Australian Government
Civil Aviation Safety Authority

Civil Aviation Advisory Publication

May 2013

Guidelines for the establishment of on-shore Helicopter Landing Sites (HLS)

CAAPs provide guidance, interpretation and explanation on complying with the Civil Aviation Regulations (CAR) or Civil Aviation Orders (CAO).

This CAAP provides advisory information to the aviation industry in support of a particular CAR or CAO. Ordinarily, the CAAP will provide additional 'how to' information not found in the source CAR, or elsewhere.

A CAAP is not intended to clarify the intent of a CAR, which must be clear from a reading of the regulation itself, nor may the CAAP contain mandatory requirements not contained in legislation.

Note: *Read this advisory publication in conjunction with the appropriate regulations/orders.*

This CAAP will be of interest to

- Aerodrome and HLS designers
- Current and future Air Operators' Certificate (AOC) holders authorised to conduct helicopter operations
- Current and future aerodrome and HLS operators
- HLS certification agents
- Helicopter pilots
- Suppliers of aerodrome and HLS equipment

Why this publication was written

This Civil Aviation Advisory Publication (CAAP) has been written as an interim measure to remove reference to the recommended criteria for off-shore resource platform and vessel-based HLS (helidecks), as this information is available now in a separate advisory publication – CAAP 92-4.

Status of this CAAP

This is the third issue of CAAP 92-2 and supersedes CAAP 92-2(1) issued in 1996. CASA has taken the opportunity to align concepts in this document with current terminology until a fully revised CAAP on the design and siting of on-shore HLSs is published, or standards are promulgated in the Part 139 Manual of Standards (MOS).

For further information

Additional copies of this and other related CAAPs may be obtained from the CASA website. For policy advice contact your local CASA regional office (Telephone 131 757).

Contents

1. Relevant regulations and other references

- Regulations 92, 92A and 93 of the *Civil Aviation Regulations 1988 (CAR)*
- Part 139 and proposed Parts 133 and 138 of the *Civil Aviation Safety Regulations 1998 (CASR)*
- Aeronautical Information Publication (AIP–AD)
- Annex 14, Volume II – *Heliports*, to the Chicago Convention
- ICAO *Heliport Manual* (Doc 9261)
- CASA Policy Notice CEO PN025-2005

2. Acronyms

AIP	Aeronautical Information Publication
AFM	Aircraft Flight Manual
AOC	Air Operators Certificate
CAAP	Civil Aviation Advisory Publication
CAR	Civil Aviation Regulations 1988
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations 1998
FATO	Final Approach and Take-off area
HLS	Helicopter Landing Site
ICAO	International Civil Aviation Organization
MOS	Manual of Standards
RD	Rotor Diameter
RPT	Regular Public Transport
SARPs	Standards and Recommended Practices
TD/PM Circle	Touchdown/Positioning Marking Circle
TLOF	Touchdown and lift-off area
VMC	Visual Meteorological Conditions

3. Definitions and other expressions

AIR TAXI – the airborne movement of a helicopter at low speeds and at heights normally associated with ground effect.

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 an HLS.

BASIC HLS – 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 helicopter Visual Meteorological Conditions (VMC).

BUILDING – any elevated structure on land.

CATEGORY A – with respect to rotorcraft, means a multi-engined rotorcraft that is:

(a) designed with engine and system isolation features specified for Category A requirements in Parts 27 and 29 of the FARs or EASA CS–27 and CS–29; and

(b) capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated ground or water area and adequate performance capability for continued safe flight or safe rejected take-off in the event of engine failure.

D-VALUE (D) – the largest overall dimension of the helicopter when rotors are turning. This dimension will normally be measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane (or the most rearward extension of the fuselage in the case of Fenestron or Notar tails).

FINAL APPROACH AND TAKE-OFF AREA (FATO) – in relation to an HLS, means 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.

FINAL APPROACH – the reduction of height and airspeed to arrive over a predetermined point above the FATO of an HLS.

GROUND TAXIING – movement of a helicopter on the ground under its own power on its undercarriage wheels.

HELICOPTER VMC – Visual Meteorological Conditions in relation to helicopters, as detailed in the Aeronautical Information Publication (AIP).

HELICOPTER LANDING SITE (HLS):

(a) an area of land or water, or an area on a structure on land, intended for use wholly or partly for the arrival or departure of helicopters; or

(b) a helideck; or

(c) a heliport.

HELIDECK – an area intended for use wholly or partly for the arrival or departure of helicopters on:

(a) a ship; or

(b) a floating or fixed off-shore structure.

HELIPORT – an area that is:

(a) intended for use wholly or partly for the arrival or departure of helicopters, on:

(i) land; or

(ii) a building or other raised structure on land; and

(b) meets the heliport standards set out in Annex 14, Volume II to the Chicago Convention or an equivalent standard used by a National Aviation Authority.

LIFT-OFF – in relation to a helicopter, means to raise the helicopter from a position of being in contact with the surface of the HLS into the air.

MOVEMENT – a touchdown or a lift-off of a helicopter at an HLS.

SAFETY AREA – A defined area on a standard HLS surrounding the FATO, or other defined area, 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.

STANDARD HLS – a place suitable for use as an aerodrome for helicopter operations by day or night that does not conform fully to the standards for a heliport set out in Annex 14, Volume II to the Chicago Convention.

TAKE-OFF – in relation to a helicopter, means to accelerate into forward flight and commence climb at the relevant climb speed.

Note: *Dependent on the take-off technique being used, the aircraft may be positioned using a vertical or a back-up profile prior to the forward acceleration segment.*

TOUCHDOWN – means lowering the helicopter from a flight phase not in contact with the surface of the HLS into a position which is in contact with the surface of the HLS for a landing.

TOUCHDOWN AND LIFT-OFF AREA (TLOF) – a defined area on an HLS in which a helicopter may touchdown or lift-off.

Note: *An expression that is defined in the Civil Aviation Act, the Civil Aviation Regulations or the AIP has, when used in this CAAP, the same meaning as it has in those publications.*

4. Background

4.1 Presently, paragraph 92(1)(d) of CAR states:

An aircraft shall not land at, or take-off from, any place unless…the place…is suitable for use as an aerodrome for the purposes of the landing and taking-off of aircraft; and, having regard to all the circumstances of the proposed landing or take-off (including the prevailing weather conditions), the aircraft can land at, or take-off from, the place in safety.

4.2 The Civil Aviation Act 1988 (the Act) defines an aerodrome, as:

an area of land or water (including any buildings, installations and equipment), the use of which as an aerodrome is authorised under the regulations, being such an area intended for use wholly or partly for the arrival, departure or movement of aircraft.

4.3 In the latter definition, the concept of 'authorised' means an aerodrome that is authorised by a certificate or registration under Part 139 of CASR. This concept also applies to aerodromes established under the *Air Navigation Act 1920*; a place for which a requirement of Section 20 of the *Civil Aviation Act 1988* is in force; and to places that are not aerodromes. However, Regulation 2 of CAR does not define an HLS.

4.4 Likewise, Part 139 of CASR and its MOS do not (at this time) apply to an HLS unless it is located on an aerodrome. This aside, due to the fact that helicopters can be operated from a variety of locations (which may or may not be normally an HLS), it is CASA policy that guidance on what constitutes a suitable HLS, in a variety of circumstances, should be made available to industry.

4.5 In keeping with submissions to ICAO on this topic, CASA recommends owners and operators of an HLS, who intend to develop and operate a heliport for the purposes of RPT or Charter operations, should refer to and comply with the ICAO Standards and Recommended Practices (SARPs) set out in Annex 14, Volume II to the Chicago Convention.

5. Factors that should be considered prior to using an HLS

5.1 The pilot of a helicopter operating to, from or at an HLS should ensure that:

- the HLS is clear of all:
  - persons – other than persons who are trained and been found competent in helicopter operational safety procedures and who are essential to the helicopter operation; and
  - objects and animals likely to be a hazard to manoeuvring the helicopter – other than objects essential to the helicopter operation;
- no person is within 30 metres of an operating helicopter, other than a person who is essential to the safe conduct of the operation and who is trained and been found competent in helicopter operational safety procedures.

  Note: *Despite the above, unless the specific nature of the task requires it, CASA recommends that, for normal operations, the FATO and the TLOF are free of personnel and obstacles while the helicopter is operating.*
- appropriate permission from the owners and authorities has been obtained;
- where the performance requirements of an Aircraft Flight Manual (AFM) detail greater or additional requirements for defined areas or the approach and departure paths (than those set out in these guidelines), then the greater and/or additional requirements are met.

5.2 A helicopter must not land at, or take-off from an HLS unless:

- for a flight under the Visual Flight Rules, the applicable helicopter VMC exists;
- for any flight, the relevant instructions in the AIP are followed; and
- for an HLS that is located within controlled airspace:
  - two-way VHF radio communications with the relevant Air Traffic Service unit is established; and
  - the appropriate Air Traffic Control clearances have been received.

5.3 If a proposed HLS is to be located near a city, town or populous area (or any other area where noise or other environmental considerations make helicopter operations undesirable), it may be subject to the provisions of the *Commonwealth Environment Protection (Impact of Proposals) Act 1974* and parallel State legislation. There may be other local legislation that also applies to the siting of HLSs.

5.4 With respect to operations in multi-engine helicopters at an HLS, the pilot in command should ensure that the operation complies with the relevant requirements of CASA CEO Policy notice CEO PN025-2005. See http://www.casa.gov.au/corporat/policy/notices/CEO-PN029-2005.pdf.

6. Attributes of an HLS[1]

6.1 The helicopter is one of the more versatile of aircraft and can (if required under special circumstances) operate to and from a space little larger than its overall length. The smaller the site, and the less known about hazards presented by obstacles and surface conditions, the greater the risk associated with its use. The risk presented by such hazards can be reduced when:

- the size of the defined areas of the HLS are greater than the minimum required size;
- sufficient information is available about the site to the pilot in command in a suitable form; and
- visual information, cues and positional markings are present for the defined areas at the site.

Defined Areas

6.2 Defined areas are the basic building blocks of an HLS and have a set of attributes that persist even when co-located or coincidental with another defined area (In these cases the defined area with the more limiting standard would apply.)

6.3 Defined areas are in one of four main categories:

- **FATO** – the area over which the final approach is completed and the take-off conducted;
- **TLOF** – the surface over which the touchdown and lift-off is conducted;
- **Stand(s)** – the area for parking (and within which positioning takes place); and
- **Taxiways and associated taxi routes** – the surfaces and areas for ground or air taxi.

6.4 A defined area on a landing site may have one or more of three basic attributes:

- **Containment –** an attribute which affords protection to the helicopter and/or its undercarriage and permits clearance from obstacles to be established. Containment is of two types: undercarriage containment and helicopter containment.
  - Where a defined area (such as a TLOF or taxiway) provides only undercarriage containment, it should be situated within, or co-located with, another defined area (a FATO, stand or taxi-route) to ensure that helicopter containment is attained.
- **Surface loading –** this ensures adequate surface strength to permit a helicopter to touchdown, park or ground taxi without damage to the surface of the HLS or helicopter.
  - Surface loading is either:
    - **static** – where only the mass (one G) of the helicopter is considered, although elevated heliports/helidecks may include additional factors to protect the building/structure; or
    - **dynamic** – where the apparent weight (a force comprised of multiples of G) of the helicopter is used. Two types of dynamic loading need to be considered:
      - dynamic loading due to normal operations; and

[1] Adopted from ICAO Heliport Design Working Group Information Paper: 'Heliports - Defined Areas', presented by Mr Jim Lyons 4 December 2012.

- dynamic loading due to a heavy landing, determined by an 'ultimate limit state' test (touchdown at a rate of descent of 12 ft/sec for surface-level heliports).

Note: *See chapter 1.2.1.10 of the ICAO Heliport Manual; and chapter 1.3.2 for guidance on elevated heliports.*

In addition to surface loading, durability is also a necessary consideration for the designer. For this reason, likely traffic must be taken into consideration to ensure that the surface loading remains as specified for the life of the facility (or the applicable maintenance period).

- An **additional safety/protection area**:
  - **for a FATO** – a safety area surrounds the FATO and compensates for errors in manoeuvring, hovering and touchdown;
  - **for a stand** – a protection area surrounds the stand and compensates for errors of manoeuvring; and
  - **for a taxi-route** – a protection area incorporated in the taxi-route, which compensates for errors of alignment and/or manoeuvring.

With this in mind, the following section includes guidance for HLS designers in their consideration of these concepts.

7. Recommended criteria for an HLS

7.1 Basic HLS

7.1.1 A Basic HLS should:

- be large enough to accommodate the helicopter, and have additional operator-defined safety areas (or buffers) to allow it and the crew to conduct the proposed operation at the location safely;
- have a landing area strong enough to withstand the dynamic loads imposed by the helicopter; and
- only be used for day operations under helicopter VMC.

Note 1: *Requiring dynamic load bearing capability assumes all static load limits imposed by the helicopter and any other structure or vehicle will also be met. Operators should ensure this is the case prior to using the site.*

Note 2: *Because of their often developmental and 'basic' nature, CASA recommends that operators carry out thorough risk and hazard assessments of such locations for the proposed operation and apply appropriate controls to any hazards identified during this process.*

7.2 Standard HLS

7.2.1 Since a Standard HLS is intended to be used for numerous types of operations, both day and night under helicopter VMC, it should satisfy the following guidelines:

- The **FATO** should, at minimum, be capable of enclosing a circle with a diameter equal to one-and-a-half times the length of the helicopter, when the rotor(s) are turning (1.5 x D), and be free of obstacles likely to interfere with the manoeuvring of the helicopter:

- The FATO should provide ground effect if the associated TLOF is located outside of its defined area, unless operations at the HLS are to be limited to 'hover out of ground effect performance capability'. If the FATO and TLOF are coincident (eg, on a roof top) then it follows that the whole area should be dynamic load bearing and provide ground effect.
- It is recommended that a safety area extend of at least 0.25 x D or 3 metres around the FATO, or a larger distance if considered necessary for a particular HLS.
- The safety area surrounding FATO need not be a solid surface. However, its attributes should provide that no fixed object should be permitted on or in the area defined as the safety area, except as provided for by the following paragraph.
- Frangible objects, which because of their aviation safety function need to be located in this area, are acceptable but helicopter operators who use the HLS should be made aware of their location. Objects in the safety area should not exceed a height of 25 cm.
- The mean slope of a FATO should not exceed 5% for 'Category A' operations or 7% for other operations (or lesser figures if required by the AFM).

- Have at least one **TLOF** area – being a cleared and stable area capable of bearing the dynamic loads which may be imposed by the helicopter on the site by a heavy landing. The TLOF area, at minimum, should be an area equal to 1 x D and may or may not be located within the FATO:
  - The TLOF should provide for adequate drainage to prevent accumulation of water on the surface, but the overall slope should not exceed the maximum slope landing capability of the helicopter. The recommended maximum slope for a TLOF is 2% in any direction.
  - If the TLOF is not within the FATO, it should be co-located with a stand. In this case the TLOF is also protected by the safety area of the stand.
  - An air taxiing route with a width equal to twice the main *rotor* diameter (RD) of the design helicopter should be provided between the FATO and the TLOF.

Figure 1: Standard HLS – A 1 x D TLOF within a 1.5 x D FATO and additional 0.25 x D Safety Area (Total area is 2 x D). Also showing 'H', FATO perimeter and TD/PM markings.

- A helicopter **Stand** should be of sufficient size to contain a circle with a diameter of at least 1.2 x D, plus a 0.4 x D protection area for the largest helicopter the stand is intended to serve.

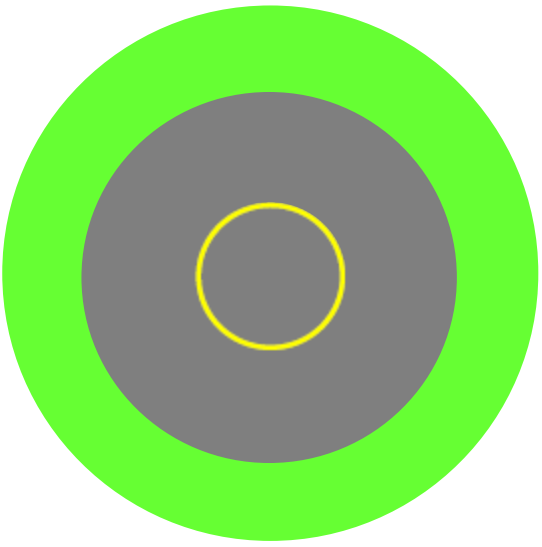

Figure 2: Helicopter stand showing 1.2 x D (grey area) and 0.4 x D protection area (Green area. Also shown with TD/PM marking – see section 7.3)

- When a helicopter stand is to be used for turning in the hover, the minimum dimension of the stand and protection area should be not less than 2 x D, and suitably larger for wheeled helicopters turning on the ground taking into account the arc, or path, of the tail rotor.
- No fixed objects should be permitted within the stand and protection area. All moveable objects, except those essential to the operation (eg, portable floodlights), should be removed so as not to present a hazard while the helicopter is operating.
- If there is a need for more than one stand, locate each within its own TLOF and with its own safety area.
- For multiple adjacent stands and related simultaneous operations, refer to the ICAO *Heliport Manual*.

- The **approach and departure paths** should extend outwards from the edge of the FATO as illustrated in Figure 3 and have an obstacle free gradient of approximately 7 degrees (1:8 vertical to horizontal), measured from the edge of the FATO to a height of 500 feet above the FATO level. The sides of the obstacle free sector should diverge at an angle of 10 degrees in the horizontal plane to a maximum of seven times the RD of the design helicopter for visual day operations and ten times the RD for visual night operations[2]. This path may be curved left or right to avoid obstacles or to take advantage of a more advantageous approach or departure path.

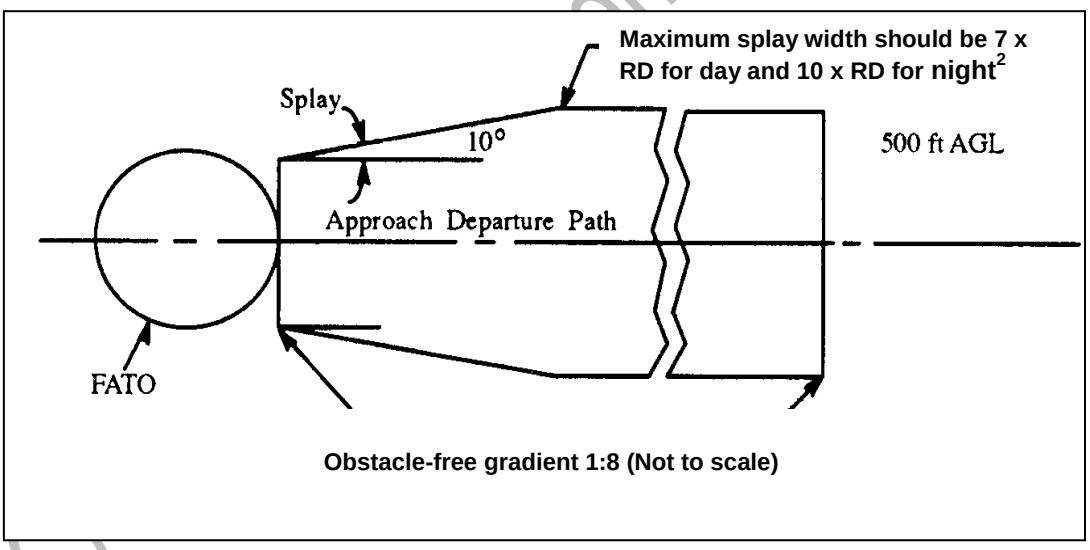

Figure 3: Dimensions of Standard HLS Approach and Departure Paths (Visual Operations)

- **Access** – the HLS should be sited with separate primary and emergency personnel access routes, with both routes located as far apart as practicable.
- **Fire extinguishers** – the HLS should be equipped with at least two carbon dioxide fire extinguishers, each with a minimum capacity of 4.5 kg. One extinguisher should be positioned at each of the primary and emergency personnel access routes.

[2] Note that this is an increase on the 4 x RD width suggested in CAAP 92-2(1).

7.3 Markings and indicators

- Wind Indicator:
  - A standard HLS should be equipped with at least one wind indicator, which is visible to the pilot for take-off, approach and landing.
  - The wind indicator for night operations should be capable of being lit or meet the requirements of paragraph 7.7.

  Note: *CASA recommends the wind indicator standards outlined in paragraphs 5.1.1.4 to 5.1.1.7 of Annex 14, Volume II to the Chicago Convention.*

- HLS Identification Marker:
  - Should be painted on the HLS FATO in the form of a large letter 'H' as specified in the Part 139 MOS.
- FATO edge markers:
  - The edge of the FATO should be marked with a 40 cm-wide white stripe, painted to clearly delimitate the FATO on the HLS; and
  - If the FATO is separate from the TLOF, it should be marked so it is easily identifiable by the pilot when conducting operations. The use of aiming point markings may assist in this situation.
- A runway-type FATO should be marked in accordance with the standards in Chapter 5 of Annex 14 Volume II
- Aiming point marker:
  - An aiming point marker should be provided at the HLS where it is necessary to make an approach to a particular point prior to moving to the TLOF. CASA recommends that any aiming point marker should be in line with the standards outlined in Chapter 5 of Annex 14, Volume II.
- Touchdown/Positioning Marking (TD/PM):
  - A TD/PM circle should be provided where it is necessary for a helicopter to touch down or be accurately placed in a specific position;
  - A TD/PM should be located so that when the pilot's seat is over the marking, the undercarriage will be inside the load-bearing area and all parts of the helicopter will be clear of any obstacle by a safe margin; and
  - A TD/PM should be a yellow circle and have a line width of at least 0.5 m. The inner diameter of the circle should be 0.5 D of the largest helicopter the HLS TLOF is intended to serve.

  Note: *Further information on touch down and positioning marking can be found in Chapter 5 of Annex 14, Volume II and the ICAO Heliport Manual.*

- A maximum helicopter tonnage marking:
  - should be painted as a whole number on the HLS within the FATO with the weight, expressed in kilograms, calculated by multiplying the indicator number by 1000; and
  - these figures should be orientated to the preferred approach path and be able to be read on final approach to the HLS.

7.4 Buildings

7.5 As the operators of most building-sited HLSs will want to cater for charter operations (and future Air Transport type flights under the CASRs), the reader should consult the Standards and Recommended Practices in section 3.2 of Annex 14, Volume II to the Chicago Convention. This and the ICAO *Heliport Manual* have extensive provisions and guidance on the design and construction of elevated heliports.

> ***Note:*** *CASA does not recommend construction of new elevated HLSs with D values less than 1 x D*

7.6 The following are additional guidelines to subsections 7.2 and 7.3 of this CAAP and are suggested for operations from an elevated Standard HLS that – for whatever reason – cannot meet the ICAO standards:

- **Drainage facilities** should be provided to prevent the collection, spreading or draining of liquids on to other parts of the building.
- **A safety net** should also be provided as a means of avoiding risk of death or injury to passengers, crew and other personnel. The outer edge of an elevated HLS should be protected by a safety net, or similar device, that is at least 1.5 metres wide and does not project above the level of the HLS at its outer edge.

7.7 Night Operations

7.7.1 For night operations at a RPT or Charter capable HLS, designers should refer to Annex 14, Volume II of the Chicago Convention and the ICAO *Heliport Manual*.

7.7.2 For other night operations the following guidelines are suggested; however designers may apply the ICAO standard if desired:

- **Lighting** – the edge of the FATO should be defined by either omni-directional white lights which project no more than 25 centimetres above the level of the HLS – spaced no more than eight metres apart, or by a combination of markings and floodlighting.
- **Wind velocity information –** this may be accomplished by either an illuminated wind direction as mentioned in Section 7.3 above or by any other suitable means such as radio communication with a responsible person located at, or in close proximity to, the HLS.
- **Approach guidance** – when it is considered essential that an accurate approach path be achieved, due to obstacles, the direction of approach should be indicated by at least two omni-directional green lights, or by one white lead-in light, positioned as indicated in Figure 4 of this CAAP.
- Any **air taxiing route**, as recommended for day operations, should have a minimum width equal to three times the main RD of the helicopter and, depending on the operational demands, be marked by either blue edge or green centre line lights spaced at 15 metre intervals, or be floodlit.
- **All lights**, except air-taxiing route lights, should be visible from at least 5 km in clear conditions and be compatible with Night Vision Goggles if they are to be used for operations into this site.

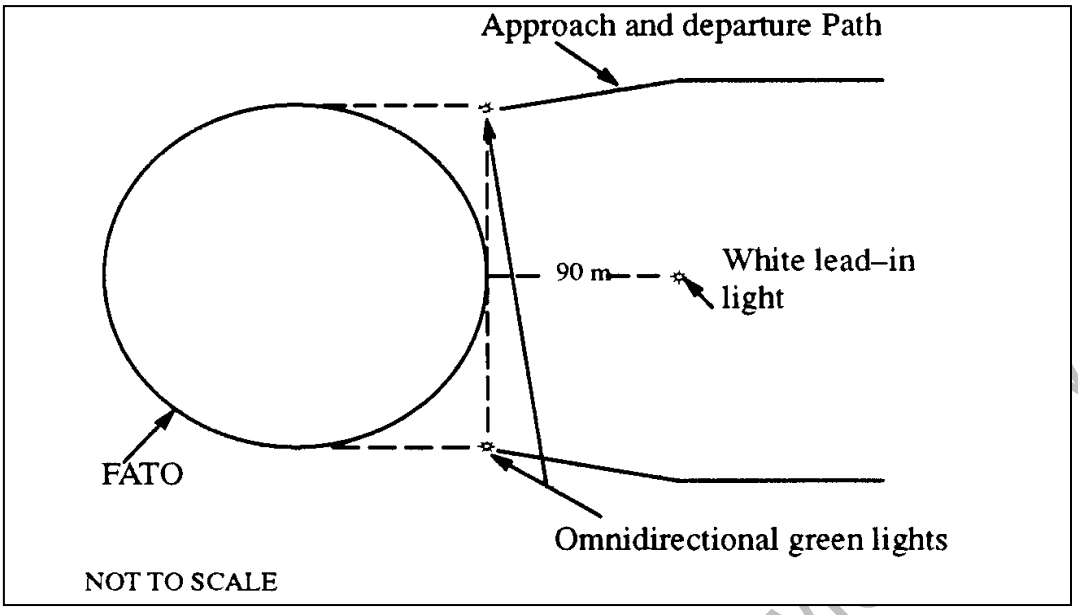

Figure 4: Approach guidance lighting for a Standard HLS

Note: *Readers looking for guidance on the design and operation of off-shore resource platform, off-shore resource ship and marine HLS should read CAAP 92-4.*

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