

**Attachment 12 (Special Circumstances)** to Application for Certificate of Authorization (COA)  
Reference COA Draft #2608 for the U.S. Army Aeroflightdynamics Directorate RMAX  
Unmanned Aircraft System at Moffett Field, CA

**1. Summary.** The U.S. Army Aeroflightdynamics Directorate (AFDD) Autonomous Research Project (ARP) operates two Yamaha RMAX remotely controlled helicopters that have been modified with the necessary avionics for autonomous flight. The ARP has been operating the two RMAX helicopters and conducting autonomous flight research at Moffett Federal Airfield since 2001. Three prior COAs have been issued for this operation. Research topics for the ARP include mission planning, autonomous landing, and obstacle field navigation. The results of this research have been published at numerous technical conferences and in technical journals. A previous UAS COA, 2008-WSA-12, which expired on 10 August 2009, was issued to NASA, but the oversight of the ARP has changed to AFDD and the RMAX aircraft are currently operating under COA 2009-WSA-91 for Moffett Field. Under the NASA COA, RMAX research flights were conducted at the Moffett Field Disaster Assistance Rescue Training (DART) site which is located within the Moffett Class D control zone (Figure 1). The current COA restricts RMAX operations within 500 ft of power lines which has prevented continued use of the DART. While within the DART site the RMAX would be operated in day, VFR conditions within the Class D airspace at a frequency of 10-12 flights annually.

**2. Waiver Request.** AFDD requests a waiver to be included in the COA addressed in this application to be able to resume flight testing in the Moffett Field DART site (Figure 2). Use of this site is critical to the advancement of autonomous obstacle field navigation and safe landing site determination research for helicopter UAVs. The power lines surrounding the DART site (Figure 3) would come within 200 ft of flight operations.

**3. Risk Mitigation Measures.** The RMAX aircraft would be operated within the boundaries of the DART site at groundspeeds below 40 knots and altitudes less than 200 ft AGL. AFDD uses a system operator who can remotely control the aircraft to override autonomous flight. Additionally a safety observer is present, and both he and the system operator will remain within sight of the RMAX at all times during flight operations and would be positioned between the RMAX and the power lines. The RMAX aircraft would be operated within the boundaries of the DART site at groundspeeds below 40 knots and altitudes less than 200 ft AGL. The RMAX will not be air taxied to the DART site; it would instead be transported by ground vehicle. AFDD will also coordinate with NASA to ensure the buildings are not occupied during RMAX flight operations at the DART site.

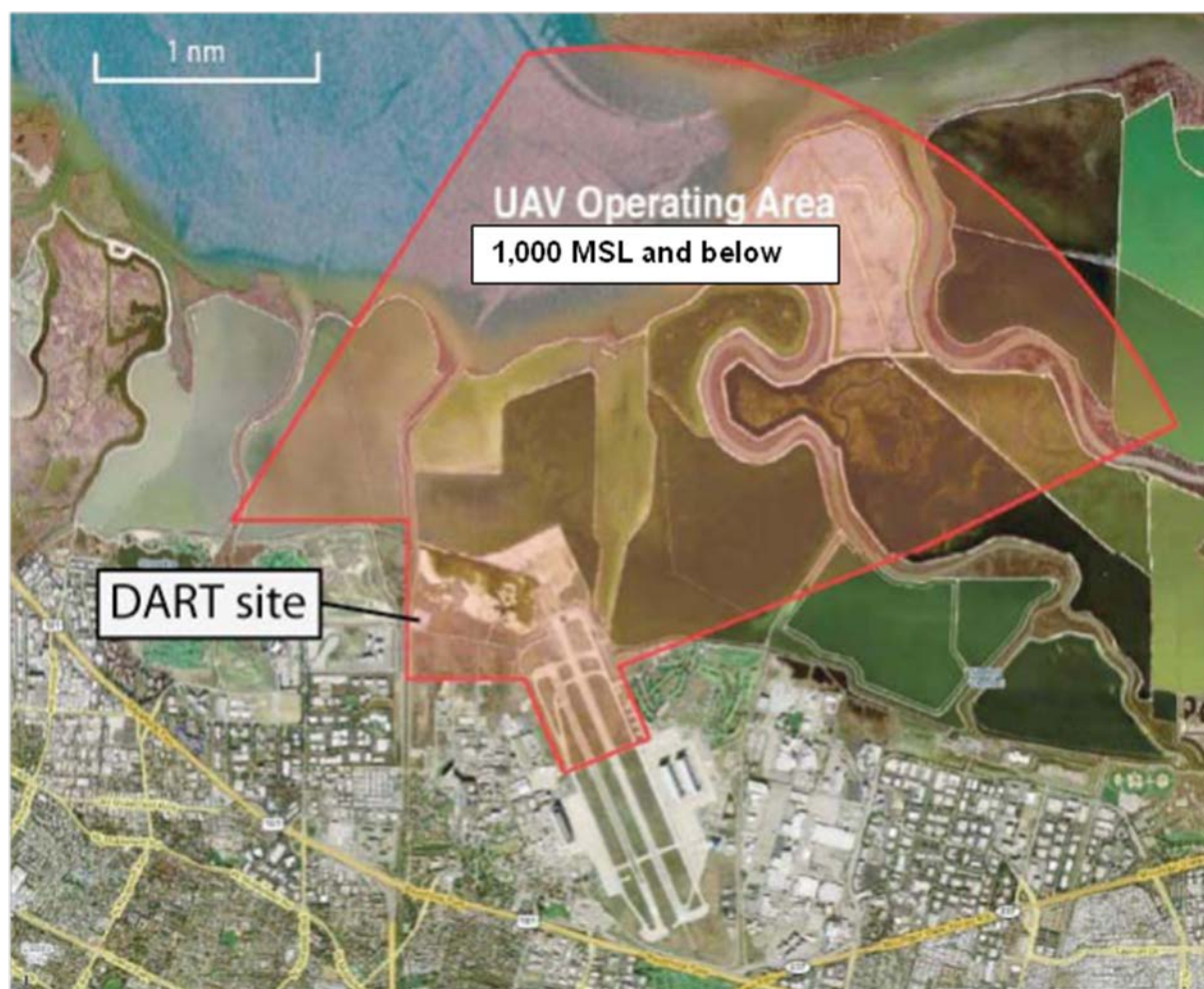


Figure 1. RMAX Operating Area within Moffett Class D Airspace



Figure 2. Disaster Assistance Rescue Training (DART) Site on Moffett Field.





Figure 3. Wire Location and Proximity to DART Site.