

# Consultation Response Document: Vertiport Design Proposal for Existing Aerodromes

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## We Asked

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The UK Civil Aviation Authority (CAA) initiated a consultation for existing aerodromes desiring to accommodate VTOL (Vertical Take-off and Landing) aircraft with the expectation that the first “eVTOL” flights would use existing infrastructure. This consultation was aimed at existing aerodromes intending to include a “vertiport” for commercial VTOL aircraft operations, where vertiports or areas for VTOL aircraft operations will deviate from traditional aerodromes. The information gathered from the consultation is also being used to inform future vertiport regulation more generally, although further consultation will take place as appropriate into specific issues not covered by this consultation.

The design proposal catered to VTOL aircraft operating under day and night Visual Flight Rule (VFR) operations, but not for Instrument Flight Rules (IFR) and operations under Instrument Meteorological Conditions (IMC). The outcome of the consultation will help us to develop any additional requirements necessary for existing aerodromes wishing to establish VTOL aircraft operations. These requirements include the physical characteristics of the operating environment, such as the design of operating areas, obstacle limitation surfaces, and visual aids, as well as rescue and firefighting services.

Due to a lack of validated VTOL aircraft performance and design data, the CAA acknowledged that our policy proposals may change as more information became available. The expectation is that vertiport design specifications will evolve into a performance-based standard, potentially altering the dimensions specified in the document as the flight characteristics of VTOL aircraft become more apparent.

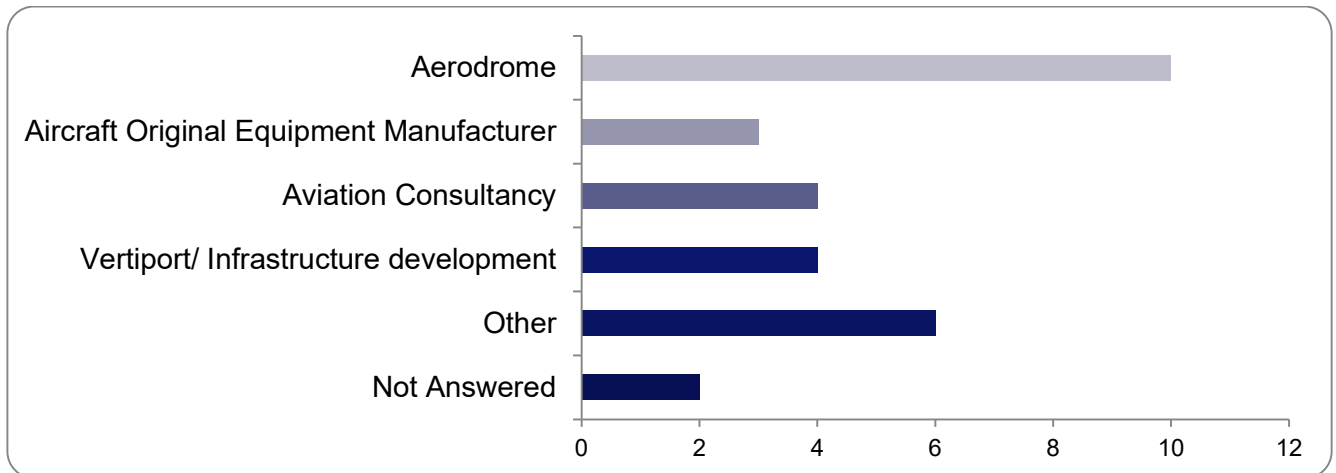
The design proposals from the consultation were also intended to form the initial foundation for bespoke vertiport design, with further details to be established once VTOL aircraft manufacturers and operators provide more data.

Simultaneously, the CAA is considering the conditions under which unlicensed aerodromes wanting to establish commercial VTOL aircraft operations, or a vertiport, might need to obtain a licence. The CAA plan to continue engaging with stakeholders on initial proposals and conduct a separate consultation process later.

## You Said

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There was a total of 29 responses submitted. 27 came from organisations and 2 were individual personal responses. Below is a breakdown of the types of organisations who responded:



76% stated that they want a separate CAP (Civil Air Publication) that pertains to bespoke vertiports.

## General comments

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Based on the feedback provided, these are key points of consideration:

**Regulatory Requirements:** The respondents suggest basing regulatory requirements for a licensed vertiport on those defined by the International Civil Aviation Organisation (ICAO). They also mention the need for safe electrical charging systems, firefighting, and battery storage within the licensing requirements.

**Existing Regulations:** Some respondents suggested treating VTOL aircraft flights under the current regulatory regime for helicopters in the UK, therefore not requiring all vertiports to become licensed for commercial revenue/non-scheduled operations.

**Interoperability:** Several respondents emphasised that heliports and vertiports should be interoperable for VTOL aircraft, unless there is a clear safety rationale that necessitates divergence.

**Scope of Consultation:** A few respondents encouraged the CAA to expand the scope of the consultation to encompass bespoke vertiport designs, which will support networked landing infrastructure for this new class of aircraft.

**Use of Existing Infrastructure:** Some respondents mentioned that existing helicopter landing zones, flight zones etc. should be considered for use for VTOL aircraft, rather than assuming that all additional bespoke facilities are being added at an aerodrome.

**Planning and Materials:** Although out of scope for the CAA, a few respondents suggest that planning within cities, buildings and areas that may be suitable must be taken into account, as well as which eco-sustainable materials must be used.

## Design Proposal Comments

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### Terms and definitions

Respondents suggested terminology, such as D-value and vertiport, could be adjusted to include helicopters. Certain definitions related to helicopter operations were identified as potentially non-essential for VTOL aircraft.

### VTOL Operating Areas

Several respondents asked why certain regulations were added specifically for vertiports and VTOL aircraft. For instance, one respondent mentioned that outwash data from VTOL aircraft was said to be similar to that of helicopters of similar weight, questioning the need for specific regulations. They also said that the majority of VTOLs currently undergoing certification are expected to weigh 3,175 kg or less, and a helicopter of similar characteristics would require a 1D FATO (Final Approach and Take Off), questioning the necessity of a 1.5D for VTOL aircraft. However, several respondents emphasised the importance of OEMs providing performance data and characteristics of their aircraft with the CAA to assist with developing the guidance and regulation.

Other respondents proposed allowing a TLOF (Touchdown and lift off area) to be placed on a taxiway if it fulfils the minimum requirements and addressing the lack of a detailed explanation regarding the design of runway-type FATOs. A reduction in the minimum clearance between a VTOL aircraft's nose and buildings (including chargers) on geometry-based stands was also suggested by them.

Respondents also asked that future revisions of the design proposal consider, in addition to static FATO design principles for operations, incorporating dynamic aspects, such as varying wind conditions and traffic flow.

Respondents advised following ICAO Annex 14 Vol. 2 and suggested a review and potential revision of the regulations as necessary. They recommended the use of a safety assessment indicating that it would not adversely affect the safety and efficiency of VTOL aircraft operations.

## OLS requirements

It was noted that new objects or extensions of existing ones should not be allowed above the approach or take-off climb surfaces for VTOL aircraft. Respondents considered that exceptions could be made if these objects are shielded by an existing immovable object or if a safety assessment determines that they would not negatively impact the safety or significantly disrupt the regularity of VTOL operations.

One respondent also proposed that multiple turns in the approach and take-off climb surfaces should be permitted if the aircraft's capabilities allow it. Furthermore, the minimum turning radius should be determined based on VTOL aircraft performance and similar approach to FATO (Final Approach and Take-Off) separation is recommended, which allows for a shorter minimum turning radius based on a safety assessment.

## Visual aids

Comments about visual aids were primarily about on whether a "V" or a "H" marker should be used. One respondent mentioned that a test found markings at 45-degrees and 90-degrees provide better visual cues for pilots as they approach the TLOF than anything directly below or directly in the front of the aircraft. Some respondents highlighted the need for guidance for geometry-based stands and markings specific for taxiways used for VTOL aircraft operations only. A recommendation that all markings should comply with ICAO standards and be coordinated with EASA (European Aviation Safety Agency) proposals was also mentioned.

## Vertiport emergency response

There has been a call for additional guidance on fire hazards associated with lithium-ion batteries. Several respondents noted that emergency service response approaches should be revisited to account for differences between battery and kerosene fires.

Recommendations included incorporating the NFPA (National Fire Protection Association) 418, along with EUROCAE's work, in the emergency response section. The latest edition of the NFPA 418 provides fire standards for both heliports and vertiports as a useful reference to adopt or adapt from rather than creating new standards from scratch. It was also recommended that current RFFS (Rescue Fire Fighting Service) service specifications are reviewed and then built into existing Emergency Orders.

It was also noted that certification criteria for VTOL aircraft battery systems require containment of potential thermal runaway to make an open fire unlikely. A respondent suggested the fire risk is much lower than with a kerosene aircraft and suggested that additional RFFS requirements should not be anticipated for VTOL aircraft.

## Figures and Tables

Observations have been made that certain figures and tables require modification and should be revisited to effectively represent the different sections as required.

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## State-level impact analysis of the change proposal comments.

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### **What impact might the proposal have on safety?**

The response emphasised that safety concerns and recommendations for VTOL aircraft operations revolve around several key areas, such as battery fires and lack of clear instructions and guidance for an effective Rescue Fire Fighting Service (RFFS) response.

It was also noted that the distances between the FATO edge and runway and/or taxiway edge could create a significant risk to aircraft through wake turbulence, and jet efflux given certain wind condition constraints. However, respondents suggested that proper planning and integration would likely mitigate negative safety impacts as part of the risk assessment process. Aerodrome risk assessments will need to take into account the specific VTOL aircraft hazards including the effects of rotors and charging within the aerodrome operational context.

Respondents expected the implementation of (or amendments to) Safety Management Systems (SMS) to highlight the additional hazards presented by mixed operations. The operation of helicopters at existing licenced aerodromes currently forms part of the overall licensing and safety arrangements which could be adapted to cover VTOL aircraft operations when required without the need to establish a dedicated operational area. Bringing together existing safety and quality standards for the design and operation of vertiports as well as clarifying the requirement delta between the operation of traditional helicopters and piloted VTOL aircraft at aerodromes will have a significant impact on future safety. The operation of the latter is extremely close to that of traditional helicopters; thus, any differences should be clarified, and requirements set where differences are found.

### **What impact might the proposal have on the efficiency of the aviation system, either locally, nationally, or internationally?**

Responses discussed the integration of vertiports and VTOL aircraft into existing aviation systems. They highlighted the conflict between efficiency and safety, with efficiency pushing for high-density usage of available space and safety advocating for increased separations and less dense infrastructure arrangements. The responses called for a need to balance these considerations.

One respondent stated that clear and concise recommendations in CAPs would allow industry to readily apply correct and safe characteristics to vertiports. It also noted that using ICAO recommendations will have a positive impact on standardisation efforts and by extension on safety.

Further comments mention that efficiency could be better achieved by combining vertiports with established airfields and heliports with ground transportation and local infrastructure to support it. However, they point out that fuel status priority could be an issue for those aerodrome respondents when any electric powered aircraft is integrated with traditional aircraft; VTOL aircraft have less flexibility to hold-off, delay, with critical power



capacity/reserves. Sharing the same aerodromes or landing sites with conventional aircraft implies VTOL aircraft may have to always be given priority which may discourage some aerodrome operators.

Some respondents felt that in the early stages of establishing airport locations for VTOL aircraft operations, it is considered unlikely that the number of flights that would take place would be a sufficient to have a material impact on efficiency. Where airports have established arrival and departure procedures for helicopters, it would be sensible and pragmatic to follow the same profiles.

### **What financial impact might the proposal have? Will implementation have a financial cost?**

Respondents indicated that the financial impact of the proposal will vary depending on the specific circumstances of each aerodrome. Potential costs that could be incurred are:

- **Adapting Existing Infrastructure:** Aerodromes that can adapt their existing infrastructure for VTOL aircraft operations will likely face minimal costs. These adaptations could include modifying runways, hangars, or other facilities.
- **Implementing Full Design Changes:** Aerodromes that need to implement full design changes will likely face greater costs. These changes could include installing charging infrastructure for VTOL aircraft, implementing new air traffic management (ATM) systems, modifying airspace, and creating passenger-related facilities.
- **Balancing Efficiency and Safety:** The proposal must balance efficiency and safety, which could also have financial implications. High-density usage of available space could lead to cost savings but may compromise safety. On the other hand, prioritizing safety with increased separations and less dense arrangements of infrastructure could lead to higher costs.

A respondent also noted that these are only potential costs, and the actual financial impact will depend on a variety of factors, including the specific design of the VTOL aircraft operations, the existing infrastructure of the aerodrome, and regulatory requirements. Therefore, a detailed cost-benefit analysis would be necessary to determine the exact financial impact of the proposal.

Comments on whether future vertiports will need to be licensed were also raised, as this will have financial implications. Respondents asked when an unlicensed aerodrome would need to become licensed and apply such rules for VTOL aircraft operations and when does a site used for ad hoc VTOL aircraft operations separate from an airfield need to become licensed. This was backed by the comment that charter helicopter operators currently conduct ad hoc or charter flights from unlicensed areas they consider safe, provided they have the landowner's permission and file the appropriate flight plans.

## **What impact might the proposal have on aviation security?**

The responses highlighted the ongoing need for security considerations to integrate VTOL aircraft into existing aviation frameworks. Some concerns were raised about the control over who is on board and what they might be carrying if flights operate as part of the NASP (National Aviation Security Programme) and from unlicensed sites. One respondent mentioned that factors such as location, operational risks, airspace security, and systems & passenger security will influence the security arrangements however, the same level of security currently experienced nationally can be achieved

It was suggested by some respondents that using the CPRSA (critical parts of security restricted areas) for accommodating a vertiport facility could create security issues and that VTOL aircraft operations must be kept separate from any demarcated area. A clear differentiation between whole aircraft use and pay-per-seat or ride-share business models was also mentioned. Cybersecurity was also identified as a core component of any risk assessment.

Overall, most of the responses suggested that while there are challenges to be addressed, integrating VTOL aircraft operators into the existing security process could have a low to no impact. However, careful consideration and robust measures are needed to ensure security to support continuity of safety.

## **What impact might the proposal have on the environment; for example, increased fuel burn, increased CO2 emissions?**

Respondents concluded that while the shift to electric power is generally positive, the environmental impact of VTOL aircraft is multifaceted and depends on many factors, including the source of electricity, the end use of the aircraft, and the development of sustainable charging infrastructure. More research and careful planning by industry are needed to ensure that the growth of VTOL aircraft contributes to the journey to net zero emissions.

Respondents noted that battery manufacture, disposal, and recharging also have environmental impacts, as do potential fire incidents involving fuel cells.

Some respondents noted that although the ongoing advancements of VTOL aircraft integrating into existing flight procedures could mitigate some environmental impacts with direct routings reducing CO2 and noise emissions, there are embedded carbon issues with adaptive works and electrical installations, and potential increases in fuel burn from regular respondents having to hold for vertical aircraft. Vertiport design as a whole will need to continue to consider environmental impacts as they are established.

## **Do you consider that this proposal may disadvantage people who are protected under the Equality Act 2010?**

Although the general consensus was the design proposal will not have an impact for those protected under the Equality Act 2010, it was noted that locations where commercial VTOL aircraft activities take place should be designed and constructed to enable access for all in accordance with current design requirements.

## Our Response

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The CAA is working on the regulation of bespoke vertiports, which is expected to be consistent with the regulations that will enable VTOL aircraft to use existing infrastructure, by 2026. The CAA continues to consider the request to ensure that there is alignment between VTOL aircraft and helicopter operations. To validate that VTOL aircraft and helicopter operations are similar however, we consider that more relevant evidence is required from Original Equipment Manufacturers (OEMs) in order to demonstrate the safety of this approach.

The CAA is also working to ensure that vertiport requirements being developed globally will align with our current regulation where possible and will continue to gather data that supports this work. We are collaborating with other national aviation authorities to work towards harmonisation and safe operation of bespoke vertiports and heliports, considering potential differences in aircraft operation.

The CAA is working on bespoke vertiport regulation in parallel with this design proposal. To facilitate engagement, consultation and collaboration on these matters, a Vertiport Stakeholder Working Group (VSWG) is being established. The CAA will be requesting aircraft design and performance data from multiple OEMs as part of this process. This is important because the type of operations conducted at vertiports will affect the licensing process. Information regarding next steps will be discussed with the VSWG of which details will be made available soon.

The CAA is representing the UK at the Vertiport Infrastructure Design Working Group at the International Civil Aviation Organization (ICAO). However, it must be noted that the work here is to inform international vertiport Standards and Recommended Practices (SARPs); the vertiport job card extends to 2028. ICAO has also been working closely with the OEMs and their performance characteristics.

Operating in and out of bespoke vertiports established in urban areas are currently out of scope for this piece of work as it pertains to existing aerodromes only. The CAA understands from consultation responses that vertiports should be an agnostic aerodrome for all VTOL type aircraft to use, including helicopters where possible. We intend to follow this approach by applying helicopter-related regulation to VTOL aircraft where appropriate and amending regulation where the technical requirements must be different for VTOL aircraft to operate in and out of vertiports safely.

The CAA will continue to ensure that where possible, existing regulation concerning helicopter operations and aerodromes equally apply to VTOL aircraft operations. We will continue to request aircraft performance information and as data and analyses are presented by both aircraft OEMs and fellow national aviation authorities, the CAA will take this into account as we progress this work. This includes considering detailed and bespoke information on downwash (which was referenced by one respondent) to conduct

an analysis of this in comparison to studies such as CAP2576: Understanding the downwash/outwash characteristics of eVTOL aircraft.

As part of our ongoing efforts, the CAA will continue to evaluate the circumstances under which unlicensed aerodromes seeking to operate commercial VTOL aircraft or vertiports may require a license. The CAA intends to maintain ongoing engagement with stakeholders regarding initial proposals and will conduct a separate consultation process at a later stage.

The CAA will evaluate the points raised by all stakeholders and considers that the responses highlight the need for clear guidance, collaboration, and data sharing in the development and regulation of VTOL aircraft operations and infrastructure. It is crucial that any new requirements or guidance are based on a clear safety case and data, and that the CAA continues to work closely with industry stakeholders to ensure a smooth and effective transition to this new era of aviation.