

Windracers SATE 2 Use-Case Survey



Dear Stakeholder,

Windracers is a UAV technology company leading the effort for the use of uncrewed aircraft systems (UAS) to deliver critical cargo to remote areas of the UK. Developed with the University of Southampton, Windracers' aim is to provide robust middle-mile logistics and humanitarian aid operations. The company manufactures, operates, and maintains a multi-aircraft fleet with proven experience in delivering safe, cost-effective assistance to traditionally isolated communities.

Quickly following the maiden flight of Windracers first airframe in 2019, the company took on the challenge of providing support to remote areas throughout the pandemic. In 2020, the Windracers platform was used to deliver medical supplies to St Marys NHS in the Isles of Scilly and to the Isle of Wight after standard supply chains were disrupted. Following on from this, 2021 saw the development of a new and more efficient airframe. This was used to develop flight routes for cargo delivery between mainland UK, the Orkneys, and the Shetland Islands through the SATE project.



Figure 1 Windracers ULTRA

Unmanned Low-cost TRANsport (ULTRA)

The Windracers ULTRA platform was developed in response to the need for a new type of light cargo drone. Since then, the airframe has evolved with a range of up to 1000 km and payload capabilities up to 100 kg with a 700 L volume cargo space. ULTRA has proven ability of short take-off and landing on various airfield surfaces to provide an operational capacity to even the most remote communities.

With the Windracers aim of providing aid including environmental protection, the aircraft itself was designed with environmental impact in mind. The airframe structure is 95% highly sustainable and fully recyclable aluminium. The engines are capable of running on bioethanol and synthetic fuels. The CO₂ output is estimated to be 30% less per kg of payload than that of manned aviation. The automated control system also makes the aircraft highly efficient in flight.

The aircraft's Flight Control System (FCS) was designed and built by Distributed Avionics in tandem with the development of ULTRA. The ethos behind the FCS architecture therefore included the aims set out by Windracers to form a resilient, safe, and reliable platform for UAV delivery. This led to a

unique flight control system built to withstand many subsystem failure modes. The combined success of robust airframe and systems allow ULTRA to operate in conditions that traditional cargo routes such as ships and manned aviation are unable to achieve.

SATE Overview

In 2020, Highlands and Islands Airports Limited lead the organisation of a consortium to create the Sustainable Aviation Test Environment (SATE) in Scotland. The aim of the consortium is to bring together aviation industry specialists in the hopes of achieving low carbon aviation. To achieve this Kirkwall Airport (Orkney) has been set up as the UK's first operationally based, low carbon aviation test centre. This is an ideal base to provide regional flights across the Orkneys as well as mainland Scotland and the Shetland Isles.

The initial phase of Windracers flights involved regional Orkney flights from Kirkwall to Wick, North Ronaldsay, Eday and Fair Isle. To achieve this, Temporary Danger Areas (TDAs) were put in place to perform the flights in segregated airspace. This allows ULTRA to operate autonomously Beyond Visual-Line-of-Site (BVLOS) with minimal disruption to general aviation. Windracers also established a radio relay on Fair Isle, between Kirkwall and the Shetland Islands. The next phase of flights aimed to connect the Orkneys with the Shetland Isles. Similar TDAs were set up between Kirkwall, Tingwall and Unst, the most northerly airfield in the UK. Another radio relay was set-up on the island of Yell, in between Shetland mainland and Unst.

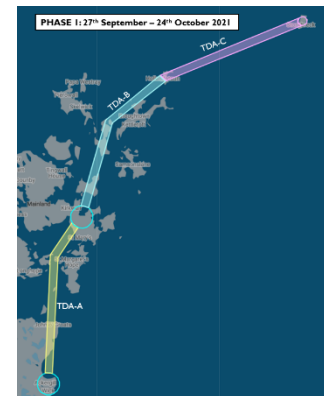


Figure 2 Phase 1 Temporary Danger Areas

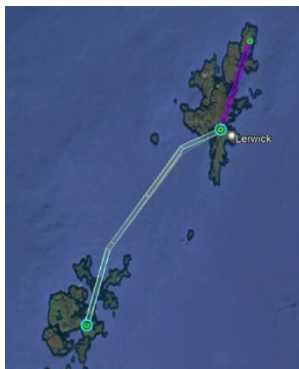


Figure 3 Phase 2 Temporary Danger Areas

Future flights with SATE aim to showcase the application of UAV technology for coastal and island communities. Windracers intend to work with those communities including councils, logistics companies, NHS Scotland and other stakeholders to supplement current supply chains. Going forward the scope of the SATE project will extend to form a network of routes across Scotland. Windracers also intend to fly the first international BVLOS civilian UAS flight between Kirkwall and Bergen in Norway. This will coincide with Norwegian Constitution Day to celebrate and support the connection between the communities.

Why are we contacting you?

To set up a useful and beneficial network across Scotland we are contacting communities and relevant stakeholders to fully understand the needs and requirements of the relevant parties. We have identified several members of the Highlands and Islands communities that might have interest in this network, and we believe you (or the organization you represent) fall into this group. To capture your position and possible requirements on intended operations please fill in the survey that you'll find by clicking [this link](#), scanning the QR code, or email operations@windracers.org.

