Snowdonia Aerospace Airspace Change Proposal (Stage 4B), ACP-2019-58 Llanbedr Aerodrome Danger Area(DA)

Annex 7 – Operational diagrams used in the consultation to illustrate and aid understanding of environmental impacts

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1. Operational diagrams used in the consultation to illustrate and aid understanding of environmental impacts

The following diagrams were used in the consultation to illustrate and aid understanding of environmental impacts, particularly in the context of indicative overflight profiles.

Unlike a conventional airport, there are no set flight profiles for the novel aerospace system activities conducted at Llanbedr, so it is highly unlikely that any area will be overflown on a regular basis. Indeed, due to the experimental nature of the activities, SAC work with each of the flight test teams to minimise overflight of buildings and property and the aircraft autopilots typically have in-built geo-fencing boundaries that prevent them from overflying sensitive areas or leaving the Danger Area.

To give stakeholders an indication of the type of flight profile that might be typical for RDT&E activity using the Danger Area, Figure 1 shows the flight plan and aircraft track for one of our recent sorties with the Penguin B drone to explore the potential for aeromedical delivery to a remote location. The green dots denote pre-programmed waypoints (WP) for the autopilot that were defined to allow us to fly different circuits over the airfield and confirm the function on the onboard systems before transitioning out over the coast to perform the mission demonstration. The red line shows the aircraft ADS-B (GPS) track that was overlaid on the Ground Control Station mission plan in real-time with the defibrillator drop performed at WP10. Before conducting this trial activity we gained permission from Gwynedd Council to access the beach, we scheduled the flight for a weekday afternoon when the beach was near-deserted, we made sure that the drone was always more than 50m away from all people and property (as per CAA guidance) and we stationed our own observers on the beach who were equipped with a megaphone, fire extinguisher and first aid kit and who were in continuous ground radio contact with both the drone pilot and the Flight Information Service Officer (FISO) in the Llanbedr Air Traffic Control tower.

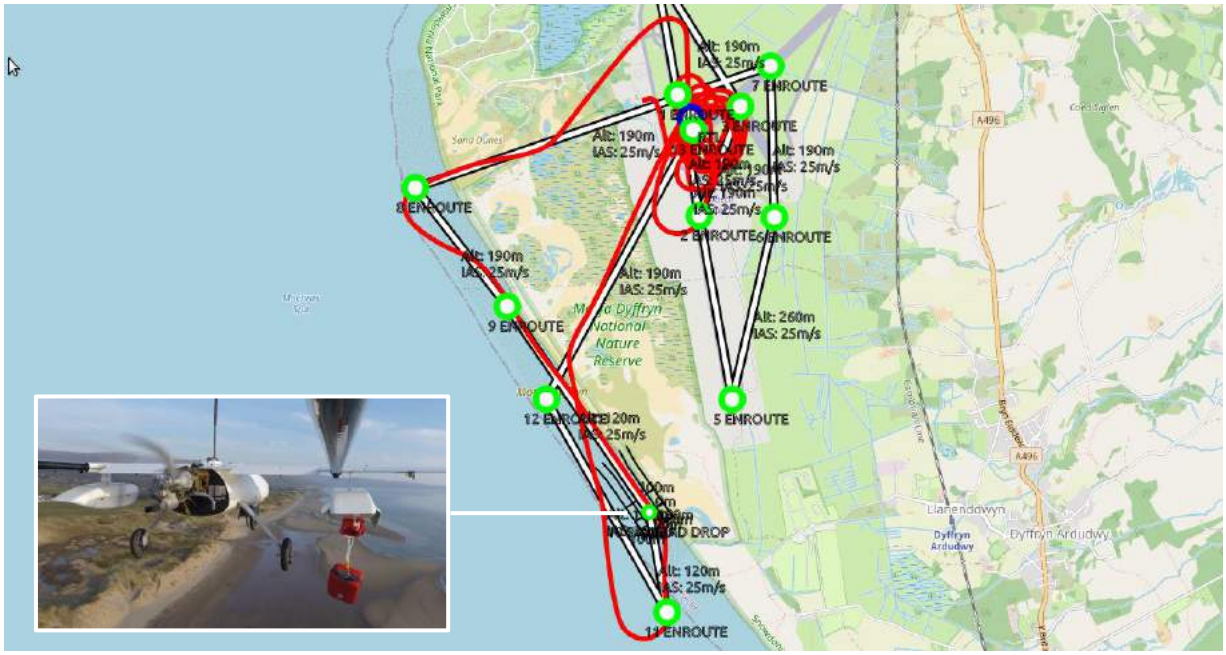

Figure 1 *– Ground Control Station pre-mission plan and overlaid aircraft ADS-B (GPS) track for flight of the Penguin B drone to explore the potential for aeromedical delivery to a remote location*

The drone was only audible (and visible) to the ground observers when it came within a range of 500m (approximately) at an altitude of 100m / 330 ft. With the drone travelling at 25ms^{-1} the "time of exposure" was less than a minute as it completed the loop from WP10 to WP11 before disappearing from sight and sound again near WP12. We also made sure to minimise the flight time over the Site of Special Scientific Interest (SSOI) along the western boundary of the airfield and transitioned over this area at a higher altitude (190m / 625ft) to further reduce the noise profile.

Figure 2 shows a simulation-based flight path visualisation for a more extensive future trial activity with a small jet-powered drone planned for Summer 2021:

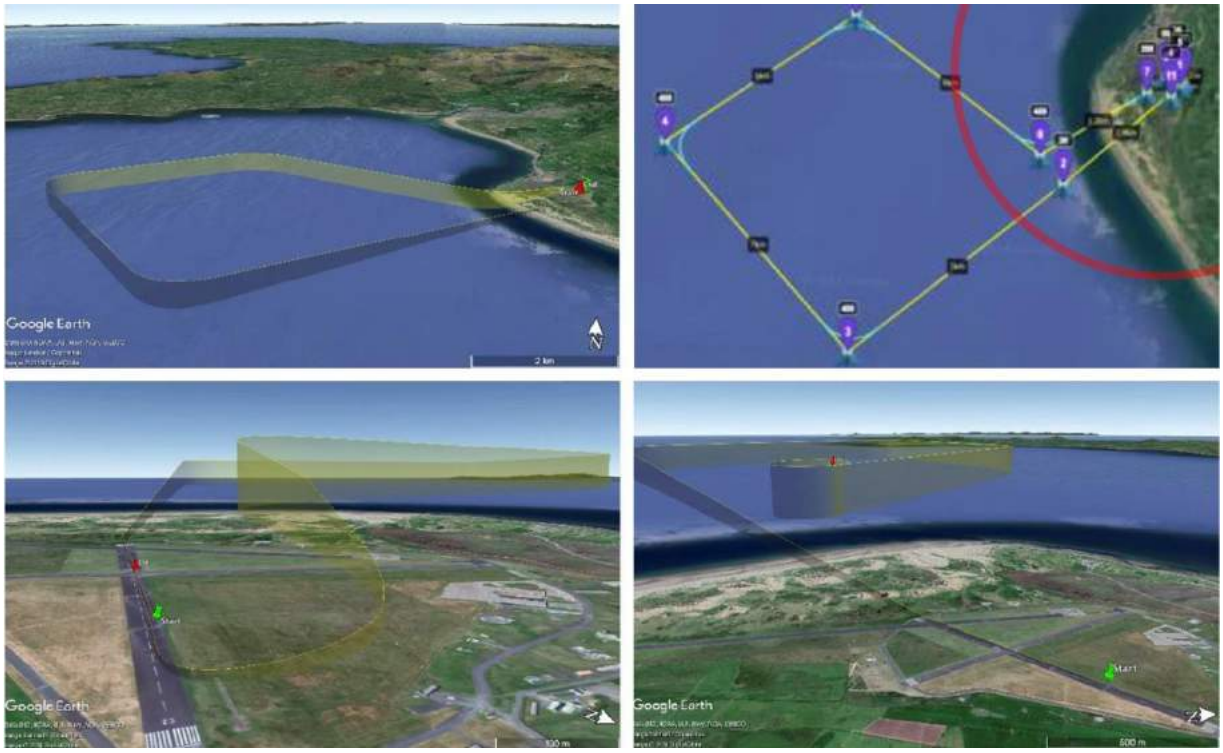

Figure 2 *– simulation-based flight path visualisation for a small jet-powered drone flight test*

Figure 2 again shows a series of pre-programmed waypoints that will be used to define the aircraft flight track, with a simple circuit in the vicinity of the airfield and the mission profile offset out over the sea. In this instance, the total flight time will be 15 minutes and the aircraft track length will be 35km with the clipped red circle (top-right subfigure) representing the boundary of Area A that is a core feature of the airspace design segmentation.

We estimate that approximately 90% of flight trials using the Danger Area will be conducted over the aerodrome or out over the sea in a similar manner to the examples shown in Figures 1 and 2 (or transition down the Area C/D corridor into the larger D201 Cardigan Bay Danger Area). In addition to simple circuits and linear transits, we might also expect to see standard mapping and search profiles as shown in Figure 3. These will typically be of the order of 1km square (although the creeping line mapping profile might be further extended), anchored to a pre-programmed waypoint and flown automatically via the autopilot (under the full supervision of the pilot).

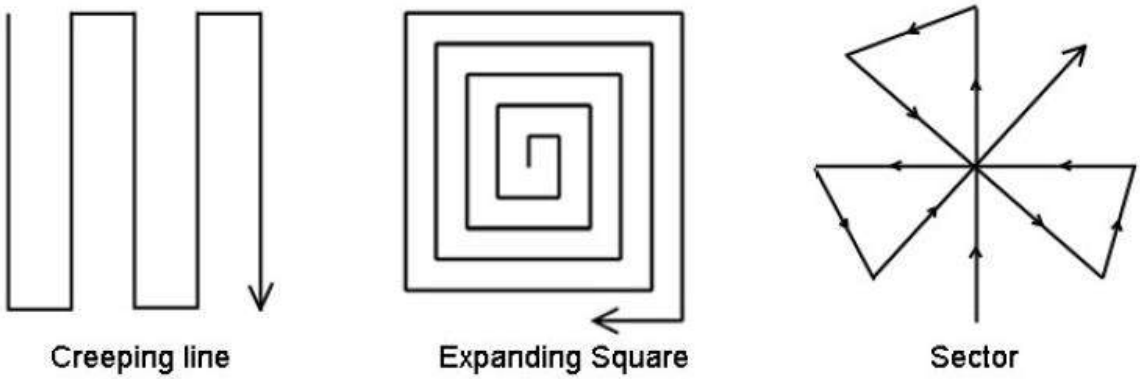

Figure 3 *– example mission profile elements*

In approximately 10% of cases (roughly 12 days per year), we estimate that flight trials will need to be conducted over land (*i.e.* east of the railway line) in order to test specific mission sensors and potential customer applications. These flight profiles will use similar building block elements to those illustrated in Figures 1 to 3, but as discussed previously, the tracks and associated waypoints will be crafted to avoid overflight of buildings, property and any other sensitive areas and will be appropriately geo-fenced. SAC will work with visiting teams to ensure that flight plans respect local sensitivities. In all cases, all flights will also be subject to the CAA granting approval of an Operating Safety Case (OSC).

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