ACP-2022-031

Northumbria NHS Aerial Delivery Network

Temporary Danger Area Submission – Issue 1.0

11 November 2022 Issue 1.0

Contents

Introduction

Apian, in conjunction with the Northumbria Healthcare NHS Foundation Trust and utilising the government funded Small Business Research Initiative, is looking to conduct feasibility trials using uncrewed air systems (UAS) between hospitals in Northumbria for the distribution of medical payloads such as chemotherapy drugs and urgent medical supplies and samples.

The hospitals are located at Wansbeck, Alnwick and Berwick upon Tweed. This means that the UAS will be operated from sites near these locations as detailed below:

Wansbeck – [redacted]

Alnwick – [redacted]

Berwick upon Tweed – [redacted]

The project is intended to allow an evaluation of the potential advantages of transporting such time sensitive small and medium-weight healthcare items by use of UAS Beyond Visual Line of Sight (BVLOS) delivery operations during the period 13 February to 12th May 2023. In order to do this in the area selected for this activity, current regulation requires the activity to be contained within segregated airspace.

As a result of the need for this airspace segregation, Apian is applying for the establishment of a Temporary Danger Area (TDA) on the east coast of Northumbria between Berwick upon Tweed and Wansbeck. The proximity of one of the hospital operating sites to the Newcastle CTR/CTA creates a requirement for a dispensation to the UK CAA Policy Statement Special Use Airspace – Safety Buffer Policy for Airspace Design Purposes dated 22 August 2014. See Annex B.

The operations will take place in daylight hours and the TDA ceilings will be 600 feet amsl for segments A and C and 850 feet amsl for segment B.

The UAS conducting this activity will be the Swoop Aero Kookaburra operated by Skyports Ltd. The leading particulars of the UAS are as follow in Figure 1.

Type	Swoop Kookaburra Mk III. Hybrid – Powered Lift transitional platform (VTOL)
Max speed	68kt
Cruise speed	60kt
Max endurance	68 mins (forward flight limit at MTOW)
Max payload	3kg
MTOM/MTOW	17kg
Lighting	Navigational lights and a white strobe
Max. wind	27 kts (14 m/s) from any direction
Min. visibility	Min. 1500m at Take-off and Landing Points. Flights will comply with visual meteorological conditions (VMC).
Precipitation	Moderate rainfall (2mm – 10mm per hour)
Cloud ceiling	No limitation
Min. / Max. Operating Temperature	0°C / +45°C
Electronic Conspicuity	The UA is fitted with ADS-B IN and OUT, which can process uncertified ADS-B signals, namely SIL/SID=0. ***Note:*** *This is only for RP's situational awareness and is not used as a tactical means of deconfliction.*

Figure 1 Swoop Kookaburra Leading Particulars

Timings

A draft schedule giving the danger area activation periods is at Annex A and covers the whole period 13 February to 12 May 2023. Flights will be of one aircraft and subject to CAA Operational Authorisation, a maximum of two.

TDA Dimensions

The dimensions of the TDA are as shown in Table 1 below:

Identification and Name Lateral Limits	Vertical Limits	Remarks
CAA to insert identification Northumbria TDA Area A An area bounded by: 551109N 0013239W - 551157N 0012933W - 552030N 0013009W - 552237N 0013146W - 552213N 0013405W - 552010N 0013212W - 551244N 0013134W - 551143N 0013340W - 551109N 0013239W -	Upper Limit: 600FT ALT Lower Limit: SFC	Activity: UAS Beyond Visual Line of Sight (BVLOS) DAAIS: Scottish Information Frequency: 118.975 Skyports Ltd. Tel: TBC Sponsor: Apian Ltd. Hours: When notified
CAA to insert identification Northumbria TDA Area B An area bounded by: 552407N 0014217W - 552406N 0014109W - 552321N 0013946W - 552336N 0013201W - 552237N 0013145W - 552212N 0013405W - 552201N 0014025W - 552240N 0014228W - 552407N 0014217W -	Upper Limit: 850FT ALT Lower Limit: SFC	Activity: UAS Beyond Visual Line of Sight (BVLOS) DAAIS: Scottish Information Frequency: 118.975 Skyports Ltd. Tel: TBC Sponsor: Apian Ltd. Hours: When notified
CAA to insert identification Northumbria TDA Area C An area bounded by: 553407N 0013810W – 552331N 0013438W – 552336N 0013202W – 553432N 0013534W – 554149N 0014532W – 554643N 0015711W – 554605N 0020415W – 554403N 0020232W – 554458 N 0015610W – 553407 N 0013810W –	Upper Limit: 600FT ALT Lower Limit: SFC	Activity: UAS Beyond Visual Line of Sight (BVLOS) DAAIS: Scottish Information Frequency: 118.975 Skyports Ltd. Tel: TBC Sponsor: Apian Ltd. Hours: When notified

Table 1 TDA Dimensions

Airspace Management Arrangements

The Operating Authority for the TDAs is Apian Ltd.

Activation and de-activation of the TDA will be notified by Apian Ltd

A Danger Area Activity Information Service (DAAIS) will be available either via radio from Scottish Information on 118.975 MHz or via telephone from Skyports (insert number).

Notification

The TDA will be activated via NOTAM, at least 24 hours in advance of operations.

Sponsor

Enquiries relating to the subject TDAs should be directed in the first instance to the Aviation Manager, Apian Ltd Tel: 020 3714 4145 or email: airspace@apian.aero

Note: Should the TDA submission gain approval then the Sponsor (Apian) will put in place appropriate measures for the monitoring, collating and reporting on the level and contents of any complaints received to the CAA. Stakeholders will be notified of how they can provide feedback or complaint prior to activation of the TDA.

Airspace Maps

Whole TDA Structure - three segment areas

Figure 2: Proposed Temporary Danger Area Structure.
(NOT TO BE USED FOR NAVIGATION)

Northumbria Area A

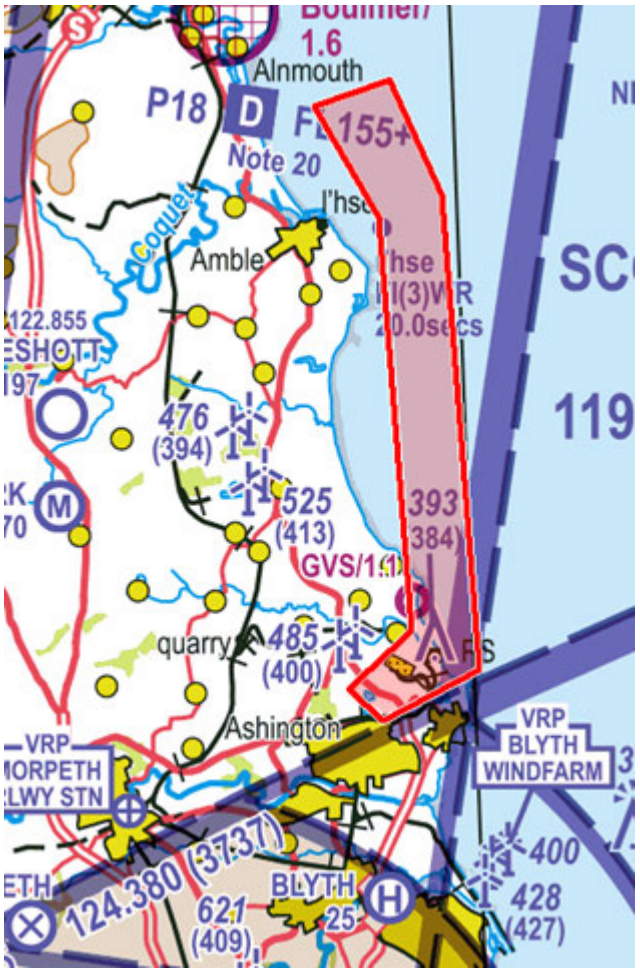


Figure 3: Proposed Temporary Danger Area Structure.
(NOT TO BE USED FOR NAVIGATION)

Northumbria Area B

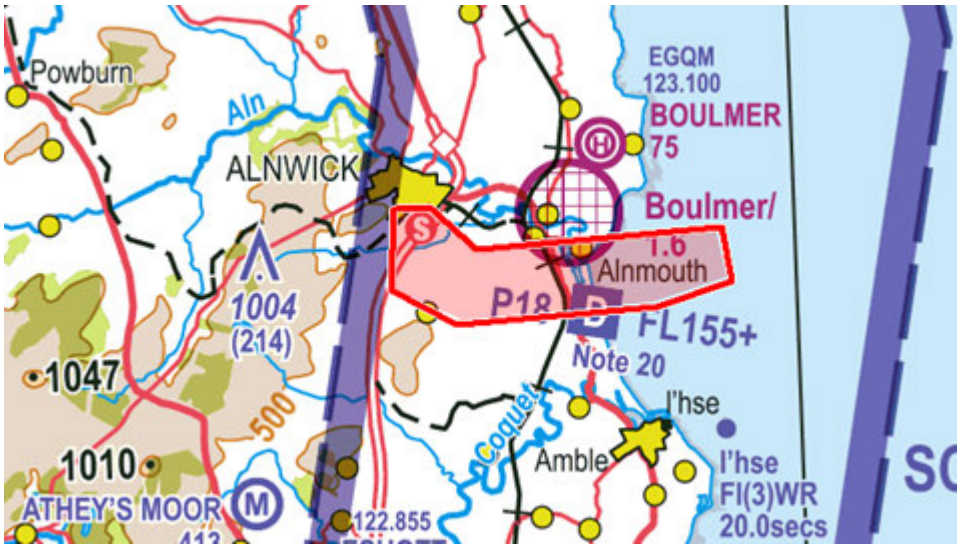


Figure 4: Proposed Temporary Danger Area Structure.

(NOT TO BE USED FOR NAVIGATION)

Northumbria Area C

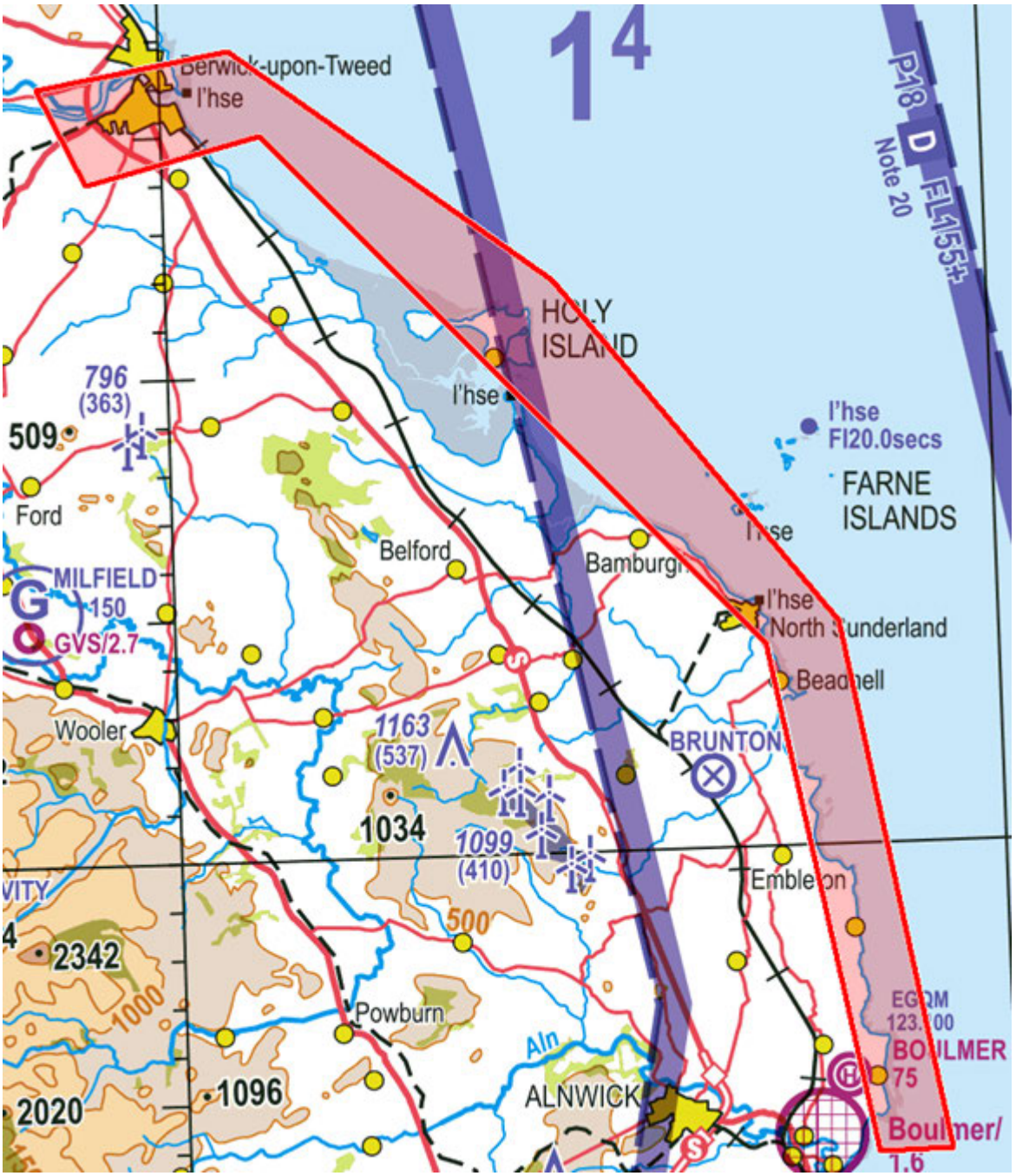


Figure 5: Proposed Temporary Danger Area Structure.
(NOT TO BE USED FOR NAVIGATION)

Glossary of Terms and Abbreviations

ADS-B	Automatic Dependent Surveillance - Broadcast
ALT	Altitude
amsl	Above Mean Sea Level
ATC	Air Traffic Control
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CTA	Control Area
CTR	Control Zone
DAA	Detect and Avoid
DAAIS	Danger Area Activity Information Service
DAATM	Defence Airspace and Air Traffic Management
ft / FT	Feet
GNAAS	Great North Air Ambulance Service
GVS	Gas Venting Site
LARS	Lower Airspace Radar Service
MoD	Ministry of Defence
MToM	Maximum Take-off Mass
MToW	Maximum Take-off Weight
NHS	National Health Service
OSC	Operating Safety Case
SARG	Safety and Airspace Regulation Group
SFC	Surface
SSR	Secondary Surveillance Radar
SUA	Special Use Airspace
TDA	Temporary Danger Area

TOLP	Take-off and Landing Point
UAS	Uncrewed Air System
WGS 84	World Geodetic Survey 1984

Annexes

A. **TDA Activation Programme 13 Feb 2023 – 12 May 2023**

B. **Buffer Policy Dispensation Application**

C. **1 – 3 Letters of Agreement/Temporary Operating Instructions**

D. **Environmental & Noise Impact Assessment Summary**

Annex A

TDA Activation Programme 13 Feb 2023 – 12 May 2023

The intended activation times of the TDA to allow for the delivery flights will be as follow.

Day	Times (UTC)	Intended total of daily flights
Monday	09:45-14:15, 16:00-18:15	8
Tuesday	09:45-14:15, 16:00-18:15	8
Wednesday	08:45-14:45, 16:00-18:15	10
Thursday	08:45-14:30, 16:00-18:15	8
Friday	08:45-14:30, 16:00-18:15	11

The project will adhere to the Flexible Use of Airspace principles and airspace will be handed back when not required.

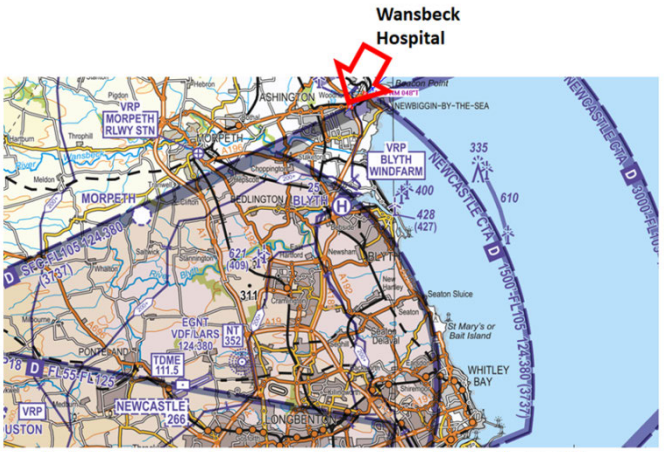
Annex B

An Application for a Dispensation from CAA Buffer Policy for UAS Operations near the Newcastle CTR

Reference: SARG - Policy Statement - SPECIAL USE AIRSPACE - SAFETY BUFFER POLICY FOR AIRSPACE DESIGN PURPOSES dated 22 August 2014

Introduction

The use of a UAS to demonstrate the potential of an aerial delivery service for the NHS in Northumbria is planned for the Spring of 2023. The items to be transported include chemotherapy drugs which are provided by the NHS unit at Wansbeck Hospital. This hospital lies just underneath the Newcastle CTA. The base altitude of the CTA in this location is 1500ft amsl as illustrated below. The UAS is planned to be operated from a site a few hundred metres to the north of the hospital and will fly Beyond Visual Line of Sight to and from other operating sites in the vicinity of Alnwick and Berwick upon Tweed. Both towns lie to the north. In the absence of a certified Detect and Avoid (DAA) system, the conduct of a Beyond Visual Line of Sight (BVLOS) flight requires a Temporary Danger Area to be established.



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As a result of the proximity of this planned BVLOS operation to the CTA/CTR, a dispensation is sought from the UK Civil Aviation Authority Buffer Policy.

CAA Buffer Policy

The reference document lays out in para 2.5 the types of activity which require a buffer to be applied, this includes the flight of UAS (Beyond Visual Line of Sight (BVLOS)). The document then reads as below.

2.6 The following buffer criteria shall be applied to the activities described in paragraph 2.5:.

> *a. Lateral Buffer Requirement - A lateral safety buffer will normally be established and promulgated in order that the minimum separation between structures will be:*
>
> *(1) 5nm from the edge of an airway, TMA, CTA or CTR.*
>
> *(2) 10nm from the centreline of Advisory or Upper ATS Routes.*

b. Vertical Buffer Requirement - SUA will normally be established and promulgated in order that a minimum separation of 2000ft above or below structures will be maintained.

c. The above criteria may be achieved through airspace design or ATM procedures. Similarly, where a new controlled airspace structure or air traffic route is proposed, it may not be established where the above criteria would be infringed.

2.7 The above criteria do not apply to Temporary Reserved Areas (TRA). Autonomous operations in a TRA by aircraft - operating SSR with pressure altitude reporting - should aim to operate no closer than 3nm to the lateral boundary or no closer than 500ft of the vertical limit of an active TRA where this abuts controlled airspace.

2.8 Application of the buffer requirements is to be considered when planning temporary airspace activities not necessarily contained within permanently established SUA, for example military exercises and other activities that are subject to Airspace Co-ordination Notifications

The document also contains the following note:

3.2 BVLOS UAS Operations

Where SUA is established only to support BVLOS UAS operating at IAS of 150kts or less, the airspace buffer may, subject to appropriate mitigation (see paragraph 3.1), be reduced from 5nm to 3nm from the edge of an airway, TMA, CTA or CTR, or from 10nm to 8nm from the centreline of Advisory or Upper ATS Routes.

In verbal discussions between Apian and Newcastle Airport, the airport ATC indicated a willingness to cooperate in the use of further reduced criteria provided a safe procedure was established which does not impact on their current operations. That procedure has been agreed and is detailed in the Annex C2 to this submission along with proprietary supplementary information from the Operator. A summary of the mitigations is provided in this document.

UAS Flight Times

The medical delivery flights will take place to a planned timetable which is detailed below. Operations will be conducted within two periods of the day

Day	Times (UTC)	Intended total of daily flights
Monday	09:45-14:15, 16:00-18:15	8
Tuesday	09:45-14:15, 16:00-18:15	8
Wednesday	08:45-14:45, 16:00-18:15	10
Thursday	08:45-14:30, 16:00-18:15	8
Friday	08:45-14:30, 16:00-18:15	11

Relevant segments of the segregated airspace will be activated as necessary in accordance with the Flexible Use of Airspace.

UAS Operating Altitude

The UAS flights will be operated below 400ft above the surface, and will be either in the climb or the descent when in the proximity of the Newcastle CTA/CTR.

Topics considered

The prime aim of the agreed procedures is to ensure that the UAS will not enter the controlled airspace of the CTA/CTR and due note was taken of the following:

- “Go arounds” by aircraft using the airport.
- Aircraft routing via Visual Reporting Points (such as Blyth Windfarm)
- Proximity to SIDs and STARs and runway in use.*****
- Weather minima.
- Time deconfliction windows
- Air Traffic Services
- UAS mitigating features
- Flyaway/Loss of Command Link leading to an airspace infringement.

*** These procedures are available at:**

https://www.aurora.nats.co.uk/htmlAIP/Publications/2022-05-19-AIRAC/html/index-en-GB.html

Mitigating factors.

There are a number of technological and operational mitigations which can be implemented to ensure that safe operations are conducted in close proximity to the Newcastle CTA/CTR.

- The UAS position is visible to the Pilot in Command on a Control Unit screen.
- The UAS is fitted with ADS-B in/out making the UAS electronically visible to other suitably equipped airspace users.
- Newcastle airport provides a Lower Airspace Radar Service in the area.
- The UAS has a geofence feature (described in a supplement to the Annex) which will prevent the UAS from entering the Newcastle CTA/CTR.
- The maximum IAS of the UAS is <150kts and it also has a slow rate of climb, permitting time for contingency actions to be taken.
- Communications will be checked between the UAS Operator (Skyports) and Newcastle Airport ATC prior to the TDA activation.
- The UAS team are trained in the necessary procedures, and these procedures form part of a UK CAA accepted Operating Safety Case.

- A procedure detailing required actions in the event of the UAS infringing the CTR is contained in the Annex - *Letter of Agreement between Newcastle Airport, Skyports and Apian for the purpose of airspace deconfliction*.
- Newcastle Airport has established procedures for actions to be taken in the event of the controlled airspace being infringed by a UAS.

Request

On the basis of the above, Apian requests a dispensation from the requirement for a buffer, detailed the SARG - Policy Statement - SPECIAL USE AIRSPACE - SAFETY BUFFER POLICY FOR AIRSPACE DESIGN PURPOSES dated 22 August 2014, between the proposed TDA and the Newcastle CTA/CTR.

Supporting evidence for this request is provided by Newcastle Airport:

[redacted]

[redacted]

Feedback for NCL is as below:

NIAL are supportive of the principles that this ACP aims to achieve in terms of the movement of essential medications efficiently, sustainably and safely.

Providing the assurances around 3D Geofencing are realised and the operational details of the LoA worked out and signed off well in advance of the operation becoming active NIAL have no significant objection to this ACP. We have been provided assurances that the TDA will not interfere/impinge with the CTA/R or any established IFPs and this is appreciated. To achieve this we understand that APIAN will require alleviation from the prescribed 'buffer policy' (SARG - Policy Statement - SPECIAL USE AIRSPACE - SAFETY BUFFER POLICY FOR AIRSPACE DESIGN PURPOSES dated 22 August 2014). As previously stated – provided the assurances of Geofencing, statistical data on reliability and risk assessments are realised and shared which makes any residual risk ALARP or ALoS NIAL has no objection to this application to the policy.

[redacted]

Newcastle International Your Airport

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Note:

There is currently an ACP by ORE BVLOS Danger Area Proposal off the coast at Newbiggin–by-the–Sea, close to the airspace required for the TDA to support this project. Contact with that organisation formed part of the Apian ACP early stakeholder process. The organisation confirmed by email on 12 Aug 2022 that the application is currently paused. The ACP Portal was checked 9 Nov 2022 and this confirms the status as Paused.

See ACP-2021-089

https://airspacechange.caa.co.uk/PublicProposalArea?pID=422

Annex C

Letters of Agreement/Temporary Operating Instructions

C1 Temporary Operating Instruction Apian TO01 EGD *** BVLOS Flights by Skyports Ltd.

C2 Letter of Agreement between Newcastle Airport, Skyports and Apian for the purpose of airspace deconfliction.

C3 Letter of Agreement between Emergency Services Operators and Apian for access to the Northumbria Danger Area(s) EGD ****.

Annex C1

Temporary Operating Instruction Apian TOI01 EGD *** BVLOS Flights by Skyports Ltd.

Period of validity: 13 Feb – 12 May 2023

Introduction

Apian has been awarded funding from the Northumbria Healthcare NHS Foundation Trust and Innovate UK to conduct feasibility trials using UAS (Uncrewed Air Systems) between hospitals in Northumbria.

The project aims to increase the capacity of time sensitive medical supplies leading to costs savings for the NHS through reduced operating costs and reduced waste of drugs not delivered during their period of maximum efficacy. Therefore, the project will evaluate the technical and operational limitations of the method of transport in the region, and by extension, evaluate a template which could be applicable in other areas of the UK.

In order to conduct these flights safely, the current UK CAA regulations require such Beyond Visual Line of Sight (BVLOS) flights to be conducted in segregated airspace. The method of segregation is the use of a Temporary Danger Area (TDA), which is used as mitigation for the lack of the detect and avoid function normally conducted by a pilot on-board the aircraft.

Purpose

The purpose of this Temporary Operating Instruction (TOI) is to detail the mitigations and procedures which will be implemented to ensure, that if necessary, aircraft conducting priority tasks can safely utilise the airspace contained within the lateral and vertical boundaries of the Temporary Danger Area EGD ***. An individual signature Letter of Agreement (LOA) for the parties indicated below, when necessary, is contained in the annexes following this TOI.

Parties to the Agreements

The parties affected by and included in this agreement are:

Apian

Skyports

Newcastle International Airport (‘Newcastle Airport’)

†National Police Air Service

†UK Ministry of Defence - DAATM

*Great North Air Ambulance Service

*Maritime Coastguard Agency

Those parties marked * are regarded as Emergency Services Operators and therefore can expect to be permitted to enter the TDA subject to the procedures detailed in this document and the accompanying LOAs.

Those parties marked with † are regarded as Emergency Services or Military Operators on short notice operational taskings, but have stated to Apian that they do not require a Letter of Agreement to be in place and their Operations Room/Military Operators will make contact by telephone if penetration of the airspace is required.

The affected areas

The airspace affected by the creation of the TDA lies within the red lines indicated in the figure below:

The TDA will be activated by NOTAM and in accordance with the requirements for Flexible Use of Airspace (FUA) will be activated and only remain activated when required for use.

The operating hours for this airspace are referenced in Table 1.

Day	Time (Local)
Monday/Tuesday	09:45-14:15 16:00-18:15

Wednesday	08:45-14:45 16:00-18:15
Thursday	08:45-14:30 16:00-18:15
Friday	08:45-14:30 16:00-18:15
Saturday/Sunday	N/A

Table 1: Intended TDA activation periods

Not all of the airspace will be required during these times. As a result, the specific areas (A, B and C) will only be activated when flights are due to take place within those areas.

The vertical limits of the areas are:

- Area A Surface to 600ft AMSL
- Area B Surface to 850ft AMSL
- Area C Surface to 600ft AMSL

Apian will promulgate all TDA activation times by NOTAM at least 24 hours before planned use.

Air Traffic Services

A Danger Area Activity Information Service (DAAIS) will be provided by Scottish Information.

It is anticipated that the TDA airspace is too low lying for the Newcastle LARS to be available for any deconfliction service.

The Skyports UAS is fitted with the uAvionix Ping 1090i device, this is capable of both ADS-B IN & OUT. The IN capability allows the Remote Pilot to see other aircraft operating Electronic Conspicuity (EC) devices in the vicinity of the UAS.

Communications

The Skyports UAS is not to depart any operating site without first checking communications with the Skyports destination site and the daily check with Newcastle Airport by telephone.

Telephone numbers:

Skyports

Wansbeck TBC

Alnwick TBC

Berwick upon Tweed TBC

Newcastle ATC Radar: [redacted]

[redacted]

Apian [redacted]

Radio Frequencies:

Newcastle LARS 124.380 MHz (This frequency will be monitored)

Loss of Voice Communications

UAS on the ground

The UAS shall not be launched until effective voice communications have been re-established

UAS airborne

In the unlikely event of a total loss of voice comms, the UAS Pilot in Command (PiC) shall land at the nearest landing site whether it is one of the scheduled locations, or an emergency landing site. The aircraft must at all times remain within the TDA.

Penetration of the TDA by Emergency Services Aircraft

If an Emergency Services aircraft or Military Operators on short notice operational taskings require access to the TDA airspace, the Operations Room of that organisation is to make telephone contact with the Skyports local area number: [redacted]

In the event that the Emergency Services Aircraft or Military Operator is already airborne and needs to enter an active TDA and no Operations Room contact is achieved, the aircraft should make all available attempts to contact the Skyports team via Newcastle Airport on radio frequency 124.380 MHz, or via a phone patch service stating location, required route and destination. For certain Military Operators a TDA sector and time window may be passed instead. Newcastle Airport will relay the messages or requests to Skyports. Upon receipt of any entry request by Emergency Services Aircraft, Skyports' UAS shall vacate the affected airspace and land as soon as possible to give way to the Emergency Services Aircraft.

Once the UA has landed, Skyports shall confirm with the Emergency Services Aircraft Operator or Newcastle ATC that the UA has vacated the airspace, via the medium or means of communication that Skyports have been contacted on. Skyports' operations shall not resume until the Emergency Services Aircraft Operator or Newcastle ATC has confirmed that the traffic has left the TDA.

The UAS Pilot in Command (PiC), if aware of the presence of the aircraft, is to ensure the UAS is kept well clear of any such routing as per the Operation Safety Case.

Infringement of the TDA by other aircraft

If any unknown traffic enters the active TDA, the following procedures apply:

UAS on the ground

The UAS is to remain on the ground and not be launched

UAS airborne

The procedure may depend upon the source of the detection such as notification by Newcastle Airport, ADS-B detection etc. and the ensuing level of situational awareness.

The UAS PiC is to:

Monitor the position and height of the UAS, and ensure that adequate separation is maintained between it and the infringing aircraft.

Consider the option of landing at a safe location.

In Area A or close proximity to the CTR, and subject to the proximity of the UAS and infringing aircraft and circumstances of the encounter, the UAS PiC shall select what they judge to be the safest of the following actions:

- Enter a hold at low level
- Return to the launch point or landing point – whichever is closer
- Divert to an emergency landing location
- Terminate the flight by landing immediately regardless of the risk to the UAS, but taking due consideration of the nature of the surface below the drone (e.g. sea or inhabited area).

UAS airborne and there is an immediate risk of collision

The UAS PiC is to take any necessary avoiding action, including the consideration to land immediately regardless of the underlying surface.

Other relevant documents

- Letter of Agreement between Apian, Newcastle Airport and Skyports. (Annex C2)
- Letter of Agreement between Apian, MCA & GNASS. (Annex C3)

Glossary & Abbreviations

amsl	Above Mean Sea Level
ADS-B	Automatic Dependent Surveillance - Broadcast
ALT	Altitude
ATC	Air Traffic Control
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CTA	Control Area
CTR	Control Zone
DAAIS	Danger Area Activity Information Service
DAATM	Defence Airspace and Air Traffic Management
ft / FT	Feet
GNAAS	Great North Air Ambulance Service
GVS	Gas Venting Site

LARS	Lower Airspace Radar Service
LOA	Letter of Agreement
MCA	Maritime & Coastguard Agency
NHS	National Health Service
OSC	Operating Safety Case
PiC	Pilot in Command
SARG	Safety and Airspace Regulation Group
SFC	Surface
SSR	Secondary Surveillance Radar
SUA	Special Use Airspace
TDA	Temporary Danger Area
TOI	Temporary Operating Instruction
UAS	Uncrewed Air System

Annex C2

Letter of Agreement between Newcastle Airport, Skyports and Apian for the purpose of airspace deconfliction.

Note: This agreement also contains a supplementary document detailing proprietary information provided on a confidential basis to the CAA and Newcastle Airport, but which is not available for wider release.

Parties to the Agreement:

Apian Ltd Skyports Ltd Newcastle International Airport

References:

A. SARG - Policy Statement - SPECIAL USE AIRSPACE - SAFETY BUFFER POLICY FOR AIRSPACE DESIGN PURPOSES dated 22 August 2014

Purpose of the Agreement.

The Purpose of this Letter of Agreement (LoA) is to detail the responsibilities and procedures to be used by the parties in relation to the management of a Temporary Danger Area (TDA) established to support an NHS Uncrewed Air Systems (UAS) delivery project and the conduct of flight operations within that airspace.

Intent

The intent of this LoA, in addition to its purpose, is to assure the Civil Aviation Authority (CAA) that robust procedures exist and due consideration has been given to mitigate the risks created by operation of a Beyond visual line of sight operations (BVLOS) UAS in close proximity to Controlled Airspace and to allow a dispensation to be issued for such operations.

The Parties:

Newcastle International Airport ('Newcastle Airport')

Newcastle Airport is an International airport serving the NE of England with a mix of scheduled and unscheduled aircraft movements. The runways are 07/25 and the airport has Class D Controlled Airspace associated with it. The aerodrome elevation is 266ft and the Class D has an upper limit of FL105. In the vicinity of Wansbeck the base altitude is 1500ft and within two nautical miles to the east of Wansbeck this rises to 3000ft. Within two and a half nautical miles to the west is the edge of the Control Zone (CTR), the base of which is the surface (SFC).

The airport is notified for 24 hour a day operations. Air Traffic Services include a Lower Airspace Radar Service (LARS).

Skyports

Skyports is an innovative aerospace company originally established to set up and operate vertiport infrastructure for the UAS and electric vertical take-off and landing (eVTOL) market. The company has since successfully developed its own UAS operating capability and carries out BVLOS flight operations both in the UK and overseas. The company holds a UK CAA Operational Authorisation in the Specific Category (Note: This type of Authorisation is location specific and the Northumbria operation will require a CAA variation to include this).

Apian

Apian is a medical logistics company, focused on the use of UAS to deliver faster, smarter and greener healthcare. Founded by a team of NHS doctors and ex-Googlers, Apian is building products and platforms that connect the healthcare industry with the UAS industry to improve patients' health outcomes and staff well-being.

The situation

Apian are contracted by the Northumbria Healthcare NHS Foundation Trust to conduct feasibility flights using UAS between specific hospitals in Northumbria for the distribution of medical payloads such as chemotherapy drugs, urgent medical supplies and patient samples. Such a delivery network would ensure that essential services are provided in a more time critical manner to those who need them the most, and that issues created over the course of the pandemic such as dealing with the backlog of care are tackled as quickly as possible.

Provisional dates for the feasibility flights are from 13th Feb 2023 and end on the 12th May 2023. In order to achieve this, Apian has applied for a Temporary Danger Area (TDA) to be established in order to provide segregated airspace in which the UAS may operate (ACP-2022-031). This requirement for segregation is as a result of United Kingdom CAA CAP 722 Edition 8, Chapter 2 Operational Guidance, 2.1.2 BVLOS. "*Operation of an unmanned aircraft beyond a distance where the remote pilot is able to respond to or avoid other airspace users by direct visual means (i.e. the remote pilot's observation of the unmanned aircraft) is considered to be a BVLOS operation. Unmanned aircraft intended for BVLOS operations will require either:*

- *A technical capability which has been accepted as being at least equivalent to the ability of a pilot of a manned aircraft to 'see and avoid' potential conflictions. This is referred to as a Detect and Avoid (DAA) capability.*
- *A block of airspace to operate in which the unmanned aircraft is 'segregated' from other aircraft - because other aircraft are not permitted to enter this airspace block, the unmanned aircraft can operate without the risk of collision, or the need for other collision avoidance capabilities; or*
- *Clear evidence that the intended operation will pose 'no aviation threat' and that the safety of persons and objects on the ground has been properly addressed."*

There is currently no suitable certified DAA capability and the operation cannot be assessed as "no aviation threat". Segregated airspace is therefore necessary to mitigate for the fact that the UAS does create an aviation risk and has no DAA capability to fulfil the see and avoid function of a pilot on-board an aircraft.

The BVLOS flight operations are planned to take place in Class G airspace. Part of that airspace, in the vicinity of Wansbeck Hospital, lies adjacent to the Newcastle CTA (see Figure 1 below). BVLOS operation in close proximity to controlled airspace would require the issue of dispensation from the CAA, due to the constraints of Reference A. The policy states that

*2.6 The following buffer criteria shall be applied to the activities described in paragraph 2.5**

a. <u>Lateral Buffer Requirement</u> A lateral safety buffer will normally be established and promulgated in order that the minimum separation between structures will be

(1) 5nm from the edge of an airway, TMA, CTA or CTR.

(2) 10nm from the centreline of Advisory or Upper ATS Routes

b. <u>Vertical Buffer Requirement</u> SUA will normally be established and promulgated in order that a minimum separation of 2000ft above or below structures will be maintained

c. The above criteria may be achieved through airspace design or ATM procedures. Similarly, where a new controlled airspace structure or air traffic route is proposed, it may not be established where the above criteria would be infringed

*** 2.5 includes UAS Beyond Visual Line of Sight**

The planned maximum operating height of the UAS in this sub-section of the TDA will be below 400ft (above the surface), with the TDA extending up to 600ft amsl. The base of the Newcastle CTA at Wansbeck is 1500ft amsl. The TDA in the vicinity of Wansbeck is illustrated below in Figure 1 within the area marked in yellow. This means that there will be 900ft of vertical clearance from the top of the TDA to the base of the adjacent CTA.

[redacted]

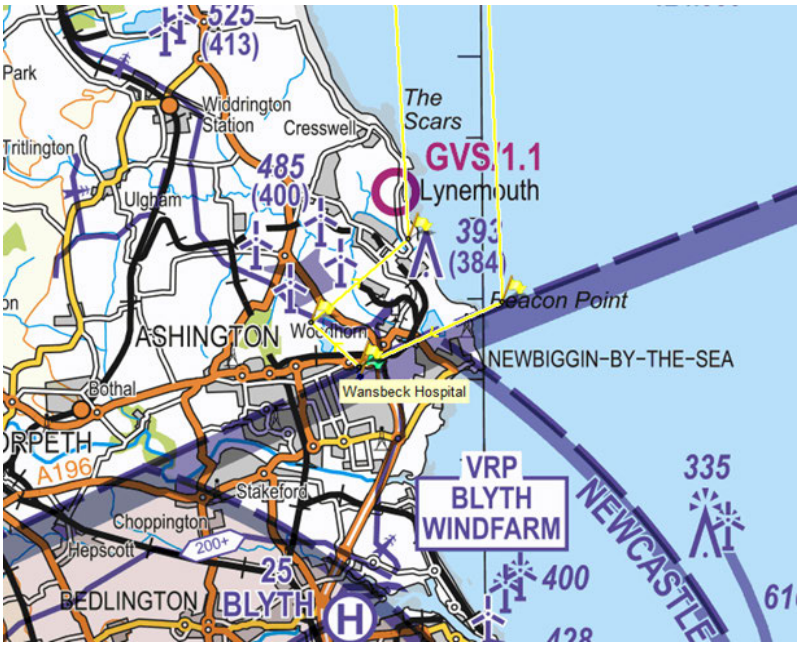

Figure 1: Wansbeck Area and Newcastle CTR/CTA - Not to be used for Navigation

The Swoop Kookaburra UAS is fitted with the uAvionix Ping 1090i device, this is capable of both ADS-B IN & OUT. [redacted]

The TDA, subject to UK CAA approval, is planned to be available for use from 13 February 2023 for a period of 90 days. Any extension beyond this period is once again subject to UK CAA approval.

Weather minima for UAS operations

Aircraft limitations state that flight in cloud and known icing conditions is prohibited. The aircraft's temperature limits are 0° to +45° Celsius. In the event of fog or low cloud, the aircraft will fly clear of cloud and with the UAS visible.

For BVLOS flights, the minimum visibility required is not less than 1500m at take-off/landing point with a cloud base not less than 1,500 feet AGL.

Meteorological data from the following resources will be utilised: Airport TAFs & METARs, Windy Route planner and potentially deployed 4G enabled weather stations to get accurate readings on-route.

UAS Flight Times

Operations will only take place during the proposed fixed hours as detailed here which will be NOTAM.

Monday	09:45-14:15, 16:00-18:15
Tuesday	09:45-14:15, 16:00-18:15
Wednesday	08:45-14:45, 16:00-18:15
Thursday	08:45-14:30, 16:00-18:15
Friday	08:45-14:30, 16:00-18:15

The medical delivery flights will take place to a planned timetable which will be shared with Newcastle weekly.

Responsibilities:

Apian

Apian will publish the flying programme and submit NOTAM requests.

Newcastle Airport

Newcastle Airport provide a LARS service. They will also facilitate an entry service to the danger area for emergency and military aircraft as described in Annex C1 Temporary Operating Instruction Apian TOI 01.

Skyports

Skyports will provide an Operations Desk capability for management of the TDA airspace and DAAIS for phone users. [redacted]

[redacted]

[redacted]

Except in an emergency, the routing of the UAS is always to be within the TDA and as detailed in the Skyports OSC documentation as accepted by the CAA.

Skyports will call Newcastle ATC to inform them of the UAS activities before the first flight of each day and after the last flight of each day.

Alerting Newcastle Airport in the unlikely event of an airspace infringement and/or flyaway.

Notes:

Methods and means of Communication

Real time communication between the Skyports Pilot in Command and Newcastle ATC is to utilise the following phone numbers:

Skyports Primary: TBC

Skyports Secondary:TBC

Newcastle Airport radar: [redacted]

Notification of the intended flying programme is to be communicated between the following email addresses:

airspace@apian.aero

tbc@skyports.net

Aircraft Lighting

The Kookaburra UAS is fitted with navigation and strobe lights.

Obstructions

There is a Gas Venting Site (GVS) at Ellington 55°13'20"N 001°31'53"W which creates an avoidance requirement. This is of a minimum of 0.25 nm radius and extends from the surface to 1100ft ALT for crewed aircraft.

In addition to the GVS there are numerous offshore wind turbines in the Blyth area. These will also be avoided by the UAS.

Emergency Hold

A holding pattern at the altitude/height of 360ft will be established at a location deemed appropriate to Skyports' Flight Operations team during pre-deployment survey, should Newcastle ATC request (i.e. emergency aircraft inbound to Newcastle).

Flyaway/Lost Link.

In the event that Skyports lose command link with the UAS, or it fails to respond to commands, the Pilot in Command is to inform Newcastle Airport ATC as expeditiously as possible. The information is to include the following as a minimum:

The following details are to be passed:

1. UAS Type: [redacted]
2. Last known position/Current location – Range & Bearing from Newcastle Airport
3. Current heading
4. Current speed (knots)
5. Current altitude (feet amsl)
6. Endurance remaining: estimated maximum probable flight time remaining in minutes.
7. Waypoint destinations of pre-programmed route.
8. Maximum potential speed: 68 knots V_{NE}.
9. ADS-B code
10. Continue to update Newcastle Airport with ADS-B position data as required.

Known CTA/CTR Incursion

In the unlikely event of a CTA/CTR incursion by the UAS, the detecting party, whether Skyports or Newcastle Airport, shall immediately inform the other. Newcastle Airport will follow their Standard Operating Instructions for an incursion.

Skyports will use all available options to land the UAS safely, recognising that this may be a balance between the safety of persons on the ground and those potentially in the air.

Amendments

Nothing in this Letter of Agreement prevents any party suggesting alternative arrangements in the interest of safety with regards to a specific situation, provided that it is done with the mutual agreement of the other parties. The signatories (or their representatives) shall be free to consult together to amend or revise this Letter of Agreement should they see fit. Any subsequent amendments will be agreed by the undersigned prior to implementation.

Signatures of the Parties:

Apian	Newcastle Airport	Skyports
Signature:	Signature:	Signature:
Name:	Name:	Name:
Date:	Date:	Date:

Abbreviations & Terminology

amsl	Above Mean Sea Level
ADS-B	Automatic Dependent Surveillance - Broadcast
ALT	Altitude
ATC	Air Traffic Control
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CTA	Control Area
DAA	Detect and Avoid
DAAIS	Danger Area Activity Information Service
EC	Electronic Conspicuity
ft / FT	Feet
LARS	Lower Airspace Radar Service
GVS	Gas Venting Site
MEL	Minimum Equipment List

NHS	National Health Service
OSC	Operating Safety Case
SARG	Safety and Airspace Regulation Group
SFC	Surface
SUA	Special Use Airspace
TDA	Temporary Danger Area
UAS	Uncrewed Air System
V_{NE}	Velocity Never Exceed
WGS 84	World Geodetic Survey 1984

Annex C3

Letter of Agreement between Emergency Services Operators and Apian for access to the Northumbria Temporary Danger Area(s) EGD ******.

Parties to the Agreement:

Apian Ltd

Great North Air Ambulance Service

Maritime & Coastguard Agency

Purpose of the Agreement.

The Purpose of this document is to record the agreement of the Parties to the procedures detailed in Temporary Operating Instruction - Apian TO01 EGD *** BVLOS Flights by Skyports Ltd to enable access by emergency services aircraft to the Temporary Danger Areas established on the coast of Northumbria during the period of 13 Feb 2023 – 12 May 2023.

The Temporary Danger Area (TDA) is established to support an NHS Uncrewed Air Systems (UAS) delivery project and the conduct of flight operations within that airspace.

The situation

Temporary Danger Area airspace is required to create segregation of crewed and uncrewed aircraft, due to lack of a Detect and Avoid capability on the UA to fulfil the see and avoid function of a pilot on-board an aircraft. It is accepted by the Parties that military and other emergency services aircraft may need to enter the Danger Area(s) during times when the airspace is active.

Weather minima for UAS operations

Aircraft limitations state that flight in cloud and known icing conditions is prohibited. The aircraft's temperature limits are 0° to +45° Celsius. In the event of fog or low cloud, the aircraft will fly clear of cloud and with the UAS visible.

For BVLOS flights, the minimum visibility required is not less than 1500m at take-off/landing point with a cloud base not less than 1,500 feet AGL.

TDA Activation Times for UAS Flights

Operations will only take place during the proposed fixed hours as detailed here which will be activated by NOTAM.

Monday	09:45-14:15, 16:00-18:15
Tuesday	09:45-14:15, 16:00-18:15
Wednesday	08:45-14:45, 16:00-18:15
Thursday	08:45-14:30, 16:00-18:15
Friday	08:45-14:30, 16:00-18:15

Skyports will provide an Operations Desk capability for management of the TDA airspace and DAAIS for phone users. [redacted]

Skyports will liaise with Scottish Information and Newcastle ATC to inform them if the TDA is deactivated earlier than the time promulgated by the NOTAMs.

[redacted]

In the event that phone contact is not established, Newcastle Airport can facilitate an entry service for emergency services or military aircraft to the Danger Area through their LARS radio frequency and then making phone contact on behalf of the emergency services or military aircraft with the Skyports Operations Desk

Signatures of the Parties:

Apian	GNAAS	MCA
Signature:	Signature:	Signature:
Name:	Name:	Name:
Date:	Date:	Date:

Abbreviations & Terminology

amsl	Above Mean Sea Level
ADS-B	Automatic Dependent Surveillance - Broadcast
ALT	Altitude
ATC	Air Traffic Control
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CTA	Control Area
DAA	Detect and Avoid
DAAIS	Danger Area Activity Information Service
ft/FT	Feet
LARS	Lower Airspace Radar Service
GVS	Gas Venting Site
OSC	Operating Safety Case
SARG	Safety and Airspace Regulation Group
SFC	Surface
SUA	Special Use Airspace
TDA	Temporary Danger Area
TOI	Temporary Operating Instruction
TOLP	Take-off and Landing Point
UA	Uncrewed Aircraft
UAS	Uncrewed Air System

Annex D

Environmental & Noise Impact Assessment Summary

As part of ConOps development, the flights have been carefully planned to minimise noise in the areas of operations. Skyports do not envisage any adverse impact on tranquility when operating over inhabited areas due to the following reasons:

- **Noise of the UA** – According to previous measurements, the mean maximum sound pressure level (L_{ASmax}) of the Swoop Kookaburra Mk III UA during take-off and landing is [redacted], and that when the UA is cruising at a height of 200ft AGL is [redacted], which is virtually undetectable from ground.

  Note: [redacted] noise penalty is added to account for the tonal nature of drones.

  [redacted]

  [redacted] In normal circumstances, the UA will cruise at a height of 360ft AGL.

  During the daily activation periods Skyports will operate an average of 2 return flights to each location. As a result, Apian and Skyports believes the noise impact with such a short span of time, and such a small noise footprint, is negligible.

- **Routes and TOLPs planning** – The routes were carefully designed to prioritise operating over sparsely populated areas (see Figure 1 below; the colours denote population density).

  At key locations such as Take-off and Landing Points (TOLPs), they were also chosen to be located outside/away from residential areas to minimise the noise impact during take-off and landing (see Figures 2, 3 and 4). However, as this is a medical delivery operation, it requires the UA to take-off and land as close to hospitals and medical facilities as possible, despite being sensitive noise receptors. In this regard, the TOLPs were chosen at locations with a suitable distance from the medical facilities deemed acceptable by the NHS to minimise noise impact without sacrificing the benefits this operation brings.

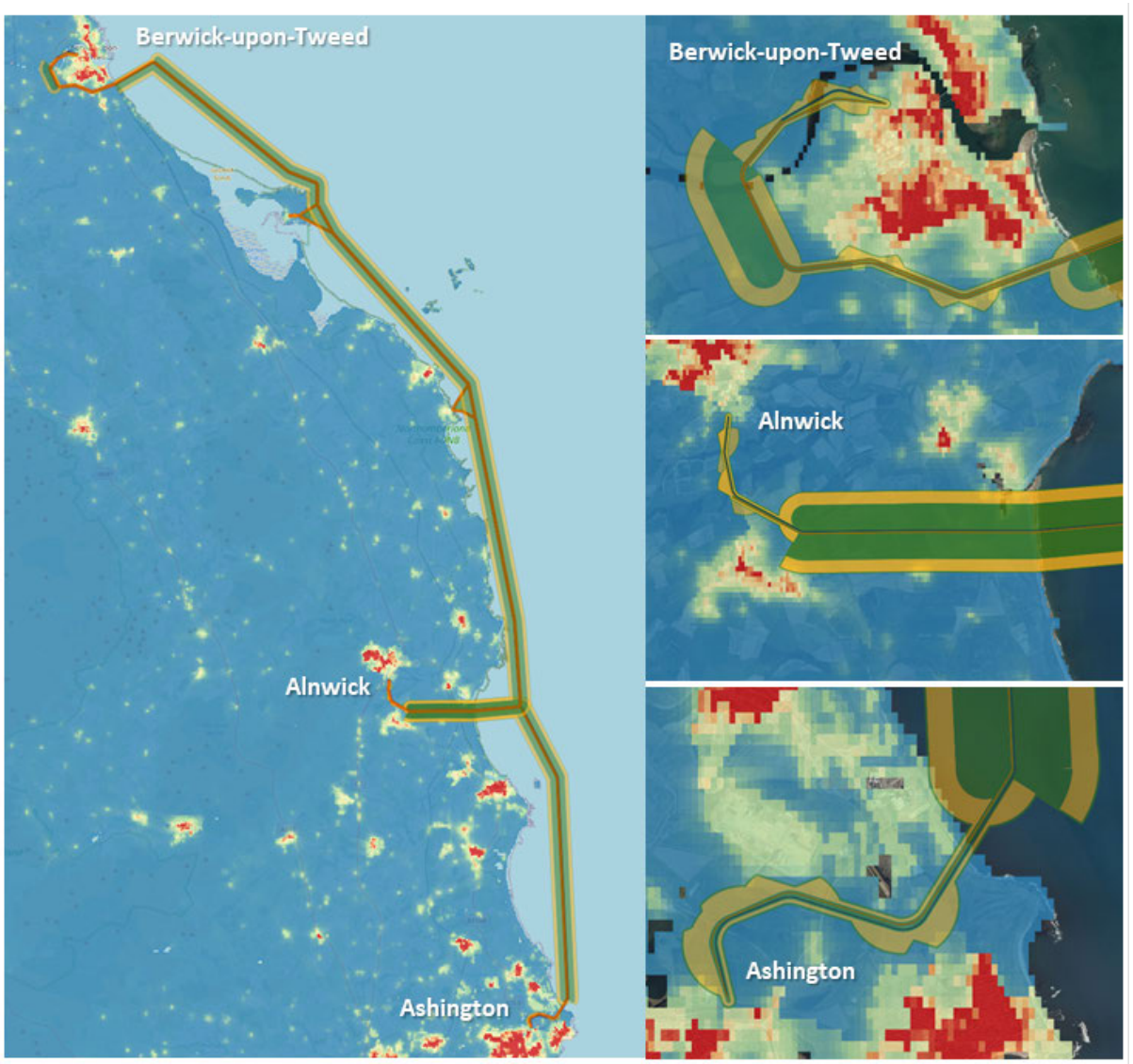

Figure 1 - Population density map with flight routes overlaid
Number of residents per 100m^2: Blue = 0 Green = 1 Yellow = 5 Orange = 10 Red = >15

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Abbreviations & Terminology

ConOps	Concept of Operations
dB	Decibel(s)
TOLP	Take-off and Landing Point
UA	Uncrewed Aircraft
UAS	Uncrewed Air System