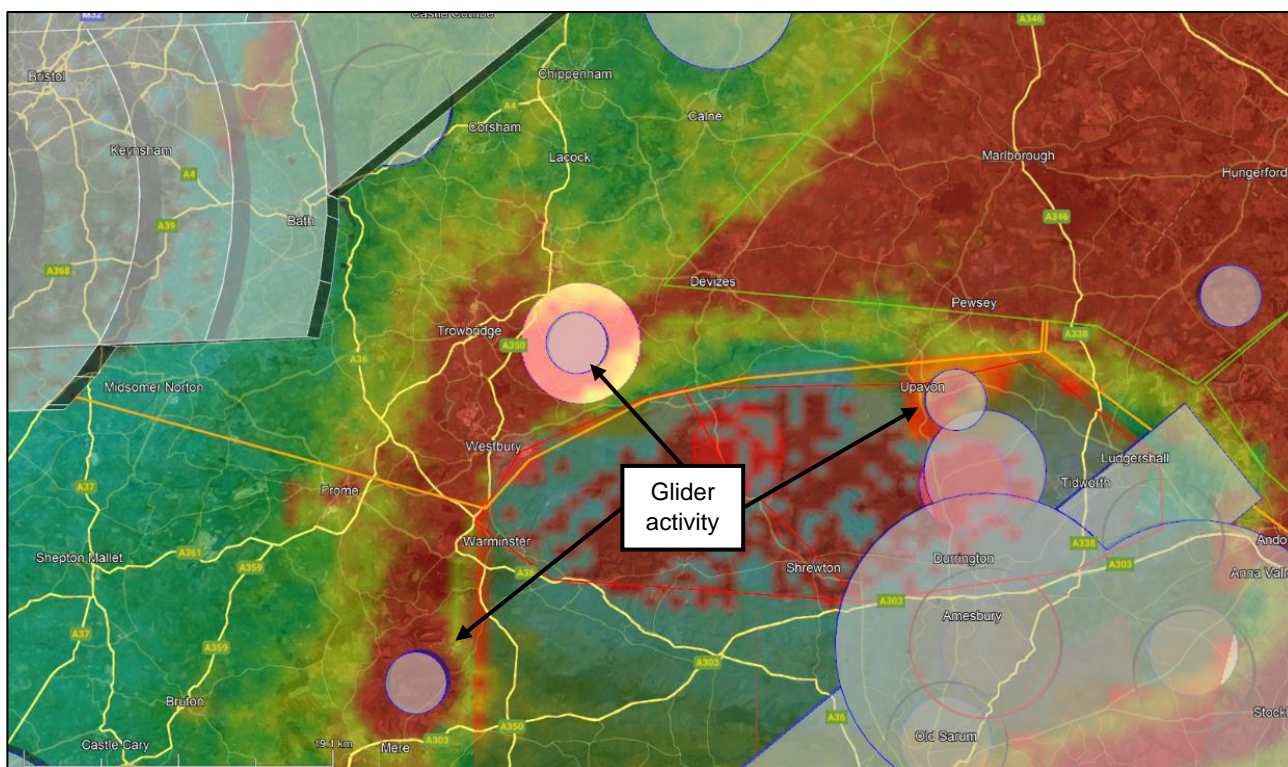


Image 2 – VFR Significant Areas in General. Source: FASVIG, Google Earth

1.10 It is assessed that any additional airspace around Keevil would not alter then heatmap significantly for the following reasons:

<sup>3</sup> <http://docs.fasvig.info/Projects/MAS01/20170930-MAS01-0002-FASVIG-VSA-V2.pdf>

<sup>4</sup> Register of VFR Significant Areas v2, p39

- The majority of traffic route around the North of the airfield or above the overhead therefore additional airspace will not change current behaviour as long as it is minimised to the North and West and uses similar altitudes to that of the existing structures.
- Some aircraft currently routing overhead below 3,500ft may have to route further North than they currently do, making the gap between Trowbridge and Devizes more congested.

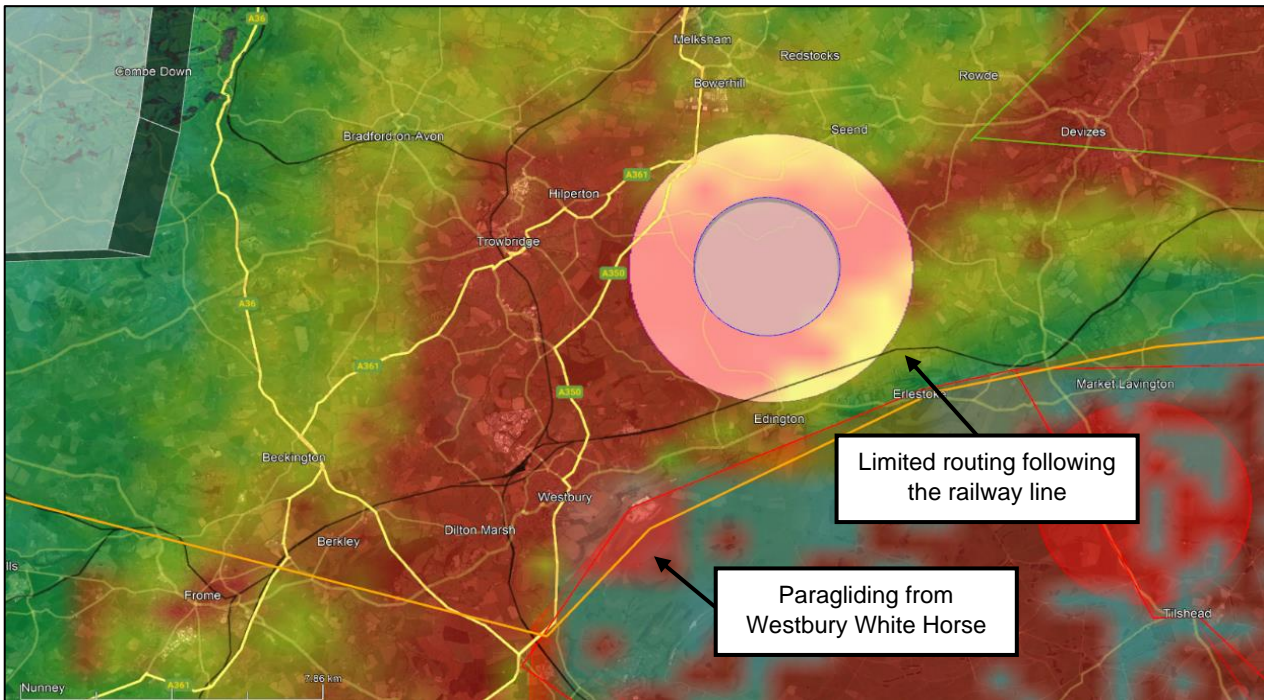


Image 3 – VFR Significant Area in Detail. Source: FASVIG, Google Earth



## BGA Ladder

1.11 The dataset below was obtained from the BGA Ladder<sup>5</sup> and represents gliders who submitted a flight in which Keevil was a turning point between 11<sup>th</sup> May 2019 and 15<sup>th</sup> August 2021. All flights in which Keevil was the start point have been filtered.

Number	Date of Flight	Club	Site	Task	Date
1	15-Aug-21	Wyvern Gliding Club	Upavon	UPA - KEE - WEL - UPA	Weekend
2	13-Jun-21	Wyvern Gliding Club	Upavon	UPA - KEE - WEL - UPA	Weekend
3	05-Jun-21	Wyvern Gliding Club	Upavon	UPA - KEE - WEL - UPA	Weekend
4	05-Jun-21	Wyvern Gliding Club	Upavon	UPA - KEE - WEL - UPA	Weekend
5	02-May-21	Cotswold GC	Aston Down	AST - EYE - KEE - WAN - AST	Weekend
6	02-May-21	Cotswold GC	Aston Down	AST - EYE - KEE - WAN - AST	Weekend
7	02-May-21	Cotswold GC	Aston Down	AST - EYE - KEE - WAN - AST	Weekend
8	12-Sep-20	Wyvern Gliding Club	Upavon	UPA - KEE - WEL - UPA	Weekend
9	10-Sep-20	Cotswold GC	Aston Down	*TPO - YAT - BOW - KEE - *TPO - *TPO	Weekday
10	11-Aug-20	Edghill Gliding Center	Shenington	EDG - RAR - RIV - KEE - EVE - EDG	Weekday
11	29-Jul-20	Edghill Gliding Center	Shenington	EDG - SNI - KEE - RIV - NOS - EDG	Weekday
12	22-Jul-20	Edghill Gliding Center	Bicester	EDG - SNI - KEE - RIV - NOS - EDG	Weekday
13	21-Jul-20	Cambridge Gliding Centre	Gransden Lodge	GRL - WOB - DCT - KEE - WTB - GRL	Weekday
14	12-Jul-20	RAFGSA	RAF Halton	HAL - KEE - CHV - HUS - HAL	Weekend
15	11-Jul-20	Bristol & Gloucester GC	Nympsfield	NYM - PRK - KEE - GCB - NYM	Weekend
16	07-Jun-20	Windrushers GC	Bicester	OXF - LA3 - KEE - BC1	Weekend
17	02-Jun-20	Wyvern Gliding Club	Upavon	UPA - WEL - KEE - UPA	Weekday
18	31-May-20	Windrushers GC	Bicester	BIC - GRW - KEE - MYN - BC1	Weekend
19	31-May-20	Windrushers GC	Bicester	BC1 - GRW - KEE - MYN - BC1	Weekend
20	31-May-20	Windrushers GC	Bicester	BIC - GRW - KEE - MYN - BC1	Weekend
21	31-May-20	Bath, Wilts & N. Dorset GC	The Park	PRK - MEL - MLY - BAS - KEE - PRK	Weekend
22	09-Oct-19	Wyvern Gliding Club	Aboyne	Height Gain	Weekday
23	20-Aug-19	London GC	Dunstable	LBZ - MUR - KEE - BOZ - SIL - DUN	Weekday
24	04-Aug-19	Herefordshire GC	Shobdon	TRO - MAM - CLN - BLA - DEV - KEE	Weekend
25	22-Jun-19	Bath, Wilts & N. Dorset GC	The Park	PRK - TIS - GLA - KEE - PRK	Weekend
26	25-May-19	RAFGSA	RAF Halton	HAL - KEE - DID - ENS - HAL	Weekend
27	11-May-19	Bristol & Gloucester GC	Nympsfield	NYM - SHA - BCL - KEE - NYM	Weekend

Table 1 – BGA ladder of gliders overflying KVL. Source: bgaladder.net

1.12 The following deductions can be made:

- Out of a total of 27 flights, 19 occurred at the weekend and 8 during the weekday.
- Of the 8 aircraft that overflowed Keevil as a turning feature during the working week the highest altitude recorded was 4,475ft and the lowest was 3,100ft.
- The average altitude overflowed during the working week by a glider was 3,887ft.

1.13 It is acknowledged that there will be more unrecorded glider flights for which no file has been uploaded. These will include local training and leisure flights from Bannerdown, The Park, Aston Down, Nympsfield, Halesland, Upavon, Rivar Hill and

<sup>5</sup> [Daily Scores \(bgaladder.net\)](https://bgaladder.net)

other regional gliding airfields, as well as flights by pilots who choose to fly cross country but not participate in the BGA online competition.

1.14 However, whilst it is acknowledged that the BGA ladder does not represent all glider flights that will have occurred over this period it assessed to be indicative of the altitude that gliders operate at when flying cross country.

1.15 It is therefore concluded that a Danger Area with a vertical dimension of around 3,500ft AMSL will have a low impact on cross-country gliding, which can further be mitigated by a crossing service, provided the glider is radio-equipped (estimated to include 80% of gliders operating in the vicinity of Keevil<sup>6</sup>).

### Electronic Conspicuity Data<sup>7</sup>

1.16 The image below is a summary of Electronic Conspicuity tracks identified between 4<sup>th</sup> and 8<sup>th</sup> April 2022. The aircraft displayed are a combination of civilian and military aircraft that were operating SFC-4000ft AMSL. Full analysis was conducted between 28<sup>th</sup> March and 8<sup>th</sup> April and can be found at Reference G.

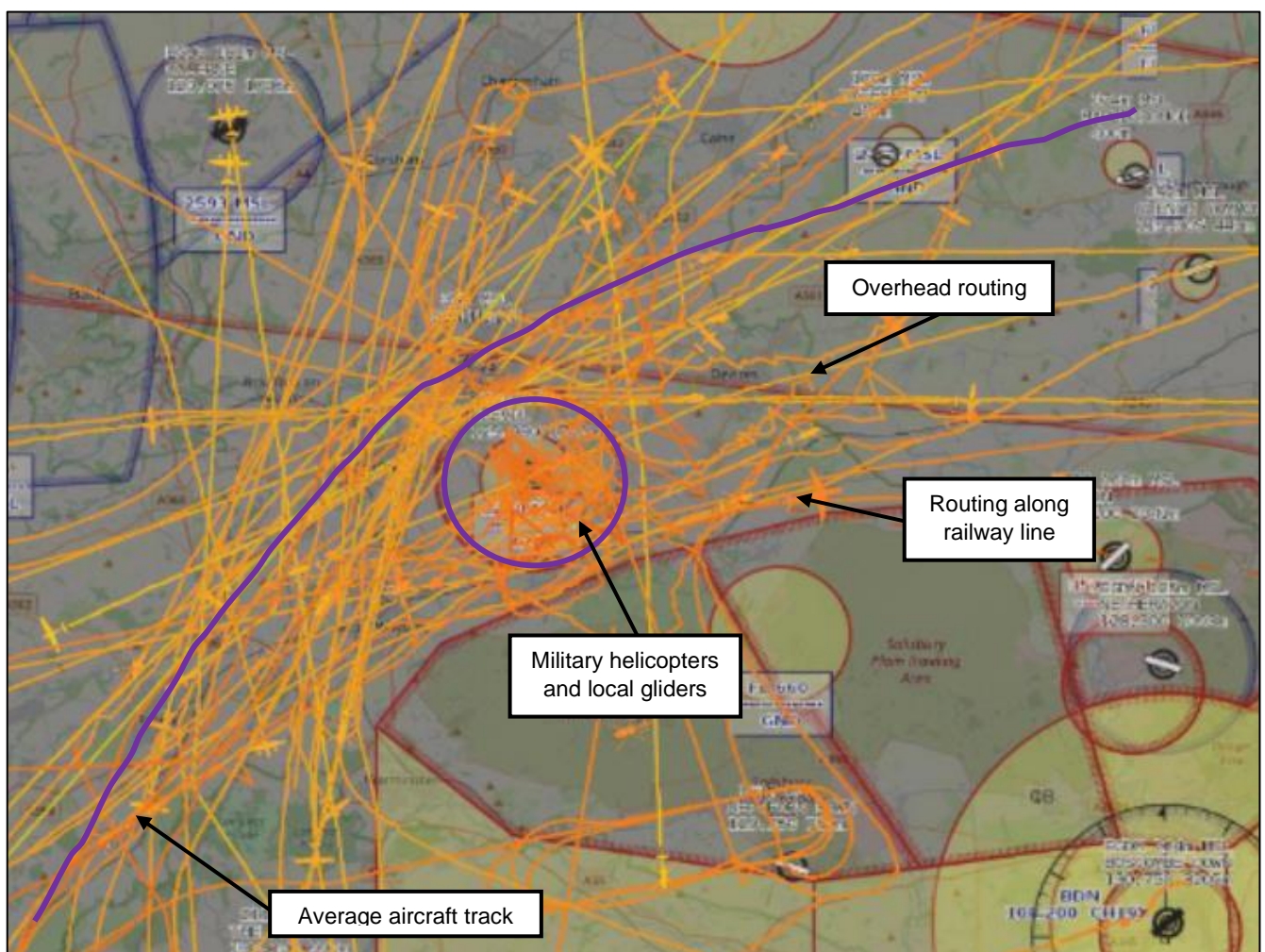


Image 4 – Electronic Conspicuity data Source: globe.adsbexchange.com

<sup>6</sup> As estimated by the BW&ND GC representative during previous engagements

<sup>7</sup> Electronic Conspicuity Data implies data retrieved from ADS-B, MLAT and FLARM traces over a set 2 week period. The term Aircraft Traces, Electronic Conspicuity, ADS-B, FLARM or MLAT all implies the document and data at Ref G

1.17 Whilst, due to the time of year and limited time of data collection, this may underrepresent the volume of aircraft tracks expected during the summer it is assessed that the behaviour of air users will not change. In summary, the following key deductions have been made about the behaviour of aircraft in the 'do nothing' scenario:

- Over a two-week period (weekdays only) 164 aircraft operated in the vicinity of Keevil- 88 were civilian and 76 were military.
- The majority of air users currently elect to route around the Keevil area to the North (76% of air users).
- The majority of users routinely operating below 3,000ft and within 2NM of the airfield are military helicopters and local gliders (gliders launched from Keevil itself).
- Some air users (around 1 in 12) elect to use the railway line for VFR navigation.
- Very few (17) air users elect to transit overhead below 3,000 ft AMSL during the 2 week period. The average operating altitude for those 17 aircraft were between 1000 - 2000 ft AMSL.

1.18 It can therefore be concluded that a Danger Area with a vertical dimension of approximately 3 000ft AMSL will have a limited impact on air users when compared with the current situation.

## Environment and noise assessment

1.19 An Environmental Impact Assessment was conducted at Stage 2. This was further developed at Stage 3 and provided a rationale for a qualitative assessment<sup>8</sup> to inform the appraisal of each option. The following was considered:

- noise impact
- fuel burn/ CO2 emissions<sup>9</sup>
- traffic forecast
- Biodiversity
- Tranquillity.

1.20 Despite the limited quantitative study undertaken, due to the class of airspace the Sponsor cannot accurately estimate the frequency or type of aircraft flying in the vicinity of Keevil or where and at what height they will overfly those on the ground. It is therefore not possible to model noise or other environmental impacts quantitatively. As a result, the Sponsor was unable to conduct analysis as described in:

- CAP 1616a 'Environmental Technical Annex'
- Options Appraisal of costs and benefits set out in the Air Navigation Guidance
- The 'WebTAG' quantitative methodology<sup>10</sup>.

1.21 The additional data gathered can be used to identify trends on aircraft behaviour but does not allow for greater quantitative assessment of the environmental impact of different airspace structures compared to the current situation.

## Safety Assessment

1.22 A safety assessment (Ref. F) was conducted during Stage 2. It is assessed that the additional evidence presented supports the underlying assumptions made during Stage 2.

1.23 Safety assessment summary common to both Option 2 and 3:

- A Danger Area may cause an increase in the risk of Mid Air Collision (MAC) if the airspace structure contributes to an increase in the funnelling effect of aircraft between SPTA and Bristol CTR.

It is assessed that this risk will only increase in the event that **all** air traffic chooses to route around the DA to the North and if the gap between the DA and Bristol CTR is also reduced. The provision of a DACS will further mitigate against aircraft being required to route North unless absolutely necessary.

- Pilots currently routing through the Keevil overhead without using the Glider Common frequency or in receipt of an air traffic service may not be aware of any glider winch launching activity taking place (placing themselves and any

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<sup>8</sup> Transport Act 2000 Sect 70

<sup>9</sup> In accordance with CAP1616 and CAP 2091 para.5.13

<sup>10</sup> WebTAG A3 did not provide useful data due to the majority of the metrics required being unknown.

gliders in danger of collision). The addition of a DA with a published DACS frequency will reduce the likelihood of MAC due to ATC's awareness of traffic wishing to operate within the vicinity of the airfield.

1.24 Additionally, the risks associated with all military operations in the area are identified and reduced using the BowTie risk assessment model.

1.25 Safety Assessment of Option 2:

- It is assessed that no additional safety considerations exist with the simple Danger Area compared with those associated with the existing airspace use.

1.26 Safety Assessment of Option 3:

- The creation of a multi-sectored Danger Area seeks to facilitate continued use of the gap between the Keevil DZ/ glider site and D123, allowing VFR traffic to navigate using the railway track.
- It is assessed that, compared with Option 2, there is an increased risk of Mid Air Collision as the corridor that the design creates will lead to a higher density of traffic choosing to route through the 'Keevil-D123 gap'. Whilst currently this routing is chosen by the minority of air users it is assessed that:
  - This would lead to an increased risk of Mid Air Collision, particularly as it is concluded that this option is more likely to be chosen by aircraft without radios or electronic conspicuity.
  - This is likely to lead to an increased risk of airspace infringement given the design of the 'hanging airspace'.

## Current Situation: Option 0 – Do Nothing

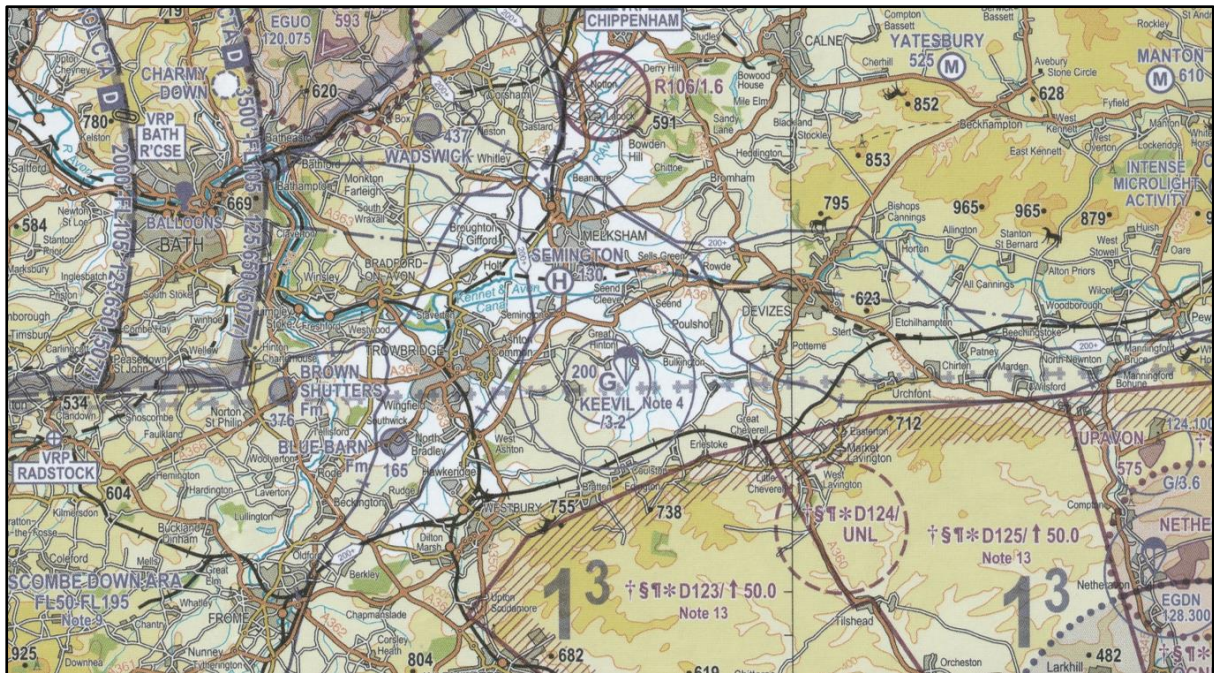


Image 5 – Do Nothing / Current Situation

Source: CAA 1:250k Aeronautical Chart, Sheet 7

Group	Impact	Level of Analysis
Communities	Noise impact on health and quality of life	Qualitative
<b>Evidence</b>		
<p>The types of aircraft that will be most affected are gliders (minimal noise impact), microlights, light aircraft and low flying helicopters (the majority being military). Gliders launching from Keevil predominantly operate during the weekends only (Friday afternoon – Sunday, sunrise to sunset). During periods of operation the area will see multiple glider launchers per hour. Currently military rotary wing helicopters from RNAS Yeovilton, Culdrose and Middle Wallop RAF Benson and Odiham utilise Keevil several times per week for technical and tactical training. Military para-dropping occurs less frequently but is conducted periodically in support of large exercises (three to four times per year).</p> <p>The limited quantity ADS-B data that was gathered suggests that due to the existing airspace structures over Keevil, the majority of aircraft already choosing to avoid the glider site / DZ. Most aircraft are planning to track to the Northern edge of the DZ near the towns of Frome and Devizes (listed VRPs). A lesser amount route through the gap between the glider site and SPTA D123 following the railway line for navigation. It is assessed that, in the 'do nothing' scenario, should the current DZ be activated aircraft will either continue to route North of the glider site or elect to climb over the activated airspace (which launching already occurs to 3,200ft AMSL) therefore limited to no change to general aviation behaviour will occur.</p> <p>The highest number of aircraft flying in the vicinity of the local villages surrounding Keevil in a single day was 28- including 5 separate HEMS movements (Helimed 22 and Helimed 65) and low-flying military aircraft. It can be expected that during summer periods this number will increase however due to the assessed behaviour of these aircraft this will still have a limited noise impact on local communities.</p>		
Communities	Air quality	Qualitative
<b>Evidence</b>		

The Sponsor assesses that currently there is a negligible impact on local air quality as a result of aviation activities. As demonstrated by the VFR heatmap and ADS-B data the altitude that aircraft transit the area as well as the number and type of aircraft leads to an inconsequential impact on air quality.

Group	Impact	Level of Analysis
Wider society	Greenhouse gas impact	Qualitative

**Evidence**

It remains difficult to meaningfully quantify the amount of greenhouse gas emission in the 'do nothing' scenario for the following reasons:

- As the affected area is entirely within Class G airspace the operation of aircraft cannot be accurately predicted.
- The number of aircraft movements in the area cannot be accurately quantified.
- The area is primarily utilised by general aviation. The variety of GA aircraft makes a quantitative assessment on the efficiency of engines and the predicted greenhouse gas emissions impossible to accurately determine.

Group	Impact	Level of Analysis
Wider society	Capacity / resilience	Qualitative

**Evidence**

If the Glider site / DZ is active, there may be a slight increase in the amount of aircraft routing in between Melksham and the Keevil DZ and contribute to the funnelling effect between Bristol and Salisbury Plain. Legacy ADS-B data shows that most aircraft already choose to route around Keevil and the funnelling can already be observed. However, as the airprox data highlights, this does not translate into a noticeable increase in the risk of airprox or mid-air collision.

Group	Impact	Level of Analysis
General Aviation	Access	Qualitative

**Evidence**

The entire area sits within Class G airspace therefore GA have significant freedom and access. However, ADS-B traces indicate that the majority of GA are already routing around the area due to the possibility of gliding activity and Note 4 in VFR charts advising aircraft to avoid Keevil at all times.

Group	Impact	Level of Analysis
General Aviation / Commercial Airlines	Economic impact from increased effective capacity	Qualitative

**Evidence**

There are currently no affects to air transport or passenger numbers brought on by the current airspace structures in the area.

Group	Impact	Level of Analysis
General Aviation / Commercial Airlines	Fuel Burn	Qualitative

**Evidence**

ADS-B, MLAT and FLARM data indicates that GA are largely already routing around Keevil or climbing above.

Group	Impact	Level of Analysis
Commercial Airlines	Training Costs	N/A

**Evidence**

It is assessed that there is currently no impact on commercial airline training costs as a result of the Drop Zone or Glider site.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Other Costs	N/A

**Evidence**

It is assessed that there are no additional costs to commercial airlines as a result of the current airspace structure.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Infrastructure Costs	N/A

**Evidence**

There are no additional infrastructure costs for airports or ANSPs associated with Keevil airfield.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Operational Costs	N/A

**Evidence**

There are no additional operational costs for airports or ANSPs associated with Keevil airfield.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Deployment Costs	N/A

**Evidence**

There are currently no deployment costs for airports or ANSPs.

### Summary of Option 0 Full Appraisal

1.27 Option 0 does not satisfy the Design Principles set out in Stage 1 of the airspace change process. However, whilst this option in itself would not facilitate BVLOS operation of RPAS, it will provide the baseline to compare the remaining options against.



## Section 2

### Options Appraisal

#### Operating Principles

2.1 The following operating principles are common to both remaining airspace design options<sup>11</sup>:

- a. The Danger Area would only be activated by NOTAM when required. During exercise periods activities on Friday will typically conclude by 1400hrs in order to offer greater access to local air users, in particular the local Gliding Club. Should operation at night or the weekend be required this will be published further in advance.
- b. The Danger Area would be kept active for the duration of the RPAS sortie (in order to facilitate early recovery or emergency situations) but will be available for use by other air users as soon as RPAS have established in SPTA. The take-off and landing phases of a typical Watchkeeper sortie will last no longer than 15 minutes. A Danger Area Crossing Service from Boscombe ATC may be utilised by aircraft in order to efficiently utilise the airspace whilst RPAS are operating within SPTA.
- c. Keevil will remain an uncontrolled airfield and WK departures and recoveries will be locally managed. The SAFETYCOM frequency (135.480 MHz) will be utilised to provide additional situational awareness for transiting aircraft. SAFETYCOM can be used throughout the UK by any aircraft operating in the vicinity of an aerodrome without a dedicated A/G frequency.
- d. There must be a guarantee of HEMS access at all times. A Letter of Agreement with Wiltshire Air Ambulance must be drafted to ensure procedural deconfliction allows unimpeded access during emergency responses.
- e. **Frequency of flights.** It is anticipated that RPAS will operate from Keevil predominantly between the months of May and September, usually for 3-6 weeks at a time. It is not currently the intent to operate on an enduring basis nor will routine weekend or evening activity be conducted. Normal operation will see one RPAS operated per day from Keevil.
- f. **Hours of operation.** Routinely the MOD will utilise the airspace between the hours of 0830 – 1730 Monday- Thursday and 0830 – 1430 on a Friday. However, only a short time will actually be spent within the airspace itself with the majority of the sortie spent within Salisbury Plain.

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<sup>11</sup> The establishment of Danger Areas and the provision of DACS/DAAIS can be found in the CAA Policy Statement on the Establishment of Danger Areas [here](#) (Jul 20).

## Option 2 - Danger Area (simple design)

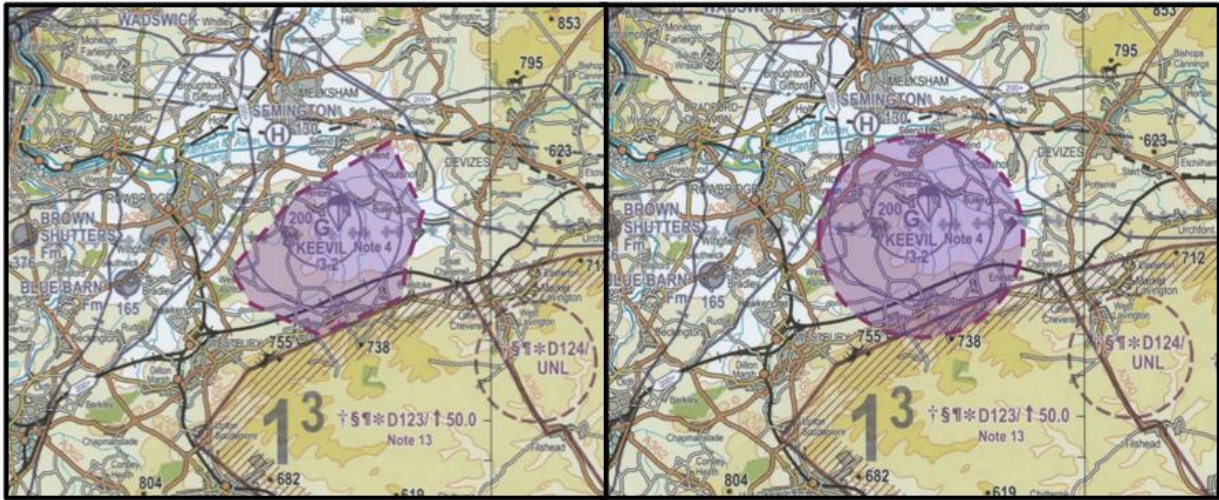


Image 6.A – Simple Designs (multi point)

Image 6.B – Simple Designs (circular design)

Source: CAA 1:250k Aeronautical Chart, Sheet 7

**Note:** These images are for illustrative purposes only. The principle of a simple design consists of a single structure, SFC to a published altitude.

Group	Impact	Level of Analysis
Communities	Noise impact on health and quality of life	Qualitative
<b>Evidence</b>		
<p>A Danger Area with a simple design allows the Sponsor to tailor the dimensions of the airspace to the minimum required size. Aircraft electing to climb over a Danger Area will create less noise impact than those currently routing at lower altitudes. The types of aircraft will not differ from those in the Option 0 'do nothing' scenario.</p> <p>The area required to the North of Keevil may be reduced such as with Image 6.A above, allowing more space for transiting aircraft to pass through. This will allow better dissipation of aircraft reducing the effect of noise to the local communities.</p> <p>ADS-B data also demonstrates that due to the existing airspace structures over Keevil, the majority of aircraft already elect to avoid the glider site / DZ, with very few choosing to route directly overhead. A lesser amount route through the gap between the glider site and SPTA D123 following the railway line for navigation. It is assessed that should the DA be activated, aircraft will either continue to route North of the glider site or elect to climb above thereby causing no change to noise impact on communities compared with the 'do nothing' option.</p> <p>It is therefore assessed that a Danger Area will lead to:</p> <ol style="list-style-type: none"> <li>2 No change in the level of noise compared with the 'do nothing' option. The same level of gliding and military activity will continue.</li> <li>3 A decrease in noise in some areas with fewer aircraft routing via the railway line between the DZ and D123 (or routing higher if they still elect that track).</li> <li>4 No change in noise patterns for aircraft on a direct track using a Crossing Service.</li> <li>5 A decrease in noise for aircraft climbing over the activated airspace higher than they currently may choose to.</li> </ol>		
<b>Evidence</b>		
Group	Impact	Level of Analysis
Communities	Air quality	Qualitative
<b>Evidence</b>		

The Sponsor has concluded that a Danger Area around Keevil will not result in an increase of CO2 emissions. It is assessed that there is no additional impact on air quality compared to when the existing DZ or glider site is activated.

Due to more definitive flight planning possible compared to the current situation (due to certainty of the DA over a glider site or note on VFR charts), pilots should be better able to plan their routing either around or over the airspace. This will allow a gradual climb to altitude over a greater distance, displacing the emissions over a larger area compared to initiating an orbital climb once at the boundary of the DA. ADS-B data shows that aircraft approaching Keevil seeking to route overhead are already at the appropriate altitude for a transit therefore air quality will remain unchanged.

Aircraft expecting to navigate following the railway track may be required to route to the North resulting in additional flight time should they not be able or wish to climb over the active airspace or obtain a DACS.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Wider society	Greenhouse gas impact	Qualitative

**Evidence**

No additional greenhouse gas emissions compared to the impact from the DZ/ glider site. There is no anticipated increase in air traffic in the area as a result of a Danger Area being activate compared with 'do nothing' option.

WebTAG could not provide any quantifiable data due to the varying amount, altitude and type of aircraft transiting the area daily.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Wider society	Capacity / resilience	Qualitative

**Evidence**

The Sponsor assessed that there may be some reduction in traffic North of Keevil and a resultant increase to the current use of the Keevil airspace by those pilots who are currently avoiding the overhead due to Note 4 in the VFR chart (sheet 7 Ed 13) or glider activity. Since a crossing service can be afforded, pilots who are observed routing around Keevil may now choose to cross through the overhead using a crossing service, slightly reducing their route length, fuel consumption and aircraft congestion North of Keevil.

Additionally, if activated by NOTAM it is assessed that air users will be more certain of the activity status of the airfield whereas currently air users are advised to avoid the area at all times.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation	Access	Qualitative

**Evidence**

The area is extensively used by GA to route around SPTA. The ADS-B data indicates that GA are largely already routing around the Keevil area due to the possibility of gliding activity and Note 4 in VFR charts (sheet 7 Ed 13) advising aircraft to avoid Keevil at all times. ADS-B traces also suggest a lesser number of pilots are routing via the railway line between the airfield and D123. Even fewer pilots are choosing to route overhead, particularly below 4,000ft.

With a DACS being afforded there may be an increase in aircraft opting to route through the Keevil overhead whilst the Danger Area is active. Additionally, if only activated by NOTAM, a resultant increase in aircraft operating through the overhead when not active can be expected as activity can be better determined compared to the current scenario.

However, there will be an increased amount in aircraft routing around or over the airspace (when active) if they are not equipped with or qualified to operate a radio as it will not be possible to obtain a Crossing Service and make an assessment of whether or not the DA is safe to cross.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation / Commercial Airlines	Economic impact from increased effective capacity	Qualitative
<b>Evidence</b>		
There are no changes to air transport or passenger numbers brought on by this proposal. The altitude and location of the proposed airspace does not impact on any airline activity.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation / Commercial Airlines	Fuel Burn	Qualitative
<b>Evidence</b>		
Radar traces indicate that GA are largely already routing around Keevil or climbing above. Additionally, any climb that would be required as a result of the DA being activated is inconsequential in fuel burn.		
There is no identified fuel burn impact on commercial airlines.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Training Costs	N/A
<b>Evidence</b>		
It is assessed that there will be no impact on commercial airline training costs as a result of this design option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Other Costs	N/A
<b>Evidence</b>		
It is assessed that there will be no additional costs to commercial airlines as a result of this design option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Infrastructure Costs	N/A
<b>Evidence</b>		
There are no additional infrastructure costs for airports or ANSPs associated with this option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Operational Costs	N/A

Evidence		
There are no additional operational costs for airports or ANSPs associated with this option.		
Group	Impact	Level of Analysis
Airport / Air Navigation Service Provider	Deployment Costs	N/A
Evidence		
There are no deployment costs for airports or ANSPs associated with this option.		

## Summary of Option 2 Full Appraisal

2.2 It is assessed that a Danger Area with a simple design, adhering to Design Principles to ensure it is as small as possible to achieve technical requirements. It will have a negligible impact on both the environment and the majority of air users although it is noted that it will, when active, affect non-radio equipped aircraft and those wishing to utilise the railway line for VFR navigation at low level. It is concluded that:

- A DA such as Image 6.A will not increase the funnelling effect between SPTA and Bristol CTR as it is able to limit any unnecessary encroachment to the North of Keevil.
- Image 6.B, as the most basic in design, is too simplistic and therefore inefficient as it extends too far North of the airfield into areas in which segregated airspace is not required. A circular design, similar to an offset ATZ will be an inefficient method of generating segregated airspace for the purpose of RPAS operations.

2.3 Both Image 6.A and 6.B designs concepts will be taken forward for consultation.

Option 2 is to be retained.

### Option 3 - Danger Area (multi-sector design)

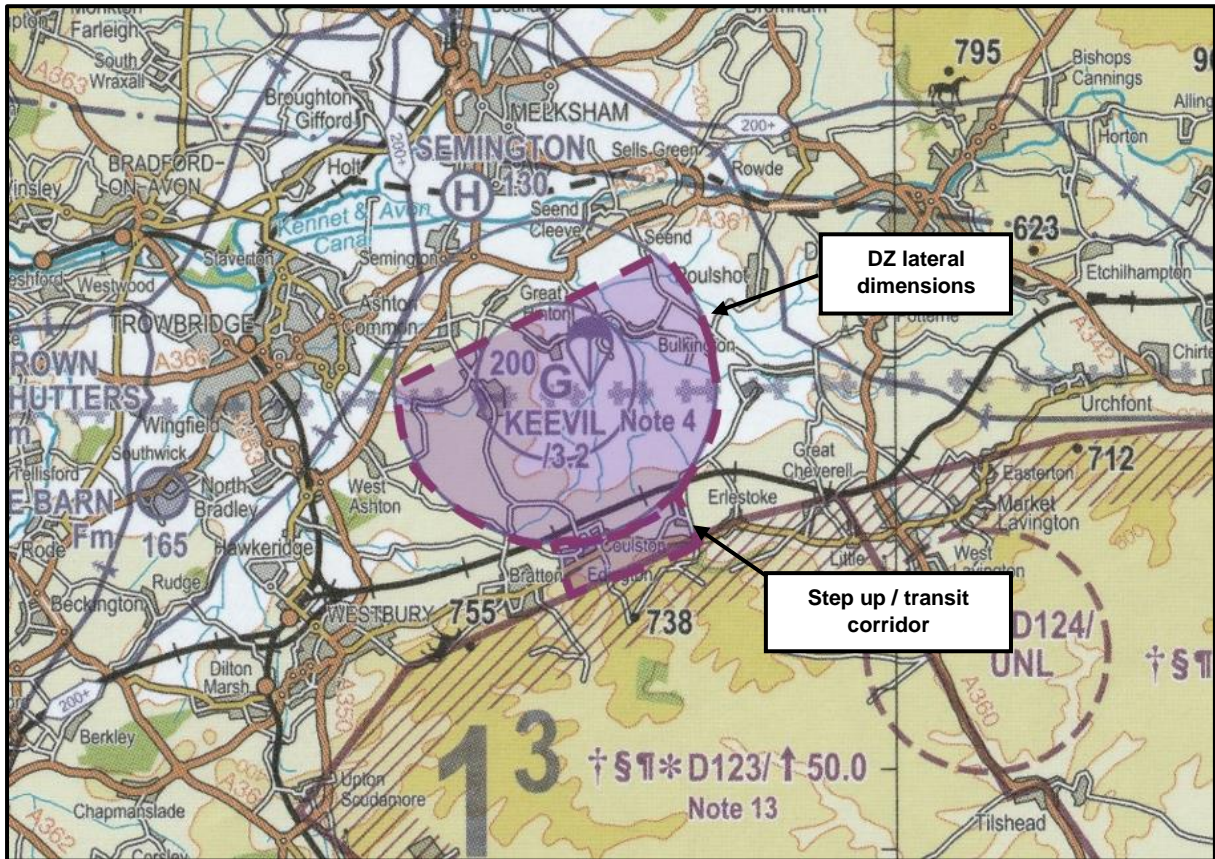


Image 7 – Multi-Sector Design

Source: CAA 1:250k Aeronautical Chart, Sheet 7

**Note:** The multi-sector design consists of several structures (some may be “hanging airspace” not connected to the surface).

Group	Impact	Level of Analysis
Communities	Noise impact on health and quality of life	Qualitative
<b>Evidence</b>		
<p>It is concluded that the activation of this Danger Area shape will result in:</p> <ul style="list-style-type: none"> <li>6 No change in the level of noise compared with the ‘do nothing’ option or Option 2.</li> <li>7 No change in noise patterns for aircraft on a direct track using a Crossing Service.</li> <li>8 A decrease in noise for aircraft choosing to climb over the activated airspace slightly higher than they currently may have to.</li> </ul> <p><i>No change compared to Option 2.</i></p>		
Group	Impact	Level of Analysis
Communities	Air quality	Qualitative
<b>Evidence</b>		
<p>It is concluded that the different shape of this airspace compared to Option 2 will not result in an increase of CO2 emissions compared with the ‘do nothing’ option. See Ref. E for further analysis.</p> <p><i>No change compared to Option 2.</i></p>		
Group	Impact	Level of Analysis
Wider society	Greenhouse gas impact	Qualitative
<b>Evidence</b>		

No additional greenhouse gas emissions would arise compared to when the current DZ is activated or Option 2. It is expected that if more aircraft choose to route through the airspace rather than around it will result in a minor reduction in aircraft emissions.

WebTAG could not provide any quantifiable data due to the unknown amount and type of aircraft transiting the area. Further rationale for a qualitative analysis can be found at Ref. E.

*No change compared to Option 2.*

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Wider society	Capacity / resilience	Qualitative

**Evidence**

The Sponsor assessed that there may be some reduction in traffic North of Keevil and a resultant increase to the current use of the Keevil airspace by those pilots who are currently avoiding the overhead due to Note 4 in the VFR (Sheet 7 Ed 13) chart or possible glider activity.

Since a crossing service can be afforded for the majority of GA, transiting pilots who normally route around Keevil may now choose to cross through the overhead using a crossing service, slightly reducing their route length, fuel consumption and aircraft congestion North of Keevil.

*No change compared to Option 2.*

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation	Access	Qualitative

**Evidence**

ADS-B traces demonstrate that GA are largely already routing around the Keevil area due to the possibility of gliding activity and Note 4 in VFR charts (Sheet 7 Ed 13) advising aircraft to avoid Keevil at all times. ADS-B traces also suggest that a lesser number of pilots are routing via the railway line between the airfield and D123. Even fewer pilots are choosing to route overhead, particularly below 4,000ft.

A Danger Area activated by NOTAM when required will see GA access limited only during periods when RPAS are operating when a DACS is unavailable or air users are unable to obtain a crossing service. When a DACS is afforded there may be an increase in aircraft opting to route through the Keevil overhead. Additionally, when not active aircraft may choose to route overhead whilst currently air users are advised to avoid.

The key difference between options 2 and 3 is the aim to facilitate VFR navigation using the railway line between D123 and Keevil. It is assessed that:

- Only a small amount of air users utilise the railway line to navigate the gap between SPTA and Keevil as demonstrated by the VFR heatmaps and ADS-B data.
- There is scope to develop procedures for low-flying military helicopters to continue to utilise the low flying routes.
- 'Hanging airspace' could create a very small transit gap that may increase the risk of MAC if aircraft are forced into a small gap, intensified by the fact that some may not be operating radios or electronic conspicuity.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation / Commercial Airlines	Economic impact from increased effective capacity	Qualitative

**Evidence**

There are no changes to air transport or passenger numbers brought on by this proposal. The altitude and location of the proposed airspace does not impact on any airline activity.

<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
General Aviation / Commercial Airlines	Fuel Burn	Qualitative
<b>Evidence</b>		
ADS-B data indicates that GA are largely already routing around Keevil or climbing above. Additionally, any climb that would be required as a result of the DA being activated is inconsequential in fuel burn. For aircraft already routing between D123 and Keevil there will likely be no additional fuel burn should this Design Option be able to facilitate continued access. There is no identified impact on commercial airlines.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Training Costs	N/A
<b>Evidence</b>		
It is assessed that there will be no impact on commercial airline training costs as a result of this design option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Commercial Airlines	Other Costs	N/A
<b>Evidence</b>		
It is assessed that there will be no additional costs to commercial airlines as a result of this design option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Infrastructure Costs	N/A
<b>Evidence</b>		
There are no additional infrastructure costs for airports or ANSPs associated with this option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Operational Costs	N/A
<b>Evidence</b>		
There are no additional operational costs for airports or ANSPs associated with this option.		
<b>Group</b>	<b>Impact</b>	<b>Level of Analysis</b>
Airport / Air Navigation Service Provider	Deployment Costs	N/A
<b>Evidence</b>		
There are no deployment costs for airports or ANSPs associated with this option.		

### Summary of Option 3 Full Appraisal

2.4 It can be concluded that, as with Option 2, this Danger Area option will have a negligible environmental impact compared with the 'do nothing' option.

Whilst Options 3 is not the simplest DA option, it may help to alleviate the additional pressure of funnelling aircraft who traditionally utilise the railway line to navigate around Salisbury Plain. However, it is assessed that this will only affect a small number of air users and may increase both the risk of airprox and mid air collision as well as airspace incursion.



2.5 Additionally, as both airspace structures would be required to be activate at the same time in order to facilitate transit to and from Salisbury Plain it is not assessed to provide a significant difference in airspace access compared to Option 2. Option 3 is to be retained.

## Section 3

### Conclusion and Next Steps

#### Summary and Preferred Option

3.1 Both Danger Area options have been further developed following the Stage 2 Initial Options Appraisal. Many of the assumptions made during Stage 2 have been validated with the trend analysis from sources such as the VFR heatmaps, ADS-B traces and airprox data.

3.2 Building on the Initial Options Appraisal the Sponsor concludes that Option 2 (a Danger Area of a simple design) remains the preferred option. It is assessed that it will have a minor impact on the majority of air users and guarantees regulatory compliance for BVLOS operations.

#### Specific Challenges Identified

3.3 **HEMS.** The area is regularly utilised by the Wiltshire Air Ambulance. As a result, a Letter of Agreement similar to that agreed during the Temporary Danger Area of Spring 2021 will be required in order to ensure access to HEMS regardless of the airspace status. This includes establishing robust communications between Keevil Ops and the Wiltshire Air Ambulance and creating procedural deconfliction measures.

3.4 **Keevil – D123 gap.** Option 2, whilst aiming to facilitate continued use of the railway line for navigation at low level, has the potential to create a choke point and therefore increase the risk of MAC. It may also increase the risk of airspace incursion for aircraft attempting to operate between the gap.

#### ACP Timeline

3.5 In order to meet the Consult Gateway on 27<sup>th</sup> May the Sponsor submitted all Stage 3 documentation to the CAA by Friday 20<sup>th</sup> May. Redacted versions will then be uploaded to the Portal.

3.6 Provided a successful pass through the Consult Gateway the Sponsor will then commence formal consultation on Options 2 and 3 from Wednesday 1<sup>st</sup> June.