

# Advisory Circular

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## GUIDANCE ON HANDLING OF OBSTRUCTIONS

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### GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 11 of the Air Navigation Act 1966 (ANA), to demonstrate compliance with a statutory requirement. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

### PURPOSE

This AC provides the guidance to demonstrate compliance with, and information related to the handling of obstructions such as the limitation, control of obstacles, and making arrangements for the removal or lowering of obstacles to ensure the safe operation of aircraft at the aerodrome.

### APPLICABILITY

This AC is applicable to an operator who intends to or holds an aerodrome certificate or heliport certificate.

### RELATED REGULATIONS

This AC relates specifically to Regulation 26 of the Air Navigation (139 – Aerodromes) Regulations 2023 (“ANR-139”).

### RELATED ADVISORY CIRCULARS

- AC 1-3 Safety Management System
- AC 139-2-1 Guidance on Aerodrome manual or Heliport Manual
- AC 139-4-1 Application to deviate from Aviation Specifications

## CANCELLATION

This is the first AC issued on the subject.

## EFFECTIVE DATE

This AC is effective from 1 March 2023.

## OTHER REFERENCES

- ICAO Annex 14, Vol I Aerodrome Design and Operations
- ICAO Airport Services Manual Part 6 – Control of Obstacles and Part 8 Airport Operational Services (Doc 9137)
- Civil Aviation Authority of New Zealand – Advisory Circular 139-10

## 1 CONTROL OF OBSTACLES

1.1 The effective utilisation of an aerodrome may be considerably influenced by man-made activities<sup>1</sup> and natural growths (e.g. trees) within the aerodrome and its vicinity. These may result in:

- (a) Limitations on the distances available for take-off and landing operations;
- (b) The range of meteorological conditions in which take-off and landing operations can be undertaken;
- (c) A reduction in the payload of some aircraft types; or
- (d) Any of the combinations above

Such man-made activities and natural growths can pose as a hazard to aircraft operations at the aerodrome.

1.2 Obstacle limitation surfaces (OLS) is defined in the ANR-139 as:

*“A series of surfaces that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aircraft operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.”*

1.3 The operator is responsible for the limitation and control of obstacles and making arrangements for the removal or lowering of obstacles at and within 5km of the aerodrome. For obstacles located within 5km of the aerodrome, the operator should formalise an arrangement with CAAS and other relevant authorities to deal with the timely removal or lowering of these obstacles. Procedures and arrangements to remove or lower such obstacles should be developed in consultation with relevant stakeholders and captured in the aerodrome manual as standard operating procedures, which should be updated as and when there are changes.

1.4 Effective obstacle control processes require the collective efforts of various parties including the operator, relevant authorities, property / construction site owners and the general public. These efforts would provide a safe environment for efficient and safe operation of aircraft at and near the aerodrome. In this regard, the operator should regularly engage the relevant parties to ensure that the established processes are robust and effective.

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<sup>1</sup> Man-made activities include construction activities and aerial activities such as flying or operating a kite, parasail, captive balloon, model aircraft or unmanned airship.

- 1.5 The operator should minimally consider the following for its obstacle control regime:
- (a) Frequency and timing of obstacle surveys;
  - (b) Marking and lighting of obstacles other than natural growths;
  - (c) Staff competency and training;
  - (d) Calibration of equipment required for obstacle surveys;
  - (e) Conduct of day obstacle surveys;
  - (f) Conduct of night obstacle surveys;
  - (g) Documentation and follow-ups;
  - (h) Promulgation of information on obstacles;
  - (i) Obstacle data analysis and continuous improvement; and
  - (j) Engagement with relevant authorities and stakeholders in removal of obstacles.
- 1.6 The operator should contact CAAS Airspace Policy Division concerning obstacle-related matters and copy CAAS AAR Division in such correspondences.
- 1.7 The operator should consult CAAS early on any proposed construction within the aerodrome that may be beyond the limits of the obstacle limitation surfaces that extend above a height established by CAAS.
- 1.8 The operator must notify CAAS of the presence of all obstacles, including shielded obstacles as described in **Appendix A**, and their detailed characteristics through the submission of its Aerodrome Manual.

## **2 MARKING AND LIGHTING OF OBSTACLES**

- 2.1 The operator should make every effort to have the obstacles removed or reduced in height so that they no longer pose danger to aircraft operations.
- 2.2 Where it is impractical to remove an obstacle or to have an obstacle reduced in height, it should be appropriately marked and / or lit so as to be clearly visible to pilots in all weather and visibility conditions. Aviation Specifications 5, *Chapter– 9 - Visual Aids for Denoting Obstacles*, contains the requirements concerning marking and / or lighting of obstacles.
- 2.3 It should be noted that the marking and lighting of obstacles is intended to reduce hazards to aircraft by indicating their presence. It does not necessarily reduce operating limitations which may be imposed by the obstacle.
- 2.4 Vehicles and other mobile objects, excluding aircraft, on movement area of an aerodrome are obstacles and must be marked and if the vehicles and aerodrome are used at night or in conditions of low visibility, lit, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.
- 2.5 The operator should inspect all obstacle lights and markings at and within a radius of 5 km around the aerodrome and take necessary steps to have unserviceable lights repaired or replaced, and faded markings painted or replaced.

## **3 OBSTACLE SURVEYS**

- 3.1 The objective of obstacle control is for the operator to ascertain that man-made structures, natural growths (e.g. trees) or aerial activities likely to infringe the OLS are

discovered before they pose a danger to aircraft operations. Hence, the operator should put in place a process of systematic and frequent obstacle surveys at and within a radius of 5 km around the aerodrome. The obstacle surveys should include checks to detect any unauthorised presence of construction equipment and hazardous aerial activities that may pose a danger to aircraft operations. The operator is to take necessary corrective actions to address any penetrations of the OLS, non-compliances and /unauthorised presence of construction equipment.

- 3.2 The operator should conduct regular obstacle surveys in the day, as well as in the night, at and within a radius of 5km around his aerodrome. The operator should consider the following when planning the frequency and timing of such surveys:
- (a) Locations and types of activities e.g. construction works, operating or flying a kite or model aircraft;
  - (b) Amount of activities;
  - (c) Timing at which the activities are being carried out;
  - (d) Area of coverage and scope of each survey;
  - (e) For tree surveys, the species of natural growths (e.g. species of trees); and
  - (f) Records on previous penetrations of OLS, non-compliances and / or unauthorised presence of construction equipment as well as aerial activities.

#### **4 COMPETENCY AND TRAINING**

- 4.1 The operator should ensure that the personnel (e.g. aerodrome staff or contractor) conducting the obstacle surveys are properly trained and are able to perform the obstacle surveys.
- 4.2 The operator should put in place a formal and structured training programme for the personnel. The training programme should include recurrent training so as to maintain the proficiency of personnel and keep them updated on new developments and technology which may enhance their work.
- 4.3 The operator should also be conversant with the following:
- (a) Correct use of equipment as required for the obstacle surveys;
  - (b) Familiar with the aerodrome layout and at and within a radius of 5 km around the aerodrome;
  - (c) Identify different types of tall construction equipment used at sites;
  - (d) Identify different species of trees found at and within a radius of 5 km around the aerodrome and their characteristics;
  - (e) Read obstacle charts and be able to accurately relate obstacles in the chart to their actual ground locations;
  - (f) Calculate and measure the range and bearing of an obstacle from the aerodrome reference point;
  - (g) Identify the different types of markings & lights to be used on obstacles; and
  - (h) Information to be provided to AIS for the promulgation of a Notice to Airmen (NOTAM) to inform air traffic services units and pilots of an obstacle and its location.

#### **5 CALIBRATION OF EQUIPMENT FOR OBSTACLE SURVEYS**

- 5.1 The equipment required for obstacle surveys such as height measuring equipment and Global Positioning System (GPS) device should be calibrated to ensure its accuracy

and integrity before using. In cases where the calibration is done in-house i.e. by the aerodrome personnel, the personnel must be competent and is familiar with the self-calibration process. Otherwise, the calibration should be sent to the manufacturer for calibration as recommended before its due date.

- 5.2 The operator should ensure that the calibration records of the equipment are retained.
- 5.3 The operator should also ensure that there is spare equipment available to be used for obstacle surveys when the main equipment is found to be unserviceable.

## **6 CONDUCT OF OBSTACLE SURVEYS**

6.1 Obstacle surveys at and within a radius of 5 km around the aerodrome are conducted in the day, as well as in the night, to detect unauthorised obstacles and inform CAAS if detected. These will include checking the following:

- (a) Obstacles are within the maximum allowable height approved by CAAS and are appropriately marked and/or lit;
- (b) Erected objects (e.g. construction equipment) have been approved by CAAS;
- (c) Markings, markers, and lights on vehicles and other objects (e.g. construction equipment and buildings) are in proper working condition and properly maintained;
- (d) Natural growths (e.g. trees) are within its allowable height;
- (e) Aerial activities, if any, are approved by CAAS; and
- (f) Follow-up actions have been taken arising from previous OLS infringements, non-compliances and / or unauthorised presence of construction equipment as well as aerial activities, if any.

6.2 The operator should be aware of the developments at and within a radius of 5 km around the aerodrome. The operator should also be aware of the outcomes of the previous surveys conducted, i.e. any penetrations of OLS, non-compliances and / or unauthorised operations of construction equipment as well as aerial activities noted, to effectively plan the survey route. As the route may change from time to time, the operator should record down the changes and their reasons in the checklists used. The operator should be familiar with the area to be surveyed and the locations of sites to be checked.

6.3 The operator should carry the following items for the obstacle survey:

- (a) Up-to-date checklists for day obstacle survey (to be completed by staff during the survey);
- (b) Information on the activities at and within 5km of the aerodrome (e.g. construction sites);
- (c) Obstacle-related requirements imposed by CAAS;
- (d) Information on outcomes of previous surveys conducted;
- (e) Up-to-date obstacle charts / aerodrome maps;
- (f) Binoculars;
- (g) Digital camera;
- (h) Calibrated GPS device;
- (i) Calibrated height measuring instrument;
- (j) Documentation to facilitate his access to areas for the purposes of the survey; and
- (k) Torchlight (for night survey)

- 6.4 The operator should make use of observation points to assist in the survey. In the event that access to certain sites are required for the survey, the operator should seek necessary permissions from the land or property owner and make arrangements for access to the site.

#### *Survey of construction activities*

- 6.5 The operator, when conducting a survey on a construction site, should:
- (a) be in the appropriate personal protective equipment;
  - (b) check that numbers, types and heights of construction equipment used at the site do not pose as unauthorised obstacles. If the height measurements of the construction equipment could not be easily taken, the heights of the surrounding structures could be referred to as reference;
  - (c) if there are no works at night, check that all equipment are retracted/lowered and lit in accordance with the relevant requirements; and
  - (d) inform and provide supporting documentation (e.g. photographs) to CAAS and the person-in-charge of the construction site if unauthorised obstacles have been detected.
- 6.6 When an obstacle is detected, the operator should advise the person-in-charge to cease operations, retract / lower equipment and refer them to CAAS to apply and seek approval for the obstacle to be authorised. The operator should also report the detection to CAAS, the air traffic services provider and appropriate authorities immediately, and promulgate a NOTAM to notify on the detected obstacle.
- 6.7 The operator should also highlight the following issues, to the land or property owner, if encountered:
- (a) Flags should not increase the hazard presented by the object they mark. The operator could use binoculars to inspect the flags. Flags in poor conditions (e.g. faded, torn) should be replaced.
  - (b) Markings painted on buildings and structures located within the aerodrome that are of poor conditions (e.g. faded) should be repainted.
  - (c) When checking the obstacle lights at night, an obstacle light that is unlit or significantly dimmer than the other obstacle lights should be replaced.
- 6.8 The operator should refer to the relevant Aviation Specifications and AC 139-4-2 *Recommended Practices for Aerodromes* for specifications of flags used for marking different objects and markings used for marking buildings and structures.

#### *Survey of trees*

- 6.9 In the case of natural growths (e.g. trees), the operator should make arrangements with the property owner to remove such obstacles (e.g. by trimming the trees).
- 6.10 It is important to understand the species of trees which could pose a problem, assess the growth rate of these trees and trim them low enough so that the ensuing growth will be below the height limits until the next survey. In this regard, the operator should identify trees that are near to their height limits for closer monitoring and / or possible proactive actions (e.g. trimming) to prevent them from exceeding their height limits.

- 6.11 If a tree was found to have exceeded its height limit, the operator should immediately inform and provide supporting documentation (e.g. photographs) to CAAS and the property owner.

*Night survey of vehicles and mobile objects within the airside*

- 6.12 As part of the obstacle survey within the airside, the operator should check that the use and serviceability of lights on follow-me vehicles and mobile objects, are as specified in the relevant Aviation Specifications.
- 6.13 Besides checking for the presence of the physical light fixture and whether it is properly lit, i.e. the particular light has similar intensity / brightness as the other lights found on the same vehicle / mobile object or other similar vehicles and mobile objects located around the same area, the operator should also check if the specifications of the light are as specified in the relevant Aviation Specifications.
- 6.14 In the event that a vehicle or mobile object is not appropriately lit, the operator should immediately inform and provide supporting documentation (e.g. photographs) to CAAS and the person-in-charge of the vehicle or mobile object .

## **7 DOCUMENTATION AND FOLLOW-UPS**

- 7.1 The operator should take photographs of the trees, aerial activities, buildings, vehicles and mobile objects sighted during the survey for record purposes. These photographs should be printed and filed with the completed checklists.
- 7.2 In all cases, it is important that the operator records down all the survey information and outcomes in the checklists as they may be used for subsequent surveys or obstacle data analysis. For the purposes of NOTAM promulgation, geographical coordinates of the location of the penetration / unauthorised aerial activity should be determined in terms of World Geodetic System – 1984 (WGS-84) format using a calibrated GPS device. The operator should annotate in the up-to-date aerodrome obstacle charts, locations of the on-going activities near the aerodrome as well as the penetrations, non-compliances and unauthorised aerial activities noted during the surveys. For the latter, the operator should arrange to conduct follow-ups including revisiting the site the next day or two and keep CAAS updated.
- 7.3 It is a good practice for the personnel to share the survey conducted and its outcomes with the other personnel who may be conducting subsequent surveys. This sharing may be incorporated into the daily handing / taking over sessions between personnel.

## **8 PROMULGATION OF INFORMATION ON OBSTACLES**

- 8.1 The geographical coordinates, top elevation, type, marking and lighting, if any of the obstacles within the aerodrome and its vicinity should be measured and reported by the operator to the Aeronautical Information Service (AIS) provider.
- 8.2 Whenever a penetration, either temporary or permanent in nature, is identified, the operator is to inform CAAS and other appropriate authorities (including air traffic services provider). The operator is responsible to ensure that information on all obstacles is promptly transmitted to the AIS (e.g. issuance of NOTAM). The operator has the most direct interest in seeing that information is properly disseminated, and

through the periodic surveys, the operator is most likely to be aware of the presence of new obstacles. The operator should report all data on obstacles, including marking and lighting, if any to the AIS for promulgation. Such data should be amended at regular intervals as may be necessary to keep it up-to-date.

## **9 OBSTACLE DATA ANALYSIS AND CONTINUOUS IMPROVEMENT**

- 9.1 The operator should make use of the obstacle data collected and conduct periodic data analysis. This should allow the operator to review the overall effectiveness of the obstacle control process. Through such analysis, the operator should also be able to identify potential risks and hotspots, and develop mitigating measures to address them.
- 9.2 The operator should seek continuous improvement in the obstacle control process. The operator should review the process and ensure that it is in compliance with the relevant CAAS requirements at all times.



## APPENDIX A – SHIELDED OBSTACLES

- A1 A new obstacle located in the vicinity of an existing permanent obstacle and assessed as not posing any additional hazard to aircraft is deemed to be shielded by the existing obstacle.
- A2 Unless specifically directed by CAAS, a shielded obstacle does not require removal, lowering, marking or lighting and should not impose any additional restrictions to aircraft operations.
- A3 An existing obstacle within the approach and take-off climb area is called the critical obstacle. Where a number of obstacles exist closely together, the critical obstacle is the one which subtends the greatest vertical angle measured from the appropriate inner edge.
- A4 As illustrated in Figure 1, a new obstacle may be assessed as not imposing additional restrictions if:
- (a) when located between the inner edge end and the critical obstacle, the new obstacle is below a plane sloping downwards at 10% from the top of the critical obstacle toward the inner edge;
  - (b) when located beyond the critical obstacle from the inner edge end, the new obstacle is not higher than the height of the permanent obstacle; and
  - (c) where there is more than one critical obstacle within the approach and take-off climb area, and the new obstacle is located between two critical obstacles, the height of the new obstacle is not above a plane sloping downwards at 10% from the top of the next critical obstacle.

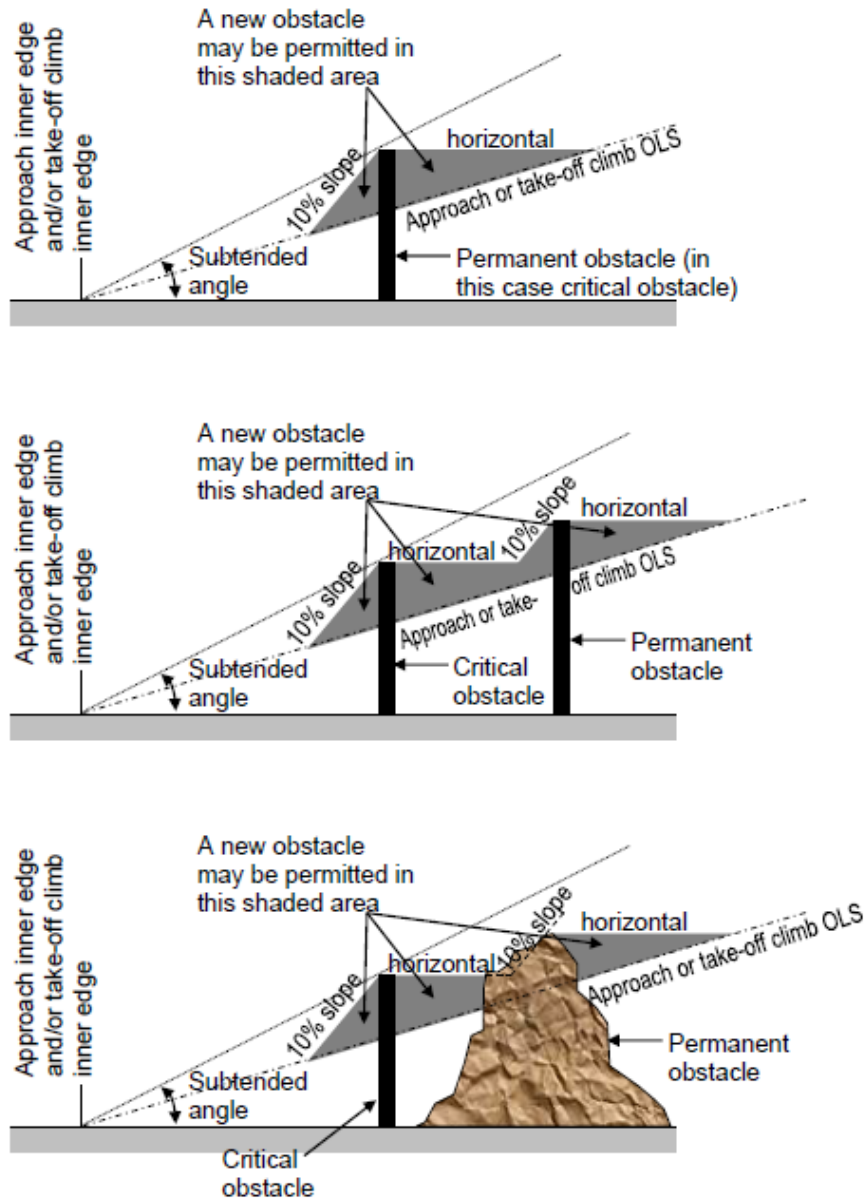


Figure 1 – Shielding of obstacles penetrating the approach and take-off climb surfaces

*Obstacle penetrating the inner and outer horizontal and conical surfaces*

- A5 A new obstacle may be accepted if it is in the vicinity of an existing obstacle, and does not penetrate a 10% downward sloping conical-shaped surface from the top of the existing obstacle, i.e. the new obstacle is shielded radially by the existing obstacle.

*Obstacle penetrating the transitional surfaces*

- A6 A new obstacle may be assessed as not imposing additional restrictions if it does not exceed the height of an existing obstacle which is closer to the runway strip and the new obstacle is located perpendicularly behind the existing obstacle relative to the runway centre line.