BVLOS TRIAL IN NON-SEGREGATED AIRSPACE

Trial Plan Part 1: Temporary Danger Area *V3.0*

Change history	
V1.0	First issue
V2.0	Updated to add further rationale for size of TDA, add detail around continued engagement throughout the trial, highlight chances of delay due to any delays in OSC permissions, add information on permissions for Temporary Flight Restriction (TFR) field within standard FIS-B format, clarification of CAP1616 Paras 324-327 and update to the noise section based on new noise calculations provided by CAA.
V3.0	Correction to noise calculations (not relevant to noise assessment outcome)

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Introduction

Consortium partners Trax International, uAvionix, Plane Finder and ANRA Technologies are working together with trial hosts Goodwood Aerodrome and The Aviation Innovation Centre, and trial participants Skyports, on a project that aims to prove a concept of safe Beyond Visual Line of Sights (BVLoS) Un-manned Aerial System (UAS) operations alongside conventional traffic in non-segregated airspace.

The consortium wishes to demonstrate the concept via a live airspace trial, within a temporary Transponder Mandatory Zone (TMZ) which needs the permission of the CAA. However, before that can take place the consortium requires the protection of a Temporary Danger Area (TDA) to develop the operating procedures and protocols and gain the safety assurances needed to enable the CAA to permit such a trial.

To request permission for a live trial requires us to submit a trial plan to the CAA. However, at this stage we cannot submit a complete single trial plan with all assurances to request permission for a live trial within a temporary TMZ. For this reason, the trial plan is delivered to the CAA in two parts:

- Trial Plan Part 1, this document, contains the request for the establishment of a TDA and contains all information required in CAP1616 and the CAA Policy for the Establishment of Permanent and Temporary Danger Areas. This trial plan also includes information on the activity that will take place within the TDA and that is currently taking place in preparation for the trial.

- Trial Plan Part 2 will contain the request for permission for a live trial within a temporary TMZ. It will include the safety evidence and assurances, supported by the information obtained during Part 1, and will also include details of stakeholder consultation. Part 2 is expected to be presented to the CAA in July 2021.

An overview of the project including a description of the Concept of Operation to eventually be trialled within a temporary TMZ can be found in our Trial Strategy, available on the CAA Airspace Change Portal.

Trial Plan Part 1

This project is extremely ambitious and will be the first of its kind in the UK and Europe. Whilst the technology to be trialled to deliver the surveillance environment and the TIS-B/FIS-B broadcast already exists to defined International Standards, the operating procedures, protocols and regulations to allow the UAS operator to perform BVLoS UAS operations alongside conventional traffic do not currently exist.

In order to develop these operating procedures and protocols and to generate the safety assurances required to allow CAA to grant permission for a TMZ trial, the project first needs the establishment of a TDA to provide the segregated protection for some of the development and assurance activities.

This project is now applying to the CAA for permission for a TDA to be available for activation around Goodwood aerodrome. This Trial Plan Part 1 contains the following information:

i. Details of the project activity carried out to date including evidence and details of stakeholder engagement.
ii. Details of the finalised proposed design of the TDA, demonstrating consideration of the engagement conducted and how the TDA is the minimum size necessary to perform the tasks required by the project.
iii. An outline of the TDA management process including:
    - Details of the TDA Operating Authority including procedures for handling of infringements and short notice access for emergency services and/or aircraft in distress,
    - The TDA notification and activation processes,
    - Details of the Danger Area Activity Information Service (DAAIS).
iv. A safety assessment demonstrating how the hazard will be contained within the TDA
v. An overview of the project activities to take place ahead of the establishment of the TDA.
vi. What this element of the trial within the TDA involves and aims to investigate. The objectives of the testing and development activity to take place within the TDA and the data needed from Part 1 of the trial.
vii. A description of the ‘Before TDA’ and ‘After TDA’ scenarios
viii. A consideration and assessment of the likely noise impact of operations within the TDA and the stakeholder engagement carried out on this subject to date.
ix. How the project will engage with stakeholders during Part 1 of the Trial and how we will collate, monitor and report to the CAA on the level and contents of any complaints associated with the trial throughout the period of operation of the TDA.
x. The start and end date of Part 1 of the trial within the TDA.
xi. A Draft Aeronautical Information Circular (AIC).

This document does **not** contain an Operating Safety Case (OSC) application for Extended Visual Line of Sight (EVLoS) or BVLoS operations by a UAV operator. These will be made separately by the UAV operator(s)[1] taking part in the trial.

[1] Skyports submitted their OSC request to the CAA on 17th February 2021. Aurgia expect to submit 19th Feb

Project activity to date including stakeholder engagement

This section sets out the project activity carried out to date including stakeholder engagement. This includes a list of our stakeholders, a summary of the engagement approach and timeline, the original engagement documentation, original responses and analysis of the response and a clear audit trail to show what the stakeholders said and what we did (and why) with that information.

Project Activity

On 24th September 2020 the project submitted a Statement of Need to the CAA. An assessment meeting was held on 12th November 2020 between the CAA and the project to discuss the plans and the appropriate course of action. A number of follow up meetings were also held. The Statement of Need and minutes from the meetings with the CAA are available on the CAA Portal here.

The project has been accepted as a CAA Innovation Sandbox project as well as a Connecting Places Catapult (CPC) Pathfinder project.

We have applied for, and have been granted, two of a total of four Ofcom licences for FIS-B/TIS-B transmitters located at Goodwood and at Lasham. The other two FIS-B/TIS-B transmitters will be located at Luton (Ofcom licence applied for) and at a site in Kent. We have conducted testing using a modified uAvionix pingStation to receive FLARM data for the integration into a TIS-B transmission. One modified pingStation is now deployed and operating at Lasham. We have a second modified pingStation ready to be deployed at Goodwood.

Plane Finder have deployed an additional Plane Finder Radar receiver in support of multilateration around Goodwood. There are more Plane Finder Radar receivers awaiting deployment and installation at Lasham (co-located with the pingStation), Goodwood Aerodrome and on the Isle of Wight as soon as CV19 restrictions permit. We anticipate at least another 5 installations are needed in and around the area to provide the robust coverage required.

The build of the four FIS-B/TIS-B transmitters is complete and they are awaiting installation. Work is continuing (via remote access) to enable TIS-B functionality and to integrate FLARM data into these transmitters.

The CV19 lockdown is currently hampering deployment of the hardware and also resulting in a severe lack of Electronic Conspicuity data which may delay the testing and development process.

ANRA have integrated a number of mapping and airspace features into the SmartSkies Platform including urban and rural spaces and terrain for the Goodwood area. They are exploring the use of supplementary static and dynamic data sources such as macro and micro-weather. The platform already supports common surveillance data including ATS ASTERISK data, ADS-data and drone tracking using Remote-ID. We are now further defining the

integration of further supplementary information such as UK aeronautical data and NOTAMS into the platform and preparing training materials.

In December 2020 we began our stakeholder engagement which is covered in detail below.

Stakeholders

Table 1 lists all the stakeholders originally identified that may have an interest in this project. They include all of the stakeholders previously engaged by the Goodwood Innovation Centre for the original TDA request as well as some additional stakeholders identified by the project.

Table 1. Identified Stakeholders for TDA engagement and TMZ consultation

Stakeholders		
Goodwood Aerodrome & Aero Club	Bembridge Airport	Farnborough Airport
Goodwood Flying School	Shoreham Airport	ARC Rescue Co-ordination Centre
Goodwood Aircraft Engineering	Sandown Airport	DAATM
Elite Helicopters	Bognor Regis Gliding Centre	National Police Air Service
Ultimate High	Parham Gliding Site, Southdown Gliding Club	Kent, Surrey & Sussex Air Ambulance Trust
Boultbee Flight Academy	Glidden Microlight Site	BGA
GA Aircraft (Based at Goodwood)	Thorney Island Royal Artillery Station	LAA
Solent Airport	Southampton Airport	A4A
GAA	BMFA	NATMAC
Chichester & District Model Aero Club	Lasham Gliding Club	Western Power
Goodwood Aerodrome Consultative Committee (Boxgrove, Lavant, Singleton, Tangmere and Westhampnett Parish Councils, Chichester District Council, The Chichester Society, Summersdale Residents Association, Sussex Police and West Sussex County Council.)	Local Businesses e.g. Rolls Royce Factory, The Goodwood Hotel	Sussex Police
NATS	South Downs National Park Authority	Specialist Aviation Services

PDG Helicopters	Bristow SAR	Heliair

Method of engagement on the TDA and engagement timeline

Good stakeholder engagement means actively seeking out, listening to and acting on the views of our stakeholders. Unfortunately, due to the COVID-19 situation we were unable to engage face-to-face with our stakeholders and had to rely on online means of communication.

We created an engagement document for our stakeholders, which was sent out with an accompanying email. This aimed to give stakeholders as much detail as possible on the project as a whole, but with the main focus being on Phase 1, the TDA proposal. The engagement document included a link to the CAA Airspace Change Portal where our Statement of Need, Assessment meeting notes and presentation, and our Trial Strategy are all accessible. A copy of the engagement document is available at Appendix B, pages 2-16, along with the accompanying emails.

This document was sent out to our stakeholders on the 10th December 2020, with a feedback deadline of the 15th January 2021. A feedback deadline reminder was emailed to all stakeholders on 8th January 2021. The information sent out to the local GA pilots was distributed by Goodwood Aerodrome directly, this information was sent out on the 11th January 2021 therefore they were given an extended deadline of the 22nd January 2021.

The project felt it was important to actively engage with the Goodwood Aerodrome Consultative Committee and an online briefing was set up to provide them with more details on the project and any potential impacts it could have on the local communities. A copy of the presentation given at that meeting and the subsequent meeting notes are available at Appendix B, pages 25-35.

Where stakeholders raised a number of concerns or questions, the project held online meetings in order to better understand their issues and for us to work together to find solutions. Online meetings took place with Lasham Gliding Club, Skysurfing Club and Bognor Regis Gliding Club.

During our engagement we were contacted by some organisations who requested to be added to our stakeholder list. We were also made aware of other organisations who had not been included in our original list:

- Sky Surfing Club
- Thorney Island Microlight Club
- Hadfold Farm Airfield
- Colemore Common Airfield
- Hampshire Microlight Flying Club

Where stakeholders reached out to us, we engaged with them and provided them with our engagement document. Where we were provided with contact details on new stakeholders,

we emailed those organisations with a copy of our engagement material and offered them the opportunity to provide feedback and ask any questions they may have. Copies of our additional correspondence to these stakeholders is available in Appendices B and C.

A log of all the stakeholder activity is available at Appendix A.

Summary of our original proposal

Our engagement document focussed on the first phase of the project, to establish a TDA around Goodwood Aerodrome (EGHR), outside the normal operating hours of the airport. Only UAV operators who have CAA approval will be permitted to fly BVLoS within the TDA. Flights would only take place over rural areas, avoiding overflight of both residential and commercial areas.

Dimensions

It was proposed that the dimensions of the TDA would be the same as the original TDA established by the Goodwood Innovation Centre (between June-September 2020) although the availability of activation will change slightly.

Lateral Dimensions

A 5nm radius centred on the EGHR Aerodrome Reference Point (ARP):

N 50 51.57 W 000 45.55

Vertical Dimensions

Lower Limit: Surface

Upper Limit: 2000ft AMSL

Proposed timings that the TDA will be active

We proposed that the TDA would be available for activation from April until September 2021. The TDA would not be permanently active but would only be activated on an as-required basis and outside of the operating hours of Goodwood Aerodrome.

Activation of the TDA could take place between 0600 - 0900 and/or between 1700 and 2100 local, 7 days per week, with actual dates and times of activation promulgated by NOTAM. Activation of the TDA would take place a minimum of 24 hours in advance. In addition, if for any reason the aerodrome is closed to normal traffic during the day, we may activate the TDA between the hours of 0900-1700.

We asked our stakeholders to provide us with feedback on the following:

- the proposed dimensions of the TDA, the proposed timings and your thoughts on the access arrangements,
- any safety concerns or any considerations that the operations may have on your existing operations
- any feedback you may have from a local community perspective
- the proposed length of our consultation on the TMZ (8 weeks in May/June 2021)

We also provided a frequently asked questions section to the engagement document, however encouraged stakeholders to ask any additional questions.

A full copy of the engagement document is available at Appendix B, pages 2-16.

Summary of feedback received

Table 2 summaries the feedback and questions we received from our stakeholders, alongside a summary of our response and the outcome it had on our proposal. Full copies of all the correspondence we received from stakeholders and our communications is available at Appendix C.

Table 2. Summary of Stakeholder Feedback & Project Response

Stakeholder	Summary of Feedback	Summary of Project Response	Outcome	Location in Appendix C
[redacted] (GA)	How will the project affect dispensation for resident flyers to operate out of hours in the summer?	• UAV operations will not impact on arrival/departure routes for fixed or rotary wing aircraft. • A FISO will be on duty at all times the UAV is operating.	N/A	Pages 2-3
Bembridge Airport	No objections.	N/A	N/A	Pages 4-5
Bognor Regis Gliding Club	• Concerns over mid-air collision with non-equipped aircraft. • Modify the TDA to exclude the EGKC zone. • Carry out trial in early mornings only. • Useful to land at Goodwood in an emergency. • Prime operating times are afternoons on Wed/Thu & at weekends. • Raised concerns over TMZ.	• Re-shaped the TDA to avoid the winch site. • Noted desire to avoid Wed/Thu PMs & weekends. • Requested advance notice (when possible) of evening flying to the NW of LEC. • Confirmed height of the TDA and rules for entering. • Confirmed a FISO will be on duty when the TDA is active. • Confirmed any aircraft in an emergency will be permitted to enter the TDA. • Noted concerns over TMZ.	• TDA altered in shape to avoid the glider winch site.	Pages 6-19
Brighton City Airport	No objections to the first phase.	N/A	N/A	Pages 20-21
British Helicopter Association	• Question regarding the 'detect' capability of the drone	• Confirmed that the 'detect' capability would be developed within the TDA. • Provided details on the 'avoid' capability to be trialled within the TDA.		Pages 22-23

Chichester & District Model Aero Club (CADMAC)	• Provided information of the model flying site within the proposed TDA boundaries. • Provided information on the rules of the club and stated that they should be able to continue with their activities. • Asked to be include in NOTAM distribution. • Queried the height/timings of the TDA.	• Provided a link to the central NOTAM system. • Provided clarification on the proposed height/times of the TDA. • Requested that CADMAC inform the project via email when they intend to fly. • Requested more information on operations, how often the site is used etc. • Advised they need to obtain permission from TDA operating Authority prior to any model flying.	• Confirmed that model flying can take place in the TDA in accordance with existing CADMAC rules subject to a requirement to obtain permission from TDA operating Authority. • CADMAC area to be added to Smartskies HMI.	Pages 24-30
Chichester District Council	• Have the road network & footpaths within the TDA been mapped out? Will closures be required? • Can you confirm that new housing developments have been accounted for? • Are construction sites treated in the same way as occupied sites?	• Roads & footpaths will be avoided where possible, however can be overflown where there is no other option. • Link provided for developments that have been considered. • The project concluded that construction sites would be treated as occupied sites and not be overflown.	• Developments with planning approval added to our databases	Pages 31-36
DAATM	• No issues or objections to the proposal, including the proposed 8-week length of the consultation for the second phase.	N/A	N/A	Pages 37-38
[redacted] (GA)	• Content with the dimensions of the TDA. • Queried the operating hours of the TDA.	• Provided confirmation of the proposed timings for the TDA. • Confirmed the UAV's will be equipped with ADS-B out.	N/A	Pages 39-40

	• Asked about ADS-B on the UAV. • Queried if SkyEcho2 equipped aircraft will be able to enter the TMZ.	• Confirmed the intention is for SkyEcho2 to enable access to the TMZ but stated that this will be confirmed during the consultation in May/June.		
Farnborough Airport	• Anticipates no significant effect on Farnborough operations. • May be some interactions for Farnborough LARS west, stated that controllers will need to be vigilant for infringements. • Requested a procedure between Goodwood/Farnborough to ensure activity was notified. • No issues with proposed dimensions.	• Confirmed that a NOTAM will be issued at least 24hrs in advance. • Confirmed happy for a procedure (telephone call) to be set up between the project and Farnborough. • Requested contact details and information on primary radar coverage in the area.	• Confirmed we will call Farnborough ATC ahead of any TDA activation.	Pages 41-42
Hadfold Farm Airfield	• Requested to be added to stakeholder list.	• Added to list and provided with stakeholder engagement document.	N/A	Pages 43-44
[redacted] (GA)	• Raised concerns about the TMZ and lack of transponders on light aircraft & microlights. • Raised concerns about paraglider operations in the area.	• Informed that the TMZ would be during Stage 2 of the trial and gave information on the anticipated equipage levels needed to enter the TMZ. • Confirmed that the project has been liaising with local gliding & paragliding clubs to find solutions.	N/A	Pages 45-47
Kent, Surrey, Sussex Air Ambulance	• Ensure access to the TDA can be immediately granted for emergency flights/transits. • Queried if the DAAIS will be able to contact the drone operator swiftly enough to enable immediate access being given to the Helimed?	• Confirmed that access to emergency services will have priority and UAV operations will be immediately suspended. • Stated that the UAV pilot will monitor the Goodwood FISO frequency so	N/A	Pages 48-50

		actions can be implemented without delay.		
Lasham Gliding Society	• Suggested a reduction in radius to 3nm. • Requested the evening timings be changed to start the TDA at 6pm. • Gliders in an emergency. • Short notice NOTAMS. • Tow plane maintenance at Goodwood. • Happy with the proposed length of the TMZ consultation (8 weeks). • Advised the TDA is workable but raised concerns over the effect of a TMZ in the area.	A meeting took place to better discuss local glider operations. • Provided information on why the TDA is 5nm. • Confirmed that any aircraft/glider in an emergency would have priority. • Confirmed that all NOTAMS would be issued 24hrs prior to activation of the TDA. • Any planned movements at Goodwood would have priority over drone operations.	• Lasham offered to provide advance notice (where possible) of glider activity in the area.	Pages 51-55
[redacted] (GA)	• Concerns about any benefits to Goodwood Aerodrome. • Concerns about size of TDA and out of hours flying in summer.	• Outlined benefits to Goodwood Aerodrome. • Provided information on the size of the TDA and classification of airspace. • Clarified that the trial will have no impacts on Goodwood Aerodrome operators.	N/A	Pages 56-57
[redacted] (GA)	• No objections. • Mentioned potential impacts on out-of-hours movements. • Happy with an 8-week consultation period. • Raised concerns about noise impacts.	• Clarified the out-of-hours access arrangements of the TDA. • Provided further information on the noise impact assessment that would take place.	N/A	Pages 58-59

NATS NERL	No impacts.	N/A	N/A	Pages 60-61
NPAS	Ensure that: • DAAIS frequency is promulgated • DAAIS is available during all TDA activation • DAAIS can halt drone operations at short notice	The project confirmed that this would all take place.	N/A	Pages 62-65
[redacted] (GA)	• Requested confirmation on the TDA hours. • No objection to the TDA, due to assurances of no impact on GA. • Raised concerns with TMZ proposal due to lack of EC options.	• Confirmation the TDA activation will be after 6pm local. • Confirmation of priority to GA out of hours operations, providing Goodwood have been notified. • Full details of approved devices will be provided during the TMZ consultation in May/June.	N/A	Pages 66-67
Sky Surfing Club	• Have all local aerial communities been contacted? • Can the TDA be stopped on certain days in certain weather conditions? • Can the TDA be reduced in size? • Raised concerns about the TMZ planned for later in the year. • Advised on a ridge along the northern edge of the TDA which is frequently used for operations. • Queried why FLARM would not enable TMZ access.	A meeting took place to better discuss paragliding operations. • Confirmed which clubs and organisations had been contacted. • Confirmed the TDA will not be active all day, every day. • Provided details on why the TDA is 5nm. • Confirmed that the TMZ would be temporary and is planned during the winter months. • Provided details on emerging CAA policy which will allow only Mode S and CAP1391 approved devices to	• Asked Skysurf to provide the project with as much notice (as possible) of days they anticipate flying in the Goodwood area. • Project reshaped the northern edge of the TDA to avoid this area	Pages 68-74

		enter a TMZ acceptable to allow access to the TMZ.		
Southampton Airport/Solent Radar	No comments.	N/A	N/A	Pages 75-76
Thorney Island Microlight Club	• Provided information on stakeholders potentially missed out from engagement. • Stated that not expecting a massive impact on the club's operations.	• Added all suggested stakeholders to the list and distributed stakeholder engagement document. • Welcomed feedback and offered an online/telephone call to answer any questions.	N/A	Pages 77-80

Finalised proposed design of the TDA and the TDA Management Process

This section sets out the finalised proposed design of the TDA and the TDA management process as a result of our stakeholder engagement.

TDA Lateral Dimensions

505620N 0004753W - 505552N 0004133W thence clockwise by the arc of a circle radius 5NM centred on 505134N 0004533W to 504929N 0003823W - 504849N 0004047W - 504709N 0004152W thence clockwise by the arc of a circle radius 5NM centred on 505134N 0004533W to 505620N 0004753W.

ID	LAT (DMS ROUNDED)	LONG (DMS ROUNDED)	LAT (DMS)	LONG (DMS)	LAT (DECIMAL MIN)	LONG (DECIMAL MIN)
1	505620N	0004753W	505619.96N	0004753.12W	N 50 56.33267	W 000 47.88533
2	505552N	0004133W	505552.04N	0004133.22W	N 50 55.86733	W 000 41.55367
3	504929N	0003823W	504928.53N	0003823.09W	N 50 49.47550	W 000 38.38483
4	504849N	0004047W	504849.25N	0004046.72W	N 50 48.82083	W 000 40.77867
5	504709N	0004152W	504708.70N	0004152.03W	N 50 47.14500	W 000 41.86717
EGHR ARP	505134N	0004533W	505133.63N	0004533.20W	N 50 51.56050	W 000 45.55333

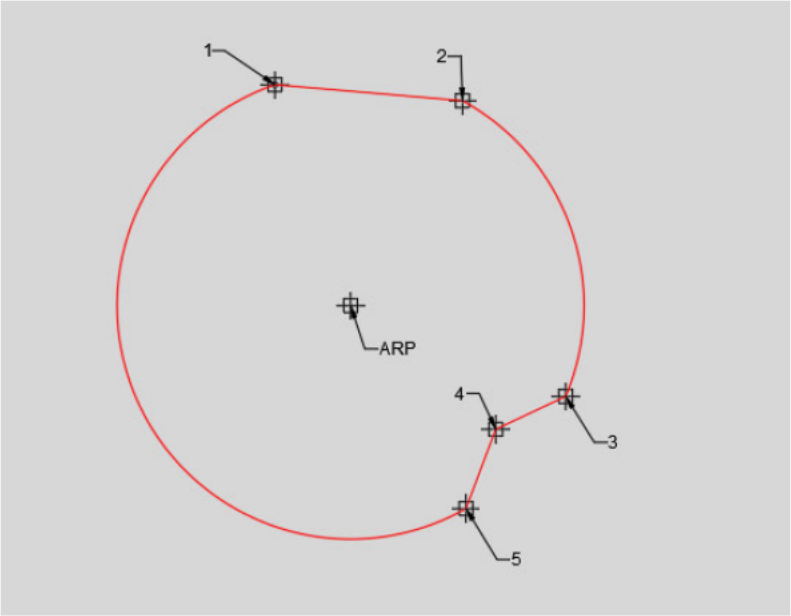


Figure 1: Lateral dimensions of TDA

Figure 2: TDA Dimensions

Figure 3: TDA Dimensions

TDA Vertical Dimensions

Lower Limit: Surface

Upper Limit: 2000ft AMSL

Justification of TDA Dimensions

The radius of c.5nm is driven by a number of factors. Firstly, the availability of off-aerodrome landing/take-off sites which require landowner permissions, combined with areas of population that need to be avoided to the South of the aerodrome. We currently have secured permissions at 4 sites and we are in negotiations with another 3 landowners within the 5nm volume. Even without the landing sites, we still require a number of BVLoS routes identified around the 5nm area as shown in Figure 6 on page 35.

Multiple sites and multiple BVLoS routes are needed because we are aiming to make the concept as transferrable to as many UAV applications as possible and to eventually demonstrate the concept within a temporary TMZ. If the temporary TMZ is limited to a relatively small area along just one BVLoS route (for example between Goodwood Aerodrome and the Racecourse) then the challenge of UAV and manned aviation deconfliction becomes easier to demonstrate but harder to achieve a robust case for use on a wider scale. Also, it would only demonstrate a single 'BVLoS route delivery service' whereas UAV operators have advised that the concept would need to work equally well for crop spraying, powerline inspections, surveying, structural healthcare etc. The volume of airspace needed is in order to fly ranges that are representative of these different operations. The BVLoS routes in the SW of the proposed TDA are to help simulate some of these activities, whilst avoiding populated areas.

If we applied for a small TDA now to prove just a small part of the concept, we would need another application for a TDA to assess the other BVLoS routes and surveillance and re-broadcast coverage ahead of the temporary TMZ request.

We are required to add 'Contingency Volumes' and 'Ground Risk Buffers' to any planned UAV operating area. They are not huge areas but none-the-less we cannot 'hug' the TDA to the edge of a BVLoS route or a landing/take-off site. We also need to be cognisant of having enough room within the TDA around the BVLoS routes for simulated 'avoidance' manoeuvres by the UAV.

The upper level of 2000ft is required because we will eventually want to operate the drones above the typical 400ft altitude so we can demonstrate integration with other traffic. Again, this is because not all UAV operations are expected to remain down at c.400ft in all scenarios.

TDA Hours of Availability

The proposed TDA would be available for activation from the 8th April until 23rd September 2021. This first part of the trial has a dependency on having UAV operators with CAA permissions to operate BVLoS within the Goodwood TDA. We therefore accept that any TDA

approval from the CAA is on the condition that an OSC is approved, prior to TDA activation. The first OSC application was submitted to the CAA on the 17th February 2021 with the second due to be submitted on the 19th February. In the event of a significant delay in assessing and approving those applications[2], it will result in a delay to the commencement of TDA activity. This in turn would delay the start of the TDA activation period and result in a later end date than those given above. However, we do not envisage requiring a period of greater than the 5 months (90 days) articulated within this plan. Any change to the planned dates of operation of the TDA will be clearly articulated to our stakeholders.

The TDA would not be permanently active but would only be activated on an as-required basis and outside of the operating hours of Goodwood Aerodrome. From April to October, Goodwood Aerodrome is open from 0900 – 1800 local.

Activation of the TDA could therefore take place between 0600 - 0900 and/or between 1800 and 2100 local, 7 days per week, with actual dates and times of activation promulgated by NOTAM. Activation of the TDA would take place a minimum of 24 hours in advance. In addition, if for any reason the aerodrome is closed to normal traffic during the day, we may activate the TDA between the hours of 0900-1800.

There will be specific dates where the TDA will be unavailable. These have currently been identified as:

Goodwood Members Meeting 15th – 16th May 2021

Goodwood Festival of Speed 8th – 11th July 2021

Goodwood Revival 17th – 19th Sept 2021

We note the feedback from general aviation, particularly the gliding community regarding the presence of a TDA between 6pm and 7pm local during the summer months on good weather days. We will endeavour wherever possible to limit TDA activation during these times when those stakeholders advise of potentially intense glider operations in the area.

We commit not to activate the TDA for more than 90 days across the 5-month period.

TDA Operating Authority

The TDA operating authority will be the Goodwood Aerodrome**.** Contact details will be available in the Aeronautical Information Circular (AIC).

Goodwood Aerodrome's Flight Restriction Zone (FRZ) for UAVs, still exists regardless of TDA status. It is illegal to fly any drone at any time within the FRZ without permission from Goodwood Aerodrome. We understand that Drone Assist, AirMap and Drone Scene are all CAA approved Apps for drone users that will promulgate the presence of the TDA.

TDA Notification and activation process

The TDA will be promulgated via AIC and activated as and when required via NOTAM. The Goodwood Aerodrome manager will arrange the NOTAM with at least 24 hours' notice.

[2] The current CAA turn-around time for a standard permission is 28 Working Days

In addition, the status and dimensions of the TDA will be broadcast via our FIS-B transmissions. Those airspace users equipped with ADS-B In will be able to receive live information on TDA status.

Any aircraft requiring to arrive or depart from Goodwood Aerodrome during the hours of TDA activation would be given priority over UAV operations, following co-ordination with the TDA Operating Authority in accordance with their out of hours flying permission process.

Danger Area Activity Information Service (DAAIS)

During TDA activation, a Danger Area Activity Information Service (DAAIS) will be available from the Goodwood Aerodrome FISO on the Goodwood Information VHF frequency 122.455 and/or by phone. Contact details will be available in the Aeronautical Information Circular (AIC).

An infringement of the TDA may become apparent to the Goodwood FISO or it may be detected visually by the UAV operator or by means of the EC surveillance system.

In the event of any infringement of the TDA, UAV operations will be suspended at the earliest, safe opportunity[3] until confirmation has been received that the infringing aircraft has left the TDA or landed. This confirmation may be received via a FISO report, by visual confirmation or by use of the EC surveillance system. In the event of any infringement of the TDA, the operating authority will submit a Mandatory Occurrence Report (MOR) annotating the relevant report as an Airspace Infringement. Additionally, a CA939 report on an alleged infringement of Air Navigation legislation will be submitted for any TDA infringement.

Requests for access to the TDA by airborne emergency services shall be made direct to the FISO on 122.455 or they can be made by telephoning the TDA Operating Authority on the details provided within the AIC. Access to the TDA by emergency services will always be given priority over UAV operations which will be immediately suspended[2].

Should any aircraft encounter a situation where emergency access is required to the TDA, this should be requested from the FISO on 122.455, if practicable. The FISO shall inform the UAV operator and operations will be immediately suspended. In the absence of any request to the FISO for short-notice access, the presence of the aircraft shall be treated as an Infringement and UAV operations will be suspended at the earliest and safe opportunity, until confirmation has been received that the infringing aircraft has left the TDA or landed.

Other requests to access the TDA

Traffic will need to avoid the TDA by transiting above the TDA or by diversion around it. VFR GA traffic requiring to operate into and out of Goodwood Aerodrome before the ATZ operating hours may be affected during the TDA activation hours. Operators based at Goodwood Aerodrome have a general out of hours flying permission that commences at 07:00 UTC or first light (whichever occurs later).

[3] UAV operations will be suspended as soon as it is safe to do so, subject to assessing the safest course of action: holding position, nearest landing site, consideration of an emergency landing, positioning to best avoid traffic etc.

The aerodrome does from time to time restrict that permission already (where it may conflict with other aerodrome events or activities). Operators not based at Goodwood Aerodrome require prior permission for out of hours operations and the aerodrome is able to manage those movements as required. Disruption to out of hours arrivals and departures will be mitigated by:

- the early morning and post 6pm timing,
- the limited number of active days,
- flexibility of activation timing to co-operate with on-site operators and aircraft owners. In response to an activation NOTAM, these users can advise the TDA Operating Authority of their movement requirements, the Operating Authority will in turn liaise with the UAV operator in order to co-ordinate UAV flight timing that minimises disruption to these operators on the day.

Any aircraft requiring to arrive or depart from Goodwood Aerodrome during the hours of TDA activation would be given priority over UAV operations, following co-ordination with the TDA Operating Authority. Other than having a radio to be able to communicate directly with the DAAIS (Goodwood Aerodrome FISO on the Goodwood Information VHF frequency 122.455), there is no minimum level of equipage for TDA access, subject to approval of the TDA Operating Authority.

Safety Assessment for TDA Operations

Only those activities for which the TDA has been specifically approved by the CAA will be conducted within the TDA.

This Trial Plan does **not** contain an Operating Safety Case (OSC) application for Extended Visual Line of Sight (EVLoS) or BVLoS operations by a UAV operator within the TDA. These will be made separately by the UAV operator(s) taking part in the trial.

The TDA ensures that testing of this concept, even initial VLOS testing, can be performed safely by allowing only integration of participating, briefed conventional aviation into the TDA to operate alongside VLOS UAV operations. Eventually this will move on to BVLoS testing both without and with participating conventional aviation[4] within the TDA, subject to the necessary OSC permissions. OSC permissions will be requested to enable BVLoS alongside participating conventional aviation within the TDA. Skyport's submitted their OSC application on 17th February 2021 and Auriga Aerospace will be submitting on the 19th February.

All BVLoS UAV operations within the TDA will adhere to the buffers detailed within the OSC permissions. Whilst operating VLoS within the TDA we will be able to ensure we stay within the confines of the TDA as the tests will originate at the aerodrome and remain VLoS (up to 500 meters maximum) from the UAV operator.

The UAV operator's OSC request for BVLoS operations will contain the assurances for how the UAV will be assured to remain within the TDA for normal operations and for possible emergencies. Prior to any BVLoS operations which rely on the surveillance system, that system will be tested for coverage, accuracy and latency and any limitations will be understood and mitigated. In addition, the behaviour of the UAVs themselves will be assessed and understood.

Any BVLoS operations within the TDA will only take place outside of Goodwood Aerodrome's operating hours.

The TDA will be promulgated via AIC and activated via NOTAM at least 24 hours in advance. This will enable all airspace users to fully brief themselves without an unexpected change in airspace arrangements mid-flight. In addition to the NOTAM, it is expected that the status and dimensions for the TDA will be broadcast via FIS-B so airspace users with ADS-B In will receive live notifications. This has not been done before in the UK.

Even though TDA activation is outside of Goodwood Aerodrome's operating hours, whenever the TDA is active, a DAAIS will be provided by a Goodwood FISO. The presence of a FISO also provides for short-term requests, via VHF radio, for TDA entry by aircraft in distress as well as for short-term access by emergency airborne services. Additionally, the UAV operators will monitor the Goodwood FISO frequency to maintain situational awareness and implement actions without delay.

[4] Commercial AOCs will not be involved in this testing.

By the time the TDA is established we will have established an Electronic Conspicuity surveillance system across the area. This will enable us to monitor infringements of any aircraft transmitting their presence via Mode S, ADS-B or FLARM.

There will be no primary radar feed available, so a risk of an undetected infringement does exist. We have mitigated this risk to the greatest extent possible through the establishment and promulgation of the TDA and availability of the EC surveillance system combined with having a Goodwood FISO in situ to help ensure the safest possible operating environment. The CAA Future Airspace and Future Safety teams have given permission for us to utilise the Temporary Flight Restriction (TFR) field within standard FIS-B format to trial the notification of a temporarily activated volume of airspace, such as the TDA. The electronic depiction of this volume via reception of the FIS-B broadcast and graphical interpretation in Electronic Flight Bag applications provides additional safety assurances to indicate the presence and status of a temporary volume of airspace. In addition, NATS Farnborough ATC have advised that, when the TDA is active they will have it marked on their radar video maps and they will notify us if they observe any infringements however, there is no responsibility on them to be actively monitoring the TDA.

Any required Letters of Agreements (LoAs) will be developed and supplied to the CAA ahead of the first TDA activation.

Whilst it is the intention of the project for the Goodwood FISO to have a Flight Information Display (FID) display to enhance their situational awareness, this will only be provided with the appropriate CAA permissions from the ATS Inspector. This request is not contained within this Trial Plan.

We understand that Drone Assist, AirMap and Drone Scene are all CAA approved Apps for drone users that will promulgate the presence of the TDA.

The proposed TDA airspace is wholly within Class G which is overlaid by:

- In the northern hemisphere of the TDA: Class E (CTA 9) associated with Farnborough Airport
- In the southern hemisphere of the TDA: Class A airspace with a Lower Limit of 6500 feet

The upper limit of the TDA is below the relevant Minimum Area Altitude[5] for IFR traffic and does not infringe any airways or CTA. VFR GA traffic transiting the airspace could be affected during the activation hours although exposure is mitigated by:

- The restricted timings of availability of the TDA
- The limited number of active days (no more than 90 days over the 5-month duration).

Bognor Regis Gliding Club

The TDA originally proposed overlapped with Bognor Regis Glider Site who have winch operations up to 2500ft. Their operation includes gliders of which some currently carry no electronic conspicuity devices. Following discussions with the site owner and operator, we

[5] UK AIP ENR 6-81

agreed that we could re-shape the TDA to avoid their winch operation and to reduce the risk of infringement of the TDA by non-conspicuous traffic.

The site owner and operator initially advised that the winch operation and overhead joins of arriving gliders are concentrated within a 1.5km radius of the airfield and later suggested that the TDA shape *"must follow exactly the current area for EGKC/ Bognor Gliding Club as depicted by the current CAA Half Million map"*. This is shown in Figure 4.

Figure 4: Bognor Regis Gliding Club winch site on ICAO 1:500000

There are no associated lateral dimensions attributed to Glider Winch sites. In effect, on a chart, the location is marked by a symbol and not a structure where the lateral dimension of the symbol has no significance. The symbology for glider winch sites can therefore vary between chart providers. Following further dialogue with the site owner and operator, we agreed that the TDA should avoid the published Glider Site co-ordinate (504804N 0003934W) by at least 1nm (1.85km) as per the c.1nm radius depicted on the VFR 1:500000 chart.

We have proposed that the edge of the TDA is drawn in straight-lines in this area to aid navigation. In addition, the straight lines further reduce the size of the TDA. Figure 5 below shows the TDA in relation to the 1nm radius around the Bognor Regis Glider Site.

Figure 5: TDA in relation to the Bognor Regis Gliding Club winch site

Chichester and District Model Aero Club

Chichester and District Model Aero Club (CADMAC) occasionally operate from a site to the north of Goodwood Aerodrome. They already have an established procedure whereby Goodwood AFIS is contacted by telephone before any model flying takes place. All flying is kept below the adjacent radio masts (765ft AMSL) and they have notified us of their maximum lateral extent of their operating area.

We have advised CADMAC that their operations may still take place within the TDA, subject to the permission of the TDA Operating Authority. This permission is required ahead of each period of activity.

Their operating area will be marked on the Smartskies platform and, when active, will be therefore notified to the UAV operator and we will ensure any BVLoS operations avoid this area when active. The project is exploring testing the use of an ADS-B beacon by CADMAC which will enable them to electronically notify the TDA Operating Authority and the UAV operator of their presence. This could potentially enable the incorporation of this activity into the FIS-B broadcast. This does not supersede the requirement for CADMAC needing prior permission from the TDA operating Authority.

CADMAC flyers are aware of their responsibility to maintain visual contact with their models at all times and they have instructed their members to land if drone activity is visually detected. They will continue to advise Goodwood AFIS of any model flying in addition to requesting permission from the TDA Operating Authority. This will be confirmed in a Letter of Agreement with CADMAC.

Sky Surfing Club

During communications with the Sky Surfing Club, they advised of a common operating route along the southern edge of the South Downs. This route can be used during periods of less optimal meteorological conditions for their members and for also fixed wing gliders. The northern edge of the TDA we originally proposed overlapped slightly with this area so the boundary of the final TDA was amended to avoid this area to reduce the risk of infringement of the TDA by non-conspicuous traffic.

Airborne Emergency Services

All feedback from airborne emergency service providers highlighted the requirement for rapid access to the airspace, often with little notice.

Whenever the TDA is active, a DAAIS will be provided by a Goodwood FISO. The presence of a FISO will provide for short-term requests, via VHF radio, for TDA entry by aircraft in distress as well as for short-term access by emergency airborne services. Additionally, the UAV operators will monitor the Goodwood FISO frequency to maintain situational awareness and implement actions without delay.

Requests for access to the TDA by airborne emergency services shall be made direct to the FISO on 122.455 or they can be made by telephoning the TDA Operating Authority on the details provided within the AIC. Access to the TDA by emergency services will always be given priority over UAV operations which will be immediately suspended[6]. In the absence of any request to the FISO for short-notice access, the presence of the aircraft shall be treated as an Infringement and UAV operations will be immediately suspended[4] until confirmation has been received that the infringing aircraft has left the TDA or landed.

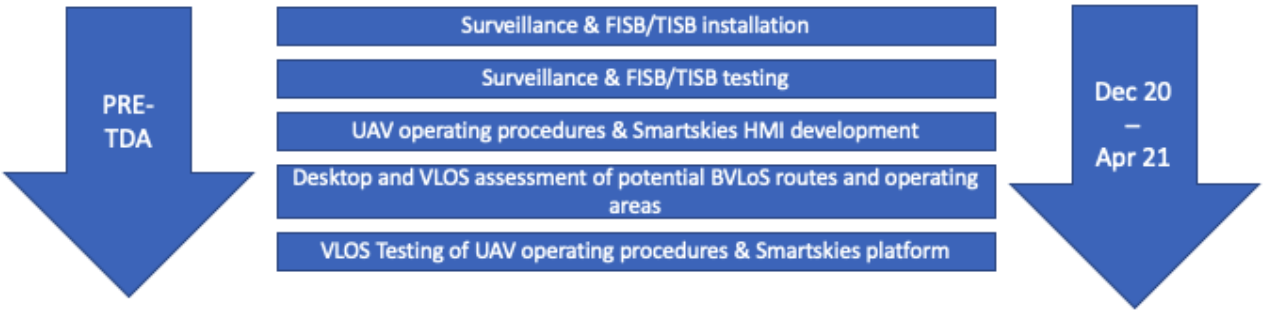
Goodwood FISOs will have a TOI for the TDA activity which will cover access for emergency procedures and CADMAC activity as well as for use of the FID. This will be sent to the ATS Inspector ahead of any TDA activity. Use of the FID will require specific CAA approval, separate to this trial plan.

[6] UAV operations will be suspended as soon as it is safe to do so, subject to assessing the safest course of action: holding position, nearest landing site, consideration of an emergency landing, positioning to best avoid traffic etc.

Further project activities ahead of the establishment of the TDA

Ahead of the promulgation of a TDA, the project will be undertaking the following series of activities in preparation for any BVLoS operations:

1. Continue the installation of a network of Electric Conspicuity (EC) receivers[7] and 978Mhz transmitters to provide robust and effective coverage
2. Validation of the accuracy and latency of the surveillance system and understanding of limitations.
3. Testing and refinement of the UTM and FISO Situational Awareness displays[8] to enable monitoring of live UAS telemetry and conspicuous aircraft.
4. Testing of FIS-B and TIS-B transmissions of the Mode S and FLARM traffic picture and associated coverage. This will be a NOTAM'd activity.
5. Provide involved RPAS operators (and other equipped aircraft) with real-time, shared situational awareness of the airspace.
6. VLoS UAS and conventional fixed and rotary wing flight testing (subject CV19 restrictions) that demonstrate both the coverage and technical specifications of the air/ground receive/transmit functions and UTM system. Surveillance coverage will be tested on the ground via hand-held EC devices where required.
7. VLoS development of the operating procedures that UAS operators shall adopt to ultimately enable remote, see and avoid BVLoS operations.
8. UAV operators to achieve CAA permissions to operate BVLoS within the TDA.



[7] To include Mode S (MLAT), ADS-B and FLARM

[8] FISO will not have any display in the tower without permission from CAA.

Objectives of the trial within the TDA and the data required from the trial

The key objective of the Trial Part 1 within the TDA is to gain sufficient evidence and assurances for the CAA to enable a request for the 2nd part of the trial – BVLoS operations within a TMZ.

The evidence and assurances will be presented to the CAA in Trial Plan Part 2.

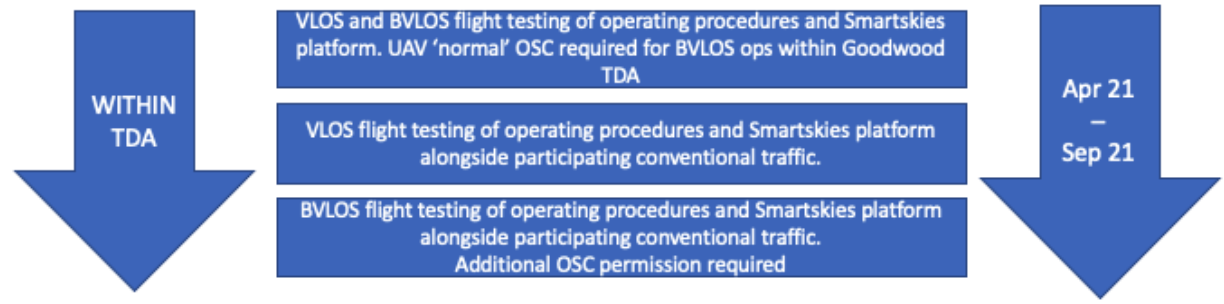
Project success for this first phase will be declared following safe trials and testing which generate sufficient assurances to allow CAA to permit a trial within a TMZ. Specifically, the evidence obtained from this first part of the trial will:

1. Document the surveillance & rebroadcast coverage, limitations and system accuracy.
2. Document the reliability of the surveillance and re-broadcast system together with fall-back procedures.
3. Demonstrate and evaluate the benefits of rebroadcasting the surveillance picture via TIS-B.
4. Demonstrate safe UAS BLVoS operations alongside participating conventional fixed-wing and rotary aircraft[9] in segregated airspace. This includes the ability to safely operate UAVs in and out of Goodwood Aerodrome alongside participating conventional fixed and rotary wing traffic arriving and departing the aerodrome.
5. Document the proposed operating procedures and protocols that UAS operators must be able to demonstrate they can meet in order to obtain CAA permission for BVLoS operations in non-segregated airspace (TMZ).
6. Understand whether the provision of a Flight Information Display (FID) for a FISO is considered a requirement to enable the safe integration of Unmanned and Manned aviation into an active aerodrome environment in non-segregated airspace (in the case of this part of the trial, a simulated non-segregated environment within a TDA). If this is a requirement, we will understand the minimum characteristics in terms of the fusion of surveillance data provided to the FISO. i.e. whether the FID needs to display all conspicuous traffic to the FISO or just the presence of the unmanned traffic.

Owing to the surveillance systems being installed, we have the ability to record all data and compare (validate) against the actual flight data from the aircraft/UAV EC devices themselves. This evidence will be used, where necessary in conjunction with recordings from ANRA's Smartskies platform to demonstrate whether the objectives of this part of the trial have been met or not. These will be supplemented by FISO feedback reports on both the suitability of the FID and the level of reliance they placed on the FID when providing an AFIS integrated with UAS.

Specific, detailed test plans are to be developed in conjunction with the CAA Innovation Sandbox team over the following months to ensure that the activities will provide sufficient data and evidence for the CAA to ultimately approve a BVLoS OSC application alongside participating traffic within a TDA and then within a TMZ.

[9] Commercial AOCs will not be involved in this testing. Participating UAV Operating Safety Cases (OSC) will require further CAA approval for this activity.


WITHIN TDA
VLOS and BVLOS flight testing of operating procedures and Smartskies platform. UAV 'normal' OSC required for BVLOS ops within Goodwood TDA
VLOS flight testing of operating procedures and Smartskies platform alongside participating conventional traffic.
BVLOS flight testing of operating procedures and Smartskies platform alongside participating conventional traffic. Additional OSC permission required
Apr 21 – Sep 21

Before and After descriptions

Goodwood is an active aerodrome in Class G airspace serving a variety of fixed-wing and rotary aircraft. A FISO provides a Flight Information Service to aircraft on frequency within the ATZ and oversees operations to/from their 3 grass runways. The surrounding airspace is often very busy with General Aviation including the Gliding Community.

Goodwood aerodrome welcome and support the trial but the project must not negatively impact the Goodwood operation or their customers.

It is the ambition of the project that a TDA will be promulgated from 8th April – 23rd Sept 2021 from surface to 2000ft and activated via NOTAM as required, outside of Goodwood opening hours.

Goodwood Aerodrome's Flight Restriction Zone (FRZ) for UAVs, still exists regardless of TDA status.

On cessation of the TDA, it is hoped it will be replaced by a temporary TMZ from 23rd Sept – 16h Dec 2021 during which the BVLOS operating procedures will be trialled in conjunction with TIS-B and FIS-B transmissions. This will only happen following a successful application to the CAA in the form of Trial Plan Part 2. The exact specifications of the temporary TMZ will be determined through consultation with our stakeholders.

In the absence of a successful application to the CAA for a trial within a temporary TMZ, the airspace will revert to its existing state of an ATZ within Class G airspace with no TDA or TMZ promulgated. However, if the trial demonstrates safety benefit, it is expected that the project will request permission for the surveillance and rebroadcast equipment and associated TIS-B and FIS-B transmissions to continue. The absence of a TMZ may reduce the overall safety benefit gained from such transmissions to other airspace users at this point, however, we believe the continued availability of the TIS-B and FIS-B transmissions would be a welcome safety enhancement to the current arrangement.

Should the airport operator, the Goodwood Innovation Centre or any other sponsor wish to establish a permanent airspace arrangement in this area, they are aware they will need to follow the full Airspace Change Process[10]. If a sponsor wishes to extend the duration of the temporary airspace arrangement whilst progressing an ACP they will first engage with their stakeholders before making a formal request to the CAA.

[10] CAP1616 Paras 324-327

Noise impacts and considerations

The CAA Policy on Airspace Trials requires sponsors to explain how the sponsor has considered and assessed the likely noise impact of its proposal. In addition, for trials longer than 90 days, that affect traffic distribution below 7,000 feet, the following information must be prepared by the change sponsor and used to engage with those affected:

a) For noise from daytime flights (0700 to 2300), 65 dB L_{Amax} footprints that illustrate the loudest and most frequent types of aircraft that will be participating in the trial.
b) For noise from night-time flights (2300 to 0700), 60 dB L_{Amax} footprints that illustrate the loudest and most frequent types of aircraft that will be participating in the trial.
c) Equivalent footprints that illustrate where the trial traffic would otherwise have flown (this assumes that any aircraft that partakes in a trial would have flown on an alternate route that reflects current operations)
d) Information on the expected frequency (both absolute and as a percentage of total traffic during the trial period) and timing of flights participating in the trial
e) Operational diagrams that illustrate the estimated overflight swathe of trial traffic, up to 7,000 feet (see 'Operational diagrams' above).

The intent behind these requirements were undoubtably written in relation to understanding the shift in noise distribution from conventional fixed wing aircraft as a result of the proposed trial or temporary change to the notified airspace design. We do not expect any change in the patterns of conventional traffic as a result of this trial.

The operation of UAS whilst operating **within** the Visual Line of Sight by any person does not require a TDA and would therefore not require any noise assessment.

Owing to the innovative nature of this project, the policy, guidance and noise modelling information on UAS operations is yet to be developed, and therefore it is not be possible to generate noise footprints without some deviation away from the methodologies currently relied on in CAA guidance.

In preparation for this trial plan submission, we held a meeting with the CAA to discuss the best approach for meeting the noise requirements given the innovative nature of the trial. Following this meeting, and as part of V1.0 of this trial plan, we submitted to the CAA noise calculations which were focused on estimating whether the trial could result in a sound exposure level (SEL) of more or less than 51dB LAeq 16hr daytime Lowest Observed Adverse Effect Level (LOAEL) or the 45dB LAeq,8hr night-time LOAEL.

This is set out in the sections below and is based on publicly available information, advice from Skyports and our estimates on the number and frequency of UAS operations together with an indication of UAS operating areas that we are assessing at this early stage.

On the 11th of February, the CAA provided us with a 'Drone Noise Screening Tool' which outlines how the CAA would like us to undertake the calculations that estimate drone flyover noise exposure using available public data. We have therefore also included the CAA's guidance based calculations in V2.0 of this trial plan.

The assessments have determined that we do not expect the noise from UAS operations in this trial to exceed either the 51dB $L_{Aeq\ 16hr}$ daytime (LOAEL) or the 45dB $L_{Aeq,8hr}$ night-time LOAEL. These are the levels above which adverse effects on health and quality of life can be detected.

Existing Goodwood Aerodrome Noise Monitoring requirements

Goodwood aerodrome do not have any requirements to monitor noise levels. They have a Section 52 agreement with Chichester District Council the terms of which can be viewed on Goodwood's website here[11]:

Chichester District Council sit on Goodwood aerodrome's consultative committee and have been engaged on this project. See section on Stakeholder Identification and Engagement Plan.

Indicative UAS noise

Owing to the emerging market for UAV technology, there is very limited information publicly available about the noise created by drones. Table 3 contains L_{Amax} data which originated from a study[12] which looked at the noise produced by a hovering DJI multicopter. This study used an array of microphones with a radius of 6m to measure drone activities and operations. The data reports the measured levels as L_{Amax} values. It should be noted that the drone used in this study is smaller than the proposed drone that Skyports intend to use[13].

	Drone Height (m) AGL	Data Extrapolated to 10KHz (LAmax) (Hovering)
DJI Multicopter	4	77 dB
	20	70 dB
	122	54.4 dB

Table 3 LAmax for a DJI Multcicopter

[11] https://www.goodwood.com/flying/aerodrome/noise-management/aerodrome-consultative-committee/section-52-agreement/

[12] Zhang, Yingzhe & Lee, Incheol & Lin, Dakai. (2017). Measurement of Noise from a Moving Drone Using a Phased Array Microphone System.

[13] There may be other drones which take part in the trial other than Skyports however, we expect them to be the main participant.

In addition, unlike the DJI multicopter, the Skyport drone (which is one of the main drones intended to be used as part of the trial) has two modes of operation; multicopter mode and fixed wing mode. Multicopter mode is used for take off and landing, and fixed wing mode is used throughout the rest of the flight. When in fixed wing mode at or above 400ft (122m), the drone operator states that it is almost imperceptible from the ground however, this claim cannot yet be substantiated. The Skyports drone will operate in multicopter mode between ground level and 400ft (122m) where it will climb or descend vertically to/from the landing/takeoff site. When it is in lateral transit along the route it will operate in fixed wing mode. In fixed wing mode it is powered by 2 forward-facing ("pull") propellers.

Table 4 provides information on the vertical climb speed specifications of the Skyports drone and the time it will take to reach certain heights above ground level.

	Drone Height (m) AGL	Time to height (s)
Skyport Drone (.5 Max speed, ROC 6.94m/s)	4	0.58
	20	2.88
	122 (Fixed wing mode)	17.57
Skyport Drone (Max speed, ROC 13.89 m/s)	4	0.29
	20	1.44
	122 (Fixed wing mode)	8.78

Table 4 Skyport Drone: time to height

As noted, other UAV operators may take part in the trial who may not have drones that are capable of operating in a fixed wing mode.

We recognise that noise created by drones is complex and the following information aims to give worse-case estimations, based on the information currently available.

Description of the UAS operations

We currently envisage that there could be a maximum 24 UAS movements on any one day comprising of 12 take-offs and 12 landings at the aerodrome although this number of movements will not occur every day of operation. The UAV will depart from Goodwood Aerodrome climbing vertically to at least 400ft and then follow a route to one of a selection of off-aerodrome sites within the TDA where it would land by descending vertically above the site from 400ft. It would then depart in the same fashion and route back to the aerodrome.

Figure 6 shows some illustrative UAS routes within the TDA which avoid overflight of residential, commercial, industrial and recreational areas. The routes shown have an overflight

corridor either side of the centreline as per CAP1498. The drones used in this trial are c.1.5m wide and will fly a route within 20 metres of the centreline. However, this overflight corridor is for illustration only and is not relevant to this noise assessment which does not include an assessment of numbers population overflown and is not comparing different airspace design options.

Figure 6: Illustrative UAS routes with overflight corridors

When following the routes, the drones will be travelling at a speed of 50-60Kts.

Figure 7 shows the nearest domestic receptors (residences) to the aerodrome landing site are 1000m away.

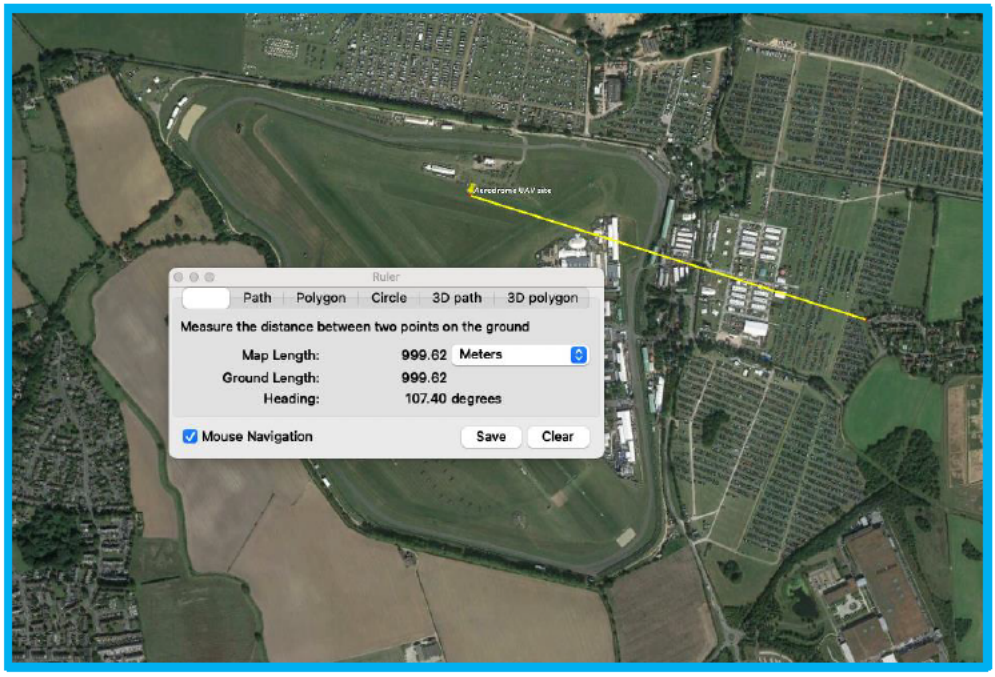


Figure 7: Nearest domestic receptors to aerodrome UAV site

We could operate for a maximum 6 hours in a day (0600-0900 and 1800-2100). 0600-0700 is therefore in the night-time period.

Noise assessment

The methodology used in the assessment has relied on determining the SEL from each 'drone event' that would be required to result in a noise-sensitive receptor being exposed either to the 51dB or 45dB LOAEL based on the level of activity reported above. Reference has then been made to the L_{Amax} data presented in Table 3 to indicate whether a drone event SEL triggering the LOAELs would be likely.

The L_{Amax} data available suggests that a multicopter drone produces a maximum noise level of 77dB when the drone is at a height of 4m from the microphone array positioned at 6m from the drone. The drone is therefore 7.21m from the microphone array.

To cover the use of a variety of drones, we assumed that the drone stays in multicopter mode when flying along the routes and it does not fly in the much quieter, fixed wing mode. To help establish and estimate SELs, we have also assumed that the L_{Amax} levels are representative of a constant level of noise being produced by the drone.

The nearest residential receptor to the most frequently used drone launch site is 1000m away. That results in an L_{Amax} level from the initial launch of 56 L_{Amax}. However, if you are overflown by a drone at a height of 20m then the data in Table 3 indicates that a level of 70 dB L_{Amax} would occur on the ground. Therefore, any noise-sensitive receptor is most likely to be affected by an overflight rather than a launch. It should be noted the routes being used within the trial aim to avoid overflight of such receptors.

0700-2300

For the daytime assessment, we assumed that all of the 24 movements take place between 0700-2300. This would require an SEL from each drone event of 84.8 dB to trigger the 51dB LOAEL.

If each drone overflight produces a maximum noise level of 70dB and this level is assumed to be constant, a drone event SEL of 84.8dB would only be reached if each drone overflight lasted 28 seconds. If a 10dB 'annoyance penalty'[14] is applied giving an L_{Amax} of 80dB, then a drone event SEL of 84.8dB would only be reached if the overflight occurred for 3 seconds at a constant level. In reality, and in practice, the noise experienced by receptors on the ground would vary as the drone will actually be moving over a receptor at a speed of at least 50Kts. This all still assumes the drone is at a height of 20m, which would not be the case.

If we correct this data to represent a drone flying at 400ft (122m) then the 70dB L_{Amax} would reduce to 54.4 dB. With an L_{Amax} of 54.4dB, a drone event SEL of 84.8 dB would only be reached if the drone overflight lasted over 1200 seconds (20 minutes). If a 10dB 'annoyance penalty' is applied giving an LAmax of 64.4dB, then a drone event SEL of 84.8dB would only be reached if the overflight occurred for 120 seconds (2 minutes) at a constant level whereas the drone will be moving over a receptor at a speed of at least 50Kts producing a time varying noise level.

2300-0700

For the night time assessment, we assumed that 8 of the 24 movements (4 aerodrome landings and 4 aerodrome departures) take place between 0600-0700. This would require an SEL from the drone event of 80.6dB to trigger the 45dB LOAEL.

With an L_{Amax} of 70dB, a drone event SEL of 80.6dB would only be reached if the drone overflight lasted 11 seconds. If a 10dB 'annoyance penalty' is applied giving an L_{Amax} of 80dB, then a drone event SEL of 80.6 dB would be reached if the overflight occurred for 1 second at a constant level whereas the drone will be moving over a receptor at a speed of at least 50Kts. This all still assumes the drone is at a height of 20m, which again would not be the case.

If we correct this data to represent a drone flying at 400ft (122m), with an L_{Amax} of 54.4dB a drone event SEL of 80.6dB would only be reached if the drone overflight lasted 458 seconds (c.8 minutes). If a 10dB 'annoyance penalty' is applied giving an L_{Amax} of 64dB, then a drone event SEL of 80.6dB would only be reached if the overflight occurred for 48 seconds at a constant level whereas the drone will be moving over a receptor at a speed of at least 50Kts producing a time varying noise level.

[14] In the absence of absolute data, the CAA recommend applying a 10dB annoyance factor to the use of multicopter drones to take into account the differing frequencies of sounds produced by multiple rotors.

CAA Drone Noise Screening Tool

On the 11th of February, the CAA provided us with a 'Drone Noise Screening Tool' which outlines how the CAA would like us to undertake the calculations that estimate drone flyover noise exposure using available public data. We have used the guidance within the tool to provide the calculations shown below; this is based on two drones (one multicopter, one fixed wing) provided within the guidance, which are the closest equivalent type and weight to the largest drone we plan to operate. The outcomes show LAeq16hr values of 43.63dB and 49.63dB for those types (with 10dB tone corrections). This outcome corroborated our original calculations which concluded that we do not expect the noise from UAS operations in this trial to exceed the daytime LOAEL.

Parameter	Value		Units	Notes
Number of Operations (N)	24	24		Based on worst case estimates (see section above for further details)
Vehicle type	GD28X	Scan Eagle		The SkyPorts Drone planned to operate is a Swoop - Kookaburra Mark III with a MTOW of 17KG (37lb). The closest equivalent drone from Table 1 in CAA guidance document in terms of weight is either the Scan Eagle or GD28X. GD28X = 64.1dB Scan Eagle = 58.1dB
Vehicle $L_{AS\ max}$ @ ref height	64.1	58.1	dB	Sourced from Table 1 of CAA guidance document
L_{ASmax} reference height	400	400	ft	Sourced from Table 1 of CAA guidance document
Actual operating height of drone	400	400	ft	No adjustment of L_{ASmax} required as reference and actual operating height are both 400ft
SEL_{avg}	73.43	67.43	dBA	L_{ASmax} + (2.4 + 0.03897 x height - 0.0000541 x height^2)
L_{Aeq16h}	39.63	33.63	dB	$L_{Aeq16h} = SEL_{avg} + 10x\log_{10}N - 47.6$
L_{Aeq16h} with additional 10db added for tone correction	49.63	43.63	dB	

Conclusion of noise assessment

This assessment has determined that we do not expect the noise from UAS operations in this trial to exceed either the 51dB $L_{Aeq\ 16hr}$ daytime LOAEL or the 45dB $L_{Aeq,8hr}$ night time LOAEL. This is principally because the duration of any drone events at noise-sensitive receptors would have to be significantly longer than what would occur in practice for these noise exposure levels to be reached.

Regulatory policy, guidance and noise modelling information on UAS operations is yet to be fully developed and published. The project welcomes any requests for the CAA to perform their own UAS noise measurement assessments during the trial to help inform the development of policy or guidance on UAS operations.

Engagement during the trial and monitoring of complaints

Throughout the establishment of the TDA we will undertake regular engagement with stakeholders to ensure that there is awareness of the trial, its progress and timelines as well as the associated complaints procedure within CAP1616. We have provided all stakeholders with a dedicated email address where they can contact us with any questions or concerns that arise during the trial. The email address will also be used by local airspace users to provide us with as much notification as possible of periods of intense activity in the afternoon which would be prohibited by activation of the TDA. In turn, we will be emailing our stakeholders to give as much notice a possible of any planned TDA activation. Whilst we cannot commit to limit all activity which has an adverse impact, we will endeavour wherever possible to limit TDA activation during afternoon periods.

As part of this engagement activity, we will make clear that complaints must meet the criteria set out by the CAA, in order for the CAA to consider whether to investigate. This will be re-iterated when we advise our stakeholders on the outcome of this Trial Plan Part 1 request for a TDA if successful.

We will collate, monitor and report complaints to the CAA. This will be actioned through Goodwood Aerodrome's noise complaint process. In addition, we have briefed Goodwood Aerodrome's Consultative Committee and are engaging them as a standing item on their quarterly meetings. Where appropriate, we will continue to add to the Frequently Asked Questions document provided to stakeholders as part of the engagement on the TDA.

We will immediately assess and action any complaints raised regarding safety.

Start and end date of the first part of the trial

It is proposed that Trial Plan Part 1 within the TDA will begin on or after the 8th April 2021 and end on or before 23rd September 2021, subject to CAA's timelines for assessing and approving the OSC applications.

There will be no more than 90 days of TDA activation within the TDA period.

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See Appendix D