

Modal

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Land Use Analysis on Vertiports Based on a Case Study of the San Francisco Bay Area

Complete an extensive literature review in land use study of vertiport planning, carry out a case study based on San Francisco bay area, and then make recommendations on both general land use policies for the vertiport planning and template for the land use studies in other regions in California.

WHAT IS THE NEED?

The concept of Advanced Air Mobility (AAM) involves enabling emerging aviation markets and operations for different types of aircrafts including fixed-wing aircraft, helicopter, e VTOL (Electrical Vertical Take-Off and Landing vehicles), and all kinds of drones or UA Vs. FAA which defines three different operating environments for different aircraft operations in the National Airspace System: UTM (Unmanned Aircraft System Traffic Management), UAM (Urban Air mobility), and ATM (Air Traffic Management). Based on the Concept of Operations defined in UAM Con Ops 1.0, UAM operations will be within the defined UAM Corridors between the vertiports at the origin and the destination; Providers of Services for UAM (PSUs) will be used by UAM operators for exchanging information; traffic management for UAM will be based on the FAA-approved Community Based Rules (CBRs); and tactical separations within UAM will not be provided by FAA, but will be allocated to UAM operators, Pilots in Command (PICs), and PSUs.

Operations of UAM corridors are complicated both in the airspace and on the ground. The airspace capacity has been already a bottleneck due to the operations of regular aircraft in the ATM environment. The design of the network of UAM corridors needs to take into consideration of the interactions between UAM operations and A TM and UTM operations, especially in the airport space, so that the capacity and efficiency of all the operations in the airspace could be maximized without sacrificing the safety.



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California's transportation system

On the other hand, the location and design of vertiports on the ground at the origin and destination of the UAM corridors play a very important role in the operations of UAM vehicles, or eVTOL, in the future. Also, operations of vertiports need to be integrated into a comprehensive multi-modal transportation system on the ground, including highways, city streets, transit, rail, and shared transportation service such as Uber. Therefore, the local and state governments, who are in charge.

WHAT ARE WE DOING?

The Researchers will collect and analyze scholarly literature, news sources, and expert presentations on vertiport and AAM corridor modelling research to date. This will include understanding current FAA recommendations, analyzing municipal codes for appropriate zoning categories, and exploring public entitlement review processes in context of compatibility, safety, and equity.

Additionally, tools and guidance already developed will be analyzed for applicability on this project. The literature review will result in generation of content that can be submitted into a review article or industry white paper addressing vertiports for passengers versus those designed for unmanned aircraft at urban, suburban, and rural scales. A review of emerging equity study methodologies will be included as well.

Location analysis is needed to develop equitable and safe vertiport land use policies. Geographic Information Systems (GIS) is a technology for aiding in site suitability. A subset of counties within the nine county Bay Area limits will be identified for the purpose of this study. Development of a repeatable workflow can identify potential parcels in local governments in the San Francisco Bay Area region. In working with public agency staff, a new geoprocessing model can be devised to map

natural feature proximity (distance to open water bodies and conservation areas) with LiDAR or point clouds of the built environment (3D renderings of multistory building, schools, outdoor venues, and existing airports/heliports), then spatially join appropriate zoning classifications for public and privately-owned parcels.

This output can be networked to a safe and efficient 2D transportation route map in GIS and weigh locations to distribution centers, highway access, rail lines, and ports. The composite map outcome should be layered with 2020 census population and socioeconomic data to address equitable placements in urban and suburban environments. Socio-economic data will include local sources (cities, counties and Metropolitan Transportation Commission) and include anticipated land use changes or other densification elements.

Once a process for identifying site suitability is standardized, then a review of land use recommendations can be assessed - such as the need for vertiport overlay zones or aviation easements. Particularly, our land use analysis of vertiports based on the case study in the bay area, will include, but not limited to: Equity analysis, Public safety, General plan and regulatory zoning land use analysis, and Airspace corridor modelling will be explored as part of the GIS modelling.

WHAT IS OUR GOAL?

The goal is to carry out a case study based on San Francisco bay area, and then make recommendations on both general land use policies for the vertiport planning and template for the land use studies in other regions in California.

WHAT IS THE BENEFIT?

This research will focus on the land use study of vertiport planning. Vertiports are an emerging and special land use category. It will require available land with safe clearance, political support, equitable community acceptance, and compatible zoning. California general plans and zoning ordinances have yet to adopt vertiport use classifications due to limited existing data. Therefore, this research will first complete an extensive literature review in this field, carry out a case study based on San Francisco bay area, and then make recommendations on both general land use policies for the vertiport planning and template for the land use studies in other regions in California. The methodology will be used as a template to carry out future vertiport land use studies in other regions.

WHAT IS THE PROGRESS TO DATE?

Progress April 1, 2022 – June 30, 2022

1. The Researchers worked on and revising the draft of the literature review paper for vertiport safety, access and equity.
2. Kerry attended the writing workshop for two days in DC, organized by the Journal of Planning Education and Research, and received important feedback for our literature review paper.
3. The Researchers worked on the GIS modeling for the bay area.
4. The Researchers received the feedback from Caltrans on the selected parameters for GIS modeling.
5. R The Researchers received the official approval for our proposal to hold a panel discussion on UAM in the APA California 2022 conference, October 1-4, 2022.
6. A research briefing meeting with the city of San Jose was held on June 1, 2022.