CIVIL AVIATION AUTHORITY OF FIJI

STANDARDS DOCUMENT

Appendix 11
Requirements For The Design And Operations Of Helicopters Landing Sites For Helicopter Operations

Published by:

Civil Aviation Authority of Fiji
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Nadi International Airport
Fiji

www.caaf.org.fj

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Copy number: Electronic Copy

This Standard Document is subject to the amendment service: þ Yes o No

Copy Holder: MASTER COPY

Organisation: Civil Aviation Authority of Fiji

Date of Issue: 27 August 2019

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REQUIREMENTS FOR THE DESIGN AND OPERATIONS OF HELICOPTER LANDING SITES FOR HELICOPTER OPERATIONS

1.0 INTRODUCTION

1.1 Section 10 of the Civil Aviation Reform Act 1999 stipulates that a person shall not operate an aerodrome except under a certificate or registration approval issued by the Authority.

1.2 The Act defines an aerodrome as: "*a defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft*".

1.3 The Standards and Recommended Practices (SARPs) for Heliports, is set out in Volume II of Annex 14 to the Convention on International Civil Aviation. Owners/operators of Heliports for the purposes of Regular Public Transport are required to certify such heliports and shall comply with the SARPs as set out in Volume II of Annex 14.

1.4 For Helicopter Landing Sites (HLS) catering for General Aviation helicopter operations on private, aerial and chartered flights, this Appendix sets out the basic requirements for the establishment of a safe HLS. These HLSs are required to obtain registration approval from the CAAF and shall comply with the requirements for registration approval as set out in this SD – Aerodromes.

1.5 Although a HLS registration approval does not cover the full scope of certification, a fundamental criterion, that is, the establishment and maintenance of an appropriate Safety Management System (SMS) commensurate with the size and type of operations, remains the same for both certified and registered sites.

1.6 All existing HLS Registration Approval holders will be granted a grace period of 5 years from the date of publication of this SD-Aerodromes Appendix 11 to bring their existing HLS up to the standards published herein, thereafter, failure to comply will result in the HLS being closed.

2.0 DEFINITIONS

2.1. **Air Taxi;** the airborne movement of a helicopter at low speeds and at heights normally associated with operations in ground effect.

2.2. **Approach and Departure path**; the track of a helicopter as it approaches, or takes-off and departs from, the Final Approach and Take-Off Area (FATO) of a HLS.

2.3. **Building**; any elevated structure on land.

2.4. **D-Value (D);** Overall length of helicopter with rotors running from the most forward position of the main rotor tip path front to the rear most point of the airframe or tail rotor disc, whichever is the greater.

2.5. **Elevated HLS**; a HLS on a raised structure on land with a FATO and a TLOF surface 2.5 m or higher above the ground in the immediate vicinity.

2.6. **Final approach and take-off area (FATO)** ; an area of land or water over which the final phase of the approach to a hover or landing is completed and from which the take-off manoeuvre is commenced.

2.7. **Final Approach**; the reduction of height and airspeed to arrive over a predetermined point above the FATO of an HLS.

2.8. **Helicopter Landing Site (HLS)**; is a place that may be used as an aerodrome for infrequent, opportunity and short term operations, other than Regular Public Transport (RPT), by day under Visual Meteorological Conditions (VMC) and may be any of the following a area of land, or an area on a structure on land or water, intended for use wholly or partly for the arrival or departure of helicopters

2.9. **Heliport**; an area that is intended for use wholly or partly for the arrival or departure of helicopters, on land or a building or other raised structure on land; and meets or exceeds the heliport standards set out in Volume II of Annex 14 to the Chicago Convention.

2.10. **Protected area**; an area within a taxi-route and around a helicopter stand which provides separation from objects, the FATO, other taxi-routes and helicopter stands, for safe manoeuvring of helicopters.

2.11. **Rotor Diameter (RD);** the diameter of the main rotor with the engine(s) running.

2.12. **Safety Area**; a defined area surrounding the TLOF/FATO, or other defined area that is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the load-bearing area primarily intended for landing or take-off.

2.13. Touchdown and Lift-Off Area (TLOF); a defined area, free from obstruction on a HLS in which a helicopter may touchdown or lift-off.

3.0 AIRCRAFT TYPE

3.1 The requirements in this Appendix is based on the following helicopters types:-

(a) Robinson R44,
(b) Airbus AS350,
(c) Airbus 120,130,
(d) AS355,
(e) Bell series, B206 and B407.
(f) EC 145

3.2 Operators considering larger aircraft types then those specified in 3.1 will find that some of the established HLS's cannot accommodate those aircraft because of the size of the TLOF. The Dynamic Load Bearing may also be an issue such as wheel type of undercarriage; therefore, it is necessary that prior consultation with the Authority is undertaken.

4.0 SITE SELECTION AND DESIGN

4.1 To minimize noise disturbance, the ambient noise level should be considered, particularly, near noise sensitive buildings such as hospitals, schools and resort accommodation and especially in relation to areas beneath the approach and departure paths of helicopters.

4.2 HLS design and location shall be such that downwind operations are avoided and cross-wind operations are kept to a minimum. HLS's should have two approach surfaces, separated by at least 150º. Additional approach surfaces may be provided, the total number and orientation ensuring that the HLS usability factor will be at least 95 per cent for the helicopters the HLS is intended to serve. This criterion shall apply equally to surface level and elevated HLS's.

4.3 For HLS's used by performance class 2 and 3 helicopters, the ground beneath the take-off climb and approach surfaces should permit safe one engine-inoperative landings or forced landings during which injury to persons on the ground and damage to property are minimized. The provision of such areas should also minimize the risk of injury to the helicopter occupants. The main factors in determining the suitability of such areas will be the most critical helicopter type for which the HLS is intended and the ambient conditions.

4.4 The presence of large structures close to the proposed site may be the cause, in certain wind conditions, of considerable turbulence that might adversely affect the control or performance of the helicopters operating at the HLS. Therefore, high terrain or other obstacles, especially power lines and cliff faces, in the vicinity of the proposed HLS should be taken into consideration when selecting a site. Equally, the heat generated by large chimneys under or close to the flight paths may adversely affect helicopter performance during approaches to land or climbs after take-off.

4.5 The site must have suitable areas for lift off, take-off manoeuvre, approach manoeuvre and touchdown. Where these components are not co-located at a particular site, taxiways shall be provided to link the areas.

4.6 Normally a site will have a simple layout which combines those individual areas that have common characteristics. Such an arrangement will require the smallest area over-all where the helicopter will be operating close to the ground and from which it is essential to remove all permanent obstacles and to exclude transient and mobile obstacles when helicopters are operating. When the characteristics or obstacle environment of a particular site do not allow such an arrangement, the component areas may be separated provided they meet their respective individual criteria. Thus, a

different direction may be used for take-off from that used in the approach and these areas may be served by a separate touchdown and lift-off area, located at the most convenient position on the site and connected to the other manoeuvring areas by helicopter ground taxiways or air taxiways.

4.7 Possible air traffic conflicts between helicopters using a HLS and other air traffic should be avoided.

5.0 DESIGN LOADS

5.1 A static load-bearing surface is a surface capable of supporting the mass of a helicopter situated upon it.

5.1.1 The design and construction of the Touchdown and lift-off area (TLOF) and any load- bearing surfaces shall support the weight of the design helicopter and any ground support vehicles.

5.1.2 Loads are applied through the contact area of the tires for wheel-equipped helicopters or the contact area of the skid for skid equipped helicopters. This should cover the normal touchdown, with a rate of descent of 1.8 m/s (6ft/s), which equates to the serviceability limit state. The impact load is then equal to 1.5 times the maximum take-off mass of the helicopter.

5.2 Dynamic load-bearing surface is a surface capable of supporting the loads generated by a helicopter conducting an emergency touchdown on it.

5.2.1 The emergency touchdown should also be covered at a rate of descent of 3.6 m/s (12ft/s), which equates to the ultimate limit state. The partial safety factor in this case should be taken as 1.66.

Hence: the ultimate design load = 1.66 service load
= (1.66 x 1.5) maximum take-off mass
= 2.5 maximum take-off mass.

5.2.2 For helicopters equipped with wheels the required minimum is 75% of the contact area of the tyre or tyres of one of the main landing wheels

5.3 Where the TLOF is within the FATO, the TLOF shall be dynamic load-bearing. The bearing strength of the surface of the TLOF shall be sufficient to with stand the dynamic loading imposed by the heaviest and/or largest helicopter for which the area is intended.

6.0 TOUCHDOWN AND LIFT-OFF AREA (TLOF)

6.1 TLOF is the surface over which the touchdown and lift-off is conducted.

6.2 At least one TLOF shall be provided at a HLS.

6.3 One TLOF shall be located within the FATO or one or more TLOFs shall be collocated with helicopter stands.

6.4 The preferred TLOF design is square because it provides the pilot with good visual clues and therefore more accuracy in completing the touchdown. It is also more economical as the construction of a square is easier to achieve.

6.5 The TLOF shall be of sufficient size to contain a circle of diameter of at least 0.83 D of the largest helicopter the area is intended to serve.

6.6 Where a TLOF is located within a FATO which can contain a circle of diameter more than 1D, the centre of the TLOF shall be located not less than 0.5D from the edge of the FATO.

6.7 A protected area, which can be grass or similar, shall be established around the TLOF for passenger movement and for loading and unloading. This area shall extend a distance of 0.25 x RD around the TLOF. It is desirable to have nothing within this area that may restrict the pilot to approach, land and depart the TLOF. However, it is clear that not all of sites available are able to provide an all-round safety area and therefore any restriction must be highlighted to all helicopter operators using the HLS. A risk assessment shall be conducted and appropriately documented by each helicopter operator prior to operation into these HLS's.

6.8 Slopes on a TLOF shall be sufficient to prevent accumulation of water on the surface of the area, but shall not exceed 2 per cent in any direction.

7.0 FINAL APPROACH AND TAKE-OFF AREA (FATO)

7.1 A surface-level HLS shall be provided with at least one FATO.

7.2 A FATO shall be obstacle free.

7.3 The FATO is the area to which a pilot can make an unobstructed approach and carry out a missed approach should the need arise. If this requirement cannot be met should the FATO be located within the TLOF, then the FATO should be established in an area adjacent to the TLOF that has no obstructions. Once established at the FATO the aircraft can then be hover taxied to the TLOF.

7.4 The dimensions of a FATO shall be:

a. where intended to be used by helicopters operated in performance class 1, as prescribed in the helicopter flight manual (HFM / RFM / AFM) except that, in the absence of width specifications, the width shall be not less than the greatest overall dimension (D) of the largest helicopter the FATO is intended to serve;

b. where it is intended to be used by helicopters operated in performance class 2 or 3, it shall be of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than:

i. for helicopters with a maximum take-off weight (MTOW) more than 3175 kg, it shall be 1D of the largest helicopter the FATO is intended to serve is;

ii. for helicopters with a maximum take-off weight (MTOW) less than 3175 kg, it shall be 0.83D of the largest helicopter the FATO is intended to serve, if not co-located with the TLOF (see 6.6).

7.5 The FATO shall provide rapid drainage but the mean slope in any direction shall not exceed 3 per cent. No portion of a FATO shall have a local slope exceeding:

a. 5 per cent where the HLS is intended to be used by helicopters operated in performance class 1; and

b. 7 per cent where the HLS is intended to be used by helicopters operated in performance class 2 or 3.

7.6 The surface of the FATO shall:

a. be resistant to the effects of rotor downwash;

b. be free of irregularities that would adversely affect the take-off or landing of helicopters; and

c. has bearing strength sufficient to accommodate a rejected take-off by helicopters operated in performance class 1.

7.7 The surface of a FATO surrounding a touchdown and lift-off area (TLOF) intended for use by helicopters operated in performance classes 2 and 3 shall be static load-bearing.

7.8 The FATO should provide ground effect.

7.9 The FATO should be located so as to minimize the influence of the surrounding environment, including turbulence, which could have an adverse impact on helicopter operations. If turbulence mitigating design measures are warranted but not practical, operational limitations may need to be considered under certain wind conditions.

8.0 SAFETY AREAS

8.1 A defined area on a HLS surrounding the FATO which is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.

8.2 A FATO shall be surrounded by a safety area which need not be solid.

8.3 A safety area surrounding a FATO shall extend outwards from the periphery of the FATO for a distance of at least 3m or 0.25D, whichever is greater, of the largest helicopter the FATO is intended to serve and:

a. each external side of the safety area shall be at least 2D where the FATO is quadrilateral; or

b. the outer diameter of the safety area shall be at least 2D where the FATO is circular.

8.4 There shall be a protected side slope rising at 45 degrees from the edge of the safety area to a distance of 10m, whose surface shall not be penetrated by obstacles, except that when obstacles are located to one side of the FATO only, they may be permitted to penetrate the side slope surface.

8.5 The surface of the safety area, when solid, shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

8.6 Where applicable, the surface of the safety area shall be treated to prevent flying debris caused by rotor downwash.

8.7 When solid, the surface of the safety area abutting the FATO shall be continuous with the FATO.

9.0 SAFETY NETS

9.1 Where there is a sheer drop from the edges of the HLS and the free movement of passengers and HLS personnel cannot be made without some risk, a safety net shall be installed around the edge of the HLS but shall not exceed the height of the TLOF.

9.2 The net should extend outwards in the horizontal plane to at least 1.5 m from the edges of the HLS and be capable of withstanding, without damage, a 95 kg mass being dropped from a height of 1.0 m. It should be so manufactured that it provides a hammock effect for a person falling into it rather than the trampoline effect produced by some rigid materials. Where possible, the safety net should be so arranged that the outboard edge is slightly above the level of the HLS but by no more than 0.25 m, having an upward and outward slope of at least 10'.

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10.0 OTHER REQUIREMENTS

10.1 **Heliport dimensions and related information;** the following data shall be measured or described, as appropriate, for each facility provided on a heliport/helicopter landing site:

(a) heliport/HLS type — surface-level, elevated, shipboard or helideck;
(b) TLOF — dimensions to the nearest metre or foot, slope, surface type, bearing strength in tonnes (1000 kg);
(c) FATO — type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length
(d) and width to the nearest metre or foot, slope, surface type;
(e) safety area — length, width and surface type;
(f) helicopter ground taxiway and helicopter air taxiway — designation, width, surface type;
(g) apron — surface type, helicopter stands;
(h) clearway — length, ground profile; and
(i) visual aids for approach procedures, marking and lighting of FATO, TLOF, helicopter ground taxiways, helicopter
(j) air taxiways and helicopter stand.

10.2 **Geographical coordinates;** the following (where applicable) shall be measured and reported to the aeronautical information services: -

(1) in degrees, minutes, seconds and hundredths of seconds;
  (a) geographical coordinates of the geometric centre of the TLOF and/or of each threshold of the FATO (where appropriate),
  (b) geographical coordinates of appropriate centre line points of helicopter ground taxiways and helicopter air taxiways where applicable in degrees, minutes, seconds and hundredths of seconds, and
  (c) geographical coordinates of each helicopter stand.

(2) In degrees, minutes, seconds and tenths of seconds; geographical coordinates of obstacles in Area 2 (the part within the heliport boundary) and in Area 3

(3) the top elevation, type, marking and lighting (if any) of obstacles

Note 1 - refer to Annex 15, Appendix 1, for graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in Areas 2 and 3.
Note 2 - PANS-AIM (Doc 10066), Appendix 1, provides requirements for obstacle data determination in Areas 2 and 3.

10.3 **Rescue equipment;** this should be housed in a heavy duty carry bag/box.

i. An Axe
ii. Fire resistant gloves, 2 pairs.
iii. Crowbar
iv. Hacksaw, heavy duty with a minimum of 6 spare blades
v. Large Bolt cutters
vi. Length of rope (climbing) to assist access (approx. 30m)
vii. Fire resistant blanket

10.4 **Fire equipment;** 2 medium (9kg) Dry Chemical Powder (DCP) or foam, or alternative fire-fighting resources providing a similar or better level of protection may be used.

10.5 **Medical kit;** Medical first aid equipment, ideally consisting of pre-packed wound dressings in protective containers, scissors, adhesive dressings and burn dressings, stretchers or spine boards and blankets.

10.6 **Wind Direction Indicator;** at least one wind direction indicator located so as to indicate the wind conditions over the FATO and TLOF and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It should be visible to the pilot during take-off, approach and landing. More than one indicator may be needed at more complex locations to ensure pilots receive full information on the wind flow over the site.

10.7 **Ground Crew;** two competent ground crew available on-site for all helicopter movements. The ground crew shall have completed training acceptable to the Authority in the following areas: -

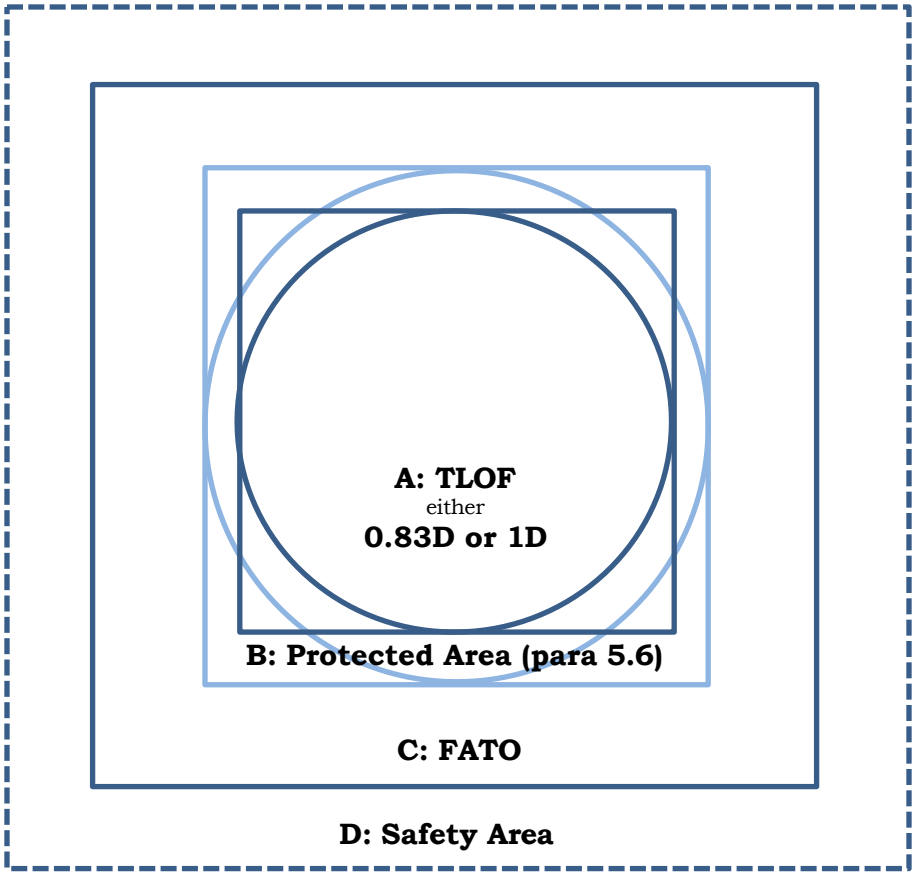
a. working around helicopters (normally provided by the Helicopter Operators, and

b. Rescue and Fire-fighting

10.8 **HLS identification marking**; Where possible, an identification marking should be painted on the HLS FATO in the form of a large letter 'H', with dimensions equal to 4 x 3 x 0.75 m (height x width x stripe) and proportionately smaller for smaller facilities. The long side of the marking should be oriented to the preferred final approach paths to the HLS.

10.9 **Emergency Response Plan;** a plan, acceptable to the Authority, shall be developed, identifying facilities, equipment, procedures, personnel and responsibilities at the HLS, that will be activated for an accident or incident.

APPENDIX A: TLOF, PROTECTED AREA, FATO & SAFTEY AREA



APPENDIX B: CALCULATED AREAS FOR COMMON AIRCRAFT TYPES IN FIJI

			Bell 407	AS355	EC145
	Maximum take-off weight (MTOW)		**2268 Kgs**	**2450 Kgs**	**3585Kgs**
	Static load-bearing surface **Dynamic load-bearing surface**		3402 Kgs 5670 Kgs	3675 Kgs 6125 Kgs	5378 Kgs 8963 Kgs
Dimensions	**Item**	**Notes**			
A	Minimum TLOF size	Circle of 0.83 D of the largest helicopter. (*Annex 14 3.2.16)*	10.48m Square or Circular	10.74m Square or Circular	10.82M Square or Circular
B	Protected Area	0.25 x RD around the TLOF	RD 10.66m 2.67m	RD 10.69m 2.67m	RD 11.00m 2.75m
C	Minimum FATO size (*Annex 14 3.1.3.b1)*	MTOW of helicopters the FATO is intended to serve is 3.175 kg or more.	12.62m	12.94m	13.03M
	Minimum FATO size (*Annex 14 3.1.3.b2)*	MTOW of helicopters the FATO is intended to serve is 3.175 kg or less.	10.48m	10.74m	NA
D	Minimum Safety area width	At least 3m or 0.25m D	3.24m	3.16m	3.26
E	Safety area Boundary (*Annex 14 3.1.22 a & b)*	At least 2 D	25.24m	25.88m	26.06M

APPENDIX C: HELICOPTER PERFORMANCE

Helicopters operate in two categories and three classes, it is the latter which concerns the size, shape and surrounds of the HLS.

<table>
<tr><td colspan="2">Category A

A multi-engine helicopter designed with engine and system isolation features specified in the applicable airworthiness codes and capable of operations using take-off and landing data scheduled under a critical engine failure concept that assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off in the event of engine failure.</td><td>Category B

A single-engine or multi-engine helicopter that does not meet Category A standards. Category B helicopters have no guaranteed capability to continue safe flight in the event of an engine failure, and unscheduled landing is assumed.</td></tr>
<tr><td>‘Operation in performance class 1’ means an operation that, in the event of failure of the critical engine, the helicopter is able to land within the rejected take-off distance available or safely continue the flight to an appropriate landing area, depending on when the failure occurs.

Examples of Category A Class 1; A109 and Bell 212</td><td>‘Operation in performance class 2’ means an operation that, in the event of failure of the critical engine, performance is available to enable the helicopter to safely continue the flight, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required.

Examples of Category B Class 2; AS355</td><td>‘Operation in performance class 3’ means an operation that, in the event of an engine failure at any time during the flight, a forced landing may be required in a multi-engine helicopter and will be required in a single-engine helicopter.

Examples of Category B Class 3; AS350, B407, R44</td></tr>
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Note: - In the event that a Class 3 helicopter should suffer an engine failure whilst landing or taking off, the size and shape of the FATO and Safety Area is critical.

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