

## Virgin Orbit Statement of Need - ACP-2021-031

Virgin Orbit is a launch company headquartered in the United States with presence in the United Kingdom. Virgin Orbit is an air launch system that carries (also called captive carry phase of flight) an orbital rocket under the wing of a Boeing 747 to a site where the rocket (LauncherOne) ignites its engine and navigates to space. LauncherOne is an expendable, two-stage rocket designed to launch small satellites into a variety of Low Earth Orbits (notionally 300 kg to a 500 km sun-synchronous orbit (SSO)). L1 offers a payload fairing capable of accommodating a variety of standards for one or multiple spacecraft and a simple design that increases reliability while keeping launch cost low. Rather than launching from ground level, LauncherOne is carried to an altitude of approximately 35,000 feet by a 747-400 carrier aircraft (tail number N744VG).

LauncherOne drop locations and trajectories will vary based on payload requirements to meet specific orbits. The requested captive carry portion of the mission will start at Spaceport Cornwall with a flight path west over the ocean. The first launch is slated for June 2022 with additional launches anticipated at 1-2 per year up to 12 per year depending on demand.

The first flight from Spaceport Cornwall will be a one-time trajectory and therefore VO is requesting a Temporary ACP. The temporary ACP will address a danger area that is located approximately 135nmi west of Spaceport Cornwall. The area size is approximately 73nmi by 73nmi. Once the 747 arrives in the area, VO is requesting segregated airspace for 1 hour. 30 minutes of this time would account for the launch window and the additional 30 minutes would be allocated to account for fall time of the stage 1 and fairing back to the surface. Virgin Orbit is working to analyze if a 30-minute debris fall time can be scaled back as this is a conservative number.

Once the rocket is dropped from the aircraft and proceeds downrange along the trajectory, a danger area will be required during the initial phase of the flight to account for probability of failure. This area is approximately 310nmi in length by 35nmi in width at the widest point. A separation event will occur off the coast of Portugal downrange from drop. The Stage 1 and Fairing of the rocket will separate from Stage 2 and fall to the ocean. An additional danger area will be located at this point of ocean splashdown.

To summarize Virgin Orbit's request:

1. Virgin Orbit is requesting a safe, efficient, and flexible solution to drop, ignite, and fly the L1 rocket. The reservation will be surface to unlimited from the drop point throughout the downrange danger areas
2. The flight from Spaceport Cornwall to the drop point to be considered as a standard 747 in the current airspace structure
  - a. No additional separation requirements during the captive carry flight
3. Temporary ACP and Temporary Danger Area
4. Allowance of a drop point and flight corridor as described in danger area deliverables
  - a. Drop point area that covers captive carry racetrack: ~73nmi x ~73nmi
  - b. Primary danger area post drop: ~310nmi x ~35nmi
  - c. Stage1/Fairing splashdown danger area: ~230nmi x ~86nmi
5. Allowance for segregated airspace of approximately 1 hour

- a. 30-minute launch window to start once the 747 in captive carry phase arrives in the danger area described in 2(a)
  - b. 30-minute debris fall time to account for both a failed launch and stage 1 fairing splashdown
6. Comply with CAP 1711 - Airspace Modernisation Strategy, respecting
- a. the goal to “deliver greater integration rather than segregation of airspace, to satisfy the requirements of all classes of aircraft including future market entrants (such as drones or spacecraft)”
  - b. the goal to “use the minimum volume of controlled airspace consistent with safe and efficient air traffic operations”

