Title: Guidance Material on Off-Shore Wind Farms

1 INTRODUCTION

This guidance material sets out certain minimum requirements for the lighting, marking, radar enhancing and supply of information for promulgation to ensure the conspicuity of off-shore wind farm machines and associated structures.

The purpose of this document is to provide general guidance for lighting, marking and radar enhancement requirements and also on information required for promulgation to ensure the conspicuity of wind farm machines and associated structures, so as to protect air and marine navigation safety.

The aircraft operations which have been considered in determining this guidance material include;

- en-route instrument and visual flight between aerodromes;
- local instrument and visual flight associated with an aerodrome;
- search and rescue (SAR) activity; and
- Helicopter operations in support of offshore installations, vessels and lighthouses.

Readers should forward advice of errors, inconsistencies, requests for further information or suggestions for improvement to this guidance material to ansdinfo@iaa.ie.

2 REFERENCES

- ICAO Annex 14- Aerodromes
- Doc 8168 – ICAO Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)
- EUROCAE: User Requirements for Terrain and Obstacle Data, ED-98
- EUROCAE: Standards for processing aeronautical data, ED-76
- COMMISSION REGULATION (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky
- EU REG 923 - SERA

3 DETAIL

General

Aircraft operations must comply with the EU REG 923 - SERA.

There may be inaccuracies associated with aircraft altimetry. An aircraft attempting to fly at 500ft above the sea may, in certain circumstances, inadvertently be lower than 500ft above mean sea level.

SAR activity is exempted from the above specified minimum height and flight visibility requirements and can be anticipated to operate at 500ft or lower levels in adverse weather conditions for the purpose of saving life.

Helicopters supporting explorations rigs, vessels, lighthouses and offshore production platforms would not be subject to the above minimum height and flight visibility requirements while landing or taking off in accordance with normal aviation practice.

An object which is higher than 90m in height is considered to have significance for the en-route operations of aircraft in Irish airspace.

Applicability

This guidance material is applicable, generally, for offshore wind farms and associated structures which are not located;

- within 8 nautical miles of publicly licensed aerodromes; or
- within 32 nautical miles of Air Navigation Services Radar and other radio navigation facilities; or
- within 4 nautical miles of any permanent offshore helipads. (Note: some lighthouses, e.g. Kish Lighthouse, have helipads).

Within such areas specified above, marking, lighting and radar enhancing requirements and information required for promulgation will require to be assessed on an individual basis.

Conspicuity Requirements

Lighting and marking requirements to protect air navigation safety consists of the same lighting and marking installed to protect marine navigation, supplemented as necessary for the protection of air navigation safety.

Lighting Requirements to Protect Marine Navigation Safety

The following general minimum specification for lighting is assumed for application in the interests of safety of marine navigation, as determined by the Commissioners of Irish Lights:

Yellow lights will be fixed to all machines and shall be located appropriately at a point(s) on the structure above the Highest Astronomical Tide but below the lowest point of the arc of the structure's rotor blades. Such lights will be visible through 360° in azimuth and will have vertical divergence of 5° above and below the horizontal, 5 nautical miles visibility and a minimum of 99% availability.

Structures chosen as suitable for representing the periphery of wind farms are termed Significant Peripheral Structures. Such structures will be spaced along the periphery of wind farms at intervals of no more than 3 nautical miles, where practicable. Such structures will be lighted with flashing lights of distinctive navigational characteristic fitted above the Highest Astronomical Tide but below the lowest point of the arc of the structure's rotor blades. Such lights will be visible through 360° in azimuth and have a vertical divergence of 5° above and below the horizontal, 10 nautical miles visibility and a minimum of 99% availability.

Lighting Requirements to Protect Air Navigation Safety

The lighting required to protect air navigation will be the lighting specified to protect marine navigation safety, supplemented as follows.

All Significant Peripheral Structures, of height ≥ 90m, to the highest point of the structure including the top of blade spin where appropriate, above Mean Sea Level; will be fitted with high intensity warning lighting meeting the following requirements:

- the lighting must be mounted on the highest point practicable of the fixed structure;
- be in accordance with the International Civil Aviation Organisation (ICAO) Annex 14 standards, on a H24 basis, for High Intensity Type A lighting:-
    - colour white with a flash rate of 40~60 fpm;

- have an effective intensity, with background luminance above 500cd/m², of 200,000 cd ± 25%;
- have an effective intensity, with background luminance 50~500cd/m², of 20,000 cd ± 25%;
- have an effective intensity, with background luminance below 50cd/m², of at least 2,000 cd;
- light fittings will be fully cut off so that practically no light will be emitted below the horizontal, or as otherwise agreed with the IAA;
- all lights across the farm should flash in synchronisation and reductions in light intensity should occur simultaneously, if practicable;
- be visible through 360° in azimuth

- any light which fails shall be repaired or replaced as soon as is reasonably practicable. An alerting system for light failure will be put in place, such as remote monitoring or other suitable method agreeable to the IAA.

Marking Requirements to Protect Marine Navigation

The following general minimum specification is assumed for application to protect marine navigation safety, as determined by the Commissioners of Irish Lights:

- high visibility yellow from high water mark to the specified level of the marine navigation protection lights, or
- double yellow bands as specified;
- fog signals may be required to be fitted on Significant Peripheral Structures in wind farm developments.

Marking Requirements to Protect Air Navigation Safety

The marking required to protect air navigation will be the marking required to protect marine navigation as per above.

Radar Enhancers Required to Protect Marine Navigation Safety

Significant Peripheral Structures may be required to be fitted with Radar Enhancers, Transponders, Reflectors and/or Marine Radar Automatic Identification Systems (AIS) as determined by the Commissioners of Irish Lights.

Radar Reflectors Required to Protect Air Navigation Safety

Significant Peripheral Structures must be fitted with Radar Reflectors.

Information Required by IAA Prior to the Erection of Structures

At least three months in advance of the erection of wind machines or associated structures, the following information shall be supplied to the Irish Aviation Authority for promulgation in a manner considered appropriate by the Authority:

- positional data representing the Estimated Position of each machine or structure to be erected. The geodetic datum to which all obstructions shall be referred is the World Geodetic System of 1984 (WGS-84). Co-ordinates should be provided in degrees, minutes, seconds and decimals of a second, as appropriate;
- the estimated maximum elevation of each structure in feet and metres;
- proposed lighting details for each structure;
- proposed marking details for each structure;
- whether it is proposed that a Radar Enhancer / Transponder / Reflector or Radar AIS be fitted;
- minimum and maximum spacing between structures;
- planned earliest date of erection, and
- Any other information considered relevant for air navigation.

Information Required by Commissioners of Irish Lights Prior to the Erection of Structures

At least three months in advance of the erection of any structure, the information listed in above shall be provided in an Application for Statutory Sanction, as required under the Merchant Shipping Acts, to the Commissioners of Irish Lights, with the proviso that the information referred to above shall be that as pertains to marine navigation.

Information Required After Erection of Structures

Within three months of the completion of the development of a wind farm or part of a wind farm, updated information, as per above, shall be supplied to the Irish Aviation Authority. The positional data will be derived by survey in accordance with the IAA Guidance Material for Obstruction Surveys (ASAM No.023), which is available on IAA web site.

The developer will thereafter be required to provide updated relevant information on any subsequent alterations to the wind farm.

This information shall also be supplied to the Commissioners of Irish Lights.

Responsible Bodies

This guidance material has been developed by the Safety and Regulation Division (SRD) of the IAA in consultation with the Commissioners of Irish Lights. Any queries regarding the contents of this material should be addressed in writing to:

ANSD,
Irish Aviation Authority,
Times Building,
D'Olier Street,
Dublin 2.

or

Commissioners of Irish Lights,
Harbour Road
Dun Laoghaire,

Future Revision of this Document

This document may be subject to future revision. Any interested party may propose an amendment to its provisions. Amendments will be agreed in consultations between the IAA, CIL, the Department of Communications, Marine and Natural Resources, and other interested parties.