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Virgin Orbit Rocket Launch – ACP Assessment Meeting

14-July-2021

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Agenda

- Introductions CAA
- Background Virgin Orbit
- Statement of Need (discussion & review) CAA/VO
- Issues or opportunities arising from proposed change Virgin Orbit
- Options to exploit opportunities or address issues identified Virgin Orbit
- Provisional indication of the level and process requirements CAA
- Provisional process timescales CAA/VO
- Next steps CAA/VO

Background

- Virgin Orbit (VO) will be conducting orbital launches originating from Cornwall Airport Newquay (also known as Spaceport Cornwall)
- Virgin Orbit is a horizontal launch company that utilizes a 747-400 aircraft to transport a rocket from a space port to a drop site located over the ocean where rocket ignition occurs
 - VO uses the LauncherOne (L1) Rocket to provide Low Earth Orbit (LEO) deployment service for small satellites
 - L1 is designed with a total payload capacity of 300 kilograms (kg) for Sun-Synchronous Orbit (SSO) and 500 kg for equatorial orbit. Subsequent versions of L1 will have increased capacity and range.
- VO's proposed drop site is directly west of Spaceport Cornwall
- The ACP will address the 747 racetrack at rocket drop as well as rocket flight



Statement of Need

- Virgin Orbit is requesting a safe, efficient, and flexible solution to transit, drop, ignition, and flight of the L1 rocket
 - Requesting a temporary ACP
 - Requesting consideration for current airspace structure for 747/L1 to the drop location
 - A flexible solution that will allow a launch trajectory within the controlled airspace
 - Segregated airspace to unlimited, of a (racetrack) corridor in length wide for a maximum period of 1 hour
 - ▶ Segregated airspace would begin once 747 is in racetrack
 - Comply with CAP 1711 - Airspace Modernisation Strategy, respecting
 - ▶ 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)”
 - ▶ the goal to “use the minimum volume of controlled airspace consistent with safe and efficient air traffic operations”.

Options


- Danger areas for a southern trajectory would be in effect for a minimum of 1 hour ([REDACTED])
 - Southern trajectory is likely a 1 time flight in order to meet customer timeline
 - Aircraft danger area extends from drop to [REDACTED] downrange (working to reduce further)
- Areas can be released quickly after drop and rocket flight

Nominal Trajectory for First UK Flight



Potential Future Flight Trajectory



 Danger Areas

Impacts to Safety, Operational, Technical, Environmental or Economic Factors

- L1 is loaded with RP-1 and Liquid Oxygen which presents a hazard
 - Debris from a failed rocket could impact aircraft that are within the danger area
 - Virgin Orbit has completed significant risk and hazard reduction by means of fault tolerant designs, qualification testing, an autonomous flight safety system, and creation of danger areas
- Operational impacts to aircraft would take place on the day of launch, requiring rerouting around danger areas for a short period of time
- Environmental impacts are low and addressed in the Assessment of Environmental Effects (AEE)
- Economic impacts may be incurred due to aircraft rerouting

Issues or Opportunities Arising from Proposed Change

- Issues

- Airspace corridors may be affected by the establishment of a danger area around the drop site and rocket flight
- Range coordination is required to successfully communicate danger area between VO/CAA/NATS
- Approval of captive carry flight as a standard 747 aircraft

- Opportunities

- Pathfinder to determine best practices for horizontal rocket launches
- Enable use of Spaceport Cornwall as a horizontal launch space port

Options to Exploit Opportunities or Address Issues Identified

- Exploit Opportunities

- Provide UK with sustainable access to space
- Use existing danger areas to reduce need to redirect air traffic
- Exploit VO's previous knowledge and experience in the US to address potential UK issues
- Facilitate opportunities for STEM programs in the UK and neighboring countries
- Creating economic opportunities for the Spaceport Cornwall area
 - VO has contracted the production of Ground Support Equipment to UK manufacturers

- Addressing Issues

- Create LOAs with airspace managers, MOD, and Coastguard
- Limit danger zone activation periods
- Utilize current procedures to address danger zones (coordination, notifications, launch day events)

Timeline

- Pathfinder mission from Spaceport Cornwall is slated for June 2022

Stage	Description	Date	Weeks
Stage 1A	Assessment Meeting	14-Jul-21	0
Stage 1B	Design Principles	8-Sep-21	8
Stage 2	Develop and Assess	27-Oct-21	7
Stage 3	Consult Gateway	29-Dec-21	9
Stage 4	Update and Submit	23-Feb-22	8
Stage 5	Decide	27-Apr-22	9
Stage 6	Implement	18-May-22	3
AIRAC	Target	19-May-22	

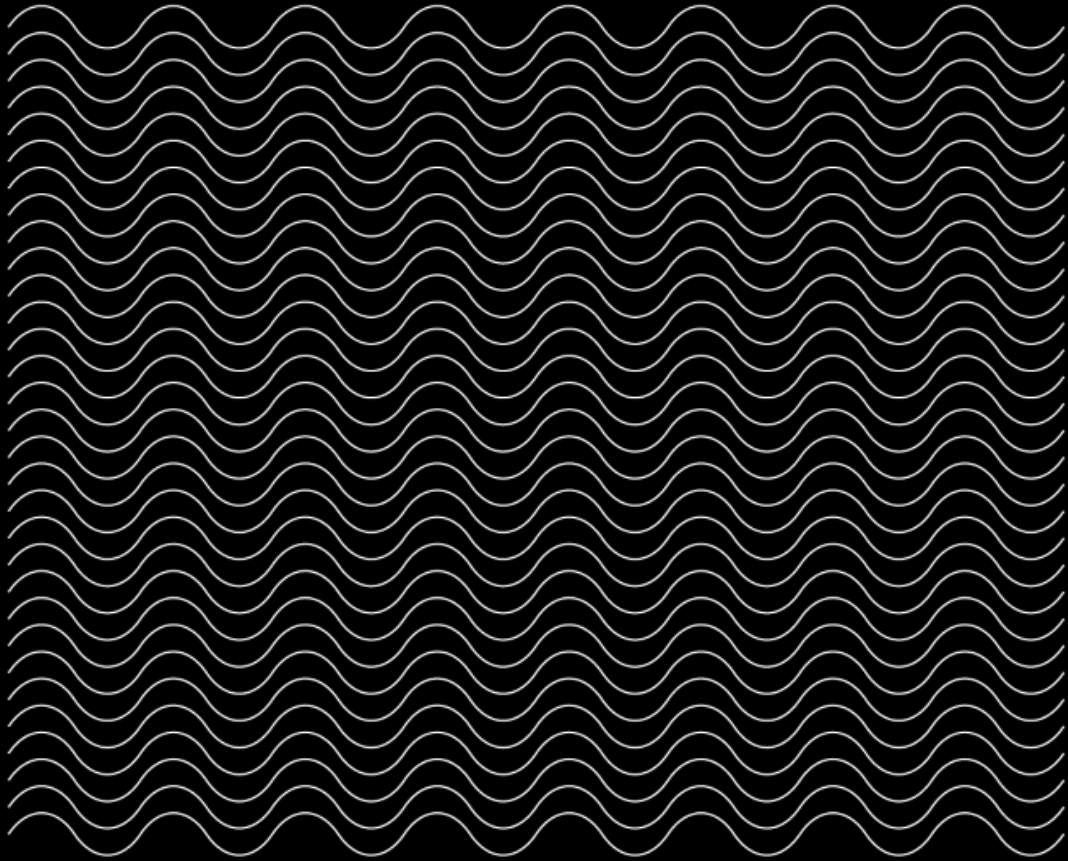
- Shortened timeline due to limited use of airspace, no changes to 747 flight, and maturity of system
- Dates may change as work is underway
- Further launches will follow starting at a rate of 1-2 launches per year

Next Steps

- Coordination of Letters of Agreement
 - Workout timelines, notifications, development of danger areas
- UK License and Range application process in parallel with ACP
 - Cross references between the two processes
- Finalize options of launch drop site and produce danger areas for rocket flight
- Understand Range requirements for surveillance of danger areas



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