



Innovation Hub

**Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)**

# Acronyms and definitions for the purpose of this document

## Introduction

As part of our Advanced Air Mobility Challenge, the CAA is in the process of determining the required technical and operational requirements to:

- enable current licensed aerodromes to accommodate VTOL aircraft, and
- enable bespoke 'vertiports' to operate VTOL aircraft

We have conducted a gap analysis between existing UK regulations for licensed aerodromes and heliports, and vertiport guidance published by other bodies such as EASA, the FAA, and ICAO Annex 14 Volume II. Along with other considerations and industry feedback, this gap analysis will be used to determine the most appropriate standards to safely accommodate VTOL aircraft in the UK. These detailed specifications will be drafted and consulted on using our standard rulemaking process.

This document is intended to serve as interim guidance to various stakeholders on what aspects they should begin to consider, and the other organisations they should initiate discussions with, to operate VTOL aircraft from existing aerodromes or bespoke vertiport facilities. It does not contain detailed specifications for infrastructure or operational requirements, but will hopefully allow industry, government, landowners, aerodromes, and the CAA to lay the groundwork in advance of the technical requirements being published in late 2024.

**Section A** of this document provides a general overview of the initial stages of the aerodrome licensing process.

**Section B** of this document contains other considerations for aerodrome licensing for VTOL operations. It is divided into roles and responsibilities that the CAA, Local Government, VTOL Operators and OEMs or Aerodromes/Vertiports need to consider.

## Acronyms :

<b>AAM</b>	Advanced Air Mobility (the emergence of a novel transportation system)
<b>ANSP</b>	Air Navigation Service Provider
<b>ATM</b>	Air Traffic Management
<b>CAA</b>	Civil Aviation Authority
<b>EASA</b>	European Union Aviation Safety Agency
<b>FAA</b>	Federal Aviation Administration
<b>ICAO</b>	International Civil Aviation Organisation
<b>MRO</b>	Maintenance, repair and overhaul
<b>OEM</b>	Original Equipment Manufacturer
<b>SMS</b>	Safety Management System
<b>Vertiport</b>	A type of aerodrome intended to be used for the arrival, departure, and ground movement of VTOL aircraft
<b>VTOL</b>	Vertical take-off and landing aircraft



# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Section A: Process for Licensing of Aerodromes

Certain VTOL operations will need to take place from licensed aerodromes. A 'vertiport' will be defined as a subset of an 'aerodrome'. [The Air Navigation Order 2016](#) requires that in the United Kingdom most flights for the public transport of passengers take place at a licensed aerodrome or at a Government aerodrome. Vertiports intending to serve VTOL aircraft operations for the [public transport of passengers](#) may need a CAA licence.

[CAP 168: Licensing of Aerodromes \(caa.co.uk\)](#) gives guidance to both applicants and licence holders and sets out the standards required at UK National licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, visual aids, rescue and fire-fighting services (RFFS) and medical services. The general processes outlined in CAP168 will apply to current aerodromes accommodating public transport, but specifics, relevant to VTOL operations may differ, for example firefighting and physical characteristics. These will be clarified in the development of specific vertiport standards as outlined in the introduction of this document.

This section provides a **general overview** of the initial stages of the aerodrome licensing process.

It is highly recommended that once discussions with landowners and Local Authorities have commenced, guidance is sought from the Civil Aviation Authority (CAA) at the earliest possible point.

### Application for an aerodrome licence:

Aerodromes with existing licences may not need an additional aerodrome licence, however, should consult with their Inspector as to the additional activities they wish to undertake.

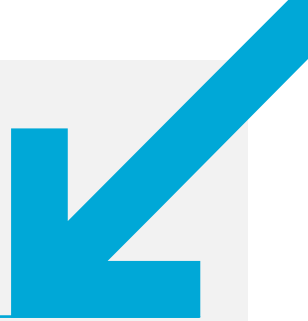
Application forms can be obtained from the CAA and are in electronic format at [Apply for an aerodrome licence | Civil Aviation Authority \(caa.co.uk\)](#)

The applicant should either be the owner of the land or have obtained the landowner's permission for the use of the site as an aerodrome. A proposal to use land as an aerodrome (vertiport) may be subject to the requirements of the Town and Country Planning Act and applicants are advised to consult the Local Planning Authority before embarking on any such project.

An application for the variation of a licence must be made in writing by the licence holder, and be accompanied by the appropriate fee, and by the relevant survey and other information whether there are any changes in the characteristics of the aerodrome.

A licence will normally remain in force until suspended or revoked but may also be issued for a limited period.

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## Requirements

### Site Requirements

Before a licence is granted, we will need to be satisfied that the physical conditions on the manoeuvring area, apron and in the environs of the aerodrome are acceptable, and that the scale of equipment and facilities provided are adequate for the flying activities which are expected to take place. In addition to the aerodrome characteristics these requirements will include the demonstration of competence by the applicant to secure that the aerodrome and its airspace are safe for use by aircraft.

Following the initial grant of a licence, our Inspectors may visit each aerodrome periodically as part of their audit/inspection programme. The Inspectors will assess compliance with requirements, audit the management of safety, and assess the competence of those responsible for safety.

### Aerodrome Manual

An application for an aerodrome licence shall be accompanied by an aerodrome manual produced in accordance with CAP 168. The CAA uses the manual to assess the suitability of aerodrome licence holders and their organisations against the safety-related requirements. The licence holder is required to maintain the manual and ensure it fully reflects the operations and is kept up to date. The manual should contain all the relevant information to describe this structure satisfactorily. It is how all aerodrome operating staff are fully informed as to their duties and safety responsibilities.

### Aerodrome Safety Management System (SMS)

Organisations must have a SMS in place. An effective SMS is an organised approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures, and forms the primary safety oversight covering how an aerodrome manages safety. It also provides an identifiable and easily audited systematic control of the management of safety at an aerodrome. It is expected that a SMS will evolve and be updated to incorporate any lessons learnt from operations over time.

An aerodrome SMS should be commensurate with the size of the aerodrome and the level of complexity of the services provided. Guidance on SMS can be found on the CAA website: [www.caa.co.uk/sms](http://www.caa.co.uk/sms).

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## Section B: Other considerations for potential applicants for an aerodrome (vertiport) licence

In Section B of this guidance, we have developed a list of considerations on developing facilities for the operation of VTOL aircraft. It is divided into roles and responsibilities that the CAA, Local and National Governments, VTOL Operators, OEMs, Aerodromes or Vertiport developers need to consider, in advance of technical requirements for vertiports being published.

### CAA/National Government Remit

Set standards for bespoke vertiport design / Set requirements for adapting current infrastructure

- > To allow for greenfield vertiport development, but also current aerodromes/heliports to adapt their operations to cater for VTOL movements. This will assist aerodromes/heliports in understanding the required infrastructure and facilities for operation and allow for required investment/planning.
- > Consider lessons learnt from projects such as Future Flight Challenge, for incorporation into guidance material.
- > Engagement with key AAM industry stakeholders, which include vertiport developers, operators, and OEMs.

ATM and Airspace

- > Review and decide on airspace change requests as required, in conjunction with ANSPs.
- > Oversight of integration into current ATM system and ensuring future integration aligns with the [Airspace Modernisation Strategy](#).

Licensing/certification

- > Undertake licensing/certification activities as required in conjunction with the aerodrome audit/certification programme and undertake ongoing oversight as per CAP168 and the ANO 2016.

Noise

- > We will continue to work with various Government departments to clarify responsibilities around noise and develop a framework for emerging technologies. Further information will be provided in due course.

Aviation Security/Cyber Security

- > Set requirements and issue guidance for physical and cyber security at vertiports.

Rulemaking

- > Identify the necessary Regulatory changes and undergo the CAA's rulemaking process to enact the changes required to make vertiports safe and efficient.

# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Local Government Remit

### Local Spatial Planning

- > Local Authorities are encouraged to engage in productive dialogue with key AAM industry stakeholders, to understand the context, the economic viability and the wider contribution to their communities, this new industry will make.
- > Local Authorities are welcome to engage with the Department for Transport on this. Please contact [futureofflight@dft.gov.uk](mailto:futureofflight@dft.gov.uk) with any questions.

### Local Transport Planning

- > Local transport authorities should seek to understand the likely trip generation using VTOL aircraft, taking into consideration flight estimates from operators. Sustainable connectivity, including walking, cycling and public transport should be prioritised to these sites. Please follow this link for more information on enablers, opportunities, barriers and risks associated with using a [Mobility-as-a-Service \(MaaS\)](#).

### Community Considerations

- > The public may have varying opinions towards what VTOL services may look like in their communities and relate them to conventional aircraft operations. This could lead to additional concerns over noise, privacy, safety, visual pollution and potentially other considerations. These areas are continuously being investigated through social science research by the Future Flight Challenge. Early public dialogue highlights the importance of these areas [lpsos report lpsos report \(ukri.org\)](#).
- > Local Authorities, together with Vertiport developers will need to consult affected communities for any new site proposal.
- > Work with aerodromes to agree approach and departure routes in a considered location, in ways to minimise disruptions for residents, schools, hospitals etc.

# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## VTOL Operator and OEM Remit

Operational and Technological Considerations	<ul style="list-style-type: none"><li>&gt; VTOL manufacturers and operators should make aerodromes aware of their aircraft performance capabilities and limitations. Flight characteristics are important when designing the vertiport. How an aircraft handles in turbulence, inclement weather, crosswinds, will all have a bearing on this. G-loading and passenger comfort is another area that will need to be considered as part of the take-off and landing performance.</li><li>&gt; Make aerodromes aware of the equipment and infrastructure required to safely operate from the location, for example the types of batteries used for the aircraft. Advise on items such as, but not limited to, the recharging facilities required, battery recharging methods (i.e. battery swaps vs. on-aircraft charging), storage handling and emergency response.</li><li>&gt; Consider the required facilities for scheduled or unscheduled maintenance of VTOL aircraft, for example will maintenance, repair and overhaul facilities be located on the vertiport or offsite?</li><li>&gt; Aerodromes should be made aware of the size and dimensions of the aircraft for universal design of the infrastructure. This information needs to be provided by the OEM.</li></ul>
Personnel Considerations	<ul style="list-style-type: none"><li>&gt; Engage with aerodrome to ensure there is a sufficient number of qualified staff to deal with the operations.</li><li>&gt; Develop competency requirements for the ground handling, maintenance and RFSS staff in relation to their roles and responsibilities when dealing with VTOL aircraft.</li></ul>
Emergency Considerations	<ul style="list-style-type: none"><li>&gt; Agree emergency procedures in case of on or off-aerodrome incident, in line with <a href="#">CAP 168</a></li></ul>
Environmental Considerations	<ul style="list-style-type: none"><li>&gt; Share and demonstrate noise and emissions data to understand the impacts of noise, light and vibration on a local area. Understanding this will be key to inform discussions on local spatial planning, local transport planning and with local communities.</li></ul>
Security Considerations	<ul style="list-style-type: none"><li>&gt; Consideration of relevant physical and cyber security regulations and guidance of operating both airside and landside.</li></ul>
Consumer Considerations	<ul style="list-style-type: none"><li>&gt; Consider and apply the <a href="#">CAA's Consumer Principles</a> to your operation. They help identify key subjects and questions to provide a consistent framework for approaching consumer issues.</li></ul>

# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Aerodrome/Vertiport Remit

### Aerodrome Licence

- > If the aerodrome is not currently licensed, with permission of the land-owner, apply for an aerodrome licence from the CAA in accordance with [CAP 168: Licensing of Aerodromes \(caa.co.uk\)](https://www.caa.co.uk). Maintain any licence conditions as required.
- > If the aerodrome is already licensed, contact your Aerodromes Inspector to discuss requirements for amending your licence to include VTOL operations.

### Operational considerations

- > Vertiports should be designed to be operationally diverse. This includes the consideration of passenger, cargo, flight training and other various use-cases.
- > The importance of the vertiport's infrastructure being aircraft agnostic should be considered to allow consumer flexibility and choice, multiple revenue streams and future proofing.

### Environmental health

- > Engage environmental health specialists to understand the impacts of noise, light and vibration on a local area. This should be informed by VTOL flight count estimates. Understanding this will be key to inform discussions on local spatial planning, local transport planning and with local communities.

### Environmental Impact Assessments and Habitats Regulations

- > Development schemes may be required to undertake an Environmental Impact Assessment (EIA)-[Town and Country Planning \(Environmental Impact Assessment\) Regulations 2017 \(the '2017 Regulations'\)](#). VTOL Operators should ensure early engagement with the local planning authority to understand whether an EIA is necessary and what the scope of the assessment should entail. This can include assessing the impact of the development on biodiversity, water quality, flood risk and wildlife including protected species etc. Where an EIA is required, it must be prepared in advance of the submission and must accompany the planning application.
- > It may also be necessary to undertake an appropriate assessment under the [Conservation of Habitats and Species Regulations 2010](#) if the proposed development is likely to have a significant effect on a site.



# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Aerodrome/Vertiport Remit (continued)

### Spatial planning processes

- > Aerodromes and vertiport developers need to consider spatial planning processes as follows:
- > Planning submissions: vertiport developers and aerodromes should familiarise themselves with the planning process to identify how they can become involved and engaged or make representation should they wish. The success of many development proposals relies on thorough and positive collaboration between developers and local planning authorities. Key AAM industry stakeholders should engage with local planning authorities early to identify site constraints.
- > Plan-making policy processes: Planning consent is granted based on the proposed development's compliance with national planning policies developed by central government, and local planning policies, developed by Local Planning Authorities.

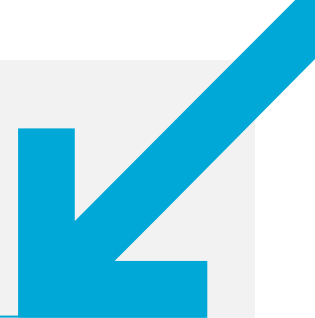
### Local transport planning

- > Set a vision of connectivity to and from the site which includes desired modal splits prioritising active and sustainable transport modes. This will require collaboration between local transport planning and key AAM industry stakeholders.
- > Early engagement with the local transport authority should ensure that surface access prioritises and integrates well with surrounding walking and cycling networks as well as public transport services. This should include sharing provisional counts of forecast VTOL flights to understand consumer demand between all MaaS providers.
- > Developing a local transport plan with local transport authorities will set out connectivity priorities for areas. Key AAM industry stakeholders should share evidence with plan-makers and respond to consultations to ensure that these are formulated with adequate evidence on the potential for VTOL and vice-versa.

### Risk Management Considerations

- > Develop or update Safety Management System (SMS) to show accountabilities, roles and responsibilities, management structure, safety governance, identification of hazards, analysis, assessment and mitigations of safety risks, safety training programme and emergency response plan.
- > Develop a clear internal oversight programme including accountable individuals, procedures, audits, inspections, non-compliance, corrective actions, and incident reporting.

# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Aerodrome/Vertiport Remit (continued)

### Community Considerations

- > Work with the key AAM industry stakeholders, local government and planning authorities to minimise noise and visual pollution, especially considering the low-flying nature of the aircraft. Noise, air quality and emissions are considered in airspace change process but need to consider privacy and other issues. This includes designing approach and departure routes away from residential areas and considering the impact of night operations for example.
- > Key AAM industry stakeholders and Local Governments and their business community should collaborate and engage to develop a strategy and timeline for engaging with their direct residents.

### Personnel Considerations

- > Aerodromes and vertiports should have sufficient staffing for the required operations, including, but not limited to, ground handling, maintenance and RFFS staff.
- > Engage with VTOL operators and OEMs to develop Training Needs Analysis and train staff working with VTOL aircraft.

### Electric and Alternative Fuel Source Infrastructure Considerations

- > Develop understanding with OEMs and VTOL operators as to the requirements for electric charging infrastructure. This includes accessing the existing electric power grid and supplying charging points for aircraft. Considerations on power requirements as this needs to involve conversations with power companies where additional power and/or outlets are required.
- > Battery charging must be carried out safely and securely. Batteries stored on-site should be stored safely away from safety critical areas. The personnel who will handle/replace the batteries vs charging the aircraft needs to be considered.
- > As some VTOLs are being developed to be fuelled alternatively by hydrogen, conventional aviation fuels (JetA1/SAFs or Avgas), or in a hybrid capacity, considerations need to be extended to cater for the diversity of aircraft operating at aerodromes and vertiports.
- > Adapt requirements to facilitate RFFS depending on the fuel types utilised on site.

### Airspace Change Considerations

- > Collaborate with ATM providers to determine if an airspace change is necessary or if airspace procedures need to be adapted

# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Aerodrome/Vertiport Remit (continued)

### Technical Considerations

- > Creation of VTOL specific operational facilities. It is encouraged that vertiport facilities are aircraft agnostic.
- > VTOL aircraft designs vary for example Multicopter, lift-and-cruise and vectored-thrust and come in various styles. Wing-tip clearance, main landing gear width, ground taxi vs hover taxi and blade configuration all need to be considered.
- > The aerodrome should be aware of aircraft performance capabilities (for example battery life, holding time, crosswinds, turbulence, downwash, approach and departure profiles, G-forces for passenger comfort) from the VTOL operator/OEM.

### Security Considerations

- > Consideration of relevant physical and cyber security regulations and guidance of operating both airside and landside.

### Facility Considerations

- > Appropriate parking areas, including stands and remote parking, should be sized and suitable for the ground handling operations and necessary equipment. They should be an appropriate size for easy manoeuvring of all VTOL aircraft including both ground and hover taxi movements.
- > Location and dimensions of electric charging facilities or alternative fuelling capabilities should be taken into consideration.
- > If the operation will service interconnecting passenger traffic and transiting services, there should be considerations for easy and secure access between terminals and other airport facilities for passenger flow and efficiency.
- > Adapt requirements to facilitate RFFS depending on the fuel types utilised on site.

# Considerations for Aerodromes and Vertiports planning to operate Vertical Take-off and Landing Aircraft (VTOL)



## Aerodrome/Vertiport Remit (continued)

### Emergency Considerations

- > Develop or update emergency response plan to include events that may occur with this novel type of aircraft. This should be done in conjunction with emergency response departments, such as fire, police, ambulance etc.
- > It must also be reviewed and tested on a regular basis.
- > Identify and create agreements with external agencies who will respond in the event of an emergency- for example external fire companies, rescue services and the police.
- > There must be appropriate equipment, PPE and training for initial emergency responders who have been given adequate information, instruction, and training.
- > A risk assessment should be carried out on the basis of:
  - Number of movements planned/unplanned
  - Frequency of movements
  - Number of aircraft in use during peak periods
  - Type of movements
  - Number of passengers
  - Size and complexity of the response area
  - Nature of terrain
  - Whether its elevated or surface-level
  - Congested or non-congested environment
  - Availability of local fire and rescue services- how rapidly they can respond
- > Consideration for the storage and handling of hazardous materials such as lithium-ion batteries, hydrogen fuel etc.
- > Consideration of safety with adverse weather conditions- for example appropriate de-icing facilities for the aircraft and operational area.

### Consumer Considerations

- > Consider and apply the [CAA's Consumer Principles](#) to the establishment of the vertiport. They help identify key subjects and questions to provide a consistent framework for approaching issues.