Ministry of Defence

ACP-2021-006 - ENABLING BVLOS UAS OPERATIONS FROM KEEVIL AIRFIELD

STAGE 3 ENVIRONMENTAL IMPACT ASSESSMENT V1

1. This document forms part of the overall submission of Stage 3A of ACP-2021-006 in accordance with the requirements laid out in CAP 1616 and supplements the Stage 3A Full Option Appraisal.

2. The aim of this document is to provide an outline of the Sponsor's rationale in using a **qualitative assessment** of the environmental impact of any of the proposed Design Options. The Secretary of State for Transport has directed the CAA not to consider the environmental impact of military aircraft and operations. The environmental impact from other air traffic as a result of the introduction of a new airspace structure has however been considered in this assessment.

3. The Sponsor notes that (although not required in CAP 1616) in order to mitigate against the impact of noise from its own aircraft on the local community, a Design Principle to reduce the impact of noise was added to the list of Design Principles during Stage 1. Any feedback received throughout the ACP regarding noise produced by the Sponsor will be considered during consultation. Minimising operating noise from the Sponsors' activities will be achieved mostly through operating procedures rather than airspace design but, in order to meet the Design Principle, the airspace structure should be able to facilitate such procedures.

4. Feedback already received regarding consequential noise produced by other aircraft will be considered by applying variations in the sizes and shapes (as much as possible) to the proposed Design Options to facilitate the dispersion of noise[1].

Assessment Categories Summary

5. **General.** The Sponsor has determined the majority[2] of aircraft are already avoiding the Keevil overhead resulting in either the overflight of areas to the North or climbing to an altitude above the notified Glider Site[3]. The Sponsor does not believe that any additional airspace over Keevil will result in an increase of powered aircraft passing through this area. The current number of powered aircraft transiting through the Keevil area is less than 30 per day, with the majority of those being single engine piston fixed wing aircraft and a smaller number being turbine engine helicopters.

6. **Noise.** Due to the existing behaviour and freedom in Class G airspace, it is not possible to accurately calculate a noise impact to produce a Quantitative Noise Assessment. The type of powered aircraft operating in the Keevil area below 4000ft AMSL are mostly single engine piston aircraft, with a lesser number of twin engine and turbine rotary aircraft. The Sponsor does not believe that any additional airspace over

[1] CAP 2091 para 3.8
[2] See Full Options Appraisal – ADS-B Flight Tracking Evidence
[3] Above the maximum winch launch altitude.

Keevil will result in powered aircraft passing through this area thereby increasing and exceeding an average of 30 aircraft per day. The lowest observed adverse effect level (LOAEL) will therefore not exceed 51 dB Leq.

7. **Overflight.** Data collected using the BGA Ladder and electronic conspicuity traces[4] indicates that the majority of aircraft transiting the Keevil area are already avoiding the Keevil overhead by either routing North of the Keevil DZ or overlying it at an altitude greater than 3500 ft AMSL[5]. The Sponsor believes due to the current practice of aircraft avoiding the Keevil overhead, that the impact of any additional airspace over Keevil will have a negligible additional impact on overflight. The majority of aircraft overflying and operating inside the Keevil DZ during the week are military helicopters conducting low level training.

8. **CO2 Emissions.** The Sponsor has determined that although any additional airspace around Keevil is relevant to traffic below 7000ft AMSL, the level of the impact will not be quantifiable due to the freedoms associated in the class of airspace and the range of options available for transiting aircraft up to 7000ft AMSL. Current trends indicate that most aircraft are, to a large extent, already avoiding the Keevil Glider Site and Drop Zone (applying good airmanship and in adhering to note 4 in the VFR chart sheet 7 Ed 13) regardless of its activation as they may not be aware of the activity being conducted in the vicinity. Any additional airspace, with the introduction of an information or crossing service as appropriate, may allow aircraft to transit this airspace directly in the future, reducing their route length and thereby CO2 emissions should they be below 3500ft AMSL. It is therefore not possible to create a Quantitative Assessment on the consequential impact on CO2 emissions. The sponsor has assessed that any additional airspace introduced at Keevil will result in a negligible impact on CO2 emissions.

9. **Local Air Quality.** The Sponsor has confirmed that the area considered does not impact on any Air Quality Management Areas (AQMA). The closest AQMAs are Shane's Castle, Devizes and Haynes Road in Westbury, both in excess of 8km from the airfield. Any additional airspace will more likely result in aircraft routing around, flying through the airspace at their current altitude, or climbing to overfly the airspace in a similar manner that they are currently operating with no additional impact on the AQMAs. This should not result in additional aircraft movements below 1000ft above ground level (agl). As a result, the Sponsor has conducted a Qualitative Assessment of Air Quality with an assessment that there will be a negligible change should any airspace structures be introduced.

10. **Tranquillity.** The Sponsor has confirmed that the area concerned does not fall within a National Park or an Area of Outstanding Natural Beauty (AONB). The number of powered aircraft transiting through the area should not increase as a result of newly proposed airspace. The consequential impact of noise due to any additional airspace has therefore been determined as negligeable. In order to minimise the effect of noise on the local community, the Sponsor has voluntarily added a Design Principle to reduce the impact of noise produced by them. The methods in achieving this will be developed during consultation where local stakeholders will be directly consulted.

[4] Electronic Conspicuity Aircraft flight path determined using https://globe.adsbexchange.com. The term "aircraft traces" or "Electronic Conspicuity" refers to any combination of ADS-B, MLAT and FLARM flight data.
[5] Raw data will be uploaded to the CAA Airspace Change Portal

11. **Biodiversity.** Due to the negligible change in traffic patterns and volume brought on by any additional airspace at Keevil, the Sponsor has assessed that there will be a negligible impact on biodiversity.

Current Situation

12. The Sponsor has compiled aircraft flight path[6] data using electronic conspicuity[7] over a 2-week period in order to assist in providing an assessment of the behavioural trends of aircraft transiting through the Keevil area. This has been used to conduct a qualitative assessment on the consequential environmental impact of introducing an additional airspace structure at Keevil. The impact assessment is based on comparison to what is currently believed to occur in the vicinity of Keevil due to the existing airspace notifications (DZ / gliding site). It is important to note that due to the airspace being Class G, not all aircraft transiting through the Keevil area would have been transponding or using FLARM, and as a result will not be captured in the 2 week aircraft trace data.

13. The exact amount of aircraft transiting the Keevil area are therefore unknown, but the sponsor has not seen any reason why those aircraft not included in this data would act differently to those captured in the electronic conspicuity data.

Fig 1. CAA UK VFR Chart 1:250 000 Sheet 7 (edition 13) with Note 4

14. From the Electronic Conspicuity aircraft traces it is assessed that:

a. Aircraft are already primarily routing North East to South West (or vice versa) passing to the North of the Keevil DZ.

[6] STAGE 3 ELECTRONIC CONSPICUITY FLIGHT DATA - VERSION 0.2
[7] Electronic Conspicuity: FLARM, ADS-B and MLAT

b. A lesser number of aircraft are using the railway line between D123 and Keevil as a VFR navigational aid in order to avoid glider activity or, when published, paradropping.

c. Paragliding activity from Westbury White Horse does not impede the DZ.

d. No commercial routes are affected.

15. The airspace around Keevil displayed are that of the current DZ. Whilst the proposed airspace structure have not been decided on yet it would be similar to or less restrictive than what is displayed below.

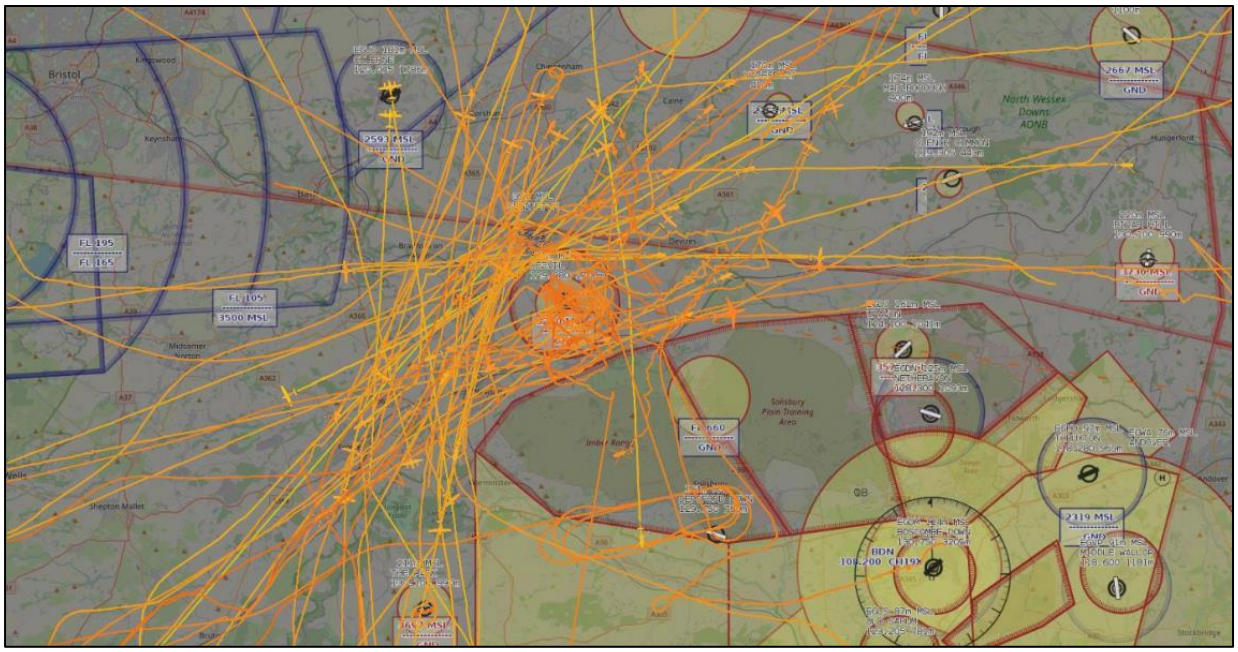

Fig 2. ADS-B and FLARM traces 4 – 8 April Sfc – 4000ft AMSL (Military helicopters shown using Keevil)

16. **Assumptions.** The Sponsor has made the following assumptions in order to set a base standard that can be used to assess environmental impact of any new airspace structures at Keevil. It is assumed that:

a. Pilots planning to fly through the Keevil area will conduct flight planning prior to their departure and will determine whether or not Keevil is active.

b. Pilots unable to determine whether gliding activity is taking place will plan to overfly the area in accordance with Note 4 of VFR charts(sheet 7 Ed13) and due to the risk posed by winch launching (up to 3,200ft AMSL).

c. If NOTAM'd as active, pilots may plan to fly over the DZ/ gliding site (if possible) depending on the altitude NOTAM'd (the DZ may be activated up to FL150). Pilots may in addition determine whether it is safe to cross but must plan an alternative should this not be possible.

d. In cases that the area is NOTAM'd as active, pilots unable to climb will plan to fly around Keevil between Frome, Trowbridge and Melksham.

e. Pilots planning to overfly the area are likely to start their climb at a greater distance away from the lateral confines of the airspace structure.

Adopting a gradual climb to altitude is more likely than flying to the lateral confines of the structure and then commence a steep climb to above the airspace.

f. A Danger Area Crossing Service (DACS) or suitable crossing service can be provided by Boscombe ATC. The provision of a DACS underpins some assessments made on environmental impacts (noise, CO2 and traffic flow) later in this document.

New Airspace Structure

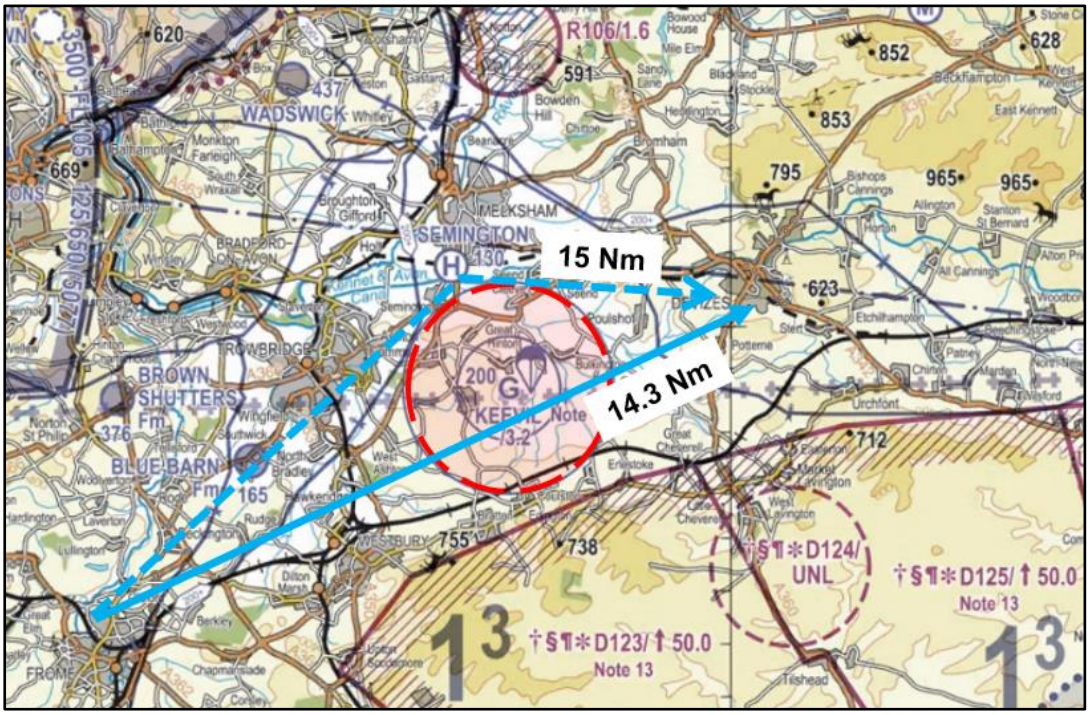

Fig 3. Most likely routing from FROME to DEVIZES. CAA UK VFR Chart 1:250 000 Sheet 7

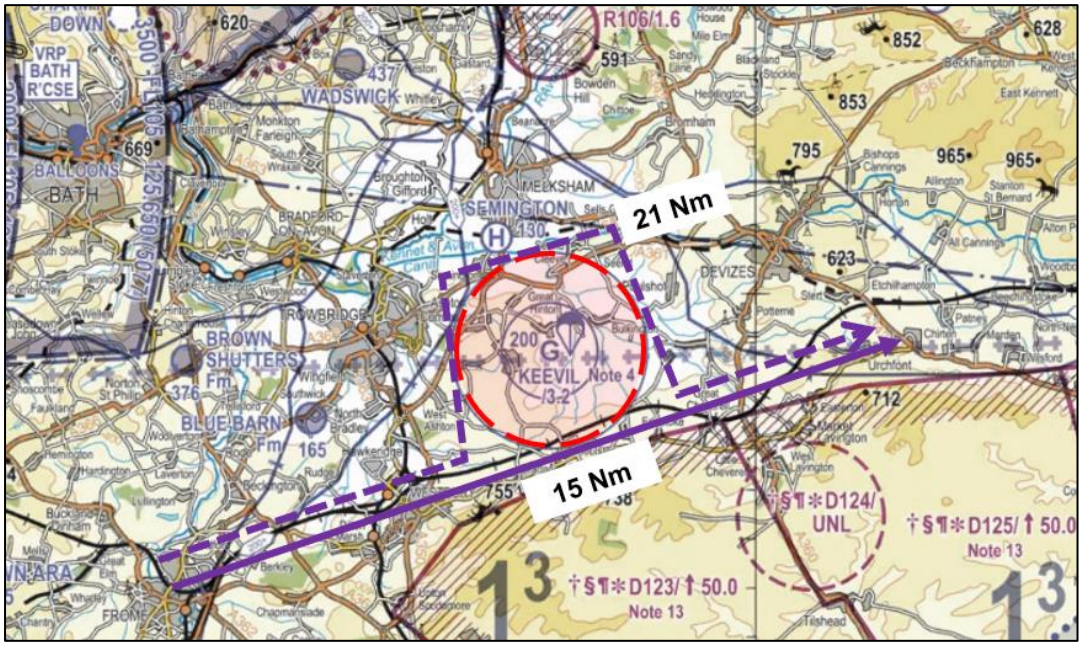

Fig 4. Worst case routing from FROME to south of DEVIZES. CAA UK VFR Chart 1:250 000 Sheet 7

17. Pilots planning to fly through the Keevil area may be required to take the additional measures as a result of any new airspace structure at Keevil. However, based on the ADS-B and FLARM data available, a large number of aircraft are already conducting this behaviour regardless.

a. Pilots wishing to climb to an altitude in order to overfly / avoid any new airspace structure may be require to climb to at least 3500ft AMSL in order to fly over the new Keevil airspace[8]. This may be lower than what they would have had to climb to in order to cross an active DZ (max FL150) and marginally higher than what the 3,200 ft AMSL vertical limit published on the VFR chart for the winch launching.

b. Pilots wishing to route around any new airspace structure at Keevil will follow a similar track to those aircraft wishing to avoid the DZ / Glider site when active. Routing will most likely be required around the Northern edge of the airspace structure.

18. The Sponsor has therefore made the assessment that the resultant routes chosen by pilots due to any new airspace structure at Keevil will be **similar** to that of the existing activity notification, requiring passing aircraft to route around or climb to overfly the airfield. For some users not equipped with radios a crossing of a new airspace structure may not be possible which will force these aircraft to route around or above it.

19. The Sponsor further assessed that there may be some **reduction** in traffic North of the DZ 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 Ed13) or glider activity. Since transiting pilots who normally route around Keevil may (when active) choose to fly through the overhead using a crossing service, slightly reducing their route length, fuel consumption and aircraft congestion North of Keevil.

Impact Assessment

20. Due to the varying number and type of aircraft transiting through the Class G airspace per day, no data was able to be collected to accurately determine noise impact or greenhouse gas emissions to set a base standard[9] that would allow for a quantitative assessment. Additionally, owing to the option for aircraft to use multiple routes and altitudes during their transit of the area, which significantly alters the results of noise model assessments, initial attempts in creating a quantitative assessment[10] have not provided useful data. It was however possible, using ADS-B and FLARM data, to differentiate between commercial, civil and military traffic, and it is assessed that very few, if any, commercial traffic will be impacted[11] in the Keevil area due to the altitude and location of the proposed additional airspace being similar to the exiting Drop Zone.

[8] 3500 ft AMSL used as an example based on the previous TDA used at Keevil as a comparison. The resulting airspace structure may be different post the Consultation phase.
[9] CAP 1991 para 163 – inability to accurately calculate traffic in Class G airspace
[10] WebTAG A3 did not provide useful data due to the majority of the metrics required being unknown.
[11] The Wiltshire Air Ambulance HQ sits underneath the Northern flightpath. The exact increase (if any) to the level of traffic in the overhead will be determined during the Full Options Appraisal.

21. **Noise.** Due to the lack of quantifiable information available, a noise modelling category could not be determined as per CAP 2091 para 2.8. Should a category need to be assigned, the most suitable is Noise Model Category E. Monetisation of the impact could therefore only be displayed in terms of the additional requirements for each type specific aircraft. The Sponsor has therefore conducted a qualitative assessment based on set assumptions discussed above in order to determine the environmental impact. The Sponsor assesses that any additional airspace around Keevil (when active) will not result in an increase the number of aircraft operating in or around the area. Additionally, it will not change the type of aircraft operating through the Keevil area, therefore aircraft will produce the same level of noise impact as is currently produced or less due to their option to climb higher and overfly the new airspace. Due to similar routing of aircraft the amount of residents impacted remain largely the same.

22. Aircraft affected are those **below 4000ft AMSL.** The Sponsor assesses that powered aircraft passing through this area will not exceed 30 per day and therefore the lowest observed adverse effect level (LOAEL) will not exceed 51 dB Leq. The individual noise impacts on an additional airspace structure are:

a. **No change** in noise compared to the current situation.

b. **An increase** in the amount of aircraft routing North when a new airspace structure is active and a crossing service is unavailable or climb overhead not possible. There will be no change in the level of noise or the type of aircraft producing noise as a result of a new airspace structure.

c. **A decrease** in noise in some areas as a result of fewer aircraft routing via the railway line between the DZ and D123.

d. **No change** in noise patterns for aircraft continuing its track through the activated airspace using a crossing service.

e. **A decrease** in noise for local residents by aircraft choosing to initiate an early climb over the activated airspace.

Note: To date, local area stakeholders have mostly raised concerns regarding the noise produced by the Sponsor's own aircraft and other military aircraft. Few stakeholders have raised concerns about the additional noise produced by GA routing changes as result of MOD activity at Keevil. The Sponsor notes that this in itself does not imply that there is no additional noise impact by GA and will consult directly with stakeholders on the impact of noise during Stage 3.

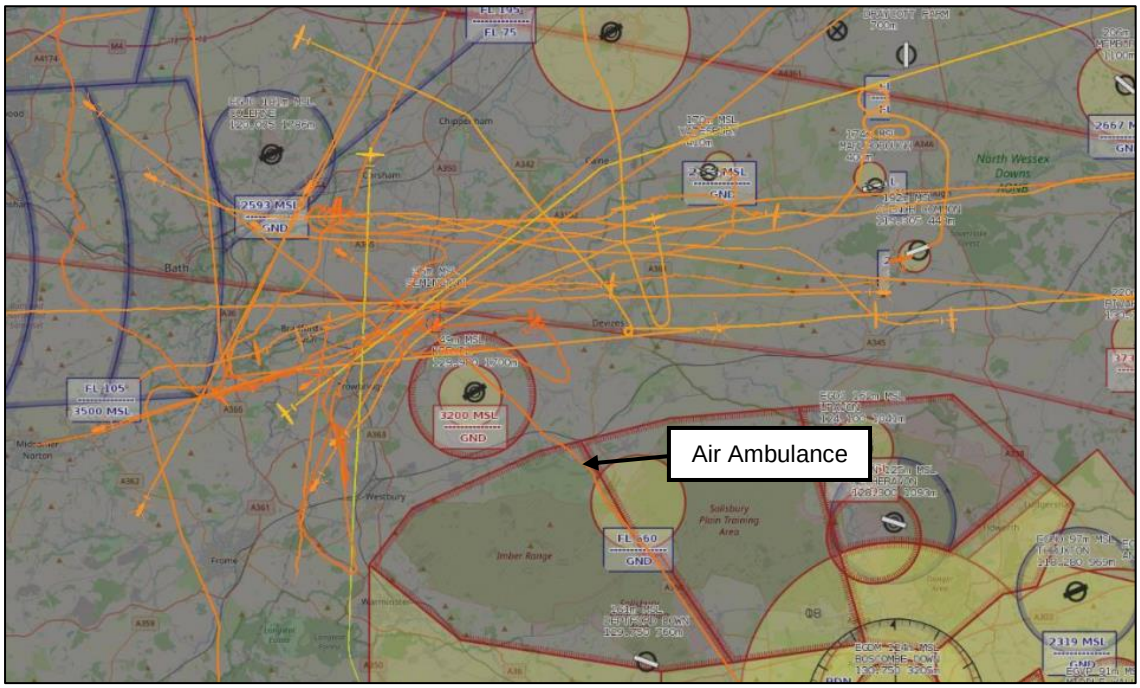

Fig 5. ADS-B Data from 28 March 2022 Source: globe.adsbexchange.com

23. In order to determine behavioural trends of aircraft passing through the Keevil area, the Sponsor conducted a 2-week (weekday only) study of ADS-B and FLARM data. Referring to the day with the highest activity, where 23 civilian aircraft transited through the Keevil area, it was concluded that:

a. 21 out of 23 aircraft avoided the Keevil Glider Site/ DZ by at least 2NM.

b. The peak periods were 12:00-13:00 and 14:00-15:00 containing 6 movements each.

c. 6 aircraft operated Sfc – 1000 ft AMSL

d. 10 aircraft operated 1000 – 2000 ft AMSL

e. 4 aircraft operated 2000 – 3000 ft AMSL

f. 3 aircraft operated 3000 – 4000 ft AMSL

24. **Overflight - Gliders.** Using the BGA Ladder[12] in order to determine gliding trends over a 2-year period, the Sponsor has concluded that:

a. 27 glider flights transited through the Keevil area

b. Out of the 27 flights, 19 were over the weekend and 8 during the week.

c. The average altitude used by the 8 glider aircraft over Keevil are 3887 ft AMSL.

[12] BGA Ladder only used for competition glider flights and not indicative of all glider activity. Data can be found in the Full Options Appraisal.

25. **Overflight – Powered aircraft.** Using Electronic Conspicuity traces (ADS-B, MLAT and FLARM) in order to determine combined gliding and powered aircraft trends over a 2-week period (week days only), the Sponsor has concluded that:

a. 164 aircraft transited through the Keevil area

b. 88 aircraft were civilian (non-military or HEMS) routing through the area

c. 27 civilian aircraft routed through the Keevil Glider Site

d. 17 civilian aircraft routed through the Keevil Glider Site below 3000 ft AMSL

e. 76% of civilian aircraft routed around the Keevil Glider Site

f. 88% of civilian aircraft routed around the Keevil Glider Site or routed over it at an altitude above 3000ft AMSL.

26. Of the 17 civilian aircraft routing overhead below 3,000ft AMSL it is assessed that only a small minority of these aircraft types would be unable to request a DACS in any future DA over the same area.

27. **Air Quality.** The Sponsor assesses that any additional airspace around Keevil will result in no change to the CO2 emissions currently produced. Potential isolated emission impacts are:

a. **No change** in carbon emissions compared to when the existing DZ is activated or gliding activity is taking place where pilots will route around it.

b. **A slight decrease** in carbon emissions for aircraft that previously routed around the airspace as a precaution (due to Note 4 on the VFR chart) should they now use a crossing service and plan a more direct routing overhead. The decrease in emissions are aircraft specific but would see a 0.7Nm reduced route length (see Fig 3).

c. **A potential increase** in carbon emissions should a DACS be denied and aircraft are forced to route around the North of Keevil for an additional **0.7Nm**. Similarly, there would an unquantifiable increase in emissions for aircraft having to climb above the airspace. This can be mitigated by an early DACS request 5NM before the boundary of any proposed airspace to facilitate an early climb if required.

28. **CO2 Emissions.** The Sponsor has determined that although any additional airspace around Keevil is relevant to traffic below 7000ft AMSL, the level of the impact will not be quantifiable due to the freedoms associated in the class of airspace and the range of options available for transiting aircraft compared to what is currently experienced:

a. **No change** in carbon emissions compared to when the existing DZ is activated or gliding activity is taking place where pilots will route around.

b. **A slight decrease** in carbon emissions for aircraft that previously routed around the airspace as a precaution (due to Note 4 on the VFR chart) should

they now use a crossing service and plan a more direct routing overhead. The decrease in emissions are aircraft- specific but would see a 0.7Nm reduced route length (see Fig 3).

c. **A potential increase** in carbon emissions should a DACS be denied and aircraft are forced to route around the North of Keevil for an additional **0.7Nm**. Similarly, there would an unquantifiable increase in emissions for aircraft having to climb above the airspace which is higher than what aircraft may currently be operating at.

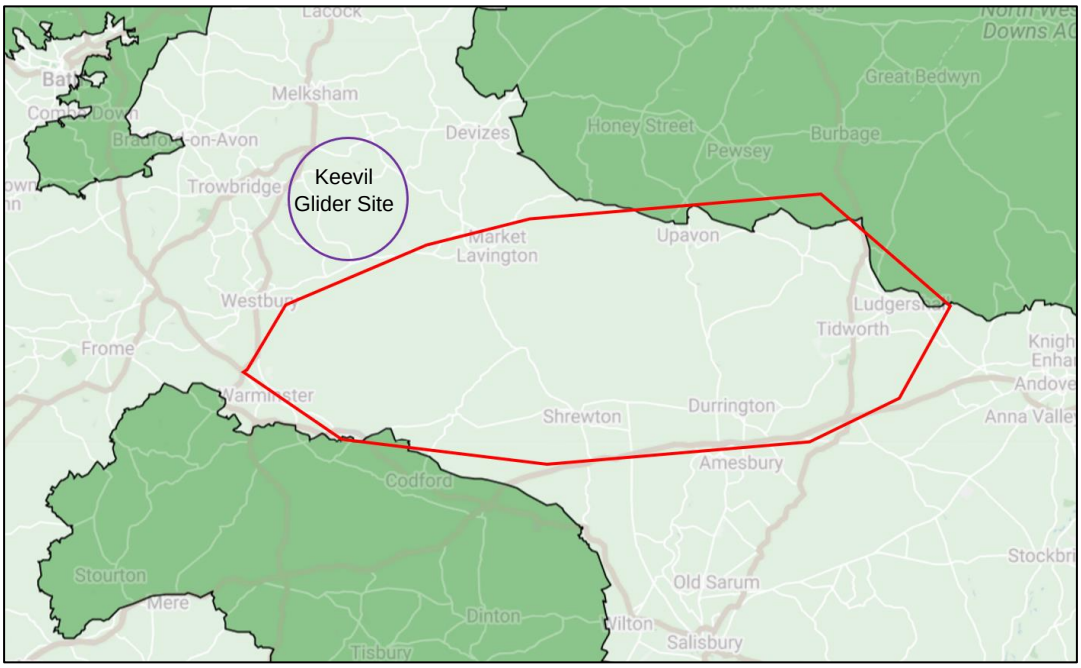

Fig 6. Areas of Outstanding Natural Beauty (dark green). Keevil Airfield (purple) and Salisbury Plain Training Area (red)

29. **Tranquillity.** The Sponsor has confirmed that the area concerned does not fall within a National Park or an Area of Outstanding Natural Beauty (AONB). The consequential impact in the production of noise due to any additional airspace has therefore been determined as negligeable as it is expected to stay the same as before due to the trends displayed on the aircraft trace behavioural data. In order to minimise the effect of noise on the local community, the Sponsor has voluntarily added a Design Principle to reduce the impact of noise produced by their operations. The methods in achieving this will be developed during the consultation phase and the subsequent creation of noise abatement procedures for MOD aircraft.

30. **Economic Impact.** The Sponsor assesses that any additional airspace around Keevil may require an additional 0.7Nm worth of fuel per aircraft type. There are no additional training burdens for pilots however should pilots not currently qualified to operate an airband radio choose to apply for a Flight Radio Telephony Operators License (FRTOL) in order to benefit from any crossing services, they will incur a cost for additional training (however, as this is Class G this would be entirely discretionary). The individual economic impact assessments are:

a. **No change** in fuel usage compared to when the existing DZ or glider site is active and pilots are required to route or above or around it.

b. **A decrease** in fuel usage for aircraft that previously routed around the airspace as a precaution (due to Note 4 on the VFR Chart) should they now use a crossing service and route direct. The decrease in fuel cost is aircraft type specific and cannot be accurately monetised.

c. **An increase** in fuel usage for an additional **0.7Nm** should a crossing not be possible (see image 1 above).

d. Should a design option's vertical dimension be higher than 3,200ft AMSL there will be a **negligible increase** in fuel usage for an aircraft that may currently transit overhead to avoid winch launch glider activity.

e. **A cost** of approximately **£250** to gain a FRTOL should pilots currently unable to use a radio choose to apply for a FRTOL in order to use any associated crossing services.

f. **A cost** of approximately **£200** to purchase an Airband radio should pilots currently operating without a radio choose to purchase one in order to use any associated crossing services.

31. **Traffic Increase.** The Sponsor does not predict an increase in traffic volumes as a result of any additional airspace in the area over a 10-year period. ADS-B data has proven that most traffic in the Keevil area is transiting and as a result fluctuates. The data does provide behavioural trends which suggests that any increase in traffic will result in additional aircraft proportionally following similar tracks to those currently used.

32. **Biodiversity.** Due to the negligible change in civilian traffic patterns and volume brought on by any additional airspace at Keevil, the Sponsor has assessed that there will be a negligible impact on biodiversity[13]. Keevil is currently extensively used by military helicopters for training. When active for BVLOS operations, the helicopter activity will be replaced by that of RPAS producing similar or lower levels of noise, resulting in a net zero increase on the impact on biodiversity.

Sponsors Conclusion

33. Due to the amount of possible routing options available for aircraft, should new airspace be introduced over Keevil, the Sponsor has conducted a qualitative environmental assessment in accordance with the rationale in this document. In addition, procedures that may mitigate against additional environmental impacts will be developed proactively with stakeholders during consultation.

[13] https://www.aef.org.uk/ Aviation Environment Federation