

 Eskom	Standard	Technology
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Executive Summary

This document is based on the requirements from the Civil Aviation Authority as it is captured on their website www.caa.co.za. Specific sections are:

- SA-CATS AH Part 139.01.33
- SA-CAR Part 139.01.33
- ICAO Annex 1

1. Introduction

The document had to be updated in order to accommodate new regulations and confirm existing regulations with regards to civil aviation.

2. Supporting clauses

2.1 Scope

This document sets out guidelines for determining when a power line, building, communication tower, wind turbines and related structures may be considered a hazard to aircraft and when not, as well as for route and site planning of the mentioned structures in the vicinity of aerodromes.

2.1.1 Purpose

Not applicable

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

2.2 Normative/informative references

The following documents contain provisions that, through reference in the text, constitute requirements of this procedure. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this procedure are encouraged to investigate the possibility of applying the most recent editions of the document listed below.

2.2.1 Normative

[1] ISO 9001, Quality Management Systems.

2.2.2 Informative

[2] DGL 34-602, Rev 0: Public Participation meetings

[3] Civil Aviation Act, Act No 13 of 2009

[4] South African Civil Aviation Authority Act, Act No 40 of 1998

[5] The Civil Aviation Regulations of 2007. Refer to the following website: www.caa.co.za

2.3 Definitions

2.3.1 General

Definition	Description
Aerodrome	A defined area on land or water intended for the arrival, departure and surface movement of aircraft is considered to be an aerodrome
Conical Surface	The inner edge of the conical surface for each runway begins at the outer edge of the inner horizontal surface. Its outer edge is defined by 2 half circles centred on the runway ends and joined by tangents. The radii of the half circles are 6 100m and the tangents are parallel to the runway centreline at a distance of 6 100m. The surfaces extend 2 100m horizontally and are sloped at a 1:20 ratio. The outer edge is 150m above the published reference elevation of the aerodrome.

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Definition	Description
Co-ordinate	Latitude and Longitude in degrees minutes and seconds and tenth of seconds format.
Day and Night Markings	Day and night markings apply to all structures defined as obstacles in the definitions above
Fees	<p>An assessment fee is applicable per application and is a “once off”, providing none of the specified dimensions changed. When the height or the position of an “obstacle” has changed, it is considered as a new application. The fee is published in part 187.00.21 (Fees relating to Part 139) and is available on the CAA website under "Fees". See Category 10 (2) (f).</p> <p>Applications for power lines are free of charge at the time when this document was published.</p>
Inner Horizontal Surface	The inner horizontal surface for each runway is defined by 2 half circles centred on the runway ends and joined by tangents. The radii of the half circles are 4 000m and the tangents are parallel to the runway centreline at a distance of 4 000m. The surface is a constant 45m above the published reference elevation of the aerodrome.
Markings	Specification on the lighting and painting of structures can be found in ICAO Annex 14 chapter 6 and the specifics in Annex 14 APPENDIX 1. COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS
Navigable Airspace	Any airspace where “heavier than air” craft can operate is considered to be navigable airspace.
Night Markings	Night markings are the addition of lights at the highest practical point of a structure to make such a structure more visible in darkness and poor light conditions. This will be found mostly on communications structures below 45m in height above ground where the need is identified to improve its visibility.
Obstacle	<p>Any power line, building, communication tower, wind turbines and any other structure, whether temporary or permanent, which has the potential to endanger aviation in navigable airspace, or has the potential to interfere with the operation of navigation or surveillance systems or instrument landing systems, including meteorological systems for aeronautical purposes, is considered to be an obstacle and shall be submitted to the Commissioner for Civil Aviation for evaluation and approval.</p> <p>Example 1. All structures exceeding 45m above the mean ground level in South Africa by default (refer SA-CAR Part 139.01.33), or lower structures when specified. Such structures may include structures where the top of the structure exceeds 150m above the mean ground level, like on top of a hill, and the mean ground level considered to be the lowest point in a 3 kilometre radius around such structure.</p> <p>Example 2: Lower structures, can also be considered as a danger to aviation.</p> <p>Example 3: Power lines, overhead wires and overhead cables are considered as obstacles and the detail shall be communicated to the Commissioner at an early planning stage, i.e., pre public participation meeting stage.</p> <p>A database of all obstacles is kept and published in an Aeronautical Information Circular and also indicated on aeronautical maps. This data is also made available for other uses such as on on-board computers of aircraft and for environmental research purposes.</p>

Definition	Description
Outer Horizontal Surface	The outer horizontal surface begins at the outer edge of the conical surface outward to a distance of $\pm 8\,000\text{m}$ from the endpoints and centreline of the runway at a constant height of 150m above the published reference elevation of the aerodrome.
Recommendation	The CAA regards the meaning of this word to be interpreted as an instruction.
Runway Strip and Runway end safety Area	For the purposes of determining obstacles on the sides of the runway, the runway strip is referenced horizontally to the runway ends and vertically to the highest threshold on the facility. It extends 300m (240m beyond the 60m strip) from each runway and 150m on either side of the centreline.
Transitional Surface	The transitional surfaces extend outward (perpendicular to the centreline of each runway) from the edges of the runway strip for 315m at a slope of 1:7 upward to a height of 45m above the published reference elevation of the aerodrome.

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
CAA	Civil Aviation Authority
CAR	Civil Aviation Regulations
CATS	Civil Aviation Technical Standards

2.5 Roles and responsibilities

Distribution land and rights is responsible for updating and the implementation of this document. Planning and GIS CoE will ensure that the standard is available and up to date.

2.6 Process for monitoring

Not applicable

2.7 Related/supporting documents

Not applicable

3. Document content

3.1 Conditions considered hazardous to aircraft

The following obstacles are considered to be potential hazards to aircraft:

Refer to the definition of "Obstacle" in paragraph 3.1.

Conductors or earth wires spanning a valley which are higher than 45 metres above the ground level of such a valley or river crossing which is wide enough to be considered navigable to aircraft. Typical conditions considered hazardous are shown in sketch in 4.7.

All power line structures and lattice radio towers which project into the obstacle limitation surfaces surrounding aerodromes.

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3.2 Obstacle limitation surfaces around aerodromes

Annex A and B sets out the South African Civil Aviation Authority (SACAA) regulation 139.01.33 which defines obstacles and obstacle marking outside aerodromes or heliports. Also refer to the definition of "Obstacle" in paragraph 3.1.

Obstacle limitation surfaces around airports are defined in the aerodrome design standards contained in annex 14 Volume 1 of the Civil Aviation Technical Standard (CATS) No. 139.02.2. The details of transitional, horizontal, conical and approach surfaces can be found in annexure 3.

Lattice radio towers and power line structures should not, where possible, be placed where they would project above the 1 in 62.5 (1.6%) slope requirement for approach surfaces for aerodromes. By this means the removal and re-positioning costs of a tower due to:

- the lengthening of runway strips
- the construction of new landing strips
- the upgrading of an aerodrome status
- the upgrading of a tower type can be avoided.

3.3 Visual aids for denoting obstacles

The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles.

Overhead wires and cables over rivers and valleys which constitute a hazard to aircraft as identified in section 4 must be marked as specified in the Act (see SA-CATS AH 139.01.33 shown as Annex A).

All power line towers and lattice radio towers exceeding 45 metres in height above ground level must also be marked as specified in the Act (see SA-CATS AH 139.01.33 shown as Annex A).

3.4 Obstacles and Obstacle Limitation

Buildings or other obstructions which will constitute an obstruction or potential hazard to aircraft moving in the navigable airspace in the vicinity of an aerodrome or navigation aid, or which will adversely affect the performance of the radio navigation or instrument landing systems, **shall not be erected or allowed to come into existence without the prior approval of the Commissioner for Civil Aviation.**

All such applications must be addressed to:

The Commissioner for Civil Aviation

Private Bag X73

Halfway House

1685

Attention: Ms. Lizell Ströh

3.4.1 Building restrictions

No buildings or structures higher than 45 metres above the mean sea level of the landing area, or, in the case of a water aerodrome or heliport, the normal level of the water, shall without the approval of the commissioner be erected within a distance of 8 kilometres measured from the nearest point on the boundary of an aerodrome or heliport.

No building, structure or other obstruction which projects above a slope of 1 in 20 and which is within 3000 metres measured from the nearest point on the boundary of an aerodrome or heliport **shall, without the prior approval of the commissioner, be erected or allowed to come into existence.**

No building, structure or other obstruction which will project above the approach, transitional or horizontal surfaces of an aerodrome or heliport **shall, without the prior approval of the commissioner, be erected or allowed to come into existence.**

In cases where special circumstances do not permit the requirements of these regulations to be met, the commissioner may, in public interest, grant exemptions from compliance with any or all the provisions of these regulations, with all the requirements.

3.5 Requirements for the marking and/or lighting of power line objects in navigable airspace

Refer to **Error! Reference source not found.** for a complete discussion on the requirements of the marking and / or lighting of obstacles in the navigable airspace.

3.6 Requirements for the painting of power line and radio tower objects in navigable airspace

Refer to a complete discussion on the requirements of the painting of power lines and radio towers and other obstacles in the navigable airspace.

4. Authorization

This document has been seen and accepted by:

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M Seabe	Land and Rights Manager: Eskom Transmission
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5. Revisions

Date	Rev	Compiler	Remarks
May 2017	1	Livhuwani Mashamba	Prepare document for publishing. No content change.
Jan 2016	Draft 0.1	I van Rooyen	Corrected the spelling mistakes and minor errors. According to the specified revision date this document needs to be updated. The document also needs to be renumbered according to the new numbering system. The name of the document changed. <ul style="list-style-type: none">• Document name changed• Document updated according the information received from CAA
Jan 2002	0		Original document issued as SCSASACF6

6. Development team

The following people were involved in the development of this document:

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Livhuwani Mashamba	Distribution Group
IM van Rooyen	Distribution Group
Ernest Grunewaldt	Transmission Group
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D Lukhozi	Distribution Group
E Sigudla	Distribution Group
J Mitchell	Distribution Group
M le Roux	Distribution Group
R de Bruin	Distribution Group

7. Acknowledgements

Many thanks to GIS Centre of Excellence for ensuring that the document is constantly updated and published.

Annex A – Examples of power lines considered to be a hazard to Aircraft.

Lines considered a hazard to aircrafts

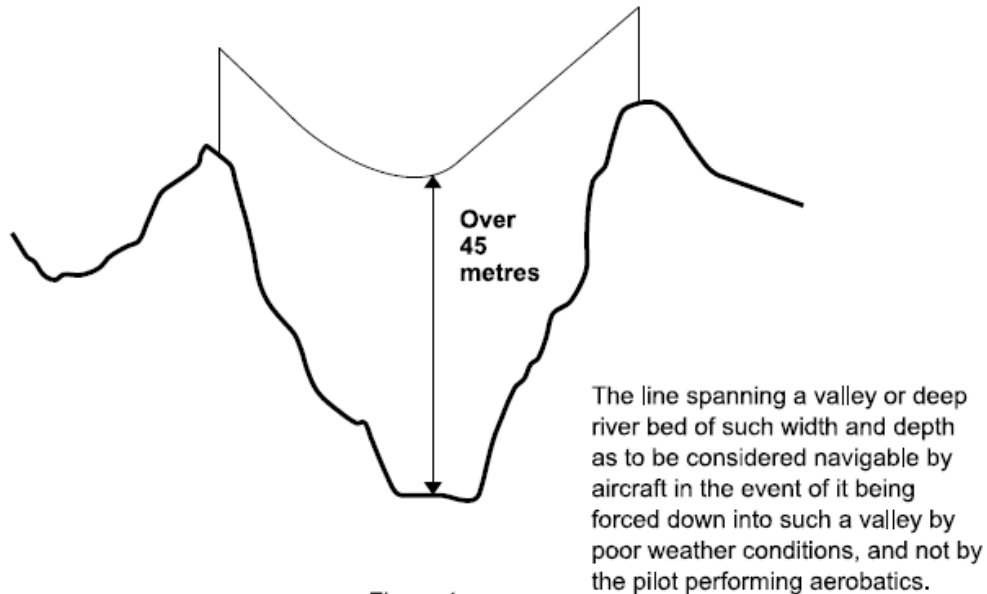


Figure 1

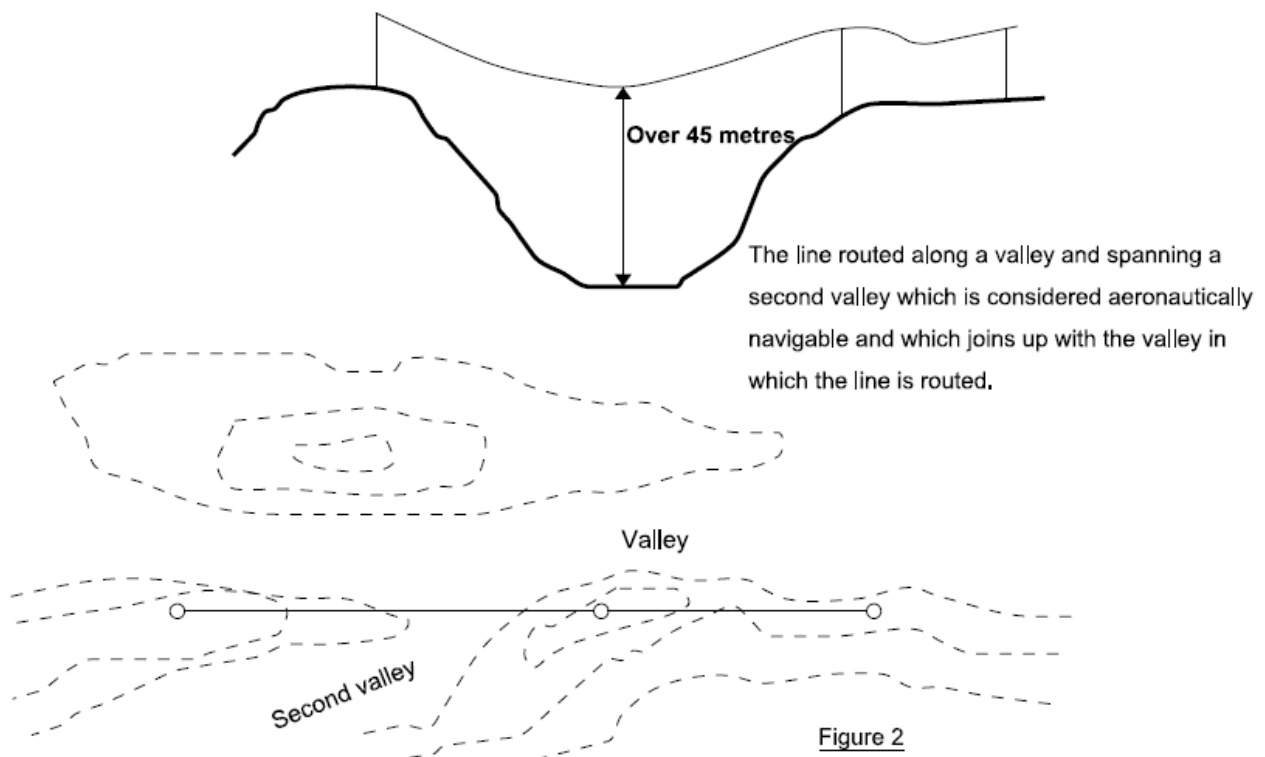
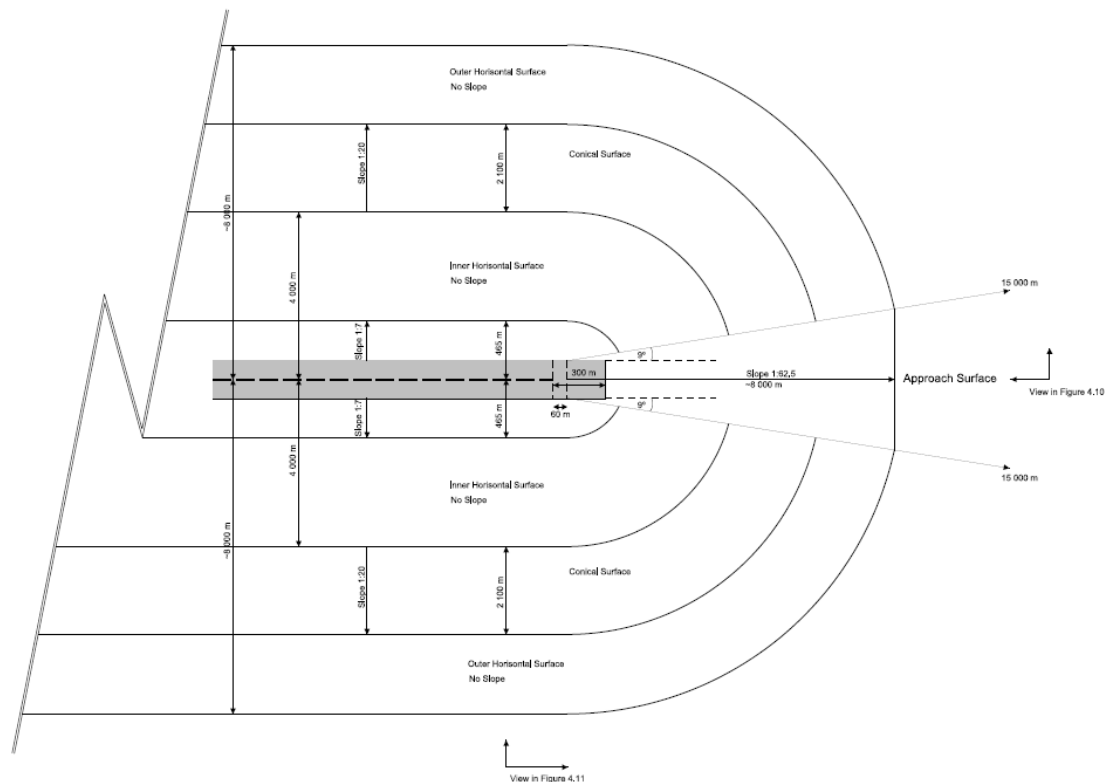


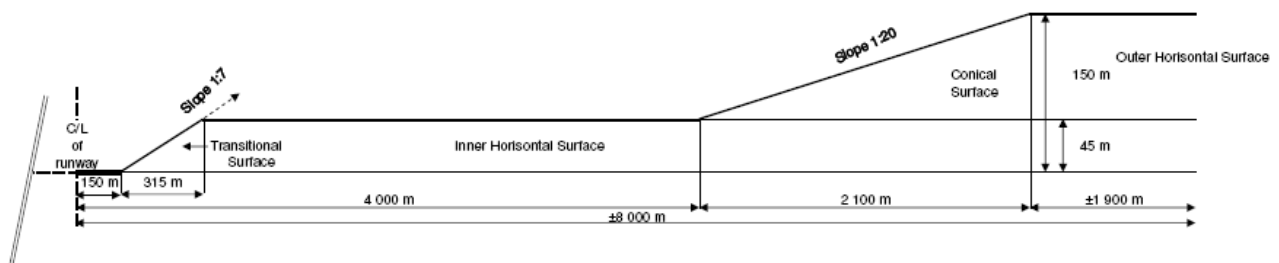
Figure 2

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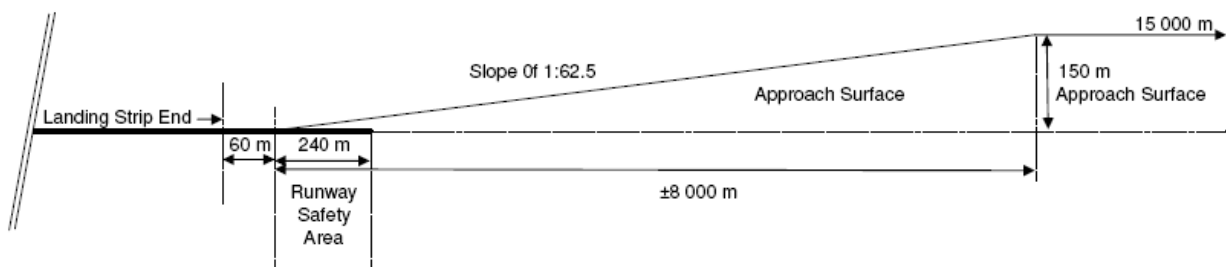
Obstacle Limitation Surfaces around Aerodromes.



Side Surfaces View



Runway View



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Annex B – SA-CATS AH 139.01.33

OBSTACLE LIMITATIONS AND MARKINGS OUTSIDE AERODROME OR HELIPORT

Marking of Obstacles

1) Applicability

If a difference between a standard prescribed in ICAO Annex 14 and the SACATS-AH exists, the SA-CATS-AH standard shall prevail.

2) Structures to be marked

Any structure exceeding 45m above ground level, or structures where the top of the structure exceeds 150m above the MEAN ground level, like on top of a hill, the mean ground level considered to be the lowest point in a 3 Kilometre radius around such structure. Structures lower than 45m, which are considered as a danger or a potential danger to aviation, shall be marked as such when specified. Overhead wires, cables, etc., crossing a river, valley or major roads shall be marked and in addition, their supporting towers marked and lighted if an aeronautical study indicates that it could constitute a hazard to aircraft.

NOTE: Wind turbine generator (Windfarms) support structures are dealt with separately.

3) Painted Markings (Day Markings)

a) PAINT COLOURS

Alternate sections of **international orange** or **signal red** and white paint shall be used as they provide maximum visibility of an obstruction by contrast in colours. The colours shall comply with the National Standard **SANS 1091 2004** as indicated: -

INTERNATIONAL ORANGE	SIGNAL RED	Cloud WHITE
S2075-Y70R	S1580-Y90R	S0505-G20Y

b) Paint Standards

Quality paints compatible with the relevant surfaces are to be used and applied to the published South African standards for the relevant surfaces.

c) Surfaces Not Requiring Paint

Ladders, decks, and walkways of steel towers and similar structures need not be painted if a smooth surface presents a potential hazard to maintenance personnel. Paint may also be omitted from precision or critical surfaces if it would have an adverse effect on the transmission or radiation characteristics of a signal. This should not reduce the overall marking effect of the structure.

d) Solid Pattern

Obstacles should be coloured in orange (or red) if the structure has a horizontal dimension of less than 1,5m and vertical dimensions not exceeding 4,5m.

e) Checkerboard Pattern

Alternating rectangles of orange (or red) and white are normally displayed on the following structures:

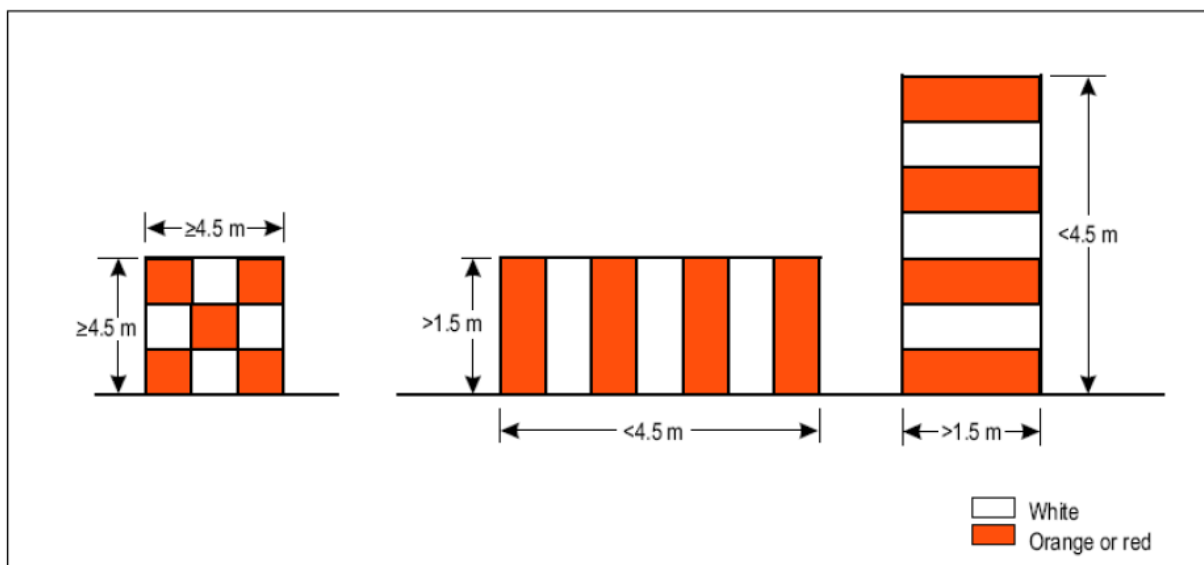
- 1) Water reservoirs, fuel storage tanks, and grain storage silos when required.
- 2) Buildings, as required.
- 3) Large structures where its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast each with the other and with the background against which they will be seen. Orange (or red) and white should be used. However, if it is impractical because of the size or shape of a structure, the patterns may have sides less than 1,5m. When possible, corner surfaces should be coloured orange.

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f) Alternate Bands

Alternate bands of orange (or red) and white are normally displayed on structures when: -

- a) it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1,5m and the other dimension, horizontal or vertical, less than 4,5m, or
- b) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m. and Includes the following structures:
 - 1) Communication towers and catenary support structures.
 - 2) Poles.
 - 3) Smokestacks.
 - 4) Skeletal framework of storage tanks and similar structures.
 - 5) Coaxial cable, conduits, and other cables attached to the face of a tower



g) Colour Band Characteristics.

The bands should be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less, and not less than 0,65m. The colours of the bands should contrast with the background against which they will be seen. Orange (or red) and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour.

Table B.1

Marking Band Widths			
Longest dimension		Band Width	
Greater than (m)	Not Exceeding (m)		
4,5	210	1/7	Of longest dimension
210	270	1/9	
270	330	1/11	
330	390	1/13	
390	450	1/15	
450	510	1/17	
510	570	1/19	

Note: Table 1 shows a formula for determining bandwidths and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour.

h) Skeletal Structures on top of Buildings.

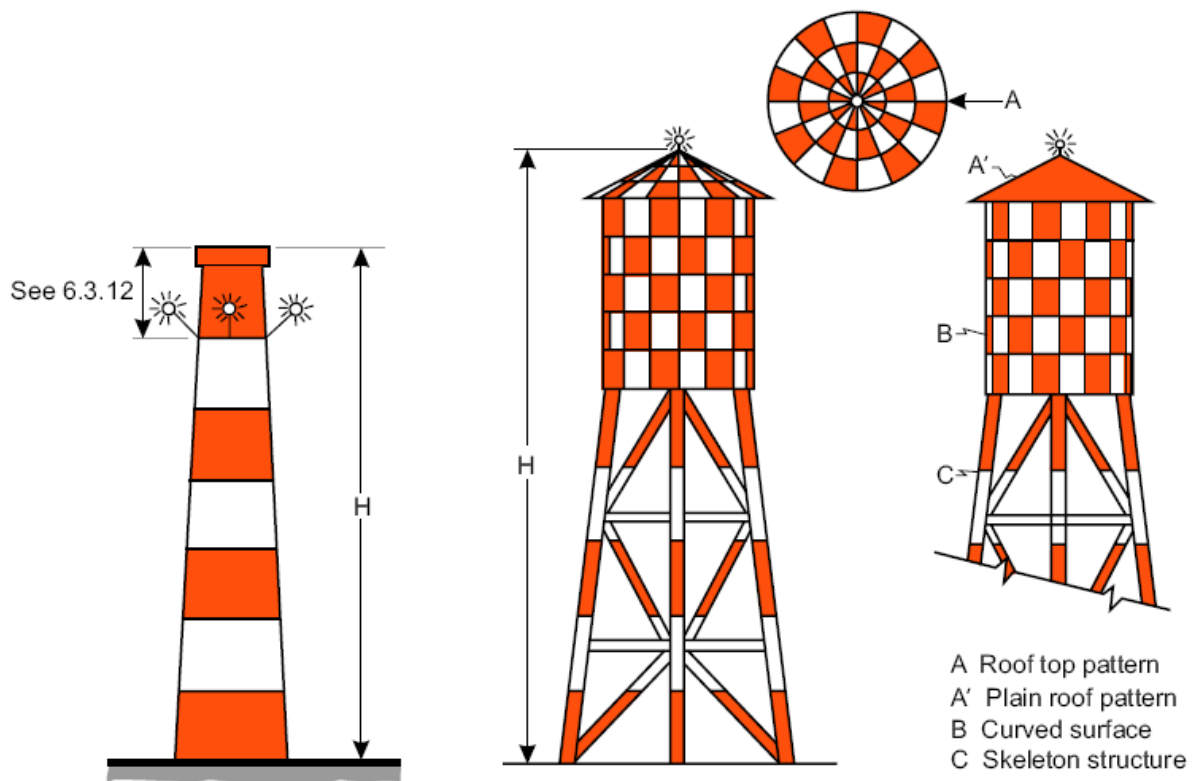
If a flagpole, skeletal structure, or similar object is erected on top of a building, the combined height of the object and building will determine whether marking is required; however, only the height of the object under study determines the width of the colour bands.

i) Partial Marking.

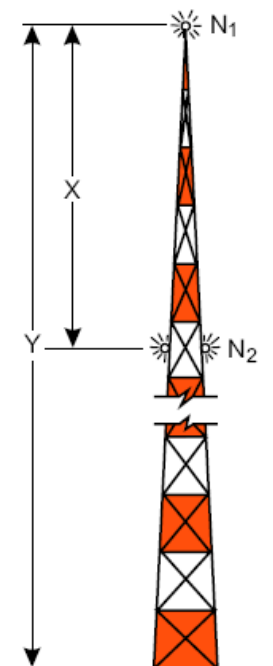
If marking is recommended for only a portion of a structure because of shielding by other objects or terrain, or it is not practicable to mark the full structure, the width of the bands should be determined by the overall height of the structure. A minimum of three bands shall be displayed on the upper third of the structure.

j) Extensive Structures.

Paint markings may be omitted when an aeronautical study indicates that a structure is extensive to the extent that additional marking will not improve the visual impact of the structure.



Note.— *H* is less the 45 m for the examples shown above.
For greater heights intermediate lights must be added as shown below.



Light spacing (X) in accordance with Appendix 6

$$\text{Number of levels of lights} = N = \frac{Y \text{ (metres)}}{X \text{ (metres)}}$$

4) MARKERS

Markers are used to highlight structures when it is impractical to make them conspicuous by painting. Markers may also be used in addition to orange (or red) and white paint when additional conspicuousness is necessary for aviation safety. They should be displayed in conspicuous positions on or adjacent to the structures so as to retain the general definition of the structure. They should be recognizable in clear air from a distance of at least 1 000m and in all directions from which aircraft are likely to approach. Markers should be distinctively shaped, i.e., spherical or cylindrical, so they are not mistaken for items that are used to convey other information. They should be replaced when faded or otherwise deteriorated.

a) Spherical Markers.

Spherical markers are used to identify overhead wires. Markers may be of another shape, i.e., cylindrical, provided the projected area of such markers will not be less than that presented by a spherical marker. The Commissioner may require that additional lighting systems be added to enhance visibility.

b) Size and Colour.

The diameter of the markers used on extensive catenary wires across canyons, lakes, rivers, etc., shall be not less than 60 cm. Smaller 30cm spheres are permitted on less extensive power lines or on power lines below 15m above the ground and within 500m of an aerodrome runway end. Each marker should be a solid colour such as orange or white.

c) Installations.

1) Spacing.

Markers should be spaced equally along the wire at intervals of approximately 30 m where the marker diameter is 60 cm progressively increasing to 35 m where the marker diameter is 80 cm and further progressively increasing to a maximum of 40 m where the marker diameter is at least 130 cm.

Where multiple wires, cables, etc. are involved, a marker should be located not lower than the level of the highest wire at the point marked. They should be displayed on the highest wire or by another means at the same height as the highest wire. Where there is more than one wire at the highest point, the markers may be installed alternately along each wire if the distance between adjacent markers meets the spacing standard. This method allows the weight and wind loading factors to be distributed.

Where 30cm spheres are used, intervals between markers should be 10m to 15m.

2) Pattern.

An alternating colour scheme provides the most conspicuousness against all backgrounds. Overhead wires shall be marked by alternating solid coloured markers of international orange and white. An orange sphere is placed at each end of a line and the spacing is adjusted not to exceed the maximum spacing for the applicable size of spheres used to accommodate the rest of the markers. When less than four markers are used, they should all be international orange.

5) Flags

- a) Flags used to mark 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.
- b) Flags used to mark fixed objects shall not be less than 0.6 m square and flags used to mark mobile objects, not less than 0.9 m square.
- c) Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background, other conspicuous colours should be used.

- d) Flags used to mark mobile objects 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.

6) COMMISSION OR ALTERNATIVES TO MARKING

Although paint markings are the preferred method of marking, an alternative method of marking by white strobe lights may be approved on application.

7) Lighting of Objects

a) High Intensity Flashing White Lighting Systems.

High intensity lighting systems are more effective than orange/red and white paint under certain ambient light conditions involving the position of the sun relative to the direction of flight and therefore may be recommended instead of marking. When operated 24 hours a day, other methods of marking and lighting may be omitted. High intensity lighting systems are not recommended on structures of 150m AGL or less.

b) Medium Intensity Flashing White Lighting Systems.

When medium intensity type A flashing white lighting systems are operated 24 hours a day on structures of less than 150m AGL, other methods of marking may be omitted. When used on structures in excess of 150m AGL it shall only be used in conjunction with paint markings.

c) Dual Lighting Systems

When approved, a dual lighting system consisting of medium intensity white strobe lights with a peak intensity of at least 20 000 candela for daytime use and steady burning red lights of at least 32 candela intensity for twilight and night time use may be used on mast structures not exceeding 150m above ground level (AGL). Dual lighting systems would require uninterruptible power supply systems with at least 12 hours of autonomy. These lighting systems are subject to monitoring and immediate repair in the event of failure.

d) Omission of Markings

All markings may be omitted, *on application*, in *bona fide* nature conservation areas on structures not exceeding 150m.

8) Standards of lighting

The characteristics of lights shall comply with Annex 14 chapter 6 table 6-3 Red aeronautical obstacle lights on top of structures that require marking shall be dual units for redundancy purposes unless the system is monitored and failed units can be replaced within one working day.

9) Lighting Systems

Red, steady burning Low intensity type A lights of at least 10 candela intensity shall be used when required on structures not exceeding 45m AGL.

Red steady (or flashing) low intensity type B lights, of at least 32 candels intensity, shall be used on structures exceeding 45m but not exceeding 150m AGL.

Intermediate lights shall consist of at least 3 single units spaced at 120 degree intervals, depending on the diameter of the structure, and may be low intensity type A lights of at least 10 candela.

When flashing lights are used, the flashes shall be synchronized.

Structures exceeding 150m AGL shall comply with the standards of Annex 14 chapter 6 unless specified differently.

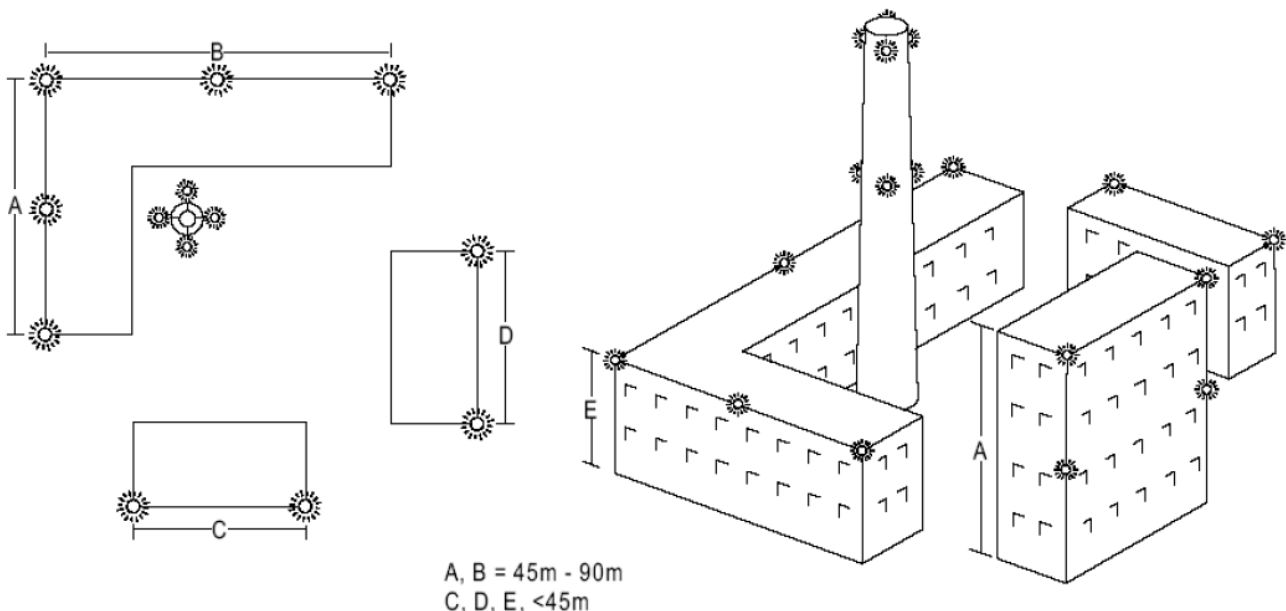
Temporary Construction Equipment Lighting - Construction cranes in urban areas should be painted in a conspicuous colour that is in a sharp contrast to the background. In addition, the jib should be illuminated with red flashing low intensity type B lights clearly defining the outline and extremities of the jib as well as the highest point of the crane. Spacing between lights should not exceed 45m.

10) CHIMNEYS, SMOKE STACKS, AND SIMILAR SOLID STRUCTURES

When required, lights may be displayed as low as 6 m below the top to avoid the obscuring effect of deposits and heat generally emitted by this type of structure. It is important that these lights be readily accessible for cleaning and lamp replacement.

a) Number of Light Units.

- 1) The number of units recommended depends on the diameter of the structure at the top. The number of lights recommended below is the minimum.
- 2) When the structure diameter is:
 - 6m or Less. Three light units per level.
 - Exceeding 6m but not more 30m. Four light units per level.
 - Exceeding 30 but not more than 60m. Six light units per level.
 - Exceeding 60m. Eight light units per level



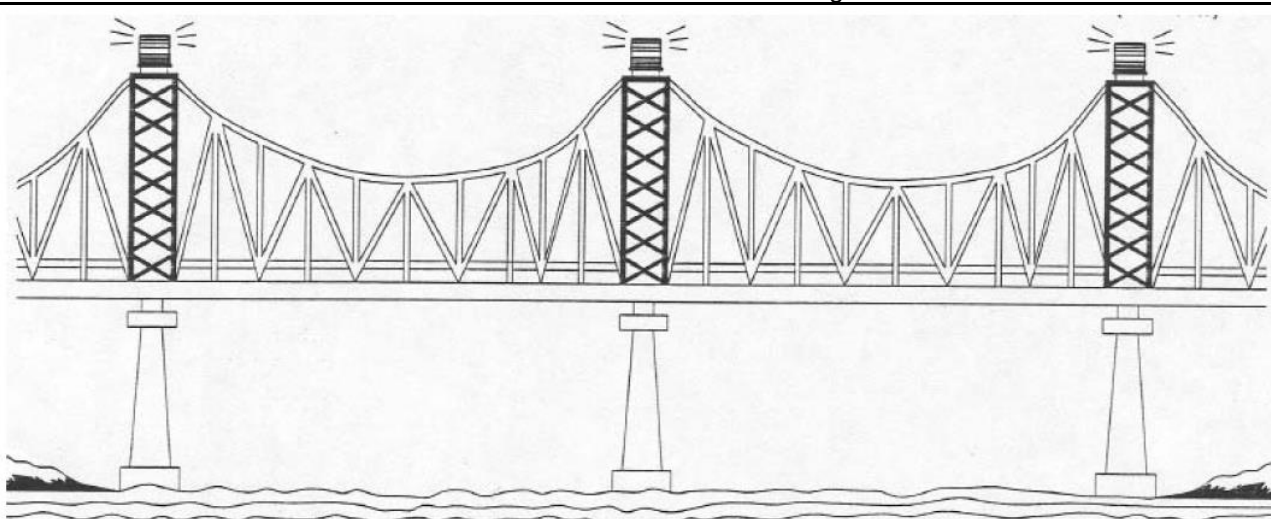
Lighting of buildings and other solid structures may be omitted if an aeronautical study indicated that other means of reaching the required visibility in the form of flood lighting or other effect lighting may suffice. The Commissioner may require an uninterruptible power source for such lighting.

11) ALTERNATE METHOD OF DISPLAYING OBSTRUCTION LIGHTS

When recommended in a CAA aeronautical study, lights may be placed on poles equal to the height of the obstruction and installed on or adjacent to the structure instead of installing lights on the obstruction.

12) Bridges

When required, bridge structures shall be illuminated by low intensity type B, steady burning red obstruction lights of, at least, 32 candela intensity. The Commissioner may require an uninterruptible power source for such lighting. Dual units shall be required for redundancy.



Balloons and other tethered devices.

The Commissioner may require that balloons and other tethered devices be illuminated for night time/twilight use.

13) Control of lights.

Day-to-Twilight. This should not occur before the illumination drops to 646 Lux but should occur before it drops below 377 lux. Illuminance-sensing device should, if practical, face the Southern sky.

14) Wind turbine generators (Wind farms)

a) Introduction

A wind turbine generator is a special type of aviation obstruction due to the fact that at least the top third of the generator is continuously variable and offers a peculiar problem in as much marking by night is concerned. When wind turbine generators are grouped in numbers of three or more they will be referred to as "Wind farms"

b) Wind farm Placement

Due to the potential of wind turbine generators to interfere on radio navigation equipment, no wind farm should be built closer than 35 km from an aerodrome. In addition much care should be taken to consider visual flight rules routes, proximity of known recreational flight activity such as hang gliders, en route navigational facilities etc.

c) Wind farm Configurations

Wind farms come primarily in three predominant configurations, although actual installations may contain one or any combination of the three configurations. These three configurations are linear, cluster, and grid.

Linear configurations are those where the turbines are placed in a line-like arrangement along a ridgeline, the face of a mountain, on a hill or along the borders of a field. The line may be ragged in shape or be periodically broken and may vary from just a few turbines to over several kilometres of wind turbines.

Cluster configurations are those where the turbines are placed in circle like groups on top of a hill or within a large field. A cluster is typically characterized by having a pronounced perimeter with various turbines placed inside the circle at various, erratic distances throughout the centre of the circle.

Grid configurations are those where the turbines are arranged in a geographical shape such as a square or a rectangle, with each turbine placed a consistent distance apart in rows, giving the appearance of a square-like pattern.

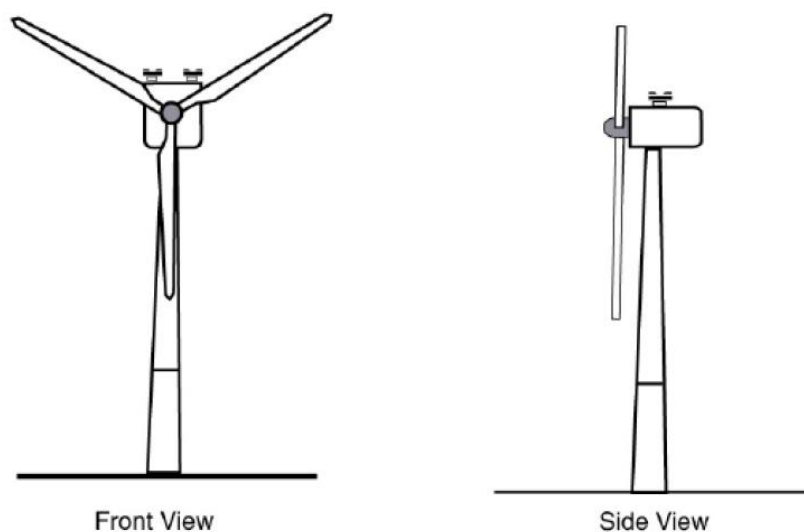
d) Wind farm markings

Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness. The colours grey, blue and darker shades of white should be avoided altogether. If such colours have been used, the wind turbines shall be supplemented with daytime lighting, as required.

e) Wind farm lighting

1) Individual wind turbine structures

Individual wind turbine structures shall be lighted by mounting two medium intensity type B lights on top of the generator housing and should flash simultaneously. Lighting fixtures are to be mounted at a horizontal separation to ensure an unobstructed view of at least one fixture by an aircraft approaching from any angle of azimuth. No intermediate level lights are required on these structures.



Lighting of individual wind turbines

2) Wind farm (3 or more units) Lighting

In determining the required lighting of a wind farm, it is important to identify the layout of the wind farm first. This will allow the proper approach to be taken when identifying which turbines need to be lit. Any special consideration to the site's location in proximity to aerodromes or known corridors, as well as any special terrain considerations, must be identified and addressed at this time.

Details are as follows:

Not all wind turbine units within an installation or wind farm need to be lit. Definition of the periphery of the installation is essential. Lighting of interior wind turbines is of lesser importance unless they project above the peripheral units. This can be the case when higher ridges or plateaus are present within the wind farm area.

Obstruction lights within a group of wind turbines should have unlighted separations or gaps of no more than 800m if the integrity of the group appearance is to be maintained. This is especially critical if the arrangement of objects is essentially linear, as is the case with most wind turbine groups.

Any array of flashing or pulsed obstruction lighting, intended to warn of a group of wind turbines forming an entity (i.e., a line, string, or series of units), shall be synchronized to flash simultaneously. If an installation consists of a number of widespread, but obviously separated areas or entities more than 1500m from each other, it is not necessary that all such areas flash synchronously.

Night time wind turbine obstruction lighting should consist of medium intensity type B aviation red flashing lights. Minimum intensities of 2000 candela for night time red flashing or strobe lights are required.

Note: Steady-burning obstruction lights shall not be used.

White medium intensity type A strobe lights may be used in lieu of the preferred medium intensity type B strobe lights, but must be used alone without any red lights, and must be positioned in the same manner as the red flashing lights.

Since the hub of the wind turbine unit is frequently as large as the nacelle (body) itself, a top-mounted obstruction light should be raised well above the surface of the nacelle so that it may be easily seen from directly in front of the turbine. Placement of the light fixtures on the turbine nacelle should be accomplished to ensure that they are visible from 360 degrees, with particular attention being made to ensure that the hub of the turbine rotor in no way blocks the light from an aircraft approaching the windward side of the turbine at the same elevation as the turbine hub.

When possible, antennas or towers of heights over 45m that are within the turbine farm area should be incorporated into the lighting plan for the site, as they offer tall, unobstructed platforms on which lighting fixtures can be mounted and should be included in the synchronization and spacing calculations.

Each turbine should only require one fixture if the site is monitored, and that a failed light fixture can be replaced within the next working day. Failure to replace a failed fixture, which is essential to maintaining the 800m-separation requirement, will result in an unsafe gap in the lighting configuration. If the facility does not possess the capability to replace fixtures within the next working day, each turbine shall be fitted with two separate fixtures.

A well-balanced lighting plan has all the light fixtures within the wind farm flash at the same time, thus delineating the farm as one large obstruction and navigation between the turbines should be discouraged. The synchronisation function can be accomplished through various means, either by radio frequency devices, hard-wired control cables, or independently mounted global positioning system synchroniser units. The site developer can decide the selection of the units, as long as the end result is that all lights flash perceivably at the same time. If the developer fails to synchronise the fixtures, the developer will be required to add additional fixtures at closer spacing. **The very basis of the lighting standards for wind farms is centred on the synchronous flashing of the perimeter lighting.**

f) Turbine Lighting Assignment

The following guidelines should be followed to determine which turbines, need to be equipped with lighting fixtures. Again, the placement of the lights is contingent upon which type of configuration is being used.

Linear: A light should be placed on each turbine positioned at each end of the line or string of turbines. From those end turbines, lights should then be positioned such that the next lit turbine is no more than 800m, from the last lit turbine. This pattern should continue until the end of the string is reached. If the last segment is significantly short, it may be practical to move the lit turbines back one or two turbines towards the starting point to present a nice, well-balanced string of lights. A high concentration of lights, in close proximity, should be avoided.

Cluster: A starting point should be selected along the outer perimeter of the cluster. This turbine should be lit, and then, continuing along the outer perimeter of the farm, a light should be placed on the next turbine with the maximum gap between the lit turbines being no more than 800m. This pattern should continue around the perimeter of the cluster, and end at the starting point. If it appears that the lights are crowded at the ending point, the lit turbines may be moved back by one turbine to present a balanced lighting presentation. If it is determined that the distance across the cluster is of a distance greater than 1500m, or the terrain may vary within the cluster (+30m from the perimeter elevations), it may be appropriate to place a few lit turbines at strategic locations throughout the centre of the cluster. This will prevent pilots from believing they may be able to climb over the outer perimeter and descend down into the centre of the cluster. Discretion should be used when placing these lights to maintain a well-balanced, safe lighting configuration.

Grid: Initially, each of the defined corners of the grid layout should be selected for lighting, and then, using the same concept of the cluster configuration, lights should be placed on turbines along the outer limits of the farm so that the maximum spacing between lit turbines is no more than 800m. If it appears as though the end of the lighting strings may be crowded, it may be necessary to move the lights back one or two turbines to create an even lighting configuration. If the grid is more than 1500m wide across the centre of the group of turbines, it may be appropriate to position one or two lights within the centre of the configuration to again provide warning to pilots attempting to climb over the outer limits of the grid, and descending into the centre of the grid. Elevation should also be considered.

Special Instances: On occasion, if one or two turbines may be positioned at locations that do not lend themselves to the linear, cluster, or grid layouts, the following guidelines should be followed. If the turbine protrudes from the general limits of the wind farm, the turbine should automatically receive a lighting fixture. If another turbine is collocated with the first turbine, it does not require any lighting as long as it is within 150m from the lit turbine and not positioned on the outboard side of the lit turbine. If these requirements cannot be met, both turbines, in this case, would need to be illuminated.

Annex C – Objects affecting navigable airspace

Introduction:

Any communications structure, building or other structure, whether temporary or permanent, which has the potential to endanger aviation in navigable airspace, or has the potential to interfere with the operation of navigation or surveillance systems or Instrument Landing Systems, including meteorological systems for aeronautical purposes, is considered an **OBSTACLE** and shall be submitted to the Commissioner for Civil Aviation for evaluation (refer SA-CAR Part 139.01.33)

Also applicable is **Part 91.01.10 of the CAR of 1997** - endangering safety:

"No person shall, through any act or omission, endanger the safety of an aircraft or person therein, or cause or permit an aircraft to endanger the safety of any person or property".

Part 185.00.1(1) (f) makes the non-compliance with the above-mentioned Regulation an offence.

As navigable airspace is any airspace where "heavier than air" craft can operate, it means that any obstacle, anywhere, needs to be evaluated.

WHY?

The main reason is to control or prevent structures that could have a serious effect on aviation safety, especially in the vicinity of an aerodrome. (*An aerodrome is a defined area on land or water intended for the arrival, departure and surface movement of aircraft* – ICAO definition). It also follows that the knowledge of where obstacles are, will add to aviation safety.

A database of all obstacles is kept and those above 60m above ground level are published in an Aeronautical Information Circular (AIC) and indicated on aeronautical maps. This data is also made available for other purposes such as for use on the on-board computers of some aircraft, for environmental research purposes etc.

Does my structure require lights or any other markings?

Obstacles are evaluated individually and marking (If any) are specified as requirements.

The following syntaxes are used:-

- **None:**

There are no requirements as far as the marking of the structure is concerned and may be left as is, camouflaged as a pink elephant, a tree, signpost etc.

- **Night Markings:**

Night markings are the addition of lights at the highest practical point of a structure to make such a structure more visible in darkness and poor light conditions. This will be found mostly on communications structures below 45m in height above ground where the need is identified to improve its visibility. The lights on top of these structures are ALWAYS used in pairs, for redundancy purposes, and shall be approved steady burning, red aeronautical obstruction lights of at least 10 candela, unless specified differently.

Night markings may also be applied to buildings or other substantial structures, which by its size and appearance cannot be overlooked in normal visibility conditions, such as a skyscraper, the cooling towers of a power station, mine headgear etc. but the need is identified to improve its visibility at night and poor visibility conditions. Such structures shall be illuminated by aeronautical obstruction lights, as above, clearly defining the outline of the structure in accordance with ICAO Annex 14 chapter 6, unless specified differently. Where this is not achievable due to practical considerations, different means of compliance may be specified or allowed, after investigation. This may be in the form of flood lighting, effect lighting (such as illuminated advertisements) etc.

• Day and Night Markings:

Day and night markings apply to all structures exceeding 45m above the ground in South Africa by default (refer SA-CAR Part 139.01.33), or lower structures when specified. Such structures may include structures where the top of the structure exceeds 150m above the MEAN ground level, like on top of a hill, and the mean ground level considered to be the lowest point in a 3 kilometre radius around such structure. Lower structures, which are otherwise considered as a danger to aviation, shall also be marked as such when specified.

Paint markings (Day markings) shall be in compliance with ICAO Annex 14 chapter 6 and shall consist of seven painted bands, each one seventh of the length of the structure, and shall consist of bands of International Orange (or Post Office red) alternated by brilliant white, starting and ending in orange/red, to a maximum length of 30 metres per band (i.e. a 210m mast). Thereafter it becomes 9 bands, each one ninth of the length of the mast up to 270m, 11 bands up to 330m etc.

Lights (Night marking) to be used shall consist of a pair of steady burning approved red aeronautical obstruction lights of, at least, 32 candela each at the highest practical point of the structure. This may be substituted by a medium intensity Type B flashing red light (20 – 60 flashes per minute), of 2000 candela ($\pm 25\%$) intensity in accordance with ICAO Annex 14 table 6-3.

Intermediate lights shall be placed at a position midway between the top of the structure and the ground and shall consist of at least three steady burning red aeronautical obstruction lights of, at least, 32 candela each, on the same vertical plane and spaced not more than 120 degree horizontally. At least two lights shall be visible through any azimuth of 360 degree and no light shall be spaced more than 30m apart, on the horizontal plane of any structure. Multiple lights may be required to satisfy this requirement. The vertical spacing of lights shall be as far as practical be evenly spaced and shall not exceed 45m between vertical levels.

Notes:

- Structures of 45 to 90m heights shall have dual lights on top and not less than a set of three lights at the intermediate level. An additional set of lights shall be added when the structure exceeds 90m in height and for any multiple thereafter.
- On structures of more than 90m, the top and every odd numbered light below may be substituted by a medium intensity Type B flashing red light (20 – 60 flashes per minute), of 2000 candela ($\pm 25\%$) intensity in accordance with ICAO Annex 14 table 6-3.
- These flashing lights shall be synchronised.* The Commissioner may require more stringent markings in specific situations and may require that lights be powered from a no-break power source (UPS).

What about power lines?

Power lines, overhead wires and cables are considered as obstacles and the detail shall be communicated to the Commissioner at an early planning stage.

The Commissioner shall require the route of the power line, the co-ordinates (*latitude and longitude in degree, minute, seconds and tenth of seconds format*) of turning points in the line, the maximum height of the structures above ground level and the name of the power line. The Commissioner shall evaluate the route and require those sections of the line (if any), which is considered a danger to aviation to be marked or rerouted.

Power lines shall be marked when crossing a river, valley or major highway with marker spheres of a diameter of not less than 60 cm. The spheres shall be of one colour and displayed alternately orange/red and white or a colour that is in sharp contrast to the background as seen from an airborne perspective. The spacing between the spheres and between the spheres and the supporting towers shall not exceed 30m. On lines with multiple cables, the spheres shall be fitted to the highest cable.

The marker spheres shall be visible from at least 1000m from an airborne perspective and 300m from the ground.

Where power lines crosses a river or valley, the co-ordinates (*latitude and longitude in degree, minute, seconds and tenth of seconds format*) and the height of the line above the valley or river, shall be communicated to the Commissioner for publication in the appropriate media.

The Commissioner may require that supporting towers be marked and lighted.

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Cranes

Where cranes are erected, prior permission shall be obtained from the Commissioner. The co-ordinates (*latitude and longitude in degree, minute, seconds and tenth of seconds format*), the ground elevation of the site above sea level, the height of the crane, the dimensions of the jib as well as the erecting date and duration of the project must be communicated to the Commissioner for evaluation and publication in the relevant media.

The Commissioner shall specify markings, if required.

When markings are required, the crane shall be painted in a conspicuous colour which in a sharp contrast to the background from an airborne perspective. Illumination shall clearly define the shape of the crane and the extremities of the structure shall be illuminated by medium intensity Type B flashing red light (20 – 60 flashes per minute), of 2000 candela ($\pm 25\%$ intensity in accordance with ICAO Annex 14 table 6-3).

Variations on Markings

Written, motivated request for the variation of any of the requirements for the marking of structures may be addressed to the Commissioner.

Where do I find the specifications on markings?

Specification on the lighting and painting of structures can be found in ICAO Annex 14 chapter 6 and the specifics in Annex 14 APPENDIX 1. COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS

Is there a cost involved?

An assessment fee is applicable per application and is a "once off" providing none of the specified dimensions changed. When the height or the position of an "obstacle" has changed, it is considered as a new application. The fee is published in part 187.00.21 (Fees relating to Part 139) and is available on the CAA website under "Fees"

How long does it take?

Unless further investigation is required, one could expect an answer within 10 working days after submission and payment of a request.

Annex D – Wind Farm Developers Application Pro Forma

South African Civil Aviation Authority

NOTICE TO WIND FARM DEVELOPERS

Please submit a completed application form for all new or revised onshore and offshore wind farm plans. The purpose of this form is to standardise the information provided and to expedite the assessment of your proposed wind farm development. Assessment is made against aviation safety (PART 139.01.33 OF THE CIVIL AVIATION REGULATIONS, 1997 TO THE AVIATION ACT, 1962 (ACT NO 74 OF 1962)) and defence interests, through evaluation of the possible effects on air traffic systems, defence systems and low flying needs.

NOTICE TO PLANNING AUTHORITIES

This form has been compiled by the South African Civil Aviation Authority (SACAA), to assist in the processing and assessment of wind farm applications. It is important that copies of this form are forwarded to the SACAA within the planning consultation process. This will help these organisations trace their records of any earlier consultations, as well as provide them with the relevant information for their assessments.

WHAT TO DO WITH THIS FORM

Please provide as much detail as possible by **filling in the shaded areas**. If the specific turbine and/or exact positions have yet to be established then fill in the likely turbine size (hub height, rotor diameter) and wind farm boundary points as a minimum. On completion send copies to the following address or email.

Address

Obstacle Specialist
Ikhaya Lokundiza
Building 16, Treur Close
Waterfall Park
Bekker Street
Midrand

Email

obstacles@caa.co.za

It is important that a copy of this form is retained for inclusion with subsequent planning applications at the same site. If no application has been made prior to a planning application, please include a completed form in your planning application.

Wind Farm Name	
Also known as:	

Developers reference	
Application identification No.	

Related/previous applications (at or near this site): Provide reference names or numbers	
--	--

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Developer Information	
Company name:	
Address:	
Contact:	
Telephone:	
Facsimile:	
e-mail:	

Relevant Wind Turbine Details			
Wind turbine manufacturer:			
Wind turbine model:			
Wind farm generation capacity (MW)		Number of turbines	
Blade manufacturer			
Number of blades			
Rotor diameter		Meters	
Rotation speed (or range)		Rpm	
Blade material including lightning conductors			
Wind turbine hub height		Metres	
Tower design (* delete as required)	* Tubular	* Lattice	
Tower base diameter/dimensions		Metres	
Tower top diameter/dimensions		Metres	

Comments
Are there any details or uncertainties that may be helpful to add?

Turbine Locations or Boundary Points

Please provide as much information as you can. The position and height above sea level of every machine if available, the site boundary if not. Please note grid references **and** latitude/longitude must be included.

A map or maritime chart if applicable should be submitted with this pro-forma, showing locations of the proposed turbine/turbines or scheme boundaries. Please number the turbines or boundary points on the map, to correlate with the information provided below.

Copy this page as necessary to account for all turbines or boundary points

Wind farm Name & Address:	
--	--

Turbine no.		Height (m) of tower base				
Grid Reference						
Easting (10 m)					Southings (10 m)	
	Degrees			Minutes	Seconds	
Latitude						
Longitude						

Turbine no.		Height (m) of tower base				
Grid Reference						
Easting (10 m)					Southings (10 m)	
	Degrees			Minutes	Seconds	
Latitude						
Longitude						

Turbine no.		Height (m) of tower base				
Grid Reference						
Easting (10 m)					Southings (10 m)	
	Degrees			Minutes	Seconds	
Latitude						
Longitude						

Turbine no.		Height (m) of tower base				
Grid Reference						
Easting (10 m)					Southings (10 m)	
	Degrees			Minutes	Seconds	
Latitude						
Longitude						

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Annex E – Obstacle Forms

Print Form

Submit by Email

Reset Form

SOUTH AFRICAN



CAA Obstacle ID

Section/division:
Telephone number:
Physical address:
Postal address:

Aerodrome Oversight, Air Safety Infrastructure
011-545-1000
Ikhaya Lokundiza, 16 Treur Cloos, Waterfall Park, Bekker Street, Midrand, Gauteng
Private Bag X73, Halfway House 1685

Fax Number: 011-545-1451
Street, Midrand, Gauteng
Website: www.caa.co.za

Form Number: CA 139-09

APPLICATION FOR APPROVAL OF OBSTACLE

Details of applicant		Details of owner	
Name of Company	<input type="text"/>	Name of Company	<input type="text"/>
Contact Person	<input type="text"/>	Contact Person	<input type="text"/>
Phone Number	<input type="text"/>	Phone Number	<input type="text"/>
Cell Number	<input type="text"/>	Cell Number	<input type="text"/>
Fax Number	<input type="text"/>	Fax Number	<input type="text"/>
email	<input type="text"/>	email	<input type="text"/>

The applicant herewith applies for assessment and approval by the SACAA for the following requisite details of a proposed structure.

Proposed Construction	
Type of Structure <input type="text"/>	Start Date <input type="text"/>
Site Name <input type="text"/>	End Date <input type="text"/>
Site ID Number <input type="text"/>	Coordinate Data Source <input type="text"/>
Latitude (S) D <input type="text"/> M <input type="text"/> S <input type="text"/>	If Other: <input type="text"/>
Longitude (E) D <input type="text"/> M <input type="text"/> S <input type="text"/>	Elevation Data Source <input type="text"/>
Site Elevation (m) <input type="text"/>	If Other: <input type="text"/>
Structure Height (m) <input type="text"/>	Datum <input type="text"/>
Sub-Structure Height (m) <input type="text"/>	Application Date <input type="text"/>
Height to top of structure <input type="text"/>	
Guy-wire/Jib (m) <input type="text"/>	
Type of Structure <input type="checkbox"/> Replacement <input type="checkbox"/> Shared <input type="checkbox"/> New	

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Conditions of approval

- ☐ None
☐ Day Markings
☐ Night Markings
☐ Day & Night Markings
☐ Other/Special

Not applicable

Attached Documents

- ☐ Survey Report
☐ Sketch Diagram
☐ GIS Coverage
☐ Other

Please note: Attach supporting documents if applicable

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**AVIATION REQUIREMENTS FOR POWERLINES,
BUILDINGS, TOWERS, WIND TURBINES AND RELATED
STRUCTURES**
Unique Identifier: **240-103616544**Revision: **1**Page: **30 of 35**

Print Form

Submit by Email

Reset Form

SOUTH AFRICAN



Section/division:
Telephone number:
Physical address:
Postal address:

Aerodrome Oversight, Air Safety Infrastructure
011-545-1000
Ikhaya Lokundiza, 16 Treur Close, Waterfall Park, Bekker Street, Midrand, Gauteng
Private Bag X73, Halfway House 1685

Form Number: CA 139-09-01

Fax Number: 011-545-1451
Street, Midrand, Gauteng
Website: www.caa.co.za

OBSTACLE DETAILS

CAA Obstacle ID			
Province		Site Name	
Municipality		Site ID Number	
Geometry <input type="checkbox"/> Point <input type="checkbox"/> Line <input type="checkbox"/> Polygon		Effectivity Start Date End Date	
Latitude (S)	D <input type="text"/> M <input type="text"/> S <input type="text"/>	Longitude (E)	D <input type="text"/> M <input type="text"/> S <input type="text"/>

The applicant herewith submit to the SACAA the requisite details of a built structure.

Horizontal Parameters

Accuracy	
Resolution	
Confidence Level	
Extent	
Derivation	
Bias	
Standard Deviation	
Reference System	
Data Source	

Vertical Parameters

Accuracy	
Resolution	
Confidence Level	
Height (m)	
Derivation	
Bias	
Standard Deviation	
Reference System	
Data Source	

FOR OFFICE USE ONLY

Conditions of approval

- ☐ None
☐ Day Markings
☐ Night Markings
☐ Day & Night Markings
☐ Other/Special

Notes

Attached Documents

- ☐ Survey Report
☐ Sketch Diagram
☐ GIS Coverage
☐ Other

Please note: Attach supporting documents if available

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Annex F – Fees**Fees relating to Part 139****187.00.21** (1) The following audit fees shall be payable:**Fire services, Security and Dangerous Goods**

Cat	National	International				
	Aerodromes	Aerodromes	Infrastructure	Lighting	Instrumentation	
1	480.00	3, 580.00	240.00	Instrument RWS:	VOR:	1, 160.00
2	1, 790.00	7, 200.00	240.00	R2.20/metre	ILS:	1, 375.00
3	3, 480.00	10, 490.00	500.00		NDB:	370.00
4	6, 040.00	16, 240.00	1, 140.00	Non-instrument RWS:	PAPI (Audit):	700.00
					per set	
5	7810.00	21, 070.00	1, 330.00	R1.10/metre	PAPI (Calibrate):	1, 375.00
					per set	
6	8, 910.00	23, 870.00	2, 650.00		VHF Spectrum:	900.00
7	27, 780.00	47, 990.00	7, 950.00			
8	61, 250.00	124, 770.00	18, 770.00			

2)	(a)	For a copy of the register of aerodrome licences, heliport approvals and heliport licences	1.30 p.p
		[regulation 139.01.6(5)] (R1.20 per page up to a maximum of 100 pages)	
	(b)	For the issuing of a licence of intent (regulation 139.02.18(2)(b)(vi))	3, 900.00
	(c)	For the issuing of a heliport licence (regulation 139.03.10(b)(viii))	3, 300.00
	(d)	For the renewal of a heliport licence [regulation 139.03.17(1)(b)(iv)]	3, 300.00
	(e)	For the approval and renewal of a helistop	3, 300.00
	(f)	For the issuing of an approval for the erection of a cellular telephone mast or any other obstacle	590.00

Fees relating to Part 141**187.00.22** The following fees shall be payable upon application:

(a)	For a copy of the register of aviation training organisation approvals	190.00
(b)	For the issuing of an aviation training organisation approval to conduct standard aviation training	2, 255.00
(c)	For amendment of an aviation training organisation approval to conduct standard aviation training	1, 070.00
(d)	For the renewal of an aviation training organisation approval to conduct standard aviation training	1, 170.00
(e)	For issuing of an aviation training organisation temporary approval to conduct aviation training (per hour)	525.00

Fees relating to Part 145**187.00.23** The following fees shall be payable upon application:

(a)		For a copy of the register of aircraft maintenance organisation approvals (regulation 145.01.10 (5)) (R1.20 per page up to a maximum of 100 pages)	1.30p.p
(b)	(i)	For the issuing of an aircraft maintenance organisation within the borders of RSA:	
		Per application	1, 375.00
		The hourly rate for inspection time	525.00
	(ii)	For the issuing of an aircraft maintenance organisation approval outside the borders of RSA per hour	US\$ 100
	(iii)	For the amendment of an aircraft maintenance organisation approval	590.00
(c)		For the renewal of an aircraft maintenance organisation approval within the borders of the RSA	
		Per application	635.00
		The hourly rate for inspection time	525.00
(d)		For the issuing of a duplicate aircraft maintenance organisation approval	95.00

Annex G – Impact Assessment

(Normative)

Impact assessment form to be completed for all documents.

1) Guidelines

- All comments must be completed.
- Motivate why items are N/A (not applicable)
- Indicate actions to be taken, persons or organisations responsible for actions and deadline for action.
- Change control committees to discuss the impact assessment, and if necessary give feedback to the compiler of any omissions or errors.

2) Critical points

2.1 Importance of this document. E.g. is implementation required due to safety deficiencies, statutory requirements, technology changes, document revisions, improved service quality, improved service performance, and optimised costs.

Comment: This document defines requirements to be met to ensure continued safe landing and departure conditions at aerodromes and to ensure that Eskom's infrastructure are not damaged by aeroplanes.

2.2 If the document to be released impacts on statutory or legal compliance - this need to be very clearly stated and so highlighted.

Comment: This document impacts on statutory requirements as set by the CAA.

2.3 Impact on stock holding and depletion of existing stock prior to switch over.

Comment: No stock levels are affected.

2.4 When will new stock be available?

Comment: No stock levels are affected.

2.5 Has the interchangeability of the product or item been verified - i.e. when it fails is a straight swap possible with a competitor's product?

Comment: No products are affected.

2.6 Identify and provide details of other critical (items required for the successful implementation of this document) points to be considered in the implementation of this document.

Comment: During the engineering survey of each power line, substation and the positioning of communication towers, it is critical to ensure that these infrastructures do not interfere into the safe aeronautical surfaces around aerodromes.

2.7 Provide details of any comments made by the Regions regarding the implementation of this document.

Comment: Not Applicable

3) Implementation timeframe

3.1 Time period for implementation of requirements.

Comment: As soon as the document is approved and published.

3.2 Deadline for changeover to new item and personnel to be informed of DX wide change-over.

Comment: c

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4) Buyers Guide and Power Office

4.1 Does the Buyers Guide or Buyers List need updating?

Comment: No products are affected.

4.2 What Buyer's Guides or items have been created?

Comment: No products are affected.

4.3 List all assembly drawing changes that have been revised in conjunction with this document.

Comment: No drawing changes are affected.

4.4 If the implementation of this document requires assessment by CAP, provide details under 5

4.5 Which Power Office packages have been created, modified or removed?

Comment: : No software is affected.

5) CAP / LAP Pre-Qualification Process related impacts

5.1 Is an ad-hoc re-evaluation of all currently accepted suppliers required as a result of implementation of this document?

Comment: Not Applicable

5.2 If NO, provide motivation for issuing this specification before Acceptance Cycle Expiry date.

Comment: Not Applicable

5.3 Are ALL suppliers (currently accepted per LAP), aware of the nature of changes contained in this document?

Comment: Not Applicable

5.4 Is implementation of the provisions of this document required during the current supplier qualification period?

Comment: Not Applicable

5.5 If Yes to 5.4, what date has been set for all currently accepted suppliers to comply fully?

Comment: Not Applicable

5.6 If Yes to 5.4, have all currently accepted suppliers been sent a prior formal notification informing them of Eskom's expectations, including the implementation date deadline?

Comment: Not Applicable

5.7 Can the changes made, potentially impact upon the purchase price of the material/equipment?

Comment: Not Applicable

5.8 Material group(s) affected by specification: (Refer to Pre-Qualification invitation schedule for list of material groups)

Comment: Not Applicable

6) Training or communication

6.1 Is training required?

Comment: No

6.2 State the level of training required to implement this document. (E.g. awareness training, practical / on job, module, etc.)

Comment: Not Applicable

6.3 State designations of personnel that will require training.

Comment: Not Applicable

6.4 Is the training material available? Identify person responsible for the development of training material.

Comment: Not Applicable

6.5 If applicable, provide details of training that will take place. (E.G. sponsor, costs, trainer, schedule of training, course material availability, training in erection / use of new equipment, maintenance training, etc).

Comment: Not Applicable

6.6 Was Technical Training Section consulted w.r.t module development process?

Comment: Not Applicable

6.7 State communications channels to be used to inform target audience.

Comment: The Change Control Committee channels

7) Special tools, equipment, software

7.1 What special tools, equipment, software, etc will need to be purchased by the Region to effectively implement?

Comment: None

7.2 Are there stock numbers available for the new equipment?

Comment: No products and equipment are affected.

7.3 What will be the costs of these special tools, equipment, software?

Comment: Not Applicable

8) Finances

8.1 What total costs would the Regions be required to incur in implementing this document? Identify all cost activities associated with implementation, e.g. labour, training, tooling, stock, obsolescence

Comment: None. This is just a new specification of an output which already needs to be done.

Impact assessment completed by:

Name: L Mashamba

Designation: NOU Land and rights manager