

ACP-2020-090

**TDA connecting Cornwall with the Isles of Scilly for
NHS Logistics Cargo UAV**

Letter of Agreement (LoA)



This Letter outlines the terms of agreement between the parties listed below with regard to the Airspace Change proposal ACP-2020-090 and the operation of ULTRA Unmanned Aircraft System (UAS) within the Temporary Danger Area derived from this ACP.

This LoA is complementary to other Agreements and Operational Instructions within the scope of these operations. All relevant documentation will be available at <https://airspacechange.caa.co.uk/PublicProposalArea?pid=321>.

AGREEMENT BETWEEN:

- Windracers Limited,
- Newquay Air Traffic,
- Land's End Airport,
- Perranporth Airport,
- St. Mary's Airport,
- Culdrose RNAS.

SCOPE OF THE AGREEMENT

1. TDA DESIGN PRINCIPLES

The design of the TDA follows a set of principles and requirements identified during the Targeted Stakeholder Engagement:

- Larger portion of the TDA to be located outside the Land's End Transit Corridor (LETC) and Culdrose AIAA.
- Vertical layout of the TDA to start from surface to mitigate risks associated to aircraft flying under the UAS.
- UAS route altitude to be as low as possible, without affecting performance of communication and navigation systems.
- The TDA should be provided with Air Traffic Services (ATS) that allow other airspace users to get information of the activity within the TDA and cross the airspace when possible.
- Activation of the TDA to be done during hours when low levels of aerial activity are anticipated.
- The UAS to be equipped with electronic and visual conspicuity aids.
- Availability of multiple ways of contacting the UAS crew during operation.
- Availability of ways of contacting the TDA Sponsor during the ACP implementation.
- TDA activated via NOTAM at least 24 hours in advance of the activity.

2. TDA DESIGN

The geometry of the TDA consists of a main leg of 75 km length, located outside and parallel to the north boundaries of the Culdrose AIAA and Land's End Transit Corridor. This main leg is connected to St. Mary's ATZ by a 14.5 km NE of the Isles of Scilly and to the mainland by a 5.7 km leg from Perranporth Airfield.

The TDA has been divided into 5 segments that facilitate the provision of traffic services and position reporting and coordination of the UAS operations.

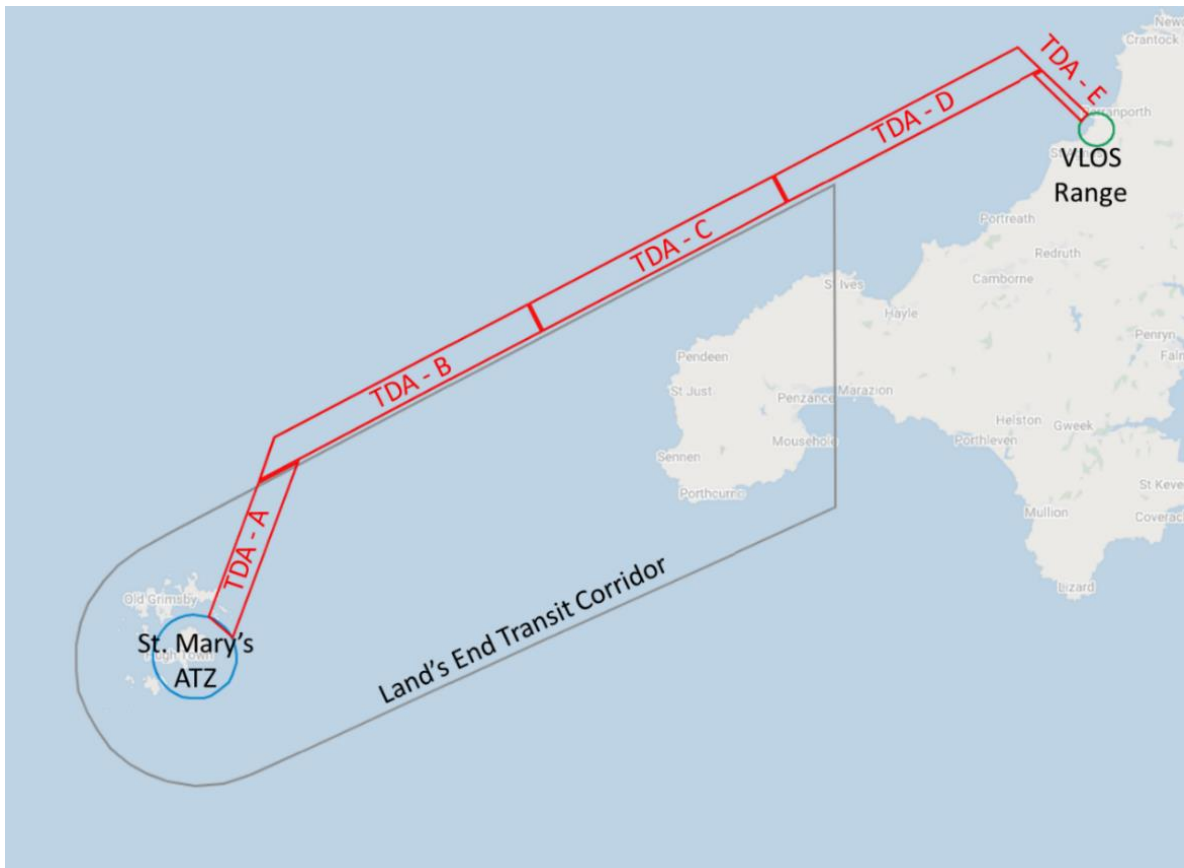


Figure 1 Horizontal layout showing location of TDA segments

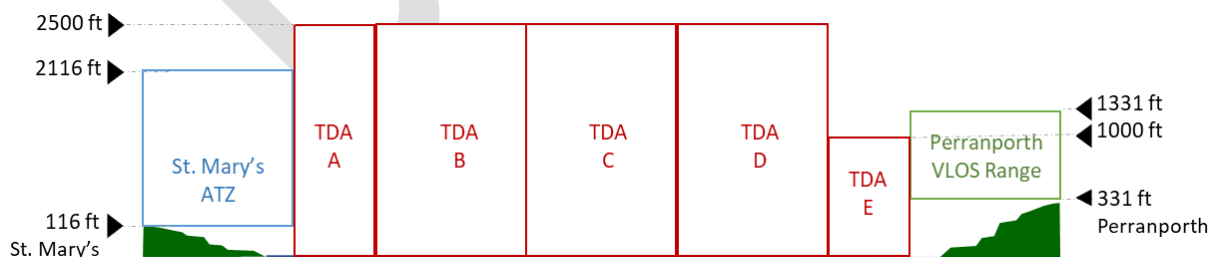


Figure 2 TDA Vertical Design

3. TDA ACTIVITY

The TDA will be published for the activity of 'UAS BVLOS Operations' and will only be used by Windracers to operate ULTRA UAS, provided these operations are within the scope of a current CAA exemption.

Specifications and limitations of ULTRA UAS are included in Sections 9 to 11 of this letter.

4. SCHEDULE

ULTRA UAS operations between Perranporth and St. Mary's will begin on the 12th April 2021 and will take place Monday to Friday for a maximum of 6 weeks.

It is anticipated that the TDA will be activated between 06:00 a.m. and 09:00 a.m. until four UAV return flights have been completed.

After this period, Windracers will request feedback from the Stakeholders listed above and revise the schedule and frequency or adjust operational procedures as necessary. The amended schedule and operational procedures will be agreed on a new LoA.

5. TDA MANAGEMENT

Windracers Limited is the sponsor and manager of ACP-2020-090. Activation and deactivation of the TDA will be requested by Windracers in accordance with the conditions described below:

Windracers will request the activation of the TDA upon coordination with stakeholders. The intention of activating will be informed to the above stakeholders 5 days in advance, if any of the stakeholders have conflicting scheduled flights this should be informed 72 hours before the start of proposed operations.

The TDA will be activated via NOTAM, at least 24 hours in advance of operations. There will be a NOTAM for each day of operation.

Should the UAS complete the return flight at least 40 minutes before the end of the TDA activation, Windracers will request the deactivation of the TDA. Processing times of these requests depend on the CAA's Airspace Regulation Utilisation Operations team.

6. COMMUNICATIONS

During operations, ULTRA UAS crew will establish contact with the Traffic Services listed below in accordance with the CAA Radiotelephony Manual (CAP413).

Westbound

- **Perranporth Radio** from start-up until entering TDA segment E.
- **Newquay DAAIS** from entering Segment E up until 10 NM DME from Land's End or entering Segment B.
- **Scillies APP/TWR** from entering segment B, until engine shutdown.

Eastbound

- **Scillies TWR/APP** from start-up until leaving TDA segment B.
- **Newquay DAAIS** from entering segment C until leaving segment E.
- **Perranporth Radio** from leaving TDA Segment E until engine shutdown. Additionally, the crew will report 10 minutes and 5 minutes before estimated arrival.

If flying during Land’s End Airport operational hours, the UAS crew will contact Land’s End TWR before crossing TDA segment C in both directions. When flying westbound, the crew will call North of St. Ives. When flying Eastbound, the call will be at 10 NM DME from Land’s End.

Additionally, all the above Stakeholders will be provided with a phone contact of each UAV crew.

7. AIR TRAFFIC SERVICES

Provision of Air Traffic Services for the TDA segments will be as shown in the table below:

Table 1 Provision of Air Traffic Services

TDA Segment	Service provided	ATS Unit callsign	Frequency
A	Danger Area Crossing Service (DACS)	Scillies Approach	124.880 MHz
B			
C	Danger Area Activity Information Service (DAAIS)	Newquay DAAIS	127.930 MHz
D			
E			

8. DECONFLICTION

As an operational principle, ULTRA UAS crews will command the UAV to give way to any manned aircraft traffic, by holding within or exiting a specific segment of the TDA as required. Examples in Appendix A.

UAS crews will provide the relevant ATS with position, altitude, intentions, and time estimates as requested by the ATS, when changes to any of them are expected or at least every 15 minutes.

9. ULTRA UAS

ULTRA is a cargo UAS designed to provide a solution to a multitude of operational requirements that involve the transport of critical supplies to isolated areas. The system has been designed and built by the Faculty of Engineering and the Environment at the University of Southampton (UoS) as part of an agreement with Windracers Ltd.



Figure 3 ULTRA UAS taking-off

The aerial segment of the system is a fixed-wing twin-engine aircraft of near 10 m wingspan and 350 kg MTOW. Given the multiple redundancy of critical sub-systems, the UAS is capable of flying safely on one operative engine, after failure of one or more control surfaces or sensors.

The aircraft is equipped with navigation and position lights as well as ADS-B in/out. ULTRA UAS features a triple redundant autopilot architecture with 9 Inertial Measurement Units (IMUs) and 2 GNSS position sensors, each with access to the GPS, GLONASS, Galileo, BeiDou, IRNSS and QZSS position information.

The GNSS unit and Flight Control System are fully independent from the Electronic Conspicuity equipment. Therefore, should GNSS failure occur, accurate position reporting can still be achieved using ADS-B signature.

ULTRA UAS ground segment includes ADSB-in and MLAT capable receivers which provide updated location data to FlightAware.

10. NORMAL OPERATIONS

The UAV route between both aerodromes is to be flown at 2000 ft AMSL except for the climb and descent legs (departure and approaches) flown at ST. Mary's ATZ, the UAV VLOS range at Perranporth and the segment E of the TDA. Transit through this last segment will be flown at 800 ft AMSL.

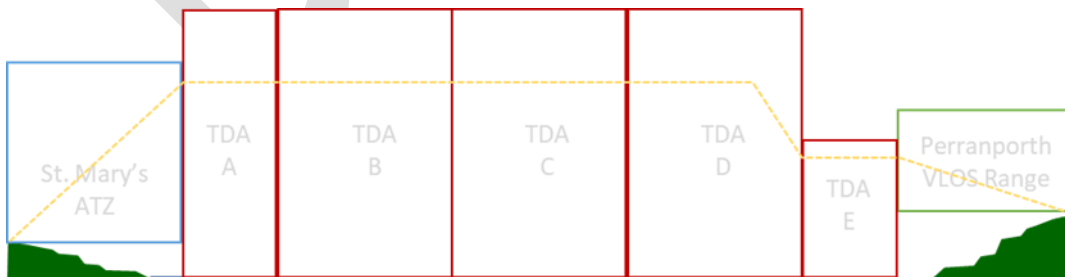


Figure 4 Vertical Mission Profile

ULTRA UAS operations are carried out under two operational rule sets:

- Visual Line-of-Sight (VLOS)
Visual Line of Sight (VLOS) operations are those where the Safety Pilot is able to see the aircraft and the surrounding airspace at all times while it is airborne. This is in order to carry out collision avoidance manoeuvres when needed.

Current CAA VLOS exemption for ULTRA UAS is 1500 m distance from UAS Pilot and 1000 ft AGL.

- Beyond Visual Line-of-Sight (BVLOS)
Beyond Visual Line of Sight (BVLOS) are flight operations where the aircraft is required to fly at a distance or height where it is no longer within the visual detection threshold of the UAS Pilot.

During this mission, ULTRA UAS will be controlled by two teams, one based in Perranporth and the other in St Mary's.

Control hand-over will be done in the vicinity of the boundary between Segments B and C of the TDA. This will depend on RPIC workload and current clearances. This should not affect the handling of traffic from the perspective of the Air Traffic Services. Both UAS crews will be in coordination with each other and the necessary ATSU's throughout the mission.

11. WEATHER LIMITATIONS

ULTRA UAS operations are subject to operational limits due to weather. Operations can only take place if both the starting and destination airports are in VMC at take-off and reduction of visibility is not forecasted. The following limits also apply:

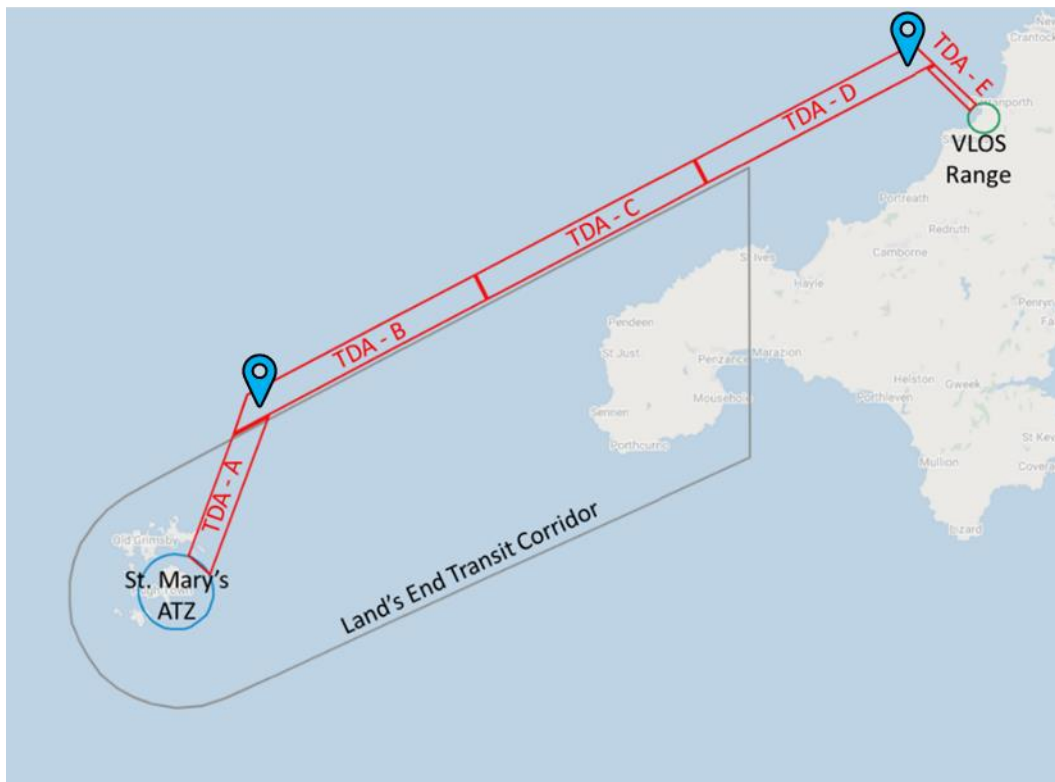
Take-off and landing maximum crosswind component	20 knots
En-route maximum wind speed	40 knots
Maximum precipitation	2.5 mm/hr

These limits will be assessed in accordance with the Windracers Operating Safety Case by the ULTRA UAS crews at both ends using information from METARs, TAFs, VOLMETs and available online weather information.

12. FAILSAFE MECHANISMS

Should a communications failure occur in flight, the UAV will automatically fly to one of the pre-programmed RTL locations. If a communications failure occurred in segments D or E, the aircraft would return the Eastern point in segment D. If the failure occurred in segments A, B or C, the aircraft would return to the western point of segment B.

Upon losing connection to the aircraft, a pan call would be made by the UAS crew in command to the relevant ATS.



13. CONTINGENCY PROCEDURES

ULTRA UAS Emergency procedures (EPs) have been designed to assess the performance of the system after a failure or critical condition has been discovered, resume control of the aircraft, and attempt a recovery in the safest possible manner.

If the situation results in an airport recovery being unsafe, the ULTRA UAS crew will safely control the aircraft descent over water (ditch) at the nearest RTL location after checking for maritime activity using Automatic Identification System (AIS).

14. ADDITIONAL FEATURES

Upon request, Windracers will provide Stakeholders with cloud access to the ULTRA UAS system, which allows real-time monitoring of the UAS, its position, altitude, and current navigation route via internet.

SIGNATURES

By signing this Letter of Agreement, the parties are accepting the operational conditions described above and commit to comply with the provisions of this agreement.

Appendix A

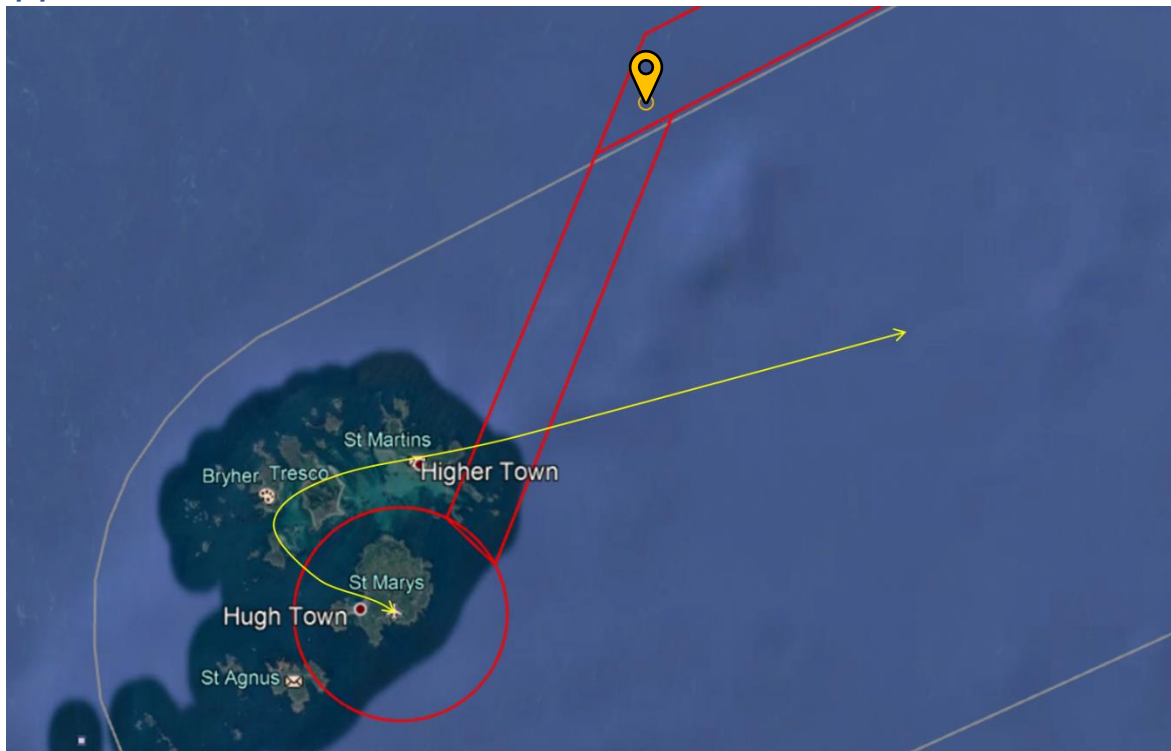


Figure 5 Manned traffic coming to land at St Mary's on RWY 14 or taking off RWY 32. UAS will hold at TDA segment B at 2000ft until manned traffic has landed or outbound 20 nm DME Land's End.

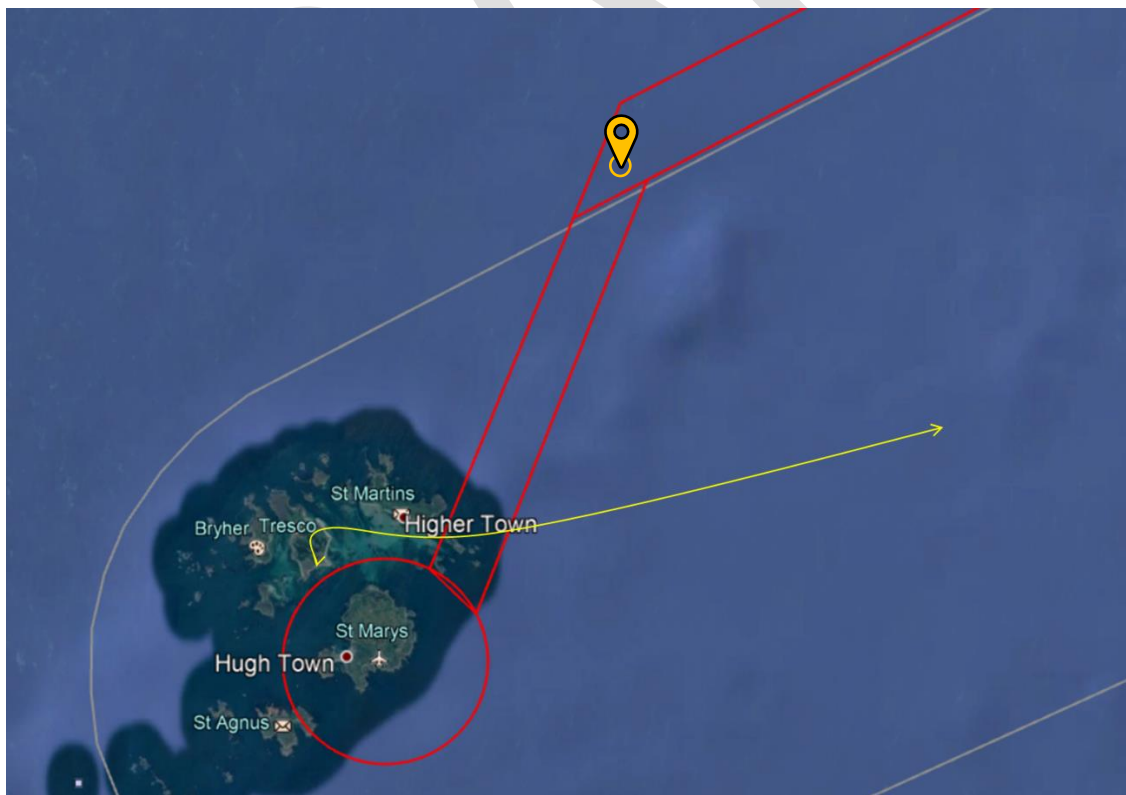


Figure 6 Helicopter arriving or departing Tresco. UAS to hold TDA Segment B at 2000 ft until traffic is landed or 20 nm DME Land's End outbound.

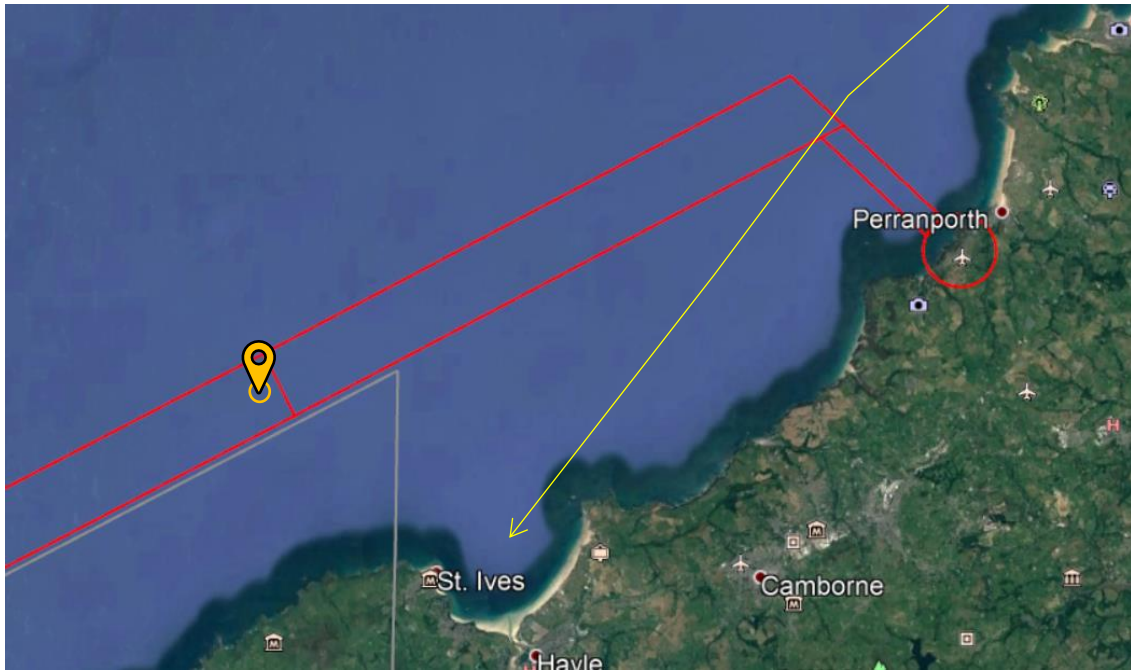


Figure 7 Search and Rescue helicopter leaves Newquay to conduct emergency operations near St. Ives. ULTRA UAS crew to hold in segment C until safe to continue into Perranporth. Newquay DAAIS provides information to both traffics.

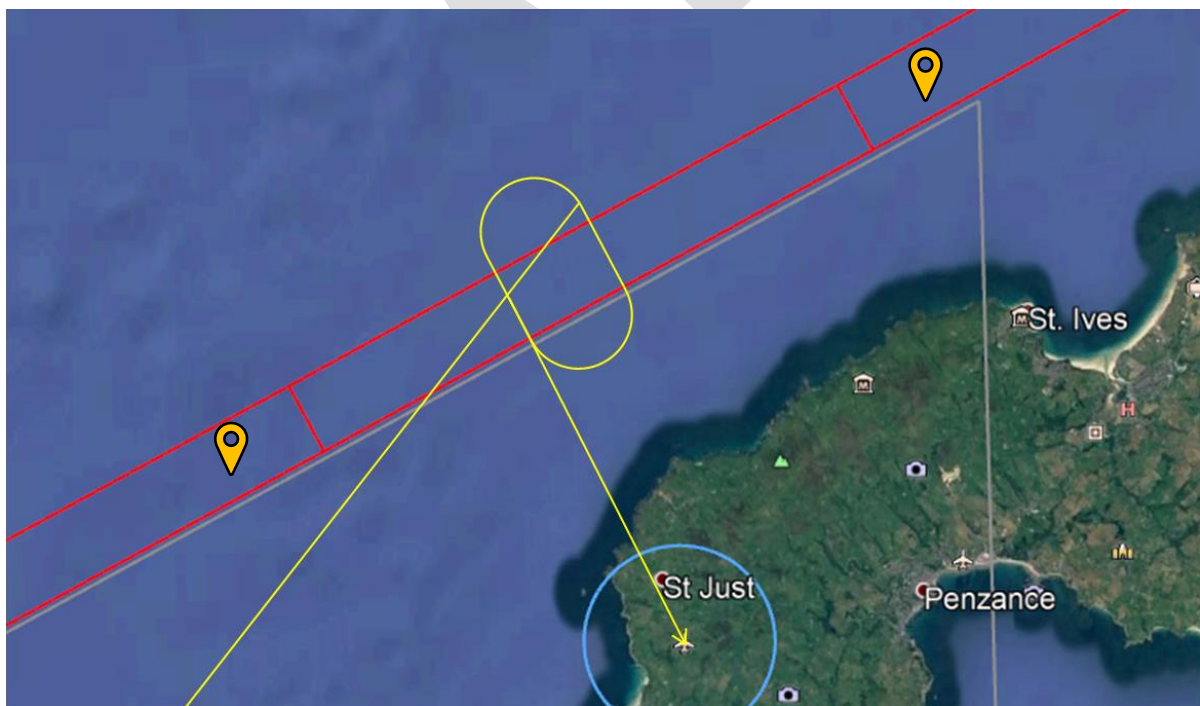


Figure 8 Aircraft landing at Land's End requires instrument approach runway 16, and requires to manoeuvre within TDA segment C. ULTRA UAS crew to hold in segment B or D until safe to continue into segment C.