

TABLE 2A: KEY INTERNATIONAL AND DOMESTIC AVIATION LEGAL REQUIREMENTS POTENTIALLY APPLICABLE TO THE ESTABLISHMENT OF THE PROPOSED CONCENTRATING SOLAR POWER PLANT

Convention on International Civil Aviation 1944 (ICAO)

[Table 2A is included in the report so as to deal with Bohlweki's instruction in regard to the project being in the vicinity of an airfield but out side of the "danger zone" of the airfield. Please note the limitations of this Table 2A, and of IMBEWU's knowledge of aviation legislation, as described at section 2.2 of the report. It is strongly recommended that Bohlweki advise Eskom to seek guidance from the South Africa Civil Aviation Authority, in respect of the matters dealt with on this Table 2A, prior to the construction of the CSP plant].

Object: The Convention establishes certain principles and arrangements to ensure that international civil aviation develops in a safe and orderly manner. South Africa is a Party (contracting state) to the Convention. Note that elements of the Convention have been introduced into South Africa domestic law in terms of the Aviation Act No. 74 of 1962, mentioned below. Consequently the requirements of the Convention, relating to the placement of markings on the CSP plant, must be duly considered in the establishment of the project.

Article 28: Air navigation facilities and standards system

Each contracting state undertakes, so far as it may find practicable, to:

- b) Adopt and put into operation the appropriate standard systems of communications procedure, codes, markings, signals, lighting and other operational practices and rules which may be recommended or established from time to time, pursuant to this Convention;
- (c) Collaborate in international measures to secure the publication of aeronautical maps and charts in accordance with standards which may be recommended or established from time to time, pursuant to this Convention

Article 37: Adoption of international standards and procedures

Each contracting state undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation. To this end the International Civil Aviation Organization shall adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures dealing with:

- (a) Communications systems and air navigation aids, including ground marking;
- (b) Characteristics of airports and landing areas;
- (c) Rules of the air and air traffic control practices;
- (i) Aeronautical maps and charts;

and such other matters concerned with the safety, regularity, and efficiency of air navigation as may from time to time appear appropriate.

Elements of the Convention that are relevant to the establishment of the CSP plant are described below.

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Annex 14 to Chapter 6 of the Convention: Visual aids for denoting obstacles (for convenience the numbering of paragraphs, as used in the Convention, is used below. This is *inter alia* so that cross-referencing between paragraphs of the Convention remains consistent).

6.1 Objects to be marked and/or lighted

6.1.1 A fixed obstacle that extends above a take-off climb surface within 3 000 m of the inner edge of the take-off climb surface should be marked and, if the runway is used at night, lighted.

[We are instructed that the CSP plant will not be located in the "danger zone" of the airfield. It is therefore concluded that the CSP plant will be beyond the abovementioned 3 000 m delimitation and will not be regarded as an "obstacle", for the purposes of the Convention, but rather a "fixed object". Bohlweki is advised to make certain that this is, indeed, the case with respect to the location of the CSP plant and to raise this issue with Eskom].

6.1.2 A fixed object, other than an obstacle, adjacent to a take-off climb surface should be marked and, if the runway is used at night, lighted if such marking and lighting is considered necessary to ensure its avoidance.

6.2 Marking of objects

6.2.1 All fixed objects to be marked, whenever practicable, should 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.

6.2.7 Use of markers

Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1 000 m, for an object to be viewed from the air, and 300 m for an object to be viewed from the ground, in all directions in which an aircraft is likely to approach the object. The shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they mark is not increased

6.2.9 The spacing between two consecutive markers or between a marker and a supporting tower should be appropriate to the diameter of the marker.

6.2.10 A marker should be of one colour. When installed, white and red, or white and orange markers should be displayed alternately. The colour selected should contrast with the background against which it will be seen.

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6.3 Lighting of objects

6.3.1 The presence of objects which must be lighted, as specified in 6.1, shall be indicated by low, medium, or high intensity obstacle lights, or a combination of such lights.

6.3.7 Medium-intensity obstacle lights, Type A, B or C, should be used where the object is an extensive one or its height above the surrounding ground is greater than 45 m. Medium-intensity obstacle lights, Types A and C should be used alone, whereas medium-intensity obstacle lights, Type B should be used either alone or in combination with low-intensity obstacle lights, Type B

6.3.8 High-intensity obstacle lights, Type A, should be used to indicate the presence of an object if its height above the level of surrounding ground exceeds 150 m and an aeronautical study indicated such lights to be essential for the recognition of the object by day.
Annex 15 Chapter 10

6.3.10 Where, in the opinion of the appropriate authority, the use of high-intensity obstacle lights, Type A or B, or medium-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 1000 m radius) or cause significant environmental concerns, a dual obstacle lighting system should be provided. This system should be composed of high-intensity obstacle lights, Type A or B, or medium intensity obstacle lights, Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle lights, Type B or C, for night-time use.

Note. Graphic recommendations on how a combination of low-, medium-, and/or high-intensity lights on obstacles should be displayed are provided at Annexure 1 to this Table 2A. To ensure consistency, numbered references in Annexure 1 are the same as those used in the Convention. References to "type" below are references to the types of marking/lighting depicted at Annexure 1 to Table 2A.

Location of obstacle lights

6.3.11 One or more low-, medium- or high-intensity obstacle lights shall be located as close as practicable to the top of the object. 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.

6.3.13 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.

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6.3.16 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 (see paragraph 6.3.7, above).

6.3.17 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.

6.3.18 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.

6.3.19 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) specified in 6.3.11 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.

6.3.20 Where high-intensity obstacle lights, Type B, are used, they shall be located at three levels:

- at the top of the tower;
- at the lowest level of the catenary of the wires or cables; and
- at approximately midway between these two levels.

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6.3.21 The installation setting angles for high-intensity obstacle lights, types A and B, should be in accordance with Table 6-2, at Annexure 1 to this Table 2A.

6.3.22 The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that object in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

Medium-intensity obstacle light- characteristics

6.3.30 Medium-intensity obstacle lights, Type A, shall be flashing-white lights, Type B shall be flashing-red lights and Type C shall be fixed-red lights.

6.3.31 Medium-intensity obstacle lights, Types A, B and C, shall be in accordance with the specifications in Table 6-3.

6.3.32 Medium-intensity obstacle lights, Types A and B, located on an object shall flash simultaneously.

High-intensity obstacle light - characteristics

6.3.33 High-intensity obstacle lights, Types A and B, shall be flashing-white lights.

6.3.34 High-intensity obstacle lights, Types A and B, shall be in accordance with the specifications in Table 6-3.

6.3.35 High-intensity obstacle lights, Type A, located on an object shall flash simultaneously.

6.3.36 High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., should flash sequentially; first the middle light, second the top light and last, the bottom light. The intervals between flashes of the lights should approximate the following ratios:

Flash interval between:	Ratio of cycle time:
middle and top light	1/13
top and bottom light	2/13
bottom and middle light	10/13

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Annex 15 to Chapter 10 of the Convention: Electronic Terrain and Obstacle Data

10.4 Obstacle database-content and structure

To ensure safety in navigation, each signatory to the Convention must collect obstacle data and record same in a digital database. In order to give effect to this obligation, all obstacles specifications must be forwarded to the Commissioner- Civil Aviation Authority for inclusion in the obstacle database.

"Obstacles of note" i.e. above 60m above ground level must be published in an Aeronautical Information Circular and must be indicated on aeronautical maps and if in the close vicinity of an aerodrome, it must be published as a declared construction on the individual aerodrome plates in the Aeronautical Information Publication. The Civil Aviation Authority (CAA) will send out initial international warnings of the existence of the construction in a telegram style notification (NOTAM).

For convenience relevant provisions of the Aviation Act No. 74 of 1962, which is a South African statute closely allied to the Convention, are described overleaf.

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The Aviation Act No. 74 of 1962