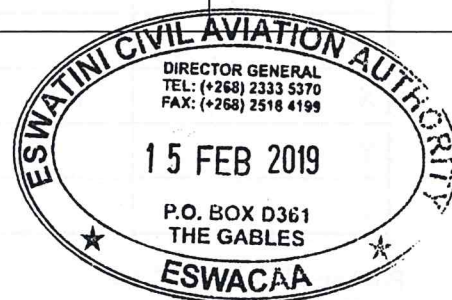




ESWATINI CIVIL AVIATION AUTHORITY

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RECORD OF AMENDMENTS

All amendments to this AC shall contain the authorisation of ESWACAA.

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A - 00	01/11/2016	Formal issue	ST
B - 01	20/07/2018	2.1.4; 2.3.18; Table-4.1, 4.2,4.3; 4.12	ST
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Order

SW-FSSD-AGA-OD-001

ESWATINI CIVIL AVIATION AUTHORITY

February 2019

OBSTACLES LIMITATIONS AND CONTROL

Foreword

Section 31(3) of the Civil Aviation Act gives the power to the Director General, Eswatini Civil Aviation Authority to issue orders pursuant to and in accordance with the provisions of the Act. An order is intended to provide detailed instructions on the implementation of the requirements contained in the Civil Aviation Regulations.

This order provides information on the implementation of the requirements contained in Civil Aviation (Aerodromes) Regulations, on the limitations and control of obstacles in the vicinity of an aerodrome. It complements the regulatory framework applicable in Eswatini for the limitations and control of obstacles in the vicinity of aerodromes and the coordination with relevant local authorities as required under ICAO Annex 14.

Pursuant to Part V of the Civil Aviation (Aerodromes) Regulations, 2011 this document provides detailed instructions on the measures to control the development around aerodromes in Eswatini so as to permit the intended aeroplane operations at the aerodromes to be conducted safely and to prevent the aerodromes from becoming unusable by the growth of obstacles around them.

This Order is approved and issued under the authority of the Director General, Eswatini Civil Aviation Authority.

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1. DEFINITIONS

The definitions used in this order are similar to those found in relevant Eswatini Civil Aviation Regulatory and guidance material such as Civil Aviation (Aerodrome) Regulations and associated documentation).

2. Requirements for obstacles control

2.1. Legal framework applicable in Eswatini

- 2.1.1. Section 104 of the Eswatini Civil Aviation Act 2009 gives to the Minister the powers to set aerodromes standards.
- 2.1.2. The aerodromes standards have been further specified in Civil Aviation (Aerodromes) Regulations and include the requirements for control of obstacles in the vicinity of aerodromes.
- 2.1.3. Civil Aviation (Aerodromes) Regulation 28 requires an aerodrome operator to establish Obstacles Limitation Surfaces (OLS) to identify the lower limit of the aerodrome airspace above which objects become obstacles to aircraft operations and report to the Authority once such OLS are established.
- 2.1.4. In addition, Civil Aviation (Aerodromes) Regulation 29 requires that the plans for erection of objects within the safeguard areas be submitted to the approval of the Authority.
- 2.1.5. Provisions are also made under Civil Aviation (Aerodromes) Regulation 32 for the lighting and marking of obstructions.
- 2.1.6. Finally, Civil Aviation (Aerodromes) Regulation 31 makes provision for the Authority to require the aerodrome operator to prepare and issue certain types of obstacles charts.

2.2. Criteria for obstacles control

- 2.2.1. No obstacle which will penetrate the obstacle limitation surfaces contemplated in Civil Aviation (Aerodromes) Regulation 28 shall, without the prior approval of the Authority, be erected or be allowed to come into existence.
- 2.2.2. Pursuant to Civil Aviation (Aerodromes) Regulation 30, a new obstacle located in the vicinity of an existing obstacle and cleared by the Authority as not being a hazard to aircraft shall be deemed as shielded and the aerodrome is required to notify the Authority of the presence of such obstacle.

2.3. Duties & Responsibilities

2.3.1. Eswatini Civil Aviation Authority

- 2.3.1.1. The Authority is responsible for advising the Minister on the regulatory and guidance material applicable to aerodromes design and operations in Eswatini, as well as its implementation.
- 2.3.1.2. The Authority has established an Aerodromes & Air Navigation Services (AANS) Department with a mandate, amongst others, to implement the obstacles control requirements prescribed in this Order.
- 2.3.1.3. AANS receives, processes the applications for approval of plans for erections or alterations of obstacles, power lines, telephone lines or other overheads required under 2.1.4.
- 2.3.1.4. AANS reviews the applications submitted under 2.1.4 to determine whether the proposed structure, or alteration of existing one, does not :
 - 1) constitute a danger presented by obstacles to an aircraft, either during an entirely visual approach or during the visual segment of the instrument approach;
 - 2) constitute a danger presented by obstacles to an aircraft, during visual circling prior to landing;
 - 3) constitute a danger presented by obstacles to an aircraft during take-off;
 - 4) adversely affect the signals of visual aids or other navigation aids; or
 - 5) prevent the aerodrome from becoming unusable by growth of obstacles.
- 2.3.1.5. Also, AANS advises the Director General on identified obstacles and actions to be undertaken to address them in order to safeguard the safety of aircraft operations.
- 2.3.1.6. In carrying the above duties, AANS follows the procedure outlined in Chapter 4 and ESWACAA guidance material applicable to aerodrome design and operations, as well as the relevant instructions contained in the Aerodromes Inspector handbook.
- 2.3.1.7. During the evaluation of applications, AANS liaises with other Eswatini concerned such as the cities planning, for their inputs in their respective areas of competence.

- 2.3.1.8. After issuance of an approval of plan for erection or alterations of obstacles, power lines, telephone lines or other overheads, AANS oversees the implementation of any conditions attached to such an approval including height restrictions, markings, and/or lighting.

2.3.2. Aerodrome Operator

- 2.3.2.1. The Aerodrome operator is responsible for establishing the Obstacles Limitation Surfaces (OLS) for its aerodrome.
- 2.3.2.2. The aerodrome operator is also required to include in the aerodrome manual, and implement a procedure for controlling obstacles within its authority as well as monitoring the height of buildings or structures within the boundaries of the OLS.

3. Obstacles Limitation Surfaces

- 3.1. The Obstacle Limitation Surfaces (OLS) define the limits to which objects may project into the airspace and must be regarded as integral part of the aerodrome environment.

- 3.2. The OLS provided for the control of obstacle include:

- Outer Horizontal surface
- Inner Horizontal surface
- Conical surface
- Approach surface
- Transitional surface
- Inner approach surface
- Inner transitional surface
- Balk landing surface
- Obstacle free zone.

- 3.3. Description of the OLS:

a) Outer Horizontal surface:

As a broad specification for the outer horizontal surface, tall structures can be considered to be of possible significance if they are both higher than 30 m above the local ground level and 150 m above the elevation of the landing area within a radius of 15 000 m of the centre of the airport where the runway code is 3 or 4.

b) Inner Horizontal surface:

The purpose of the inner horizontal surface is to protect airspace for visual circling prior to landing, possibly after a descent through cloud aligned with the runway other than that in use for landing.

c) Conical surface:

The purpose of the conical surface is to supplement the Inner Horizontal Surface in providing protected airspace for visual circling prior to landing.

d) Approach and transitional surfaces:

These surfaces define the volume of airspace that should be kept free from obstacles to protect an aeroplane in the final phase of the approach-to-land manoeuvre. Their slopes and dimensions will vary with the aerodrome reference code and whether the runway is visual, non-precision or precision approaches.

e) Take-off climb surface:

This surface provides protection for an aircraft on take-off. The dimensions and slopes also vary with the aerodrome reference code.

f) The inner approach, inner transitional and balk landing surfaces and obstacle :

Together these surfaces define a volume of airspace in the immediate vicinity of a approach surface runway which is known as the obstacle free zone. This zone shall be kept free from fixed objects, other than lightweight frangible mounted aids to air navigation which must be near to runway to perform their functions.

3.4. OLS requirements: The OLS are based on the type of runway. Table 3-1 summarizes the OLS applicable to each type of runway.

Surface	Non- Instrument	Non-precision	Precision Approach		
			CAT I	CAT II	CAT III
Outer Horizontal			x	x	x
Conical	X	X	x	x	x
Inner Horizontal	X	X	x	x	x
Approach	X	X	x	x	x
Inner Approach			x	x	x
Transitional	X	X	x	x	x
Inner Transitional			x	x	x
Balk Landing			x	x	x
Take-off climb	all runway meant for take-off				

Table 3-1 : OLS Requirements

3.5. OLS dimensions: The dimensions of the OLS are defined in Table 3-2 for approach runways and 3-3 for runways meant for take-off.

3.6. **Establishment of the OLS:** The aerodrome operator shall establish the obstacle limitation surface and provide the Authority and local planning bodies (for the use in developing height zoning limits) with pertinent information about the aerodrome, including:

- a) Location, orientation, length and elevation of all runways;
- b) Location and elevation of all the reference points used in establishing obstacle limitation surfaces;
- c) Proposed categories of runway use – non-instrument, non-precision approach or precision approach (category I, II or III); and
- d) A plan for the future runway extension or change in category.

3.7. **Basis for the OLS:** The OLS must be based on the most critical aerodrome design features anticipated for future development, since it is always easier to relax a strict standard than to increase a requirement of a lesser standard if plans changed.

RUNWAY CLASSIFICATION										
Surface and dimensions ^a (1)	Non-instrument				Non-precision approach			Precision approach category I II or III		
	Code number				Code number			Code number		Code number
	1	2	3	4	1,2	3	4	1,2	3,4	3,4
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	—	—	—	—	—	—	—	90 m	120 m ^e	120 m ^e
Distance from threshold	—	—	—	—	—	—	—	60 m	60 m	60 m
Length	—	—	—	—	—	—	—	900 m	1 500 m	1 500 m
Slope	—	—	—	—	—	—	—	2.5%	2%	2%
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	150 m	300 m	300 m	150 m	300 m	300 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	2%
Second section										
Length	—	—	—	—	—	3 600 m _b	3 600 m _b	12 000 m	3 600 m _b	3 600 m _b
Slope	—	—	—	—	—	2.5%	2.5%	3%	2.5%	2.5%
Horizontal section										
Length	—	—	—	—	—	8 400 m _b	8 400 m _b	—	8 400 m _b	8 400 m _b
Total length	—	—	—	—	—	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%

RUNWAY CLASSIFICATION

Surface and dimensions ^a (1)	Non-instrument				Non-precision approach			Precision approach category I II or III		
	Code number				Code number			Code number	Code number	
	1	2	3	4	1,2	3	4	1,2	3,4	3,4
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
INNER TRANSITIONAL										
Slope	—	—	—	—	—	—	—	40%	33.3%	33.3%
BALKED LANDING SURFACE										
Length of inner edge	—	—	—	—	—	—	—	90 m ^c	120 m ^e	120 m ^e
Distance from threshold	—	—	—	—	—	—	—		1 800 m ^d	1 800 m ^d
Divergence (each side)	—	—	—	—	—	—	—	10%	10%	10%
Slope	—	—	—	—	—	—	—	4%	3.33%	3.33%
OUTER HORIZONTAL										
Radius	—	—	—	—	—	—	—	15 000 m	15 000 m	15 000 m

a All dimensions are measured horizontally unless specified otherwise.

b Variable length.

c Distance to the end of the strip.

d Or end of runway whichever is less.

e. Where the code letter is F, the width is increased to 155 m.

Table 3-2 Dimensions and Slopes of Obstacle Limitation Surfaces - APPROACH RUNWAYS

Surface and dimensions ^a	Code number		
	1	2	3
(1)	(2)	(3)	(4)
TAKE-OFF CLIMB			
Length of inner edge	60 m	80 m	180 m
Distance from runway end ^b	30 m	60 m	60 m
Divergence (each side)	10%	10%	12.5%
Final width	380 m	580 m	1 200 m 1 800 m ^c
Length	1 600 m	2 500 m	15 000 m
Slope	5%	4%	2% ^d

- a. All dimensions are measured horizontally unless specified otherwise.
- b. The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.
- c. 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night
- d. The operational characteristics of airplanes for which the runway is intended shall be examined to see if it is desirable to reduce the slope specified when critical operating conditions are to be catered to. New objects shall be limited to preserve the existing obstacle free surface or a surface down to a slope of 1.6 per cent

Table 3-3: Dimensions and Slopes of Obstacle Limitation Surface RUNWAYS MEANT FOR TAKE-OFF

4. Obstacles Control

4.1. **General:** A person proposing to construct or alter a structure higher than 150 feet above the mean sea level of the landing area, power line, telephone line or other overheads, within a distance of 15 kilometers measured from the aerodrome reference point of any aerodrome, must submit an application to the Authority.

4.2. **Obstacles Limitation Surfaces:** A person proposing to construct or alter a structure, power line, telephone line or other overheads, above an established OLS, must submit an application to the Authority.

4.3. **Aerodrome equipment and installation which may constitute obstacles:** All fixed and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or extend above 150ft above ground level are obstacles. Certain aerodrome equipment and installations, because of their air navigation functions, must inevitably be so located and or constructed that they are within the obstacle limitation surface. Below is a list of the types of aerodrome equipment and installations which may be allowed in the OLS:

- a) ILS glide path antennas;
- b) ILS inner marker beacons
- c) ILS localizer antennas;
- d) Wind direction indicators
- e) Landing direction indicators
- f) Anemometers
- g) Ceilometers
- h) Transmissometers
- i) Elevated runway edge ,threshold, end and stopway lights
- j) Elevated taxiway lights
- k) Approach lights
- l) Visual approach slop indicator system/Precision approach slope indicator system.
- m) Signs and markers
- n) Certain radar and other electronic instillations and other devices;
- o) VOR/DME when located on aerodrome
- p) Precision approach radar system
- q) VHF direction finders

4.4. **Applications:** The application form for erection or alteration of structure is available at:

Aerodrome and Ground Aids section

Aerodromes & Air Navigation Services Department

Fight Safety Standards Division

Eswatini Civil Aviation Authority

Matsapha International Airport,
Matsapha, Kingdom of Eswatini

Tel: +2333 54050 /5370

Email: inspectorate@eswacaa.co.sz

4.5. Supporting documents : An application must be accompanied with:

- *A map indicating the distance from the structure to the aerodrome reference point;*
- *A plan showing the proposed total height of the structure ;*
- *A description of the material to be used for the construction / alteration;*
- *A letter of authorization if a consultant or third party, is applying on behalf of the owner of the structure; and*
- *A safety assessment specifying:*
 - (a) that the proposed erection or alteration of structure has no impact on :
 - (i) the OLS,
 - (ii) aircraft safety, or
 - (iii) planned development of the airport, or
 - (b) the impact of the proposed erection or alteration of structure on :
 - (i) the OLS,
 - (ii) aircraft safety, or
 - (iii) planned development of the airport, and
 - (c) proposed alternative means of addressing the identified impact.

4.6. Submitting an application: The applications required under 4.1 or 4.2 must be submitted to the Authority at least 90 days prior to the intended day of commencement of construction or alteration for permanent structures, and 30 days for temporary structures.

4.7. Processing an application:.

4.7.1. The application is processed following the procedure established in the Aerodrome Inspector's handbook.

4.7.2. The Chief, AANS may request the applicant to provide additional information necessary for the evaluation of the application.

4.8. Granting an application: The Chief, AANS shall make a recommendation to the Director General on the proposed erection or alteration.

4.8.1. An application may be granted if the Authority is satisfied that the erection or alteration of the structure at the proposed location does not:

- 1) endanger the safety of current aircraft operations, or
- 2) prevent the planned development of the airport and aircraft operations.

4.8.2. The Chief, AANS bases its determination upon the review of the application and the safety assessment findings, and may recommend :

- 1) conditions or limitations on the height, and/or location of the proposed structure;
- 2) marking or lighting the structure as prescribed in Civil Aviation (Aerodrome) Regulations.

4.9. **Refusing an application:** Following the review of the application, the Chief, AANS may recommend revision of the safety assessment or corrective actions to eliminate or mitigate hazards to air navigation.

4.9.1. If, after being advised of the additional steps that must be taken to rectify the shortcomings, the applicant is still not able to satisfy the requirements of the regulations, the Chief, AANS may recommend to the Director General to refuse to grant the application.

4.9.2. An application for erection or alteration of structure may be refused if the erection of the proposed structure, or alteration of existing one, might:

- 1) constitute a danger presented by obstacles to an aircraft, either during an entirely visual approach or during the visual segment of the instrument approach;
- 2) constitute a danger presented by obstacles to an aircraft, during visual circling prior to landing;
- 3) constitute a danger presented by obstacles to an aircraft during take-off;
- 4) adversely affect the safety of operations of navigation aids or visual aids; or
- 5) prevent the aerodrome from becoming unusable by growth of obstacles.

4.10. **Notification:** The Authority notifies the applicant of the outcomes of the review within 7 working days of receiving an application for a temporary structure, or 15 working days for a permanent structure.

4.11. **Compliance:** Each person required by 4.1 or 4.2 to submit an application shall comply with any requirement, condition or limitation imposed under 4.8.

4.12. **Objects to be marked, and/or lighted:** The following objects shall be marked and, if used at night or in conditions of low visibility, lighted

- a) Vehicles and other mobile objects, excluding aircraft, on the movement area except that aircraft servicing equipment and vehicles used only on aprons may be exempt,

- b) Elevated aeronautical ground lights within the movement area shall be marked so as to be conspicuous by day. However, obstacle lights cannot be installed on elevated ground lights or signs in the movement area,
- c) all obstacles in the movement area, above an approach surface within 3 000 m of the inner edge or above a transitional surface, an obstacle protection surface, and
- d) wind turbines, overhead wires, cables, and supporting towers if determined to be obstacles

4.13. Markings of mobile objects: Mobile objects that are required to be marked shall be coloured or display fags as follows:

- a) If marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles,
- b) If marked by flags, these are to be displayed around, on top of, or around the highest edge of the object, and not increase the hazard presented by the object they mark. The flags shall not be less than 0.9 m on each side and shall consist of a chequered pattern, each square having sides of not less than 0.3 m. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used, except where such colours merge with the background.

4.14. Lighting of mobile objects: Mobile objects that are used at night or in conditions of low visibility, shall be lighted as follows:

- a) Low-intensity obstacle lights, Type C, on vehicles and other mobile objects excluding aircraft.
- b) flashing-blue low-intensity obstacle lights, Type C, on vehicles associated with emergency or security and flashing-yellow on other vehicles.
- c) Low-intensity obstacle lights, Type D, on follow-me vehicles.
- d) fixed-red low-intensity obstacle lights on objects with limited mobility such as aerobridges shall be, and as a
- e) minimum be in accordance with the specifications for low-intensity obstacle lights, Type A, in Table 4-1. The intensity of the lights shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

4.15. Markings of fixed objects: Fixed objects that are required to be marked shall be coloured or display fags as follows: whenever practicable, be coloured, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.

- a) colours to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white are to be used, except where such colours merge with the background
- b) Flags used to mark fixed objects shall be displayed around, on top of, or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15 m. Flags shall not increase the hazard presented by the object they mark. Flags used to mark fixed objects shall not be less than 0.6 m on each side.

4.16. Lighting of fixed objects: Fixed objects in aerodromes used at night or in conditions of low visibility, shall be lighted as follows:

- a) obstacle lights shall be located as close as practicable to the top of the object,
- b) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance, such as a rod or an antenna, greater than 12 m where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light shall be located at the highest practicable point and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.
- c) In the case of an extensive object or of a group of closely spaced objects to be lighted that are penetrating a horizontal obstacle limitation surface (OLS) or located outside an OLS, the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface or above the ground, and so as to indicate the general definition and the extent of the objects.
- d) In the case of an extensive object or of a group of closely spaced objects to be lighted that are penetrating a sloping OLS, the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the OLS, and so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked.
- e) Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and
 - i. low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m; and
 - ii. medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.
- f) High-intensity obstacle lights, Type A, and medium-intensity obstacle lights, Types A and B, located on an object shall flash simultaneously.

- g) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.
- h) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.
- i) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.
- j) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s), except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.
- k) Where an object is indicated by medium-intensity obstacle lights, Type A, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.
- l) Where an object is indicated by medium-intensity obstacle lights, Type B, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and
- m) medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.
- n) Where an object is indicated by medium-intensity obstacle lights, Type C, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between

Table 4-1 Characteristics of obstacle lights

1	2	3	4	5	6
Light Type	Colour	Signal type/ (flash rate)	Peak intensity (cd) at given Background Luminance (b)		
			Day (Above 500 cd/m ²)	Twilight (50-500 cd/m ²)	Night (Below 50 cd/m ²)
Low-intensity, Type A (fixed obstacle)	Red	Fixed	N/A	N/A	10
Low-intensity, Type B (fixed obstacle)	Red	Fixed	N/A	N/A	32
Low-intensity, Type C (mobile obstacle)	Yellow/Blue (a)	Flashing (60-90 fpm)	N/A	40	40
Low-intensity, Type D (follow-me vehicle)	Yellow	Flashing (60-90 fpm)	N/A	200	200
Low-intensity, Type E	Red	Flashing (c)	N/A	N/A	32
Medium-intensity, Type A	White	Flashing (20-60 fpm)	20 000	20 000	2 000
Medium-intensity, Type B	Red	Flashing (20-60 fpm)	N/A	N/A	2 000
Medium-intensity, Type C	Red	Fixed	N/A	N/A	2 000
High-intensity, Type A	White	Flashing (40-60 fpm)	200 000	20 000	2 000
High-intensity, Type B	White	Flashing (40-60 fpm)	100 000	20 000	2 000

Table 4-2 light intensity distribution of low-intensity obstacle lights

	Minimum intensity (a)	Maximum intensity (a)	Vertical beam spread (f)	
			Minimum beam spread	Intensity
Type A	10 cd (b)	N/A	10°	5 cd
Type B	32 cd (b)	N/A	10°	16 cd
Type C	40 cd (b)	400 cd	12° (d)	20 cd
Type D	200 cd (c)	400 cd	N/A (e)	N/A

Table 4-3 light intensity distribution of medium and high intensity obstacle lights

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)			Vertical beam spread (c)		Vertical elevation angle (b)			Vertical beam spread (c)	
	0°		-1°			0°	-1°	-10°		
	Minimum average intensity (a)	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum beam spread	Intensity (a)
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75 000
100 000	100 000	75 000	37 500	3°	37 500	125 000	56 250	3 750	7°	37 500
20 000	20 000	15 000	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2 000	2 000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

4.17. **Objects outside the obstacle limitation surfaces:** In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation shall be regarded as obstacles.

4.17.1. Persons wishing to erect or alter a structure higher than 150 must apply to the appropriate local planning authority which engages consultation with the Authority.

4.17.2. Upon notification by the local planning authority, the Chief, AANS initiates a *safety assessment* to:

- (a) determine the possible impact the proposed erection or alteration of structure on :
 - (i) the OLS,
 - (ii) aircraft safety, or
 - (iii) planned development of the airport, and

(b) advise the Director General on means of addressing such impact, if any.

4.17.3. **Notification:** The Authority provides feedback to the local planning authority within 15 working days of receiving a notification to erect or alter a structure higher than 150 m outside the OLS with:

- (a) a no-objection letter if the proposed structure does not affect air navigation, or
- (b) if the proposed structure affects air navigation:
 - (i) conditions or limitations on the height, and/or location of the proposed structure;
 - (ii) marking or lighting the structure as prescribed in Civil Aviation (Aerodrome) Regulations.

5. Existing Obstacles

- 5.1. **General:** As a general rule, when obstacles have been identified, the aerodrome operator, with the assistance of the local authority, should make every effort to have them removed or reduced in height so that they do not constitute obstacle. Sections 5.2 to 5.6 provide alternative measures to be considered when it is impossible to eliminate an obstacle.
- 5.2. **Frangibility:** Some aids to navigation as those listed in 4.3 constitute obstacles which cannot be removed. Such objects must be frangibly designed and constructed, and mounted on frangible couplings so that they would fail on impact without damage to aircraft.
- 5.3. **Shielding:** If it is considered that the nature of an object is such that its presence may be described as permanent, then additional objects within a specified area around it may be permitted to penetrate the surface without being considered as obstacles. The original obstacle is considered as dominating or shielding the surrounding area. The formula for shielding is based on a horizontal plane projected from the top of each obstacle away from the runway and a plane with a negative slope of 10 % towards the runway (see figure 5-1 below).

Figure 5-1: principles of shielding



- 5.4. **Marking or lighting of obstacles:** Where it is impractical to eliminate an obstacle, it must be appropriately marked and/or lighted so as to be clearly visible to pilots in all weather and visibility conditions.
- 5.4.1. The marking and lighting of obstacles are intended to reduce hazards to aircraft by indicating the presence of obstacles. It does not necessarily reduce the operating limitation which may be imposed by the obstacle.
- 5.4.2. Such marking and lighting may be omitted when the obstacle is shielded by another obstacle;
- 5.4.3. The marking may be omitted when the obstacle is lighted by high intensity lights by day; and
- 5.4.4. Vehicles and other mobile objects, excluding aircraft, on movement areas of aerodrome, shall be marked and lighted, unless used only in apron areas.

- 5.5. **Reporting Obstacles:** All obstacles in the OLS are to be reported in the AIP, and if the duration is less than 60 days through a NOTAM following the procedure established in the aerodrome manual.
- 5.6. **Modification of approach, take-off procedures or flight patterns:** If an obstacle is deemed a hazard for the approach or take-off, the Authority may direct the Air Navigation Services Providers to modify the approach, take procedures or flight pattern in order to ensure that the identified obstacle does not constitute a hazard to aircraft taking-off or landing at the aerodrome.
- 5.7. **Re-declaring runway distances:** If an obstacle is within the OLS to the point of affecting the take-off or landing performance of aircraft, the Authority may direct the aerodrome operator to re-declare the runway distances in order to ensure that the identified obstacle does not constitute a hazard to aircraft taking-off or landing at the aerodrome.

Issued by



Solomon Dube
Director General