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INSIGHTS

Shanti Vatika Farms, Ram Mandir Road, Opposite Fortis Hospital, Vasant Kunj, New Delhi -110070

www.sarvaankassociates.com

info@sarvaankassociates.com

+91 88267 18554

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ANALYSIS OF AERODROME ADVISORY CIRCULAR ON VERTIPORTS

Table of Acronyms

Term	Meaning
ATS	Air Traffic Service
BCAS	Bureau of Civil Aviation Security
DGCA	Director General of Civil Aviation
FATO	Final approach and take off area
FPA	FATO Protection Area
MHA	Ministry of Home Affairs
OLS	Obstacle Limitation Surfaces
SCA	STOL capable aircrafts/ VTOL capable aircrafts operated as Aeroplane
SMS	Safety Management System
STOL	Short Take-offs and Landing
TLOF	Touchdown and lift-off area
WDI	Wind Direction Indicators
VCA	VTOL capable aircrafts operated as a helicopter
VFR	Visual Flight Rules
VPS	Vertical Procedure Surface
VTOL	Vertical Take-Offs and Landing

I. Introduction

The Office of Director General of Civil Aviation passed the Aerodrome Advisory Circular on Vertiports on 5 September 2024 ("**Guideline**")[1]. The aim of this circular is to provide comprehensive design and operational guidance for aerodromes, or a defined area used for the arrival or departure of VCA/SCA (**"Vertiports**") in by providing a comprehensive list of design and operational guidelines to promote safe and efficient integration of unconventional VTOL and STOL aircrafts into urban and rural environments.

II. Applicability and Scope

The eligibility criteria for this circular are as follows:

Vertiport Authorization	Aircraft Requirements
Be a Citizen of India	Powered by unconventional power source

[1] Director General of Civil Aviation, Aerodrome Advisory Circular on Vertiports, *AC No. 1 of 2024/F.No. DGCA - 31018/6/24 (5 Sept 2024) Last visited: 30 September 2024*

In case of a body corporate, it should be registered in India and meet the equity holding criteria specified by Central Government	Maximum take-off weight (MTOW) less than 5700 kg
The Central or State Government or any company controlled by any of these government	Operated by a pilot
A society registered under the Societies Registration Act, 1860	Operated under day VFR flight conditions

Additionally, pre-existing heliports/airports/runway/airstrips may also be developed as Vertiports provided they follow these Guideline.

III. Common reference system

This circular imposes the use of several reference systems for different criterion to express terms which are as follows:

Horizontal	Vertical	Temporal
World Geodetic system	Mean Sea Level	Gregorian calendar and Coordinated Standard Time.

IV. Site Selection

Prior to applying for Vertiport authorization, the applicant must receive the following appropriate clearances from:

a) The Ministry of Home Affairs clearance through the Ministry of Civil Aviation.
b) The Airport Authority of India
c) The Owner of the land
d) The Local Authority such as municipal corporation

V. Procedure for Vertiport Authorization

An applicant is required to apply to DGCA through **FORM CA (V)-1**, along with supporting documents for the Vertiport site clearance and for the grant of authorization. Additionally, they are also required to facilitate the inspecting officer(s) of DGCA at the time of inspection.

The DGCA may give an in-principal approval for a Vertiport and require the applicant to submit project report and execution plan for approval.

The selection of Vertiport site involves several considerations such as different range of aircraft types, area available, vertiport configuration, safety, access, and obstacle environment, complexity of the wind environment, flight paths in a vertiport if it is in the vicinity of other vertiports

Grant of Vertiport Authorization

The applicant is required to apply for the grant for authorization through **FORM CA (V)-2** and submit the same to DGCA. This from shall be accompanied with following documents:

a) Project Completion Report
b) Proof of Compliance
c) Vertiport Operational Manual
d) SMS Manual
e) Bird Hazard Control Plan
f) Disabled Aircraft Removal Plan
g) Other supporting documents.

Additionally, the applicant shall be required to designate an accountable manager who will be in-charge of maintenance and operations of the Vertiport.

Vertiport authorization shall be valid for a period of 5 Years and must be renewed at least 45 days before its expiration, furthermore any applications to surrender authorization must be submitted to the DGCA at least 60 days prior to its discontinuation.

VI. Vertiport Reference Point

The Vertiport reference point shall be located near the initial or planned geometric centre of the Vertiport, and be measured in degree, minutes and second. Such reference point has to be established only if the Vertiport is not co-located with an existing aerodrome. Additionally, such reference point must also be reported to the DGCA.

Vertiport related information

Particular	Information to be provided
Vertiport type	surface-level, elevated.

Touchdown and lift-off area	dimensions to the nearest meter or foot, slope, surface type, bearing strength in Quintals (100 Kg)
FATO	type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length and width to the nearest meter or foot, slope, surface type
Safety Area	length, width, and surface type
Taxiway and Taxi Route	designation, width, surface type
Apron	surface type, VCA/SCA stands
Clearway (If available)	length, ground profile
Visual Aids	Visual aids for approach procedures, marking and lighting (if available) of FATO, TLOF, VCA/SCA ground taxiways and VCA/SCA air taxiways and VCA/SCA stands.

VII. Vertiport Declared Distance

A Vertiport with VTOL/STOL capable aircrafts should declare the following to the nearest meter:

Available	Required
Landing distance	Landing distance
Rejected take off distance	Rejected take off distance
Take off distance	Take off distance

VIII. Co-ordination

Vertiport operator must inform the pilot/ATS unit about Vertiport conditions, operational status and any other information of operational significance with minimum delay.

IX. Essential Vertiport Components

Every public use vertiport is required to include an independent FATO, taxi and apron to provide at least two independent VCA parking positions, terminal building for passenger facilitation and a communication facility to facilitate exchanges between ATS unit, Vertiport operator, and pilot. It should further be designed for the most demanding VCA the vertiport is intended to serve.

Each vertiport is required to have the following specifications:

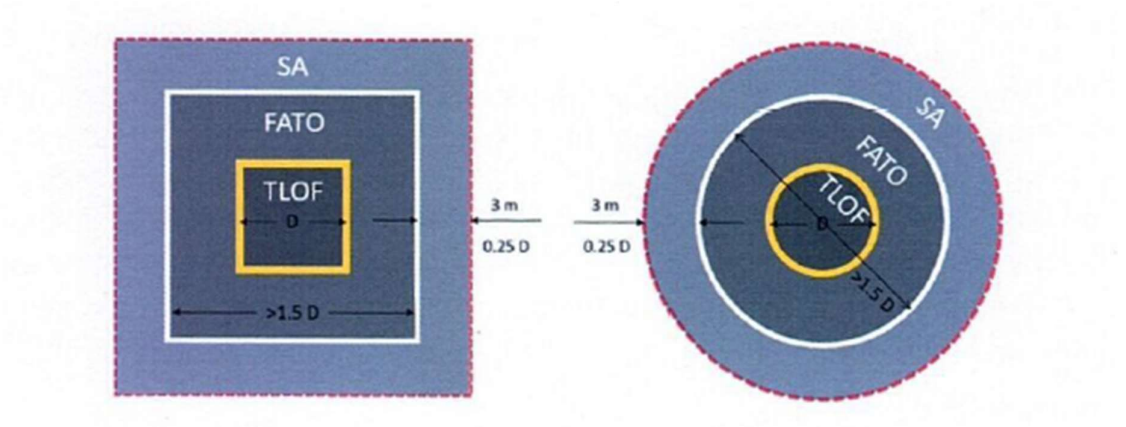
FATO Requirements

Every FATO is required to fulfil the following requirements:

a) It must be surrounded by a safety area which may not to be solid and located in a place where it will not cause an adverse impact on VCA/SCA operations.
b) If FATO is a solid, then its slope shall not exceed 2% in any direction.
c) Visual aids or others necessary systems shall not penetrate a horizontal plane at FATO elevation by more than 5 cm.
d) The FATO must be obstacle-free, except for essential objects
e) FATO should be large enough to safely contain the design's operations during the final approach and take-off phases.
f) If the FATO is combined with TLOF, it must be level with the TLOF, be strong enough to support the intended loads, and have proper drainage.
g) If the FATO is separate from the TLOF, it must be hazard-free to allow for emergency landings and connected to a safety area.

The minimum dimensions of a FATO shall be

Dimensions	For SCA	For VCA
Length	Rejected Take-off for the required Take-off procedure as per the intended SCAs, critical SCA flight manual	An area which can contain a circle with the diameter of 1.5 times of the total size of the helicopter when the rotors are spinning, measured from the front tip of the main rotor's path to the furthest back point of the tail rotor or the helicopter's body ("**Design D of the Helicopter**").
Breadth	Width as per the flight manual of the intended SCA	Area of sufficient width to meet the design requirements of a VCA but not less than 1.5 times width of the critical VCA, if there is a limitation of approach and touchdown.



h) If a FATO is near a runway or taxiway and simultaneous operations are planned, the separation between the edges of the runway/taxiway and the FATO must meet the specified minimum distance:

VCA mass are	Distance between FATO edge and runway edge or taxiway edge
Up to but not including 3175 kgs.	60m
3715 kgs up to but not including 5700 kgs	120m

i) A FATO should not be located near taxiway intersections or holding points where jet engine exhaust could create turbulence, nor in areas prone to airplane vortex wake generation.

Protected Side Slope

The protective side slop is required to be rising at 45 degrees (diverging 12.5%) outwards from the edge of a safety area and extending to 10 meters.

Rescue and fire fighting

Firefighting techniques for VCA vary by model since every aircraft and charging infrastructure has differing hazards. However, it is important to note that facilities for rescue and firefighting must be mandatorily provided in every Vertiport.

Safety Area Requirements

Every Safety Area is required to abide by the following requirements:

a) The safety area must be free of obstacles, except for essential objects necessary for the operation, to account for manoeuvring errors.
b) If the safety area is solid, it must be level with the FATO, resistant to rotor downwash, and provide effective drainage.
c) The safety area must extend from the FATO's edge by a minimum of 0.25 times the Design D of the Helicopter dimension or 3 meters whichever is greater.
d) Safety area shall not contain any mobile objects during VCA operations
e) Essential objects in the safety area must not penetrate a surface that slopes upward from the edge of the FATO at a height of 25 cm and at a 5% gradient.
f) The slope of a solid safety area must not exceed an upward gradient of 4% from the FATO's edge.

Security and Safety

To ensure safety and security at vertiports, access must be controlled, and operational areas kept clear. Security should follow MHA and BCAS regulations, and operators should implement a safety management system as per DGCA. Plans for bird control, apron management, and aircraft removal should be developed. Surface-level Vertiports should have safety barriers outside the safety area and below the approach/departure surfaces.

TLOF areas

A TLOF shall provide an area free of obstacles and of sufficient size and shape to ensure containment of the under carriage of the critical VCA the TLOF is intended to serve in accordance with the intended orientation.

The surface of the TLOF must fulfil the following criteria:

a) Has sufficient bearing strength to accommodate the dynamic loads associated with the anticipated arrival of the VCA
b) Is free of irregularities
c) Has sufficient friction to prevent the VCAs from skidding
d) Is resistant to the effects of rotor downwash
e) Be associated with a FATO or a stand
f) Has effective drainage which causes no adverse effects on the VCA
g) Its Slope does not exceed 2% in any direction.
h) For an elevated Vertiport it should be of the sufficient size to contain at least 1 Design D of the Helicopter

Vertiport Emergency Planning

Vertiport emergency planning involves preparing for emergencies at or near the Vertiport, such as crashes, medical incidents, fires, or natural disasters.

Wind Direction Indicators

Every Vertiport should have at least 1 (One) WDI. The WDI must be positioned to show wind conditions over the FATO and the TLOF, free from airflow disturbances caused by nearby objects or rotor downwash. It should also be visible to aircraft from various angles, including in flight, hovering, or on the movement area. The specifications of the WDI shall be as per the following:

Dimensions of FDI	**Surface Level Vertiport**	**Elevated Vertiport**
Length	2.4 Meter	1.2 Meter
Diameter (Larger end)	0.6 Meter	0.3 Meter
Diameter (Smaller end)	0.3 Meter	0.15 Meter

X. Optional vertiport components

Air taxi-routes

An air taxi-route should allow a VCA/SCA to move above the surface at low heights, typically within ground effect, at speeds less than 37 km/h (20 knots). The route must be at least twice the width of the largest aircraft it is designed to accommodate.

Approach/Climb-Out Surface

An approach/climb out surface should be established for each approach and climb out flight path to and from the Vertiport as far as practicable. The specifications of such surface are as follows:

Characteristics	**Value**	**Remarks**
Inner edge width:	**Width of FPA/VPS/clearway**	The approach and take-off climb surface lengths of 3386 meters, 1075 meters, and 1220 meters associated with the respective slopes,
Day use only- final width:	7x Design D of Helicopter	

Day use only-divergence:	10%	bring the VCA/SCA to 152 meter (500 ft) above FATO elevation.
Outer edge height above FATO elevation	500′ (152 meters)	This length may be reduced if vertical procedures are in place. When the VCA/SCA procedure includes the lateral element, the transitional surface may be provided.

Charging/ Energizing Facilities

Charging station for VCA/SCA battery charging with required capacity may be provided at the Vertiport. The charging station shall be as per norms/standards/specification laid down by the VCA/SCA manufacturers.

Clearway

An area free of obstacle, except for essential objects located on it to ensure containment of the design VCA when it is accelerating in level flights, and close to the surface, to achieve its safe climbing speed.

Downwash/Outwash protection

To minimize the risk of incidents from VCA downwash/outwash, downwash protection zones can be established around the Vertiport. These zones can include boundaries or restricted areas to control movement during VCA operations. For elevated Vertiports, the protection zone might need to extend below the level of the FATO. A safety assessment should be conducted to determine if this extension is required.

FATO Protection Area

An FPA should be free of obstacles, except for essential objects. Where solid, flush with the edge of the FATO, resistant to the effects of downwash and ensures effective drainage.

Ground taxi-routes

AVCA/SCA ground taxi-route shall have a minimum width of 1.5x the overall width of the largest VCA/SCA it is intended to serve and be centred on a taxiway. For instance:

Obstacle Free Volume

Provide protection above vertiports to facilitate the introduction of vertiports in congested areas and an obstacle populated environment for VCA/SCA. It shall be obstacle free and be established between VPS and FPA.

Obstacle Limitation Surfaces

A Vertiport operator should establish the OLS as applicable for the critical performance of the design VCA/SCA.

The dimensions of the OLS serve as a general objective of protection of approach, climb-out and balked landing manoeuvre in the visual phase of the approach-to-land below a height of 152 m above the FATO elevation.

Protection Area Requirements

A protection area is required to fulfil the following requirements

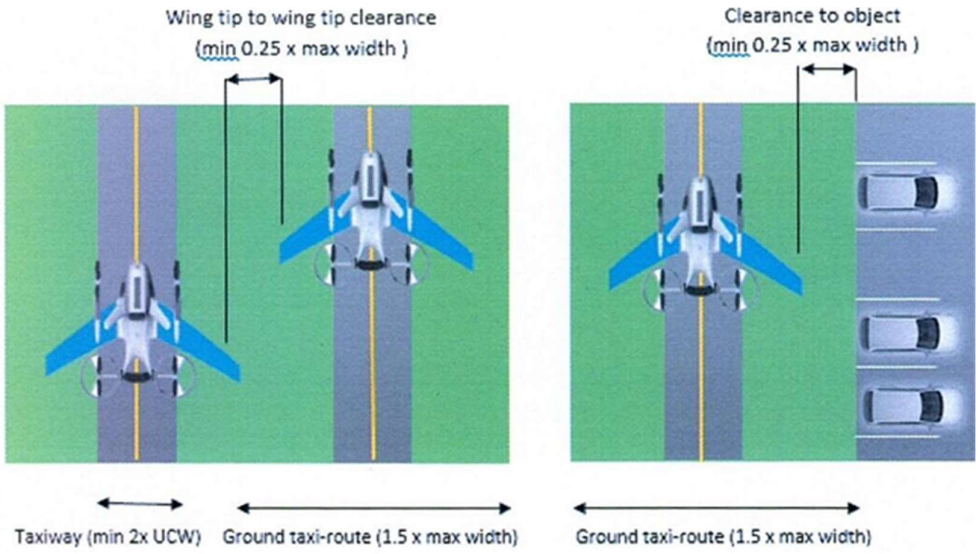
a) Be obstacle-free, except for essential objects needed for operations.
b) If solid, have a surface level with the stand, resistant to rotor downwash, and provide effective drainage.
c) For stands designed for turning, the protection area must extend 0.4 times the diameter (0.4D) of the largest aircraft from the stand's edge.

Stands

The area around a stand for VCA and SCA must be obstacle-free and large enough to fully contain the largest aircraft it serves during positioning. The space should either be a circle with a diameter of 1.2 times the largest aircraft's size, or, if there are manoeuvring limitations, it must be at least 1.2 times the overall width of the largest aircraft.

Taxi-routes

An area free of obstacles, except for essential objects which because of their function are located on it, established for the movement of VCAs; with sufficient width to ensure containment of the largest VCA the taxi-route is intended to serve.



Taxiways

Provide an area free of obstacles and of sufficient width to ensure containment of the under carriage of the most demanding wheeled VCA the taxiway is intended to serve.

Vertiport Clearway

A Vertiport clearway should be established when a VCA needs to manoeuvre horizontally, between the FPA/VPS outer edge and the approach/climb-out surface inner edge.

Vertical Procedure Surface

The VPS is a surface that encompasses the area bordered by a circumscribed square(s) aligned with the intended aircraft flight path(a) cantered on the VPS reference circle and should be free of obstacles.

XI. Conclusion

In conclusion, the DGCA's Guidelines represent a major step forward in India's regulatory framework for VTOL and STOL operations, offering significant opportunities for startups in drones, UAVs, and the air taxi sectors. By providing a structured and transparent framework, the Guidelines lower entry barriers, promote innovation, and encourage entrepreneurial ventures in these rapidly growing industries. The focus on safety, infrastructure, and Indian ownership strengthens the domestic ecosystem, fostering locally driven technological

advancements and positioning India as a key global player in the drone and UAV sectors. Aligning with international standards will ensure global competitiveness, opening doors for new business opportunities, funding, and partnerships. Startups can leverage these Guidelines to lead innovation in aerial mobility while ensuring compliance and safety, driving the future of aviation in India.

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