



## Executive Summary

This paper sets out the Royal Yachting Association (RYA) position in relation to the development of *offshore renewable wind energy*. It is intended to enable developers to take accurate account of recreational boating concerns when developing their Environmental Statements and Navigational Risk Assessments.

In summary, the RYA believes that the impact that offshore renewable wind energy has on recreational boating can be minimised provided developers fully consider the following key points which are drawn from the paper that follows:

- **Collision risk.** The RYA believes that the collision risk posed to recreational craft by wind farms and associated infrastructure can be minimised by specifying:
  - a minimum rotor tip air draft of 22 metres above Mean High Water Springs;
  - a minimum safe water clearance over submerged structures and associated infrastructure determined in accordance with the methodology set out in MGN 543(M+F), Annex 1;
  - UK wide standardisation of wind farm layouts which are uniform and predictable and that give at least one line of orientation.
- **Charting, marking and lighting.** The RYA supports the guidance provided by the MCA, UKHO and GLAs on the charting, marking and lighting of wind farms and works with them to identify site specific issues that may occur.
- **Navigational and communication equipment.** Any proposed development should account for any effect on small craft navigation and communication equipment in detail.
- **Location.**
  - The impact on recreational routes, general sailing areas, racing areas and access to boating facilities and anchorages must be considered when examining the impacts of wind farm developments and their associated infrastructure;
  - Poorly sited wind farms and those that are built within the 12nm limit may increase the risk to navigational safety and discourage visiting boaters to the area. This would have an adverse effect not only on visitors but also on the local economy.
- **Sailing and racing areas.** Any interference in wind speed and/or turbulence created by a wind farm in a sailing or racing area would create a significant negative impact on the site and diminish its value for recreation.
- **Cumulative and in-combination effects.** The RYA expects development site plans to include all adjacent developments that may have cumulative and in-combination effects on navigation.

## **The Royal Yachting Association (RYA) – who we are**

The Royal Yachting Association (RYA) is the national governing body for dinghy, yacht and motor cruising, all forms of sail racing, RIBs and sportsboats, windsurfing and personal watercraft and a leading representative for inland waterways cruising.

The RYA is recognised by Government, the media and opinion formers as the representative body and voice for the activities that it represents. It continually fights for the rights and freedoms of its 112,000 personal members.

The RYA has more than 1,500 affiliated clubs and classes, which represent some 350,000 boaters throughout the UK. It is estimated that 4 million people in the UK take part in boating activity annually.

The RYA also sets and maintains recognised standards for training for both leisure and commercial boating through a network of more than 2,400 RYA Recognised Training Centres across 58 countries. More than 250,000 people per year complete RYA training courses.

The RYA is responsible for one of the UK's most successful Olympic medal winning sports. Our coaching and development schemes actively support 800 of our country's top sailors, from talented juniors to Olympic and World champions.

The RYA is committed to promoting all forms of boating and making them accessible to everyone. For more information please visit [www.rya.org.uk](http://www.rya.org.uk).

## **The regulatory regime**

The Energy Act 2004 (as amended) establishes a regulatory regime for offshore renewable energy installations (OREI) beyond the Territorial Sea, in the UK's EEZ, and supplements the regime which already applies in the UK's internal waters and Territorial Sea. Sections 99 and 100 of the Act deal specifically with navigation and introduce a new section, 36B with the title "Duties in relation to navigation" into section 36 of the Electricity Act 1989 (as amended). Under section 36B, sub-section (1) consent cannot be granted for an OREI which is likely to interfere with the use of "recognised sea lanes essential to international navigation". This expression directly refers to Article 60(7) of the United Nations Convention on the Law of the Sea, 1982 (UNCLOS).

The Merchant Shipping (Safety of Navigation) Regulations 2002 implements the Safety of Life At Sea (SOLAS) Convention 2014 Chapter V (Safety of Navigation). This applies to all vessels on all voyages, therefore for the purposes of this document "sea lanes" are considered to be IMO-adopted routing measures and potentially other sea routes transited by all vessel types.

Section 36B, sub-section (2) of the Energy Act 2004 (as amended) provides that the decision to grant consent and any conditions placed on a consent must "have regard to the extent and nature of any obstruction of or danger to navigation which (without amounting to interference with the use of such sea lanes) is likely to be caused by the carrying on of the activities, or is likely to result from their having been carried on."

In addition, both the Marine and Coastal Access Act 2009, Part 4, Section 69, sub-section (1)(c) and the Marine (Scotland) Act 2010, Part 4, Section 27, sub-section (1)(a)(iii), provide for marine licence decisions to "have regard to the need to prevent interference with legitimate uses of the sea".

SI 2007 No 1948 "The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007" implements UNCLOS provisions for the establishment of safety zones during construction, extension, operation, maintenance and decommissioning of OREIs.

## The RYA Position

The RYA recognises the UK Government's and devolved administrations' long term efforts to promote renewable energy<sup>1</sup>. We note that it is Government policy that any potential adverse impacts, including long-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts should be taken into account. We further note that when considering cumulative effects, the Environmental Statement should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other developments (including projects for which consent has been sought or granted, as well as those already in existence<sup>2</sup>).

Our primary purpose in engaging in consultation regarding the development of offshore renewable energy installations is to secure navigational safety and to ensure that recreational boating interests are not disproportionately affected. The RYA has made objections to some proposed developments on grounds explained in this document. As more issues have come to light, we have reviewed our position on offshore renewable energy development. We recognise that some marine renewable schemes may provide opportunities to benefit recreational sailors, for example, tidal impoundments may provide areas of sheltered water which will enable sailing local clubs to thrive.

**This position paper sets out our concerns from a general perspective regarding wind energy and should enable developers to take accurate account of recreational boating concerns in their environmental impact assessments. This paper is one of four position papers discussing renewable energy, the other three address wave energy, tidal energy and tidal impoundments.**

In summary the concerns of recreational boating and offshore renewable energy developments relate to:

1. Navigational safety:
  - a. Collision risk;
  - b. Risk management and emergency response;
  - c. Charting, marking and lighting;
  - d. Effect on small craft navigational and communication equipment.
2. Location:
  - a. Loss of cruising routes and impact on offshore racing;
  - b. Squeeze into commercial routes;
  - c. Effect on sailing and racing areas;
  - d. Cumulative and 'in combination' effects.
3. End of life:
  - a. Dereliction;
  - b. Decommissioning.
4. Consultation

The MCA has developed guidance<sup>3</sup> on the issues that need to be taken into consideration when assessing the impact on navigational safety and emergency response (search and rescue and counter pollution) caused by offshore renewable energy installation developments proposed for United Kingdom internal waters, territorial sea and the Renewable Energy Zone beyond the territorial sea. The RYA expects this guidance to be used by offshore renewable energy developers seeking consent to undertake marine works. Furthermore, the RYA expects to be

<sup>1</sup> The UK Renewable Energy Strategy 2009

<sup>2</sup> National Policy Statement for Renewable Energy Infrastructure (EN-1)

<sup>3</sup> <https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping>.

consulted on matters that may affect recreational boating during any type of assessment on proposed marine works.

The RYA expects applications and accompanying supporting documents for development consent to be consistent with the instructions and guidance set out by the MCA and in the Overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Renewable Energy Infrastructure (EN-3).

## 1 Navigational Safety

Prior to departure, mariners are required to make a passage plan based on assessments of weather, tides, limitations of the vessel and crew, and navigational dangers. Offshore renewable energy developments are an additional navigational hazard to the mariner. However, if sited sensitively, designed well and managed effectively these developments can minimise the safety issues of concern to recreational boating to an acceptable level or eliminate them.

Between 2004 and 2019, 38 offshore wind farm sites including a number of demonstrator sites have been commissioned. Seven more are under construction, and further sites have either been consented or are in the consenting and planning stages of development. In that time, there have been no recorded incidents involving recreational craft and offshore wind farms since the start of operations around the UK coast.

### Collision risk

The RYA believes that wind farm design must adhere to certain consistent design parameters to reduce the risk of collision with recreational craft. There are three main hazards that must be considered:

- Collision with rotating rotor blades. An estimation of the air draft of the national fleet of yachts around the UK was established in the knowledge that these types of yachts may be found in all UK waters. These data are taken from the Royal Ocean Racing Club (RORC) Rating Office's database. For more detail see the final section on *Developing RYA policy on minimum clearance height*.
- Underwater collision with sub-surface structures, inter-array and export cable protection and rock armour and scour protection. It is important that where cables cannot be buried, the most appropriate type of cable protection is used taking into account the water depth and mariners using the area. The risk of underwater collision can also be increased where cables cross other cables and water depths are significantly reduced. Minimum safe under keel clearance over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543(M+F);
- Unpredictable wind turbine layouts, such as edge-weighted boundaries and curved rows, prevent surface craft from steering a consistent track over the ground, particularly in poor visibility. These irregular layouts are confusing at surface level and affect situational awareness. Standard layouts such as grids in straight rows and columns in accordance with known and agreed formats avoid these problems. In accordance with MCA guidelines there should be a minimum of one line of orientation.

**The RYA believes that the collision risk posed by wind farms and associated infrastructure to recreational craft can be minimised by maintaining:**

- **a minimum rotor tip air draft of 22 metres above Mean High Water Springs<sup>4</sup>;**
- **a minimum safe under keel clearance over submerged structures and associated infrastructure determined in accordance with MGN 543(M+F);**
- **UK wide standardisation of wind farm layouts which are uniform and predictable and that give at least one line of orientation.**

### **Risk management and emergency response**

Risk management provisions should be formulated from the results of a site specific risk assessment that accounts for small craft of less than 24m length overall (LOA), recognising the significant differences between small and large vessels. This distinction is important when it comes to equipment and other requirements for small and large craft. The methodology<sup>5</sup> outlining the requirements for assessing the navigation impacts of offshore renewable energy installations is available on the Gov.uk website. This should be closely followed throughout any assessment.

For recreational craft, such an assessment should take into account the following parameters:

- The number, size and type of local vessels;
- The number, size and type of national and international vessels;
- Annual events that are not covered in a short term monitoring period;
- Wave height and sea state conditions including seasonal variations;
- Seasonal variations in vessel number, size and type including weather conditions;
- Proximity to ports of refuge;
- A range of possible incidences including loss of propulsive power and failure of navigational systems.

Risk assessment consists of an objective evaluation of actual and potential hazards and subsequent evaluation of any associated risks. During the assessment, assumptions and uncertainties must be clearly considered and presented. Part of the difficulty in risk management is that measurement of both of the quantities in which risk assessment is concerned - potential loss and probability of occurrence - can be very difficult to measure and the chance of error in measuring these two concepts is large.

As the number of vessels using an area varies with the season, any traffic monitoring should be carried out in the high season. However, it is not the number of vessels passing through an area that is important but the number passing through in adverse conditions and when tidal streams are strongest. Moreover, local vessels will gain experience of navigating in wind farms arrays and the biggest risks are likely to be to visitors. General information on areas used for recreational boating is given in the *UK Coastal Atlas of Recreational Boating* (mentioned later) and the RYA can provide additional detailed information about particular sites on request.

Commercial offshore wind farms have now been deployed in UK waters since 2004, and to date there have been no recorded life threatening incidents involving small recreational craft reported to HM Coastguard. This experience should be factored into any navigational risk assessment to

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<sup>4</sup> The UKHO references air draft to Highest Astronomical Tide (HAT) and all other heights to Mean High Water Springs (MHWS). Maintaining a design requirement of 22 metres MHWS is consistent with our past approach and each wind farm will have its air draft in relation to HAT marked on UKHO charts.

<sup>5</sup> [Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations \(OREI\)](#)

provide an accurate and realistic predicted level of risk and to enable proportionate and practical measures to be implemented where a risk is shown to be intolerable.

In order to manage the risk of a vessel in distress drifting towards an installation effectively, there needs to be an effective Emergency Response System in place. This may require the ability to shut down the turbine rotors, when an emergency call is reported. In some cases, where traffic is high and turbines cannot be immobilised, a stand-by safety vessel may be required.

In addition, irregular turbine layouts, including the use of curved rows and dense (weighted) boundaries, decrease the ability to navigate through a wind farm either by sea or by air. These unpredictable layouts require the use of detailed charts to navigate and make search and rescue operations much more difficult.

### **Safety zones**

The RYA's opinion remains that the simple declaration of a permanent operational safety zone around an offshore renewable energy installation that excludes small craft on a wholesale basis is likely to be unnecessary, impracticable and disproportionate. In our view, such a restriction on small craft right of navigation and legitimate use of the sea is not justifiable in terms of safety alone and it must be recognised that there is little possibility of enforcing such zones. In some locations, a safety zone may increase risk of collision if small craft are consequently forced to use commercial craft shipping lanes. Where a wind farm is next to a shipping lane safety mitigation might be provided by permitting small craft to pass through the wind farm.

Wind farms are being developed where turbines are mounted on floating towers which are anchored to the seabed by cables extending over a much wider area. It is important that the size of any proposed safety zone for such devices should be proportionate to the risk posed to vessel types and should not be derived from the perimeter of the anchor locations.

In principle the RYA has no objection to the creation of *advisory or precautionary zones* but such zones must be designed and implemented on a case-by-case basis and with due respect to the right of navigation. The RYA believes that the purpose of any *advisory or precautionary zones* should be to warn vessels to navigate with particular caution but they should not permanently restrict navigation or exclude recreational vessels.

The RYA does, however, understand that there may be occasions when it may be prudent to impose short-term temporary restrictions, for example during engineering, maintenance or construction works. Such temporary restrictions should be promulgated through clear and timely Notices to Mariners. These need to show clear start and end dates and must be promulgated well in advance of any works. Notices to Mariners should not simply advise mariners to avoid an entire wind farm site, but instead should highlight the areas where works will be undertaken and define the location(s) of such safety zone(s). Many vessels visit the UK from continental Europe and this should be taken account of in any communication.

### **Cables and anchoring**

In most cases, small craft will not anchor within an offshore wind farm. However, in emergency situations a vessel drifting towards a turbine may attempt to anchor to reduce the risk of collision. Cables should therefore be buried to a sufficient depth to avoid being uncovered or snagging an anchor and will require full consideration in the emergency response plan

Where export cable corridors have not been surveyed in detail or there is a possibility that inter-array and export cabling cannot be successfully buried, it is important that alternative types of cable protection are carefully considered and set out in the Environment Statement; this should take account of the depth of water and the type of mariner using the area. Where there is any possibility that rock protection might be used which might reduce the depth of navigable water, particularly where cables cross, the RYA would expect this to be fully discussed in the

Environmental Statement. The MCA specifies that there should be no more than a 5% reduction in Chart Datum as a result of cable protection.

### **Charting, marking and lighting**

The requirements for charting, marking and lighting offshore wind farm sites should be consistent with IHO and IALA requirements and guidelines<sup>6</sup>. Much work has been done in this field and guidance supported by the RYA is available from the UKHO and GLAs. As a minimum, each turbine should be clearly marked in high visibility yellow paint to a height of 12m, low level lighting should allow the turbine number to be read from a 'safe' distance, corners of the wind farms should be marked and any other points or routes through the wind farm marked accordingly. These requirements should be discussed with the MCA, UKHO and GLAs.

**The RYA supports the guidance provided by the MCA, UKHO and GLAs on the charting, marking and lighting of wind farms and works with them to identify site specific issues that may occur.**

### **Effect on small craft navigational and communication equipment**

Most small craft will have some form of navigational equipment on board. The most common will be a magnetic compass. Large quantities of steel, cabling and the transmission of electrical power may produce interference with a magnetic compass, particularly in shallow waters.

Studies have shown that the effect on systems such as GPS, VHF and mobile phones from wind farms is negligible. However, there is a demonstrable 'echo' effect on some marine radar systems which may reduce the visibility of small craft to larger commercial vessels where radar scanners are often poorly sited and affected by the vessels superstructure. Adjustment of gain settings can minimise the unwanted effects, but over-reduction and consequential loss of small targets is of concern. For these reasons small craft may well be safer within wind energy sites and particular attention should be paid to developments that are sited close to commercial shipping lanes and which may obstruct visibility and avoidance of commercial routes.

**Proposed developments should account for any effect on small craft navigation and communication equipment in detail.**

## **2 Location**

The location of offshore energy installations may well conflict with access for recreational craft. It should also be noted that commercial routes and shipping lanes do not represent those routes taken by the vast majority of recreational craft. The RYA, has collated recreational routes into the *UK Coastal Atlas of Recreational Boating*<sup>7</sup> which is available from the RYA. In addition, the Atlas marks sailing areas, racing areas and the location of marinas, RYA affiliated clubs and RYA recognised training centres. The *UK Coastal Atlas of Recreational Boating* should be used to inform decision making when planning the location of offshore energy developments including where cables make landfall. When drafting the navigational chapters of an Environmental Statement local knowledge should be sought through the RYA.

Marine plans may make reference to specific zones as being suitable for offshore wind. Sailing areas have not been removed from these zones, and therefore consideration must still be given to impacts on recreational vessels.

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<sup>6</sup> IALA Recommendation O-139 – The Marking of Man-made Offshore Structures - Edition 2: December 2013

<sup>7</sup> A UK-wide dataset with associated spatial geographic information (including lat/long coordinates) which can be mapped to provide a visual representation of most common recreational boating activity.

## **Loss of cruising routes and impact on offshore racing**

When examining cruising routes and location of wind turbines it is important to recognise that sailing boats behave differently to power driven craft and that their actual line of travel may 'zigzag' across their intended direction of travel upwind as they are dependent on the wind direction. The *UK Coastal Atlas of Recreational Boating*, should be consulted together with other available information to inform the siting of the developments and individual installations and the potential provision of navigation routes through the larger sites.

Along many stretches of coast, recreational craft may need to seek shelter in poor weather. Sheltered harbours and anchorages as well as routes to these harbours of refuge should be protected. In many cases these are identified in the Atlas.

Loss of routes would also lead to an increased distance of travel. This has environmental implications for powered craft and safety implications for all craft. Some routes, typically narrow channels or those with strong tidal flows may already be hazardous at times to navigate through and adding hazards in these areas may seriously compromise navigational safety. There are also safety issues associated with the creation of turbulence and wind shadowing in confined areas where craft may be moving slowly and gusty turbulent conditions may create problems.

All home country marine plans recognise the importance of safeguarding tourism and recreation activities, and reference should be made to the appropriate policies within marine licence applications.

**The impact on recreational routes, general sailing areas, racing areas and access to boating facilities and anchorages must be considered when examining the impacts of wind farm developments and their associated infrastructure.**

## **Squeeze into commercial routes**

Recreational routes differ from commercial routes as recreational craft essentially aim to keep out of the major commercial navigation routes by travelling in the shallower adjacent waters or taking entirely different routes. As a result, the examination of commercial routes through AIS plotting alone will not ensure the safe positioning of OREIs; recreational boating must also be taken into account when assessing the impact on navigational risk. This may require routes through large developments to be identified or inshore routes for smaller craft to be safeguarded. The cumulative impact of all marine developments is becoming increasingly important when assessing these issues of squeeze.

**Poorly sited wind farms and those that are built within the 12nm limit may increase the risk to navigational safety and discourage visiting boaters to the area. This would have an adverse effect not only on visitors but also on the local economy.**

## **Effect on sailing and racing areas**

Most of the general day sailing and racing areas are close to the shore and in sheltered waters where wind speed and/or turbulence may have an adverse impact. The Strategic Environmental Assessment for Round 3 offshore wind development<sup>8</sup> recognises the busy inshore areas and states that the majority of offshore wind development should be beyond 12nm. Recreational activity is important to the health and wellbeing of the community as well as providing economic support for the local coastal economies. Retaining the undisturbed remoteness of some waters will be important in terms of its wilderness and amenity value for recreation.

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<sup>8</sup> Offshore Energy Strategic Environmental Assessment: Post consultation report. June 2009. DECC.

**Any interference in wind speed and/or turbulence created by a wind farm in a sailing or racing area would create a significant negative impact on the site and diminish its value for recreation.**

### **Cumulative and ‘in-combination’ effects**

As a result of the large increase in the number and scale of offshore wind projects in the UK, it has been recognised that the cumulative effects of these projects and other developments have potential implications for small and large craft alike. Existing and future offshore wind farms developed by other EU Member States may also add to the cumulative effect.

There is an awareness that the intended development of wind energy could also lead to in-combination effects (effects arising from these developments in combination with other activities; e.g. wave and tidal renewable installations, fishing and offshore oil and gas activities and those associated with UK and European Marine Protected Areas, including Marine Conservation Zones) that might impact all mariners. The cumulative and in-combination effects of offshore energy installations on navigation routes will be increasingly significant and must be taken into account in future siting proposals and plans.

It is common practice for developers to provide site plans that show their proposed development in isolation. This is confusing and fails to provide a visual understanding of the cumulative and in-combination effects on shipping and navigation that might be caused by other adjacent offshore developments in the area. As the number and complexity of future developments increases, the RYA expects development site plans to include all adjacent developments (including projects for which consent has been sought or granted, as well as those already in existence) that may affect shipping and navigational safety.

**The RYA expects development site plans to include all adjacent developments that may have cumulative and in-combination effects on shipping and navigation.**

## **3 End of Life**

### **Dereliction**

Whilst we would hope that these installations remain economically viable for the lifetime of the structures, the RYA would support any measures taken by Government to secure the financial provision for removing the structures, prior to consents being given. This will ensure that after the installation ceases to produce electricity for whatever reason, derelict structures that are not charted, marked and lit and remain a hazard to navigation or anchoring are removed from UK waters.

### **Decommissioning**

Equally, any decommissioning plan needs to ensure that the structures are completely removed. Any parts of the structure remaining after the commercial operation of the installation may pose a hazard to navigation. However, we recognise that secondary uses may be identified for these structures once energy generation ceases. If structures are to remain in the water, navigational safety must be taken into account and structures should be appropriately charted, marked and lit.

## **4 Consultation**

The RYA’s main office in Hamble is a primary point of contact for matters concerning the development of Offshore Renewable Energy Installation sites and the recreational boating sector. Throughout the English regions, RYA Hamble maintains a network of volunteers who are able to provide more detailed site specific information for developments that fall within their area of responsibility. Developers may find this a useful resource for timely site specific information, particularly at the start-up of any project.

In addition, the RYA's main office maintains close links with its Scottish, Welsh and Northern Irish offices, which work with the relevant jurisdictions and they can provide detailed site-specific information in the same way as the volunteers do for England.

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3<sup>rd</sup> revision of Paper 1 (of 3) – Wind Energy September 2014  
Further part added Part 4 – Position on tidal impoundments September 2015  
4<sup>th</sup> revision of paper 1 (of 4) - Wind Energy September 2015  
5<sup>th</sup> revision of paper 1 (of 4) – Wind Energy June 2019

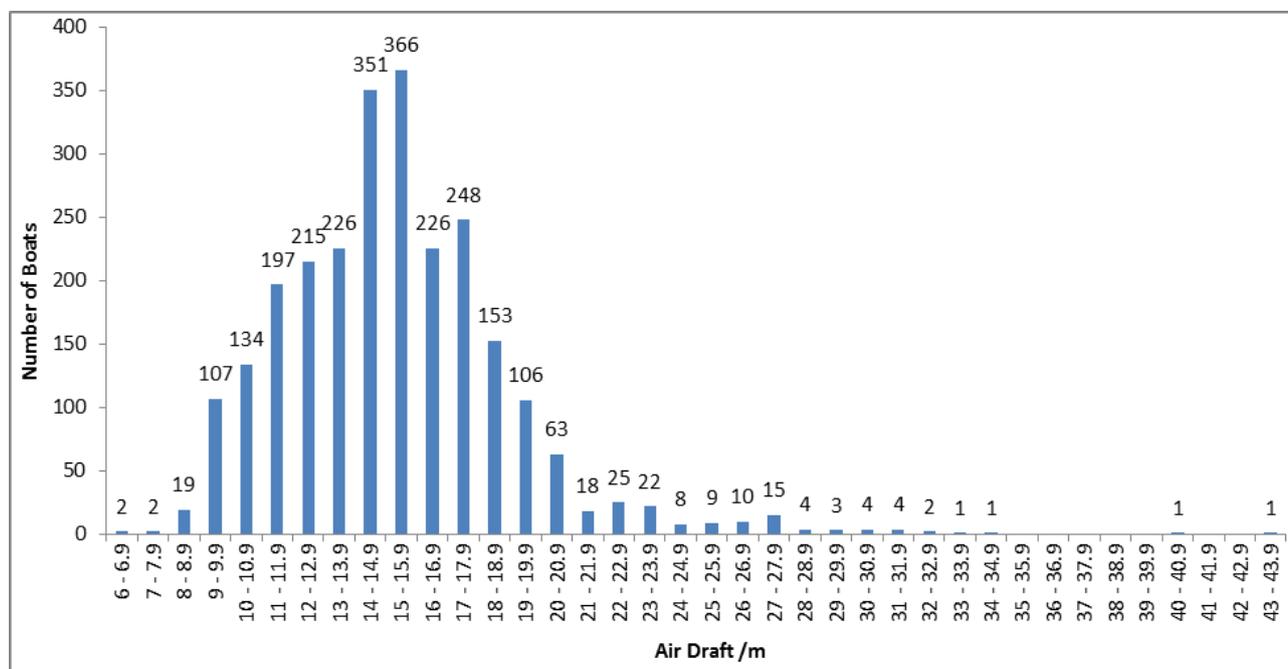
## Development of the RYA policy on minimum clearance height

The RYA originally developed its position on clearance height on the available data in 2003. This was based on data taken from the Royal Ocean Racing Club (RORC) Rating's Office database which is representative of the types of yachts that are found in common use in UK Waters. Since then the 'Arkenford' survey<sup>9</sup> carried out by Arkenford, a market research and modelling company, has shown that usage and participation data have remained remarkably stable, which would suggest that the data used for development of the RYA policy on minimum clearance and height is still valid. The graphs shown below are based on RORC data from 2011.

Although there are other rating systems in use, the RORC system is widely accepted and applied worldwide. Rating is a technical handicapping process that enables adjustments to be made to yacht racing results so as to allow a wide range of different boats to be raced on equal terms. The boats contained in the database are mainly cruisers and yachts. Many yachts taking place in club races are registered with the RORC Rating Office. The RYA believes this data, containing in excess of 2500 records, is a good representation of the type of yacht to be found sailing around the shores of the UK. Although the total number of yachts around the UK has not been specifically quantified because there is no single database that records this information, it is estimated that this represents more than 6% of the total number of boats owned in the UK according to the data on boat ownership and usage supplied by Arkenford and by the British Marine Federation.

'Air draft' as presented here is the distance from the waterline to the top of the mast structure. This is based on the 'p' measurement, boom to top of mast, in the rating system (RORC). Air draft is derived by adding the 'p' value to the sum of estimated values for each boat for midships freeboard and boom above deck. It should be noted that masthead equipment and instrumentation has not been included in the calculation of air draft, although it will also add a further half to one metre to the air draft of a yacht. Loss of this equipment may produce failure in communication from the yacht although not structural failure to the yacht.

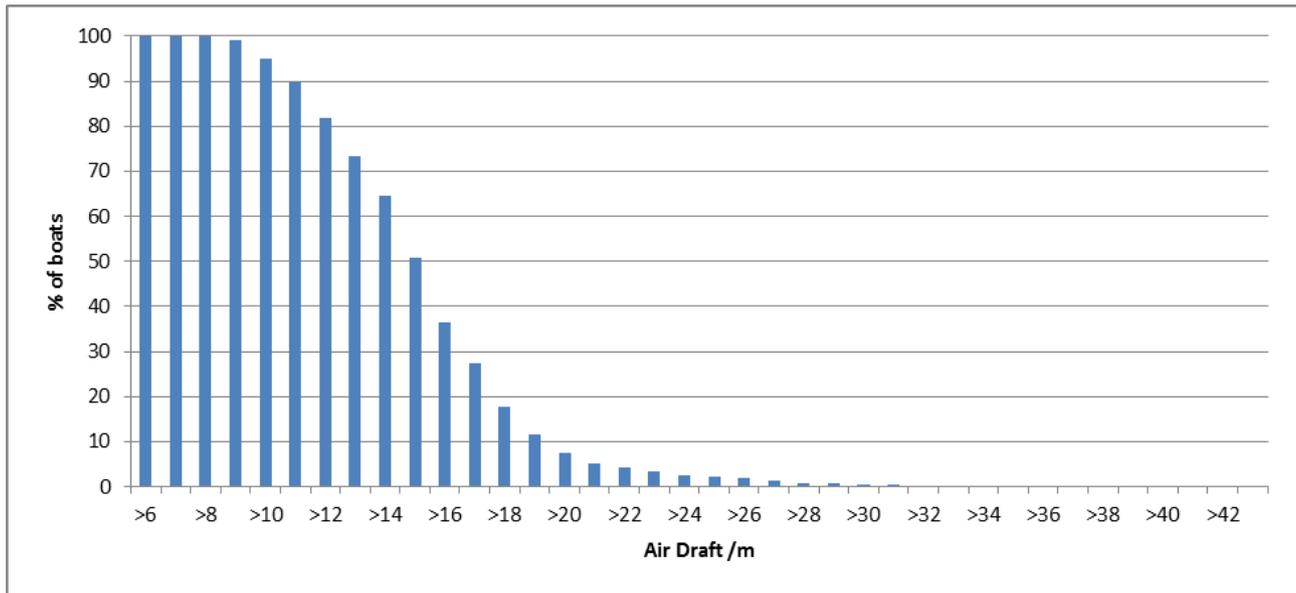
**Figure 1: Graph showing the air draft in metres of the boats within the IRC fleet (data collected 2009-2011, sample size = 2543)**



<sup>9</sup> Annual Watersports and Leisure Participation Survey carried out on behalf of RYA, BMF, MCA and RNLI

Looking at the above data in the form of percentage of the UK boating fleet, we can see the percentage of recreational yachts at risk from different rotor clearance heights. Figure 2, shows that a clearance height of 14 metres above sea level will put 65% of the national fleet at risk from rotor height collision. Reducing this to 18 metres above sea level, substantially reduces this percentage, however it still leaves 18% of the national fleet at risk from rotor height collision. This is still an unacceptable level of risk to the yachts found in UK waters. A clearance of 22 metres has been shown to be possible in engineering terms, which would put 4% of the national fleet at risk, a more acceptable level of risk in the view of the RYA.

**Figure 2: Graph showing the percentage of boats in the IRC fleet with different air draft shown in metres (data collected 2009-2011, sample size = 2543)**



As a matter of common observation, larger yachts over 22 metres in length (see Figure 3), representative of this 4% group are more likely to be run by highly experienced crews and skippers. The datum of mean high water springs (MHWS) is taken as the clearance datum rather than mean sea level and then factoring in a site specific wave height parameter. However, wave height should be examined in the risk assessment at each site. It should be noted that 22 metres above MHWS has already been specified as a minimum clearance height in several of the wind farms consented in the first round of consents and is therefore a feasible, cost-effective option for developers.

It should also be noted that while this is currently an acceptable level of clearance, yachts are increasing in size and future developments may require a greater clearance height.

**Figure 3: Graph showing the relationship of Length Overall (LOA) in metres and air draft in metres of the IRC fleet (data collected 2009-2011, sample size = 2543)**

