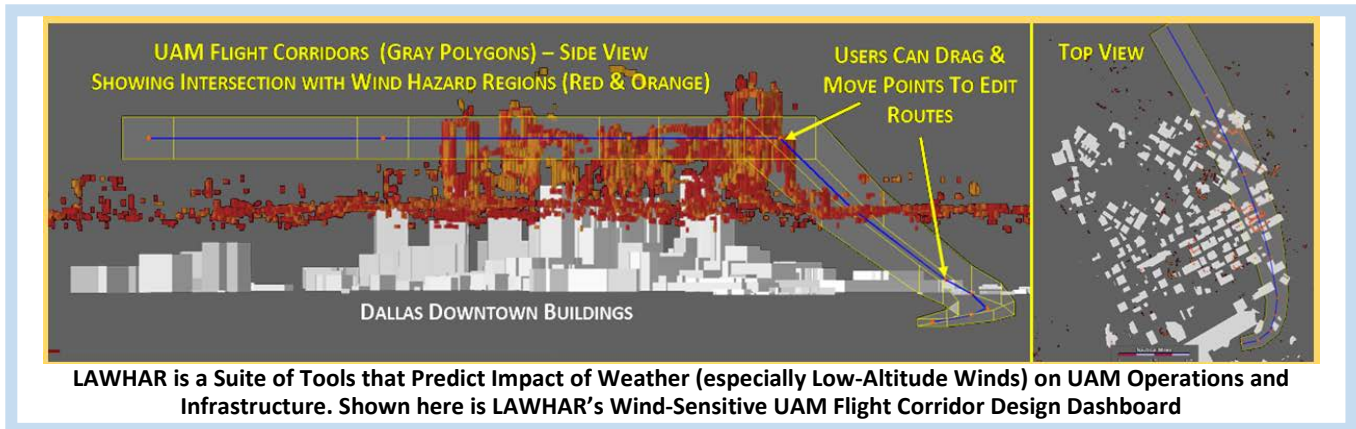


LAWHAR: A CLOUD-BASED TOOL SUITE PROVIDING GUIDANCE ON LOW-ALTITUDE WEATHER IMPACTS ON UAM, UAS, AND HELICOPTER/GENERAL AVIATION OPERATIONS AND INFRASTRUCTURE

Current operational weather guidance does not provide the spatial and temporal granularity necessary to support key decisions related to Urban Air Mobility (UAM), Unmanned Aerial Systems (UAS), and Helicopter/General Aviation (GA) operations and infrastructure. Examples of the key decisions affected by this limited guidance include **Vertiport Siting**, **UAM/UAS Flight Corridor Design**, **Wind-Sensitive Dynamic Flight Routing**, and **Wind Hazard Alerting**. Turbulence and eddy effects created by winds flowing through urban canyons (e.g., vortices shedding off of buildings surrounding a Vertiport) cannot be predicted with current weather guidance. This gap threatens the economic viability and scalability of UAM/UAS/Helicopter/GA operations.



ATAC's suite of fine-scale, low-altitude urban airspace wind prediction and wind-impact translation tools, called the Low Altitude Wind Hazard Alerting and Rerouting (**LAWHAR**) service, leverages state-of-the-art Graphical Processing Unit (GPU)-accelerated **Large Eddy Simulation (LES)** models to predict building-induced wind effects in urban canopies at fine resolutions. LAWHAR translates these fine-scale wind effects into UAM operational impacts by applying innovative, computationally efficient **data-mining-based clustering** to LES outputs for predicting dynamic wind-hazard regions.

Key Features of LAWHAR are:

- A cloud-based platform consisting of a suite of tools that predict fine-scale low-altitude wind impacts on UAM operations and infrastructure
- Leverages state-of-the-art Graphical Processing Unit (GPU)-accelerated **Large Eddy Simulation (LES)** models to predict fine-scale wind effects in urban canopies
- Key LAWHAR use-cases include:
 - **Vertiport Siting Decision Support:** Annualized quantification of severity and location of hazards induced by fine-scale wind effects in key airspace regions surrounding Vertiports. Crucial guidance in determining the viability of a Vertiport site as a safe landing and takeoff zone in the presence of predicted wind effects.
 - **Wind-Sensitive UAM Flight Corridor Design:** Provides ability to “edit” existing UAM Flight Corridors so that the corridors will not overlap with airspace regions that display frequent hazardous fine-scale wind effects.
 - **Wind Hazard Alerting Tailored to Specific Aircraft Types:** Prediction and alerting of hazardous fine-scale wind effects tailored to specific UAM aircraft types based on their susceptibility to wind disturbances.
 - **Wind-Sensitive Dynamic UAM Flight Routing Guidance:** Wind-impact-sensitive time-based scheduling to allocate wind-hazard-safe routes in and out of Vertiports to scheduled UAM aircraft operations.

