

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

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Introduction

Vertiports, areas that support the take-off and landing of electric vertical take-off and landing (eVTOL) aircraft, require more research in the emerging commercial air taxi sector known as Advanced Air Mobility (AAM). The goals of this study are to establish a framework for the systematic approach to vertiport site selection and to provide recommendations for how a region might plan their AAM network, regulations, or best practices. The approach established by this framework would ensure general consistency in AAM land-use planning for a region while remaining flexible enough to allow for other considerations that may differ between regions such as local zoning or state regulations. This research is the result of a year-long regional GIS case study analyzing vertiport site suitability across five counties in the San Francisco Bay Area. This study developed a list of prioritized landside variables to be used in GIS

to identify safe, accessible, and equitable vertiport locations in our urban, suburban, and exurban places.

Study Methods

This study incorporated multiple qualitative methods, including a literature review, participation in AAM working groups and a focus group, conducting a GIS suitability analysis, and guidance from key informants. For the suitability analysis, parameters were separated into three categories—safety, access, and equity—for vertiport site placement in the Bay Area. These parameters were identified through literature reviews and discussions with key industry and agency stakeholders. The parameters were then assigned to a priority level of high, medium, or low, which varied depending on the geographic form at that place (urban, suburban, or exurban). In a real world setting of site selection, suitability can be determined based

on four evaluation outcomes. A site which meets all nine factors in the matrix, i.e., all parameter categories at all priority levels, can be considered a "Pass" and is highly suitable. One that meets the criteria in high and medium priorities, but not low priority, can be one that is "Highly Considered." A site that only meets the criteria in high priorities is further downgraded to "Considered," and a site that does not meet high priority criteria, regardless of the other parameters it may fit, is considered a "Fail" in the suitability analysis. Using geospatial analysis tools, subject parcels that met assigned criteria were identified and summated to determine suitable locations for vertiports.

Findings

The compact urban form of San Francisco contains higher population densities and, as a result, has a higher output of suitable parcels, at 1392, meeting the priority features. On the other hand, San Jose in its suburban form contains only 43 resultant parcels that meet high priority standards. This is reduced even more in Livermore in its exurban form, where just three parcels meet high priority standards for the three parameters (safety, access, and equity). Additional parcels meet standards for medium priorities with conditions that could be developed through zoning, economic development, and capital improvements, which would boost more sites into highly suitable conditions. This study resulted in the creation of a list of variables to consider in the integration of advanced air mobility vertiports in communities. Researchers provided links to ample freely available and reputable data sources on the internet to aid in the geographic information systems analysis of safety, access, and equity locational parameters. The GIS workflow created is purposefully simple so that it can be replicated by anyone wanting to participate and engage in an informed planning discussion about where vertiports belong.

Policy/Practice Recommendations

In general, the number of suitable sites for vertiport placements increases with compact urban form and population density. Therefore, the research recommends:

- Including participatory GIS to future AAM stakeholder workshops and public meetings with 3D visualizations and auralizations.
- Incorporating vertiports in Transit Oriented Development (TOD) development plans and policies.
- Using GIS to model site suitability when preparing the Transportation and Land Use sections of comprehensive plans.
- Adding vertiport as a new land use category in land development codes and zoning ordinances.
- Prioritizing locations needing intermodality such as hospitals and transit stations.
- Valuing proximity to safe pedestrian and bicycle routes, and micromodal options.
- Understanding that suitability varies by community and that preferences change.

GIS can identify parcels that are safe, accessible, and equitable, for future vertiport development in our urban, suburban, and exurban places.

About the Authors

This research project was led by an interdisciplinary collaboration between Dr. Wenbin Wei in the Department of Aviation and Technology and Dr. Kerry Rohrmeier, AICP, in the Department of Urban & Regional Planning, both at San Jose State University (SJSU). This report was written with assistance from Tiffany Martinez, Michael Winans, and Heungseok Park, who were all student research assistants from San Jose State University (SJSU).

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2122



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