

# **‘Sharing the Wind’**

## **Recreational Boating in the Offshore Wind Farm Strategic Areas**

Identification of recreational boating interests in  
the Thames Estuary, Greater Wash and North  
West (Liverpool Bay)



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The Royal Yachting Association and the Cruising Association

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Front cover: Blyth Wind Farm, courtesy of AMEC

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## **Introduction**

Having the opportunities to take part in recreation is important, enjoyable and contributes to health and a sense of well-being. Boating in its various forms has always provided a strong appeal to those seeking a contrast to everyday life, whether this is meeting the challenges and quiet satisfactions of coastal cruising, the excitements of yacht and dinghy racing, or the thrills and spills of windsurfing. Recreational boating provides a wide range of opportunities for participation of all ages, genders, backgrounds and physical abilities. The UK Government is committed to increasing the number of people involved in physical recreation. Sailing has seen huge success for UK sport with the most Olympic medals from the recent Sydney Games coming from the sailing team. The 5 times power boating world champion is also British. Another water-sport that has achieved unprecedented success in sport is the British rowing team.

An estimated 2 million people participate in one or other form of water recreation. Its importance, both existing and future potential participation should not be underestimated.

### **About the Royal Yachting Association (RYA)**

The RYA has taken an active role in policy making that affects boat users and has been the voice of recreational boating for over a century. It represents 100,000 personal members and over 1500 affiliated clubs representing a further 400, 000 boat enthusiasts and administers training standards at over 2000 RYA training centres.

RYA represents users of:

- Cruising and racing sailboats and powerboats
- Sailing dinghies and day boats
- Windsurfers
- Personal watercraft

The RYA was originally formed as the Yacht Racing Association in 1875 to harmonise the right-of-way and handicap rules for yacht racing. Since then the focus of the Association has extended to encompass the views of all water users under sail or power, and just after WW2, the word "Racing" was justifiably dropped. Then in 1952 the "Royal" title was granted, to form the Royal Yachting Association, or the "RYA" as it is commonly known today.

RYA policy is determined by its democratically elected Council and a series of expert committees. These are almost exclusively occupied by volunteers who give large amounts of their time to helping the RYA, and it is these people who generate the policy and direction of the RYA.

### **About the Cruising Association**

The Cruising Association is the largest UK organisation solely representative of the cruising yachtsmen with approximately 5,000 persons and 3,000 cruising yachts in membership divided into 13 Area Sections with 70 Honorary Local Representatives around the coast specialising in local yacht-cruising information. The CA has the largest library of yachting information in the country and works closely with the RYA at all times. It has members and Honorary Local Representatives in all European and most major countries worldwide which enable a strong input of information and experience from overseas.

Its Objects of Association include:

- a) to encourage cruising in all types of small craft;
- b) to promote and protect the interests of all cruising people;
- c) to make information about cruising available to its Members.

### **Renewable Energy**

The UK Government policy is to produce 10% of its total energy production from renewable resources by 2010. This is driven by international obligations from the Kyoto Protocol to which the UK is a signatory (see Annex A for more information). At present, technology has only developed for harnessing wind energy on a commercial basis. Research continues into harnessing tidal and wave energy.

The UK is subject to the windiest conditions in Europe and therefore harnessing wind power has been recognised as vital if the UK is to reach its target. Land-based wind energy generation has been exploited in this country since the early 1990s and by December 2001, 285 000 homes were being supplied with electricity from renewable sources. This represented a total installed wind energy capacity of 473MW but construction of land based wind farms has met with growing opposition. As turbines have increased in size and space is more plentiful in the marine environment, these installations have moved offshore. However, this brings about a raft of different issues, in particular navigational safety and risk to life, as well as having serious environmental consequences.

Whilst the RYA and Cruising Association support the Government's efforts for developing renewable energy, they are keen to ensure that the safety of recreational boaters is not compromised and sites do not impinge directly on important recreational boating areas.

## **Recreational boating and wind farm developments**

Our primary purpose in engaging in the consultation regarding the development of offshore wind farms is to secure navigational safety and to ensure that recreational boating interests are not adversely affected. The RYA has objected to some of the Round 1 proposed developments on a series of grounds. As more issues have come to light, we have reviewed our position on offshore wind development.

In summary the concerns of recreational boating around offshore wind farms relate to:

1. Navigational safety
  - Collision risk
  - Risk management and emergency response
  - Marking and lighting
  - Effect on small craft navigational and communication equipment
  - Weather
2. Location
  - Loss of cruising routes
  - Squeeze into commercial routes
  - Effect on sailing and racing areas
  - Cumulative effects
  - Visual intrusion and noise
3. End of life
  - Dereliction
  - Decommissioning
4. Consultation

## **Government policy and strategic planning**

The proposal for the first round of offshore wind farm developments was launched in December 2000 when electricity suppliers were offered leases for offshore locations around the UK, with a view to have approved the site for development within 3 years of taking the lease. Consequently 18 sites, consisting of 30, 60 or 90 turbines situated at 13 locations have been licensed and 11 locations have received the necessary marine planning consents. Construction of the wind farms has now started and the first Round 1 project has been completed, at North Hoyle, located off the north coast of Wales, generating its first electricity in the autumn of 2003.

The need for Government policy and a strategic approach to these expanding developments led to the publication of *Future Offshore* (DTI, 2002), which identified three strategic areas for development. The three areas identified were the Thames Estuary, the Greater Wash and the North West (Liverpool Bay) areas. A Strategic Environmental Assessment was carried out for these areas which identified the constraints to development. The study highlighted the lack of readily available information on recreational boating and as a result their interests were omitted from this assessment. In July 2003 wind farm developers were invited to

apply to the Crown Estate for site leases within these three Strategic Areas. In December 2003 the Crown Estate, in conjunction with the Department for Trade and Industry, revealed that 12 developers had been offered 15 site leases. If approval is given through the Government's marine consents process, there will be a potential to produce an additional capacity of 5.4 - 7.2 GW of wind energy.

After the DTI's Strategic Environmental Assessment was published, the RYA recognised the need to collate data and information on recreational boating. Whilst none of this information was readily available, the information lay with the individuals taking part and would therefore be time consuming to collect. In conjunction with the Cruising Association, the RYA has coordinated a full consultation with members through the local clubs, the regional committees and the Cruising Association representatives to identify the main sailing and racing areas and cruising routes. This report details this work but it does not attempt to comment on individual sites; it presents only a strategic overview. Detailed comment on individual wind farm proposals will be made when appropriate directly to the developer concerned.

It is hoped that this information will be used by the relevant authorities in making their decisions on the final locations of the turbines and in making decisions on granting of consent for these developments.

Both the RYA and the Cruising Association expect to be fully consulted in the development of offshore wind and are willing to assist developers in achieving sound developments. Annex B details the formal position adopted by the RYA on behalf of UK recreational boating, this position has been endorsed by the Cruising Association and other relevant organisations.

For further information contact:

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Ted Osborn, Cruising Association, Cruising Association House, 1 Northey Street, Limehouse Basin, London, E14 8BT. Email: [office@cruising.org.uk](mailto:office@cruising.org.uk). Phone: 0207 537 2828

## **Identifying Recreational Cruising Routes, Sailing and Racing Areas**

There has previously been no attempt to gather co-ordinated data concerning the level of recreational boating around the UK or the locations of such activity. These are both urgently needed to assist the Government's drive to develop offshore renewable energy, in particular wind farms, by providing data for consideration during the planning, design, and approval process. Such data will also assist the work of making informed comment on details of individual wind farm proposals.

This project aims to gather and present, in a condensed form, such primary data as is available and to design a process of informed consultation to agree assessments for data which is not available.

Design and management of the project was conducted jointly by the RYA and Cruising Association. Primary data was sought from the UK Hydrographic Office, the British Marine Federation, the RYA affiliated Clubs and Associations within and near the areas concerned and the Cruising Association local Sections and Honorary Local Representatives. Secondary sources include all relevant nautical Almanacs, regional Pilots, Sailing Guides and similar publications. Where personal views were sought, care was taken to ensure that these were from people with a formal post in relevant organisations.

More specifically the study has developed a methodology and a set of comprehensive maps that will clearly:

- Plot the cruising routes in the three strategic areas
- Illustrate the intensity at which each route is used from local clubs
- Highlight the general sailing and racing areas within the strategic wind farm regions
- Identify possible alternative development sites or routes

In addition to the maps and comments within this report further information is available by contacting the RYA or Cruising Association at the addresses given in Annex G.

### **The format of the study**

The study was carried out in three stages:

1. Development of draft charts of cruising routes, sailing and racing areas
2. Consultation with clubs, regional committees and local experts on charts and questionnaire
3. Consolidation and analysis of information and reporting

The first stage involved compiling data from existing sources and translating the information onto the RYA's Geographical Information System (MapInfo). The collation of this information formed the first draft of recreational boating interests within the three Strategic Areas. The draft charts consisted of a combination of data including routes, sailing areas, sailing clubs, marinas, training centres, Round One and Round Two wind farm sites, the wind farm no-development zone and the whole strategic area originating from:

- Standard publications, pilot books, charts and almanacs
- Key representatives from local clubs
- Data from the RYA database of clubs, marinas and training centres
- Department of Trade and Industry and the Crown Estate.

Along with the development of the charts, a simple questionnaire was put together to gather information from the consultees on the current RYA position towards offshore wind farm development (see Annex C). The questionnaires were sent out with the charts and some background information for consultation. A consultation list was brought together including consultees from all RYA affiliated sailing clubs and RYA training centres as well as marinas, all within 2km of the coast. In addition, copies of the charts were sent to the Cruising Association Honorary Local Representatives, RYA Regional committee members and CYCC members (see Annex D for consultation lists).

The project developed a very considerable input of emails and letters from clubs and individuals providing information additional to that formally requested. Where judged suitable this information has been taken into

the overall picture. A PowerPoint presentation of the project was developed which has been shown to key clubs requesting it.

This report has been further assessed and confirmed in detail by the RYA Planning & Environmental Committee and the CA Regulations & Technical Services Committee.

## **Results of the consultation**

A total of 101 respondents sent back maps and questionnaires. The majority of these responses were from clubs, each representing the input of a number of local experts. Many clubs and organisations held local meetings to discuss the routes and the questionnaire. Many responses came back from sailing associations representing more than one club. For example, the Blackwater and Colne Sailing Protection Association (BACSPA) held a local meeting to discuss the routes in the Thames Estuary. A total of 40 people attended this meeting.

The breakdown of responses was as follows:

- Thames Estuary            66 responses
- North West                20 responses
- Greater Wash            15 responses

From the responses, it became clear that use of a single line to represent cruising routes on a chart would not be able to represent the precise behaviour of a sailing yacht which may take an apparently circuitous route depending on the wind direction. As a yacht heads into the wind, it zigzags by tacking through approximately 90 degrees across the wind in order to proceed forward. This means that many of the routes are actually wider than those represented by single lines of travel. This is explained in more detail in Annex E

The consultation led to a number of comments on the maps being made, additional routes identified and some routes were removed or redefined. The maps can be seen in the following sections and need to be considered with the accompanying explanatory text. The routes were defined as traditional, heavy, medium and light recreational routes. In addition sailing and racing areas and recreational boating facilities were identified. These routes and areas are defined and described in more detail in the Definitions in Annex F.

Whilst every effort has been made to ensure consistent application of assessment scales between and within the three Strategic Areas (for example, assessments of 'heavy', 'medium' and 'light' recreational use), the range between the three areas is such that it is inevitable that some inconsistencies may be found.

## The results of the questionnaire

The aim of the questionnaire was to more widely gauge members response to the RYA position taken with regard to the Round 1 wind farm development sites of a minimum rotor clearance height of 22m above MHWS and the use of safety and exclusion zones as well as marking and lighting and other issues (see Annex C).

### Navigating through a wind farm

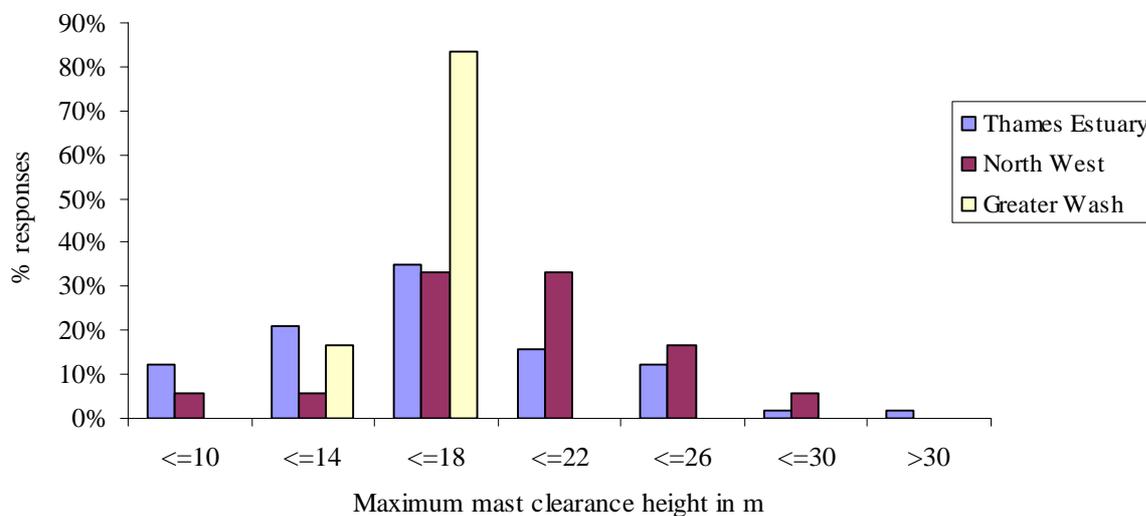
The respondents were asked whether they would be prepared to navigate through a wind farm understanding that each turbine would be between 500-700 metres apart. The majority of responses (75%) stated that in favourable conditions, they did not anticipate a problem navigating through the turbine arrays. The remainder fell into two categories with 10% stating they would be prepared to navigate through in all conditions and 14% stating they would not navigate through in any conditions. The remaining respondents gave no response.

### Minimum rotor clearance height

The majority of respondents (90%) agreed with the RYA's stance on a minimum rotor clearance height of 22 metres above MHWS (see Annex B). Those who did not agree in the majority of the cases could be related to members owning boats requiring a greater clearance height (deck height + mast height) generally exceeding 22 metres.

Maximum mast height was greatest in the North West where some clubs had members with boats of mast height over 25 metres. The responses from the Greater Wash described the amount of vessels with mast heights greater than the 22m as 'less than 5%' which supports the data the RYA used in developing this minimum clearance height (see Figure 1).

**Figure 1: Maximum mast clearance height in metres for the three strategic wind farm development areas**



### Turbine marking and lighting

There were two common themes that became apparent when analysing all the responses to the preferred methods of marking and lighting. The first was that the wind farms should be sufficiently marked with lights, either on the buoys around the perimeter or on the turbines themselves. 52% of the respondents wanted the sites lit in some way. The commonest suggestion (29%) was to have lights on each turbine. Some respondents (13%) would prefer the towers to be lit at very specific distances, 5 and 15 metres up. Other lighting options were strobe lighting (2%); 360° lighting on the turbines (3%) and some respondents (5%) highlighted the importance of lights on the top for aviation.

The second theme was that the wind farm areas should be marked sufficiently with navigation buoys. 32% of respondents called for buoys to be located on each corner of the site, some chose cardinal marks at the corners, others chose lateral buoys and some chose the corners to be marked with cardinal marks and then lateral buoys spaced around the perimeter.

Another popular option, mentioned by 9% of the respondents was bright banding on the turbines and numbering the individual towers for navigational purposes. The majority of the ideas for lighting and marking were generic to all sites but 25% of the North West respondents highlighted the need for visible and audible signals in the event of fog, which was noted as a particular problem in both the Thames and the Greater Wash areas.

It is clear that any marking and lighting will depend on the local conditions and requires careful consultation with small craft owners.

### **Safety and exclusion zones**

The respondents were asked whether the introduction of a safety or exclusion zone would improve the safety of their members. 36% of respondents felt that no zone is required around the wind farm areas. 32% of respondents thought that zones should be allocated to wind farms to improve safety for their members, 14% requested a zone round each individual turbine and 18% requested a zone around each site as a whole. However, 32% of the respondents thought that zones may only be required in some cases depending on the individual characteristics of the sites.

When asked if the zones should be enforced by law or just be advisory, 23 of the 37 respondents who had previously stated there should be no zone, did not respond at all. Of those who did, 87% thought a zone should be advisory and 13% thought it should be enforceable by law. Similarly, of the same respondents, 85% felt that the zones need not be permanently manned and 15% felt that they should.

As with marking and lighting requirements, any zoning, whether advisory or not, should be designed on the site specific risk that is identified by a comprehensive risk assessment. It is likely that risk for different vessels varies considerably and as a result should be managed appropriately.

### **Comments**

At the end of the questionnaire the respondents were asked to add any additional comments they felt would help the research. The comments made by the 101 respondents were analysed and recorded and have been incorporated in the updated RYA Position Statement (see Annex B).

## Thames Estuary Strategic Wind Farm Area

The Thames Estuary is a challenging and complicated area for recreational sailing (see Figure 2). It has a density of recreational sailing second in the UK only to the Solent area. The rivers, creeks, channels, guts and swatchways have an ancient charm and character quite unlike anywhere else and have been much valued over the centuries. Commercial traffic to and from the Thames, locally known as the 'London River', is continuously heavy requiring its formal Port Authority to have the largest area of any.

Recreational sailing in the area consists of:

- Canoeing and sail-boarding in the creeks and minor rivers
- Dinghies and other small boats in all rivers and offshore all coasts to about 15 miles
- Cruiser passage-making, both motor and sail, between all combinations of shore facilities
- Cruiser day-sailing, both motor and sail, in all coastal areas from Whitstable to Harwich
- Personal watercraft are popular but confined to certain locations inshore only
- Practical sail training in the area is extensive and based on most of the larger marinas
- 'Traditional' sailing craft in the area such as smacks, barges and other gaff-rigged craft
- Visitors from Scandinavia, the Netherlands and south Coast of England

This high level of recreational sailing activity is serviced by 92 clubs, 14 marinas and 73 RYA training centres. In addition there are an estimated 22,500 moorings (BMF, 2004). No reliable estimate can be produced for the number of vessels or crew involved but by inference from the RYA national membership data-base, total berths within marinas is around 6,900 in the strategic area and membership of clubs in the adjacent regions (Eastern, Thames Valley and South East) is around 55,000. Cruising Association records show that approximately 30% of their national UK members are based within 40 miles of the area.

In general terms it may be assumed that recreational craft offshore are fully equipped for their type and that crews have a high level of competence. Crews under training will normally be fully supervised but should not be expected to be able to cope with unexpected or unusual circumstances. Typically a vessel offshore will be equipped with marine radio or mobile telephone but small craft equipment will not have the same transmission strength as commercial vessels.

All recreational craft routes within the area are highly subject to:

- Strong tidal streams
- Wind strength and direction
- Planning for possible access to shelter depending on conditions
- Rough sea state when wind over tide conditions occur
- Presence of overfalls

As a result of these constantly changing physical factors, routes often have to be changed according to conditions, so often the most popular routes may not be followed if conditions are not favourable. A yacht day-sailing will choose constantly varying courses over a wide area. Race officers will set courses almost solely according to expected wind direction on the day.

The following notes comment only on recreational craft routes which may involve passage through or near the current proposed wind farms or through the Strategic Environmental Assessment area. They therefore exclude passages generally requiring transit only of the wind farm development exclusion area.

### Routes passing through the Thames Estuary Strategic Wind Farm Area

Yachtsmen passing through the area, from one boundary to another, are inevitably on long passages. To the south, the nearest all-weather havens are Ramsgate/ Dover and Calais. To the north, there is no reliable refuge nearer than Lowestoft or Yarmouth, neither of which can be counted as an all-weather refuge. Yachts on these passages will generally wish to follow a straight line outside all sandbanks to or from

Orfordness to a position either inshore at North Foreland or outside of the Goodwin Sands or to the Sandettie area. Many will wish to use the Knock and Long Sand Light Bys as waypoints.

Harwich is regarded as a port of refuge available for emergencies when on these long passages with access through the Harwich entrance channel both north and south of the Cork Sand or directly inshore using Goldmer Gat which is available at all states of tide. The Knock Deep passage inside the Kentish Knock is regarded as a potentially useful sheltered area available in strong weather from certain directions. Currently the proposed London Array wind farm straddles the Knock Deep.

### **Routes terminating in the Thames Estuary Strategic Wind Farm Area**

*From the South:* Yachts heading for the Swale, Medway or Thames areas require accurate tidal timing but largely use the Exclusion Area via the North Foreland. Yachts wishing to follow the traditional 'overland' passage through the Queens Channel and over the Kentish Flats will be required by the presence of the Kentish Flats wind farm to make diversions either north through the Princes big-ship channel or south through the Horse Channel Gate and Four-Fathoms Channel. The former will lead to the mixing of recreational craft with major shipping in the Shivering Sands area which has potential to be hazardous for both the recreational and commercial vessels. The latter requires accurate timing over the shallows and mixing with extensive inshore fishing close to the Kent coast. Yachts on all these routes require making the passage on the ebb or flood tide depending on direction.

*From the North:* Yachts heading for areas between the Deben and Crouch normally stay entirely within the wind farm development exclusion area. However, under certain conditions of wind over tide, the Wallet area becomes notoriously difficult to navigate through, so yachts wishing to enter the Crouch will use the East Swin or King's Channel.

*From the Continent:* Yachts from the east have to cross the Traffic Separation System (TSS) which extends across the whole of the Thames Estuary mouth. By the requirements of the International Collision Regulations (ColRegs) the tracks of these yachts will change unpredictably so do not follow a set route. They avoid the Gabbard and Galloper banks and prefer the Falls Gap in conditions which make the North and South Falls areas inadvisable. Since all these passages are out-of-sight of land most yachts will wish to confirm their positions by sighting the buoyage marking these hazards. With the exception of yachts approaching via the North Foreland to southerly destinations or via the north of the Gabbard to northerly destinations, all recreational craft on these passages cross the strategic wind farm area.

*Other passages:* Yachts on all other passages also have to cross the wind farm area. These include yachts entering at North Foreland heading north to the Deben and Crouch as well as yachts entering from the north heading for the Swale or Medway. The detail of the routes chosen through the labyrinth of banks depends almost entirely on wind and tide at the time of arrival and many will also require that a change of tidal stream direction, from ebb to flood or vice versa, occurs at a particular point in the passage.

### **Routes entirely within the Thames Estuary Strategic Wind Farm Area**

Nine major rivers enter the area directly. During a normal summer sailing season there is constant yacht traffic between every combination of origin and destination - some 110 combinations in total, although no statistics of usage are available. Amongst important passages in the strategic wind farm area are:

- Ore and Deben to Thames, Medway, Swale and Ramsgate
- Harwich and Walton to Thames, Medway, Swale and Ramsgate
- Colne, Blackwater and Crouch to Ramsgate
- Thames and Medway to Harwich (certain states of tide)
- Swale to Walton and Harwich (certain states of tide)
- Ramsgate to all except Thames, Medway and Swale

Each passage presents a wide variety of routing options and it is not possible to generalise to optimum routes most likely to be followed.

### **Anchorage, Harbours and Marinas within the Thames Estuary Strategic Wind Farm Area**

Recreational craft find safe and convenient anchorage in all the creeks and rivers along this coastline with the exception of the river Thames. Many of these are in regular use, particularly during fine weather. Coastal anchorages are to be found in sheltered parts of the coast off Walton Backwaters, in the Crouch entrance channel and off the North Kent coast.

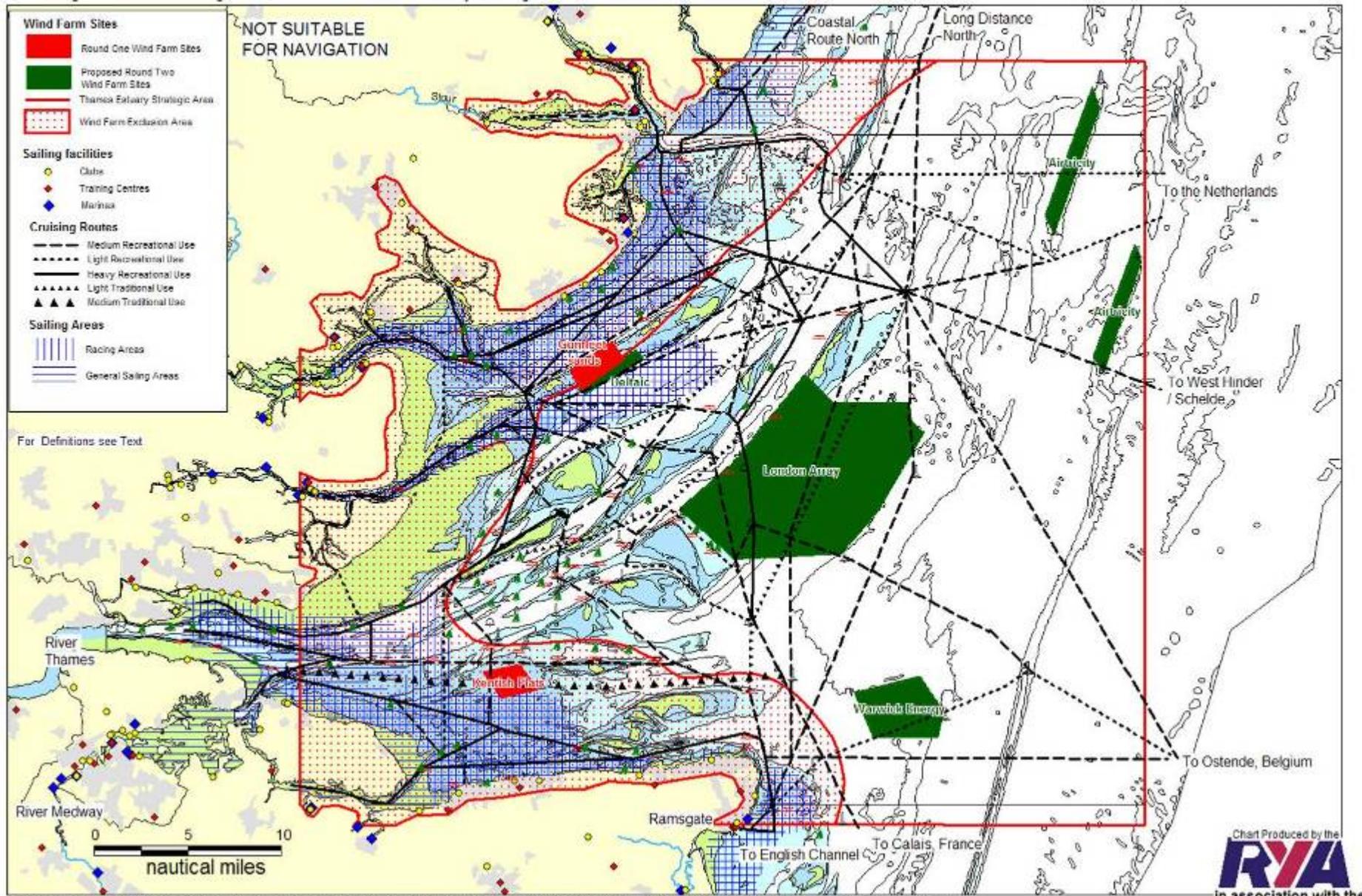
### **Sailing Areas within the Thames Estuary Strategic Wind Farm Area**

In addition to the passage routes already discussed there is a large amount of day-sailing within the Thames estuary area. Day-sailing can be defined as recreational sailing activity which follows an out-and-return pattern rather than a point-to-point routing pattern. With the exception of the Whittaker Channel area and East Swin, which is much used by craft from the Crouch, these general sailing areas are, for the most part, within the Exclusion area only. See the Figure 2 for primary locations.

### **Racing Areas within the Thames Estuary Strategic Wind Farm Area**

Yacht racing takes place from most rivers within the area, particularly dinghy and small boat racing. Races for larger boats, including international races, takes place from Harwich, Mersea and Crouch. Race courses are set only on the day of the race when actual winds may be partially predicted and will normally be designed to avoid major areas of commercial shipping. See Figure 2 Chart for primary locations.

Figure 2: Recreational Boating in the Thames Estuary



© Royal Yachting Association & Cruising Association 2004. © British Crown and Metec plc, Data licence 092003.008. © Europa Technologies Ltd. Wind farm strategic areas from DTI. Mapped © MapInfo Corporation (2003). All rights reserved. NOT TO BE USED FOR NAVIGATION

## Greater Wash Strategic Wind Farm Area

The Greater Wash Strategic Wind Farm area is a difficult and somewhat unfriendly area for recreational sailors without any all-weather all-tide safe harbour. The coastal seas can be dangerous to small craft in strong on-shore weather although the offshore passage routes are relatively safe and without physical dangers. There is limited local sailing activity, largely by small boats which can take the ground plus a few very large traditional sailing craft (see Figure 3). Commercial traffic includes some local coasters to the Wash ports and specialised vessels in connection with oil and gas platform servicing plus larger vessels entering or leaving the Humber from well offshore. Yachts have to take particular care to avoid this traffic.

Recreational sailing in the area consists of:

- Canoeing, sail-boarding and personal water-craft of a very limited local nature mainly in the Humber
- Dinghy sailing of a limited local nature mainly in the Humber but also from the smaller ports of North Norfolk and the Wash
- Cruiser day-sailing in suitable weather only
- Cruiser passage-making through the area both inshore and offshore

Sailing activity is supported by 30 clubs, 12 marinas, and 38 teaching centre. In addition there are an estimated 5,600 moorings (BMF 2004). No reliable estimate can be produced for the number of vessels or crew involved but by inference from the RYA national data-base, total berths within marinas is over 1,287 in the strategic area and membership of clubs in the adjacent regions (Yorkshire and Humberside, East Midlands and Eastern) is over 38,000. Cruising Association records show that approximately 4% of national UK members are based within 40 miles of the area.

In general terms it may be assumed that recreational craft offshore are fully equipped for their type and that crews have a high level of competence. Typically a vessel offshore will be equipped with marine radio or mobile telephone but small craft equipment will not have the same transmission strength as commercial vessels.

The following notes comment only on recreational craft routes which may involve passage through or near the current proposed wind farms or through the Strategic Environmental Assessment area. They therefore exclude passages generally requiring transit only of the wind farm development exclusion area.

### Routes through the Greater Wash Strategic Wind Farm Area

Yachtsmen passing through the Wash area, from one boundary to another, are inevitably on long passages. There is no totally safe harbour within the area. To the south, the nearest all-weather, all-tide haven is Harwich as Yarmouth and Lowestoft are both inaccessible to yachts in strong onshore weather. To the north, all harbours can be difficult to access in the commonly occurring conditions. The seemingly wide Humber entrance is similarly not always available and the planning for through passages has to include staying out at sea as the safe option. Offshore sand banks are not a problem for navigation through lack of depth over but may produce heavily breaking seas in bad weather and are best avoided. The Humber entrance has recommended yacht tracks to avoid conflict with commercial shipping.

The Cruising Association Almanac summarises the position as:

*North Norfolk Coast:* The coast of N Norfolk is unfriendly in bad weather, with no harbour accessible when there is any N in the wind. The harbours dry, and seas soon build up in the entrances or over the bars, some of which are dangerous even in a moderate breeze and an ebb tide. But in settled weather and moderate offshore winds it is a peaceful area to explore, particularly for boats which can take the ground. (Page 409, 2000 edition)

*The Wash:* Areas of shifting sands, most of which dry. Important features are the strong tidal streams, the low-lying shore, and the often poor visibility. Do not attempt entry to the rivers too early on the flood which runs hard. (Page 409, 2000 edition)

*The Wash to the River Humber:* Draws attention to off lying banks with overfalls and breaking seas in bad weather. (Page 409, 2000 edition).

*River Humber and Humber to West Hartlepool:* Draws attention to irregularity of depths, very fierce streams in Humber Entrance and advice to clear Flamborough by two miles. (Page 409-410, 2000 edition)

Three yachting routes which pass through the area may be generalised as follows (see Figure 3):

- Long Distance Offshore Route: This route will be followed by those wishing to make best speed between Flamborough Head and Winterton Ness. Whilst a straight track is preferred (if winds permit) local deviations take place to avoid gas and oil installations and offshore banks liable to have overfalls or breaking seas.
- General Offshore Route: This route runs 15-20 miles offshore avoiding the worst of the off lying banks. It uses outlying navigation buoyage for position confirmation
- General Inshore Route: This route runs approximately 10 miles off the coast, avoiding shallow areas and MoD firing ranges. Yachts on this route tend to be embayed into the Wash especially during the frequent poor visibility of the area. They use prominent marks for position confirmation and head out to sea under conditions of uncertainty. (Note that the Cromer Round 1 wind farm straddles this route)

### **Routes terminating within the Greater Wash Strategic Wind Farm Area**

The only significant route terminating in the SEA is to the Humber. Yachts tend to join the recommended yacht track just south of the Humber main entrance channel directly from Flamborough Head or the routes clearing the north Norfolk coast. Yachts proceeding to the Wash ports from outside the SEA will normally follow one of the general inshore routes and leave it at any convenient place for their destination

### **Routes entirely within the Greater Wash Strategic Wind Farm Area**

Recreational traffic between the 16 small facilities available in the area, including in the Humber and Wash, is light and at all times takes place solely within the Exclusion Area.

### **Marinas, Harbours and Anchorages within the Greater Wash Strategic Wind Farm Area**

Reliable anchorages for recreational craft are found only behind Spurn Head or off Cleethorpes in the Humber during times of suitable weather only. Further up the Humber or south of Scarborough and Bridlington, both located outside the strategic wind farm area are also suitable in favourable conditions. There are no all-weather anchorages although shelter is sometimes sought behind the various banks both offshore and inshore. Wells Next-to-Sea is the largest harbour in the area and used by locals and visiting yachts.

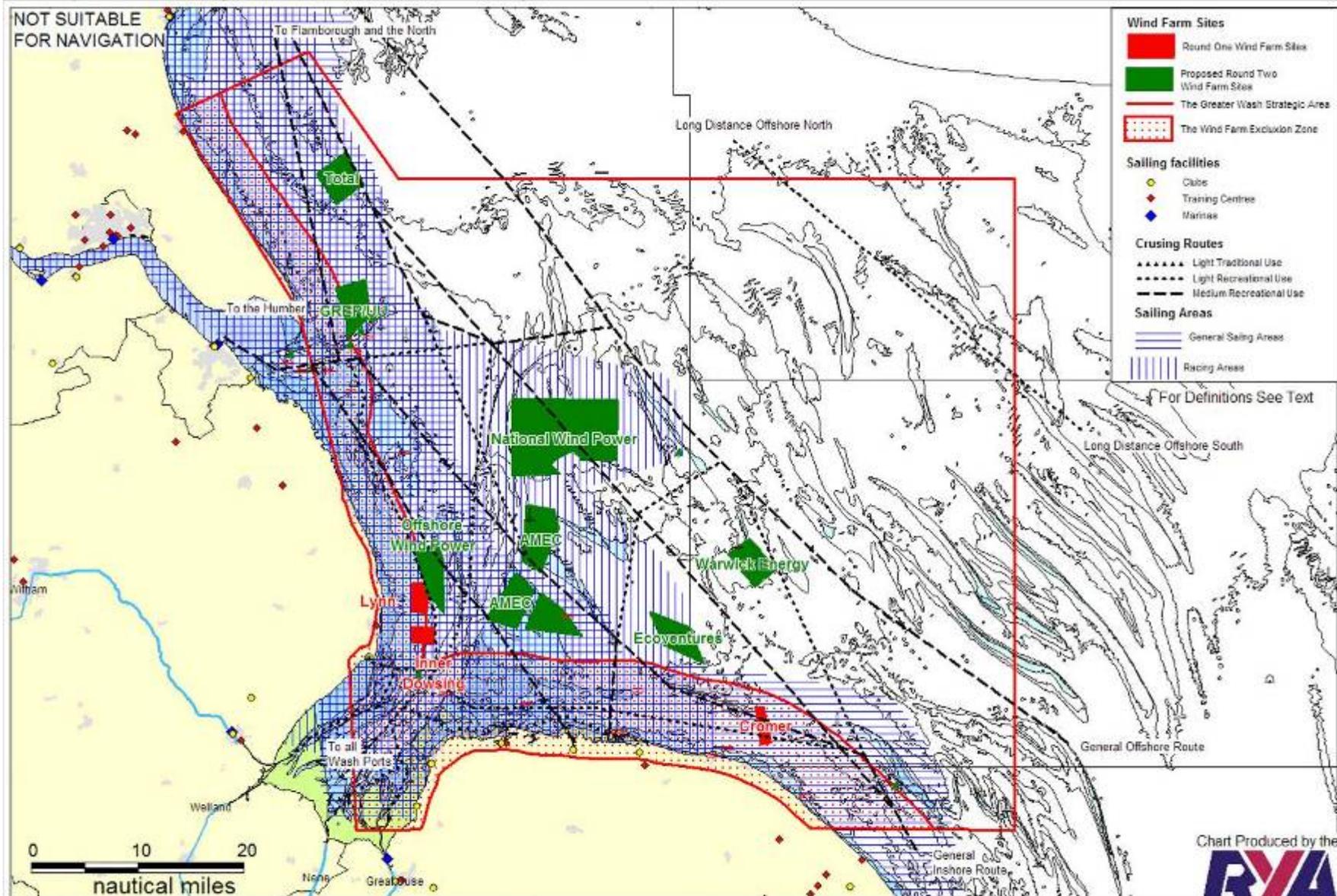
### **Sailing Areas within the Greater Wash Strategic Wind Farm Area**

General sailing areas are to be found in the Wash, in the Humber Mouth area and, lightly used, all along the coast line from Blakeney to Bridlington.

### **Racing Areas within the Greater Wash Strategic Wind Farm Area**

Dinghy racing takes place from many of the small yachting bases within the SEA area. Courses are generally within the wind farm development exclusion area. However some racing extends out further offshore into the area from the Humber.

Figure 3 Recreational Boating in the Greater Wash



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## **North West (Liverpool Bay) Strategic Wind Farm Area**

The whole area of the North West, but particularly the Scottish Coast to the north and the Anglesey-North Wales coast to the south, is frequented by a growing number of cruising yachts and other types of recreational sailing. This is leading to pressure for provision of more mooring and berthing facilities as well as an increased use of the water in general.

There are dangerous sandbanks at the entrance to all Estuaries with strong tidal streams, in particular the Solway Firth and Morecambe Bay. Most harbours have substantial bars or dry out at low water and are located on lee shores. The tidal range is large it can reach to over 10 metres and the heights are notoriously subject to atmospheric pressure. The entire coastline included in this study, excepting the North Welsh coast, is a lee shore in the prevailing weather conditions which leads to breaking seas over shallow water areas that have to be carefully avoided by recreational craft. There are no major offshore navigational dangers other than shallows associated with the major river entrances.

Recreational sailing in the area includes:

- Canoeing, sail-boarding and personal watercraft limited to a few places close inshore
- Dinghy sailing in most estuaries in suitable weather and tide conditions
- Cruiser day-sailing around whole coast out to 15 miles or more
- Cruiser passage making between most combinations of yachting base

Sailing activity is supported by 50 clubs, 19 marinas, and 16 training centres. In addition there are an estimated 11,100 moorings (BMF, 2004). No reliable estimate can be produced for the number of vessels or crew involved but by inference from the RYA national data-base, total berths within marinas is over 3,600 in the strategic area and membership of clubs in the adjacent regions (Wales and North West) is over 21,000. Cruising Association records show that approximately 5% of national UK members are based within 40 miles of the area.

In general terms it may be assumed that recreational craft offshore are fully equipped for their type and that crews have a high level of competence. Typically a vessel offshore will be equipped with marine radio or mobile telephone but small craft equipment will not have the same transmission strength as commercial vessels.

The following notes comment only on recreational craft routes which may involve passage through or near the current proposed wind farms or through the Strategic Environmental Assessment area. They therefore exclude passages generally requiring transit only of the wind farm development exclusion area.

### **Routes passing through the North West Strategic Wind Farm Area**

Few yachts transit through this area without stopping. The many yachts passing between the Scottish islands and Wales or the South West normally pass west of the Isle of Man and look towards the east coast of Ireland for refuge or shelter.

### **Routes terminating in the North West Strategic Wind Farm Area**

The whole coastline is of growing interest to cruising yachtsmen with an increasing number of yachts visiting from Scotland, Ireland and central or south Wales. Yachts based within the area visit southern Scotland, the Isle of Man, Anglesey and Ireland.

Principle entrance points to and from the area are:

*The Menai Strait:* A difficult but very popular area for recreational craft due to limiting tidal constraints frequently requiring a temporary anchorage or stop at a nearby port.

*Between Anglesey and the Isle of Man:* There are no navigational dangers anywhere except for the separation zones off Holyhead and the islands off the North Anglesey coast in this 40-mile stretch of water and navigation is made as directly as possible between points of origin and destination. This tends to lead to concentration of routes towards both the Anglesey and Isle of Man destinations.

*The Isle of Man:* A principle destination from all ports in the area. Courses and approach are made directly, avoiding only the shallows to north-east of the island where necessary.

Between the *Isle of Man and Scotland*: Most routes between recreational ports within the area and the Scottish Isles/ Northern Ireland use this stretch of water. When not the obvious direct route, it provides more shelter than routes outside the Isle of Man.

### **Routes entirely within North West Strategic Wind Farm Area**

There is some traffic directly between the Scottish coast and north Wales coast and there is an increasing amount of traffic between the Mersey / Ribble estuaries and the Isle of Man. However, the majority of inter-area routes tend to follow the coastline. Due to the tidal nature of the ports, such passages tend to be either very short distances, between neighbours for example, or relatively long distances so that arrival times can coincide with the next tide. Most such passages are within the wind farm development exclusion area except at the entrance to the Solway Firth and off Lancashire and North Wales, where the nature of the coast and shallows forces vessels further offshore.

### **Anchorage and harbours within the North West Strategic Wind Farm Area**

Safe secure anchorages in all parts of the area are limited except in offshore winds. The only all-weather all-tide port in this area is Holyhead on Anglesey, but Douglas on the Isle of Man is secure, except in NE winds. Workington, a purely commercial port, is available to recreational craft in emergencies. Most harbours have good holding ground available for purely temporary tidal waits in suitable weather. This facility is, of necessity, much used. There are few large marinas currently within the strategic area but there is much pressure for this type of development in the limited space available including pressure for development of harbour facilities.

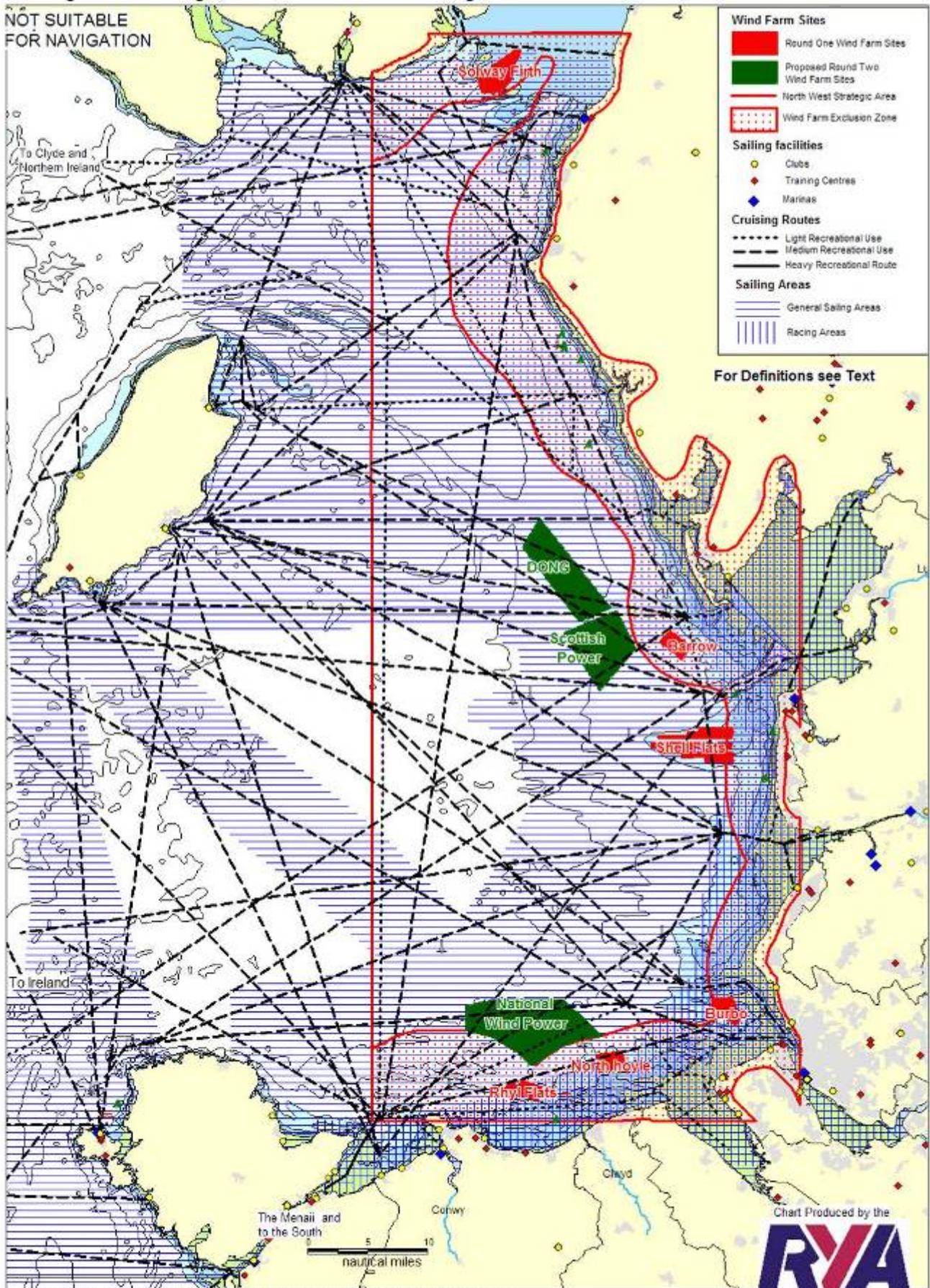
### **General Sailing Areas within the North West Strategic Wind Farm Area**

General sailing takes place to varying distances off all yachting ports and marinas in the area, constrained only by the necessity to return on the same tide or to wait for the next tide. Such sailing is particularly common on the Solway, Lancashire, Wirral and North Wales coasts and is not confined to the wind farm development exclusion area (See Figure 4).

### **Racing Areas within the North West Strategic Wind Farm Area**

Yacht racing, principally by dinghies and smaller craft, takes place in most of the estuaries. There are offshore yacht races organised from most of the larger Marinas on the main-land coast (Conwy, Liverpool, Preston, Heysham, Whitehaven and Maryport) to Ireland, The Isle of Man and Anglesey. There are Tall Ship races out of the Mersey to anywhere in the world.

Figure 4 Recreational boating in the North West



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## **Annex A: International call for renewable energy**

The Inter-Governmental Panel on Climate Change (IPCC), has predicted that mean global temperature will rise by between 1<sup>o</sup>.7 C and 4<sup>o</sup>.2 C by 2100 due to the increase in greenhouse gases in the atmosphere. An increase in the average global temperature will bring about global reactions such as melting of the polar ice caps and thermal expansion of the oceans, leading to a significant rise in sea level. With this there is a risk of increased levels of flooding, an increase in the extent and severity of storms and an increase in the level of storm impacts (IPCC, 2000). In an attempt to reduce the effects of climate change and prevent the associated risks, the IPCC have recommended that there is a significant reduction in the use of fossil fuels for energy production, therefore controlling the release of carbon dioxide (CO<sub>2</sub>) and other greenhouse gasses into the atmosphere.

The current leading global agreement on climate change is the Kyoto Protocol, drawn together in 1998, which resulted from a number of former international conventions run by the United Nations, such as Earth Summit in Rio de Janeiro in 1992 and a summit in Berlin in 1995. The Kyoto Protocol, to which the UK is a signatory, legally commits its members to specific targets aimed to limit or reduce greenhouse gas emissions. As a result, in 1998, the UK Government started to work towards its set domestic target, which was to decrease CO<sub>2</sub> emissions to 20% below 1990 levels by 2010. To successfully achieve this objective the UK Government is currently working towards a significant increase in renewable energy production with an aim to generate 10% of all UK electricity from renewable sources by 2010.

## Annex B: RYA Position on Offshore Wind Farms

# THE RYA'S POSITION ON OFFSHORE WIND FARMS



April 2004

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The RYA has taken an active role in policy making that affects boat users and has been the voice of recreational boating for over a century. We represent our 100, 000 personal members and over 1500 affiliated clubs representing approximately 400, 000 boating enthusiasts and administer training standards at over 2000 recognised teaching establishments. An estimated 2 million people participate in one or other form of water recreation.

RYA represents users of inland and coastal:

- Cruising and racing sailing and motor boats
- Sailing dinghies and day boats
- Windsurfers
- Personal watercraft

The RYA is supportive of the Government's efforts to promote renewable energy. However, our primary purpose in engaging in the consultation regarding the development of offshore wind farms is to secure navigational safety and to ensure that recreational boating interests are not adversely affected. The RYA has objected to some of the Round 1 proposed developments on a series of grounds. As more issues have come to light, we have reviewed our position on offshore wind development.

**This position paper sets out our concerns from a general perspective and should enable developers to more accurately take account of recreational boating concerns in their environmental impact assessments.**

In summary the concerns of recreational boating and offshore wind farms relate to:

1. Navigational safety
  - Collision risk
  - Risk management and emergency response
  - Marking and lighting
  - Effect on small craft navigational and communication equipment
  - Weather
2. Location
  - a. Loss of cruising routes
  - b. Squeeze into commercial routes
  - c. Effect on sailing and racing areas
  - d. Cumulative effects
  - e. Visual intrusion and noise
3. End of life
  - a. Dereliction
  - b. Decommissioning
4. Consultation

The MCA has developed guidance for assessing the navigational impact of offshore renewable energy installations, this should be utilised in addition to the information contained here.

## 1. Navigational Safety

Prior to leaving the shore, mariners make a passage plan and make assessments based on weather, tides and the environmental conditions. Offshore wind farms become an additional navigational hazard with a height restriction. In many cases, these wind farms if sited sensitively, well designed and managed effectively can address many of the safety issues of concern to recreational boating.

### Collision risk

The RYA believes there is a risk of rotor blade collision with recreational craft. The danger that the moving rotor blade poses is the reason for concern, navigating around static hazards is part of sailing and only in rare situations poses a threat to life.

**The RYA believes that the threat to recreational yachts can be minimised by specifying a minimum rotor height clearance above flat sea level (mean high water springs) of 22 metres.**

The RYA has developed its position on rotor clearance height on the available data. Firstly an estimation of the air draught of the national fleet of yachts around the UK was established with the knowledge that these types of yachts may be found in all UK waters, this data is taken from the Royal Ocean Racing Club (RORC) Rating Office's database. For more detail see final section on *Developing RYA policy on minimum rotor clearance height*.

In addition to clearance height, there is the issue of sub-surface structures which may be associated with tripod design or scour protection around the base of the turbine towers.

### Risk management and emergency response

Risk management provisions should be formulated from the results of a site specific risk assessment that accounts for recreational craft and recognises the differences between recreational craft and commercial craft.

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 vessels
- Annual events that are not covered in a short term monitoring
- Wave height and sea state conditions
- Monitoring should be carried out during the high season
- A range of possible incidences

Any risk assessment should recognise the fact that it is a theoretical process and that utilising historical data on the number of incidents reported to HM Coastguard from the area with no hazards in place may not adequately represent the situation with 30-300 turbines in situ. It should also be recognised that not all incidents are reported to the Coastguard, generally only those that are life threatening situations. The reality is that while these wind farms do not exist, we do not have any comparable incident data.

In order to effectively manage the risk of a vessel in distress drifting towards a wind farm, there needs to be an effective *Emergency Response System* in place. This will require the ability to shut down the turbines when an emergency call is reported. In some cases, where traffic is high, a stand-by safety vessel may be required.

The RYA's opinion is that the creation of zones that exclude vessels on a wholesale basis is unnecessary, impracticable and disproportionate. In our view, such an indiscriminate restriction on the right of navigation is not justifiable in terms of safety and there is little possibility of enforcing such zones. The RYA believes this may well result in conflict between users and the developer.

**An effective *Emergency Response System* should be developed to address safety issues.**

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. In all cases measures should comply with the principles of Article 60 of the UN Convention on the Law of the Sea and IALA Recommendation 0-117 'Recommendation for the Marking of Offshore Wind Farms'. The RYA believes

that the purpose of any *advisory or precautionary zones* should be to warn vessels to navigate with particular caution within the vicinity of the turbines but they should not permanently restrict navigation or exclude recreational vessels from entering.

The RYA does, however, foresee occasions when it may be prudent to impose short-term temporary restrictions, for example during engineering, maintenance or construction works, and such temporary restrictions should be promulgated through Notices to Mariners.

A further issue relating to risk management is that of cables and anchoring. In most cases, recreational craft will not anchor within the wind farm sites, however, in emergency situations this may be the only way of securing a drifting vessel to ensure no damage is done. To secure the safety of navigation, cables should be buried to a sufficient depth to avoid being uncovered. This should take into account shifting sediments on the seabed.

### **Marking and lighting**

Whilst wind farms are still relatively new developments in UK waters, the requirements for marking and lighting the turbines and wind farm sites should find consistency. As a minimum each turbine should be clearly marked in high visibility yellow paint to a height of 12 m, 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.

**The RYA looks to Trinity House and the MCA to provide detailed guidance on these issues and will identify site specific issues they may have from time to time.**

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

All craft larger than the dinghy 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 the magnetic compass. Likewise the affect on systems such as GPS are largely unknown at present. A turbine array will also affect small craft radar. These systems are not as powerful as many of the commercial varieties which results in a smear across the radar screen effectively blocking out any craft close to or within the array.

Similar problems may be found with small craft navigational equipment, which are not as powerful as commercial varieties. In addition, antennae are likely to be lower than many larger commercial vessels. The effect on VHF and mobile phones should be incorporated into an analysis of the site.

**Any proposed development should account for the effect on small craft navigation and communication equipment in detail**

### **Weather**

Local weather conditions should also be examined in the risk assessment and measures taken to reduce the effects of poor weather conditions, low visibility and fog should be included in the risk management plan. Turbines may need to have fog horns attached for low visibility conditions.

## 2. Location

The location of offshore wind farms is going to be crucial to navigational safety as well as potential loss of amenity for recreational craft. It should also be noted that commercial routes and shipping lanes do not represent those routes taken by small recreational craft.

**Recreational routes, general sailing and racing areas must be accounted for when examining the impacts of wind farm developments.**

### Loss of cruising routes

The RYA together with the Cruising Association, has compiled maps of recreational cruising routes, sailing and racing areas. When examining the routes and location of turbines it is key to recognise the fact that sailing boats behave differently to power driven craft in that their actual line of travel may zigzag across the ultimate direction of travel as they are dependant on the wind direction. These maps should be consulted as well as any other available information to inform the siting of the farms, turbine locations and the potential provision of navigation routes through the larger wind farms.

Along many stretches of coast, the recreational craft may need to seek shelter in poor weather. Sheltered harbour and anchorages and *routes to these harbours of refuge* should be protected.

In addition to the loss of routes is the *increased distance of travel* which has environmental implications for powered craft and safety implications for all craft.

In addition to the loss of routes through physical obstruction, placing structures on the seabed is likely to have an effect on seabed morphology. This may result in shifting sandbanks or *silting up of existing channels*. These knock on effects may well result in loss of routes which need to be accounted for.

### 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 other routes entirely. As a result, examining commercial routes alone will not enable safety positioning of these wind farms.

### Effect on sailing and racing areas

Most of the general day sailing and racing areas are close to the shore and in the more sheltered waters. These are generally inside the DTI 8-12 km development exclusion zone. In the situations where these areas conflict with the wind farm sites, they should be accounted for. Recreational activity is important to the health and wellbeing of the community as well as economic support for the local coastal economies.

In certain confined areas and areas heavily used for sail racing, the effects of the turbines in terms of turbulence and shadowing on craft should be taken into account.

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

In addition to the loss of amenity, there are safety issues with the creation of turbulence and wind shadowing in confined areas where craft may be moving slowly and the effects of gusty turbulent conditions may create problems.

### Cumulative effects

Of greater concern with the increasing number of developments is the need to assess each wind farm location in its wider surroundings. The *cumulative effects* of wind farms on navigation routes will be increasingly significant. Existing navigation routes affected by other proposed wind farm sites will need to be accounted for, rather than current routes.

### **Visual intrusion and noise**

The RYA has to date restricted its comments on the development of offshore wind farms to those issues affecting navigational safety and loss of amenity. However, consultations with members have identified a concern with the visual intrusion of wind farm developments and the effects of the noise. It should be recognised that recreational boating, in particular cruising yachtsmen enjoy the peace and tranquillity of the sea and its unspoilt nature. Large scale wind farm development will affect this level of enjoyment. The visual and noise intrusion of wind turbines in the marine environment is no different to those enjoying the terrestrial environment on land.

### **3. End of Life**

#### **Dereliction**

Whilst we would hope that these installations remain economically viable for the lifetime of the structure, the RYA would like to ensure that appropriate measures are taken by Government to secure the financial implications of removing the structures prior to consents been given. This will ensure that after the installation ceases electricity production for whatever reason, derelict structures that are not marked or lit and remain a hazard to navigation both concerning passage and anchoring are not found in 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 will pose a hazard to navigation and should be avoided.

### **4. Consultation**

Consultation with the RYA should be achieved through the Headquarters in Hamble and the regional committees and home country offices who can coordinate wider consultation with the clubs and individual membership and if needed, help to coordinate stakeholder meetings.

The list of RYA contacts can be found on the following page for Headquarters, RYA regional and home country secretaries or environmental coordinators is given along with a map of the regional divisions.

## List of contacts within RYA regions

### RYA Head Office

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### Eastern Region

Environmental Coordinator  
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Tollesbury  
Essex, CM9 8TV

### East Midlands Region

Hon. Secretary  
Mr. Howard Nelson  
5 Rutland Close  
South Witham, Grantham  
Lincolnshire, NG 33 5QA

### North East Region

Hon Secretary  
Mr. Neal Hill  
Eland Close Cottage  
Eland Hall  
Ponteland, NE20 9TR

### North West Region

Hon. Secretary  
Mr. Graham Knox  
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Rochdale, OL11 5YU

### South East Region

Hon. Secretary  
Miss Ruth Guy  
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### South West Region

Hon Secretary  
Mr. Ron Burdon  
Batch Cottage  
Ridge  
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Somerset, TA20 3ES

### Thames Valley

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### South East Region

Hon. Secretary  
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### RYA Northern Ireland

Hon Secretary  
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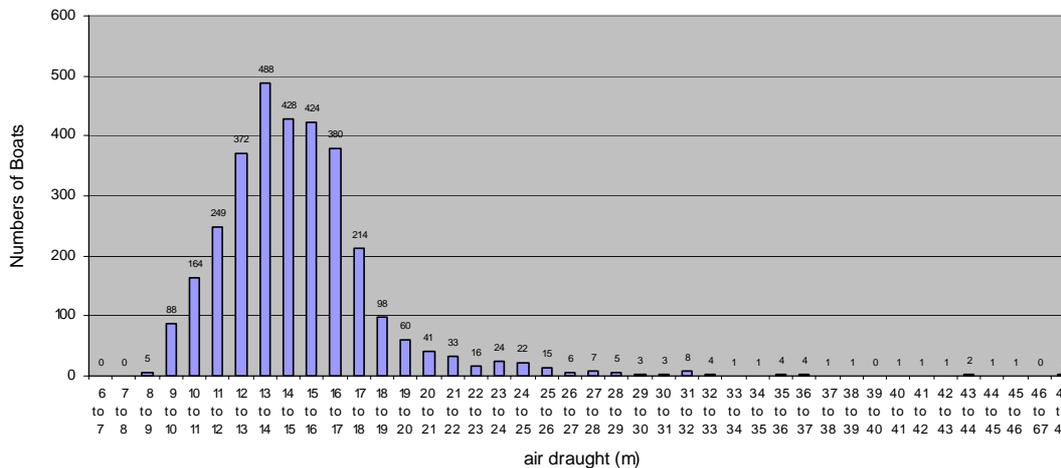


## Development of the RYA policy on minimum rotor clearance height

The RYA has developed its position on rotor clearance height on the available data. Firstly an estimation of the air draught of the national fleet of yachts around the UK was established with the knowledge that these types of yachts may be found in all UK waters, this data is taken from the Royal Ocean Racing Club (RORC) Rating Office's database. 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 3179 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 quantified, this database represents 6% of the total number of boats owned in the UK, estimated at 564,000 (BMF, 2003).

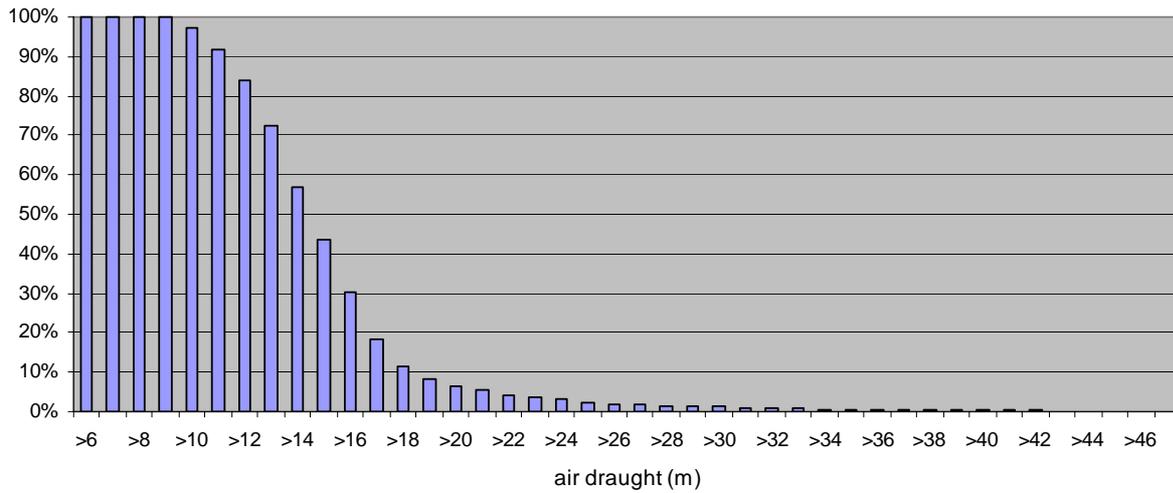
'Air draught' as presented here is the distance from the waterline to the top of the mast structure. This is based on the 'p' measurement, boom to top of mast, in the rating system (RORC, 2003). Two metres have been added for the distance from the boom to the water surface, which is a conservative estimate for the larger vessels. It should be noted that masthead equipment and instrumentation has not been included in the calculation of air draught, although it will also add a further half to one metre to the air draught 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 draught in metres of the boats within the IRC fleet (sample size=3179)**

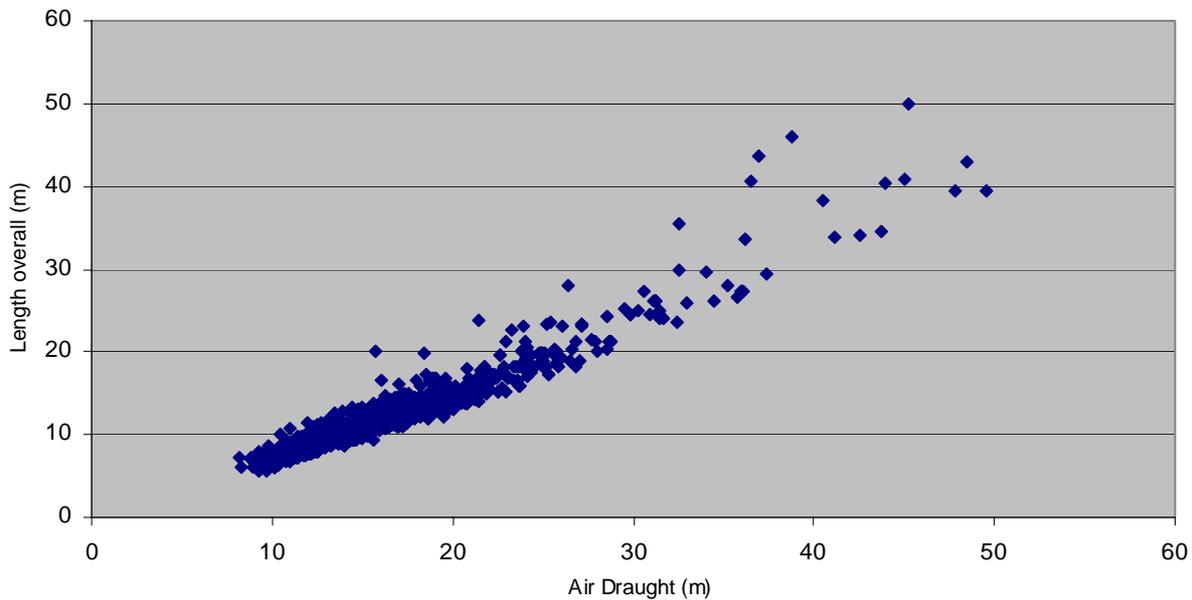


Looking at the above data in the form of percentage of the UK boating fleet, we can see the percentage of recreational yachts at risk from different rotor clearance heights. Figure 2, shows that a clearance height of 14 metres above sea level will put 57% of the national fleet at risk from rotor height collision. Reducing this to 18 metres above sea level, substantially reduces this percentage, however it still leaves 12% 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. As a matter of common observation, larger yachts over 18 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 m 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.

**Figure 2: Graph showing the percentage of boats in the IRC fleet with different air draught shown in metres (sample size = 3179)**



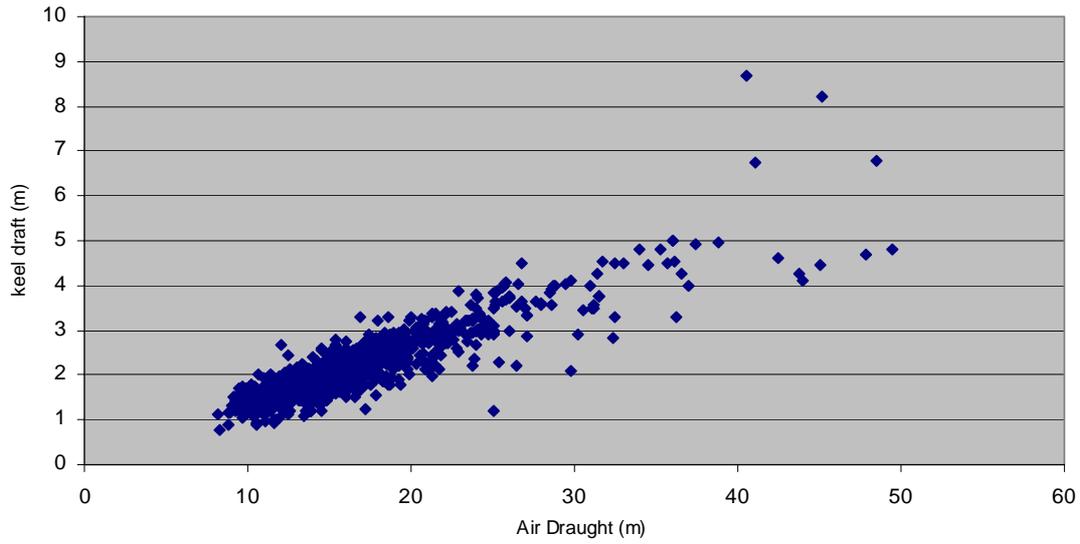
**Figure 3: Graph showing the relationship of Length Over All (LOA) in metres and air draught in metres of the IRC fleet.**



While it is accepted that in areas where the local fleet consists of smaller vessels, the risk of rotor height collision with one of these larger vessels may be calculated as small, these larger vessels are the very ones likely to make the longer journeys and enter the more remote areas. Although initially it was thought that wind farms would be developed on shallow sand banks and therefore not be a threat to larger yachts, this is apparently not the case, and developers are increasingly looking for a more stable base in deeper waters. As a result it will remain a possibility that any boat kept in UK waters as well as internationally will be able to navigate around the UK and come into the waters surrounding these wind farms. Raising rotor height by several metres, as is shown to be possible by some of the developers will minimise the risk of collision with any vessel, local, national or visiting.

Additional data is provided showing the relationship between air draught and the depth of water required for clearance below the vessels keel (Figure 4). Figure 4 shows that a depth of 5 metres is adequate for 99.8% of the fleet. Water depth of these installations is not a restricting factor for the majority of yachts in the proposed wind farm areas.

Figure 4: Graph showing the relationship of water draft in metres and air draught in metres of the IRC fleet.



### References

RORC (Royal Ocean Racing Club). 2003. IRC/IRM Yearbook. London

BMF (British Marine Federation). 2003. *Marine Leisure Industry European Overview*. Egham, Surrey.

## Annex C: Questionnaire

### YOUR VIEWS ON OFFSHORE WIND FARMS

#### Name of Club:-

Please tick or fill in appropriate answer

1. Would you be prepared to navigate through a wind farm bearing in mind each turbine will be between 500-700 metres apart?  
 YES in all conditions,  YES in favourable conditions,  NO, never
2. Do you agree with the RYA's stance on a minimum rotor clearance height of 22 m above MHWS?  
 YES     NO
3. What is the maximum mast clearance height of your member's boats (boat+mast height)? \_\_\_\_\_
4. What percentage of your members has a mast height over 22m from MHWS (boat+mast height)?  
\_\_\_\_\_
5. How would you want the turbines marked and lit?  
\_\_\_\_\_
6. Do you think a zone would improve safety to your members' activities?  
 No zone required;  Zone around each turbine;  Zone around the whole site;  
 Zones may be appropriate at some sites  
Should the zone be:  advisory or  be enforceable by law?  
Should the zone be permanently manned?  YES     NO
7. Any other comments?

Thank you for your help in this matter.

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Website: [www.rya.org.uk/environment](http://www.rya.org.uk/environment)

## Annex D: List of Consultees

### THAMES ESTUARY CONSULTTEES

- Aldeburgh Yacht Club
- Alexandra Yacht Club
- Allhallows Yacht Club Ltd
- Alton Water Sports Centre
- Ardleigh Sailing Club
- Arethusa Venture Centre
- Association of Yacht Clubs of Southend
- BACSPA
- Bawdsey Haven Yacht Club
- Bawdsey Quay Watersports Centre
- Benfleet Yacht Club
- Blackwater Sailing Club
- Blue Baker Sea School
- Blue Circle Sailing Club
- Boat House Boaters Club
- Bradwell Cruising Club
- Bradwell Marina
- Bradwell Outdoor Education Centre
- Bradwell Quay Yacht Club
- Brandy Hole Yacht Club
- Bridgemarsh Marine
- Brightlingsea Sailing Club
- Britannia Sailing (East Coast)
- Broadstairs Sailing Club
- Burnham on Crouch Sailing Club
- Burnham Yacht Harbour
- Catamaran Yacht Club Ltd
- Cinque Ports Sailing Centre (ASA 117)
- Cirdan Sailing Trust
- Clacton on Sea Sailing Club
- Colne Yacht Club
- Conyer Cruising Club
- Conyer Wharf
- Corinthian Otters
- Crouch Area Yachting Federation
- Crouch Sailing School
- Crouch Yacht Club
- Dabchicks Sailing Club
- Deben Yacht Club
- Diveline Limited
- Dover Sea School
- Downs Sailing Club
- Dutch Barge Association
- East Anglian Sailing Trust
- East Anglian Sea School
- East Mersea Youth Camp
- East of England Sailing School
- Elite Sailing
- Elmhaven Marina
- Environment Agency (Anglian Region)
- Essex Marina
- Essex Marina Yacht Club
- Eyott Sailing Club
- Fairplay Outdoor Education Centre
- Felixstowe Ferry Sailing Club
- Fellowship Afloat Charitable Trust
- Folkestone Yacht And Motorboat Club
- Gravesend Sailing Club
- Grove Ferry Boat Club
- Guardian Marine (Training) Services
- Halcon Boating Club
- Hampton Pier Yacht Club
- Harlow Blackwater Sailing Club
- Harwich and Dovercourt Sailing Club
- Harwich Area Sailing Association
- Harwich Town Sailing Club
- Haven Ports Yacht Club
- Herne Bay Sailing Club
- Highway Marine Ltd
- Hoo Marina
- Hoo Ness Yacht Club
- Hullbridge Yacht Club
- Hundred of Hoo Sailing Club
- Hythe and Saltwood Sailing Club
- Invicta Sea School
- Ipswich Haven Marina
- Iron Wharf Boatyard
- Island Yacht Club
- Isle of Sheppey Sailing Club
- Leigh on Sea Sailing Club
- Leybourne Lake Windsurfing Centre
- Lower Halstow Yacht Club
- Maldon Little Ship Club
- Marconi Sailing Club
- Margate Yacht Club
- Maylandsea Bay Sailing Club
- Medway Bridge Marina
- Medway Cruising Club
- Medway Motor Yacht Club
- Medway Outdoor Education
- Medway Pier Marine Ltd
- Medway Yacht Club
- Medway Yachting Association
- Millbrook Marine Club
- Minnis Bay Sailing Club
- Morning Star Trust
- North Kent Yachting Association
- North Sea Yachting and Motor Cruising
- Orford Sailing Club
- Orwell Yacht Club
- Pin Mill Sailing Club
- Port Medway Marina
- Power Products Marine
- Queenborough Yacht Club
- Ramsgate Marina
- Royal Harwich Yacht Club
- Royal Hospital School
- Royal Temple Yacht Club
- Redoubt Sailing Club
- Rival Sea School
- Rochester Cruising Club
- Royal Burnham Yacht Club
- Royal Cinque Ports Yacht Club
- Royal Corinthian Yacht Club Burnham On Crouch
- Royal Engineers Boat Operations (ASA 133)
- Sail with Wind and Tide
- Sandwich Sailing and Motor Boat Club
- SCC Walton on the Naze Sailing Centre
- Seasalter Sailing Club
- Seatrain Sailing

- Shotley Marina
- Slaughden Sailing Club
- South Woodham Ferrers Yacht Club
- Southend Marine Activities Centre
- Southwold Sailing Club
- Stone Sailing Club
- Stone Watersports Club Limited
- Stour Sailing Club
- Strood Yacht Club
- Suffolk Yacht Club
- Thames Estuary Yacht Club
- Thames Motor Yacht Club
- Thames Youngboats
- Thirslet Sailing Club Ltd
- Thorpe Bay Yacht Club
- Titchmarsh Marina
- Tidemill Yacht Harbour Ltd
- Tollesbury Cruising Club

- Tollesbury Marina
- Tollesbury Mud Club
- Tollesbury Sailing Club
- University of Essex Sailing Association
- University of Kent Sailing Club
- Up River Yacht Club
- Upnor Sailing Club
- Wakering Yacht Club
- Walton and Frinton Yacht Club
- Walton Marina
- West Mersea Yacht Club Ltd
- West Wick Yacht Club
- White Cliffs Motorboat and Yacht Club
- Whitstable Yacht Club
- Wilsonian Sailing Club
- Wivenhoe Sailing Club
- Woodbridge Cruising Club

### **GREATER WASH CONSULTEES**

- Bells Marina
- Blakeney Point Sailing School
- Blue Water Marina
- Bob Wride School of Sailing
- Boston Marina
- Brancaster Staithe Sailing Club
- Bridlington Harbour
- Burgh Castle Marina
- Chas Dewar Sailing Enterprises
- Cinque Ports Marine Services
- Club Margarita
- Coastwise
- College of West Anglia
- Covenham Watersports Centre
- D A P Marine Courses
- Dinghy Cruising Association
- Fastack
- Filey Sailing Club
- Glandford Boat Club
- Great Yarmouth College
- Grimsby and Cleethorpes Yacht Club
- Herbert Woods Keelboat Sailing Centre
- Hickling Broad Sailing Club

- Hunstanton Sailing Club
- J Gilbert Education
- Leziate Park Sailing Club
- Lowestoft College
- Lowestoft Cruising Club
- North Lincolnshire and Humberside Sailing Club
- Ouse Amateur Sailing Club
- Rollesby Broad Sailing Club
- Royal Norfolk and Suffolk Yacht Club
- Royal Yorkshire Yacht Club
- Scarborough Yacht Club
- Sir John Leman High School
- Skegness Yacht Club
- Snettisham Beach Sailing Club
- South Ferriby Marina
- Suffolk Water Sports Association
- Team Alpha
- Waveney and Oulton Broad Yacht Club
- Waveney River Centre
- Wells Sailing Club
- Witham Sailing Club
- YCS Outdoor Education Programme

### **NORTH WEST CONSULTEES**

- Albert Dock
- Anglesey Maritime Training
- Arnside Sailing Club
- Atlantis Aquatic Sports
- Bangor Marina
- Bay of Colwyn Sailing Club
- Blackpool & Fleetwood Yacht Club
- Blundellsands Sailing Club
- Caernarfon Marina
- Caernarfon Sailing Club
- Douglas Bay Yacht Club
- Douglas Boatyard
- Castletown and Derbyhaven Motorboat and Yacht Club
- Chester Sailing and Canoeing Club
- Conway Centre
- Conway Yacht Club Ltd
- Conwy Marina

- Conwy Marina Berth Holders Association
- Corus Colours Sailing Club
- Crosby Sailing Club
- Dee Sailing Club
- Fiddlers Ferry Yacht Haven
- Fidders Ferry Sailing Club
- Fleetwood Harbour Village Marina
- Frodsham Water Sports
- Glasson Basin Yacht Co Ltd
- Glasson Sailing Club
- Holyhead Marina
- Holyhead Sailing Club
- Hoylake Sailing Club
- Indefatigable S.T.C (ASA 123)
- James Mayor & Co Ltd
- Kirkcudbright Sailing Club
- Liverpool Yacht Club
- Llandudno Sailing Club

- Llanfairfechan Sailing Club
- Longitude School of Navigation
- Lymm Marina
- Manchester Cruising Association
- Manx Sailing and Cruising Club
- Maryport Marina
- Maryport Yachting Association
- Morecambe and Heysham Yacht Club
- North West Venturers Yacht Club
- Offshore Circuit Racing Drivers Association
- Penmaenmawr Sailing Club
- Port Dinorwic Marina
- Port Dinorwic Sailing Club
- Preston Brook Marina
- Preston Marina
- Red Wharf Bay Sailing Club
- Rhosneigr Boat Owners Sailing Club
- Rhyl Yacht Club
- Ribble Cruising Club
- Roa Island Boating Club Ltd
- Royal Anglesey Yacht Club
- Royal Dee Yacht Club
- Royal Welsh Yacht Club
- Solway Yacht Club
- Southport Lifeboat
- Traeth Coch Sailing Club
- Tranmere Sailing Club
- University Of North Wales Sailing Club
- Water Park
- West Kirby Sailing Club
- West Lancashire Yacht Club
- White Bear Marina
- Whitehaven Marina
- Whitehaven Sailing and Boating Association
- Wind & Wave Water sports
- Windermere Marina Village
- Wirral Sailing Centre

### **RYA REGIONAL CONSULTEES**

- Eastern Region
- North West Region
- South East Region
- Thames Valley Region
- Welsh Yachting Association
- Yorkshire and Humberside Region

### **CRUISING ASSOCIATION CONSULTEES**

- Alde Honorary Local Representative (HLR)
- Anglesey HLR
- Ayr / Southern Isles HLR
- Blackwater HLR
- Chairmen of HLR Committee
- Chairmen RATS Committee
- Colne HLR
- RATS Committee members (x5)
- Crouch HLR
- Cruising Association Council
- Cruising Association Past President
- Cruising Association President
- Cumbria HLR
- Deben HLR
- Dublin/Ireland HLR
- Essex Section Secretaries (x2)
- General Secretary
- Honorary Editor
- Humber HLR
- Isle of Man HLR
- Kent HLR
- Kent Section Secretaries (x2)
- Lancashire HLR
- Lower Thames HLR
- Medway HLR
- Mersey – Wales HLR
- Mid Thames HLR
- North Norfolk HLR
- North Wales HLR
- Northern Ireland / Belfast HLR
- Northumbria/East Scotland HLR
- Orwell HLR
- R. Blythe HLR
- Solway – Fishguard HLR
- South Norfolk HLR
- Stour HLR
- Strangford HLR
- Suffolk Section Secretaries (x2)
- Suffolk Secretary (x2)
- Swale HLR
- Thames Estuary HLR (x2)
- Upper Thames HLR (x2)
- Walton HLR
- Wash HLR

## Annex E: How a Recreational Craft Works

1. Both sailing yachts and power cruisers normally wish to sail in a straight line along a route between required turning points. There are many limiting factors however, which rarely permit this such as varying depths, the strength and direction of wind, the strength and direction of the tide and the time at which the tide turns, all of which are important when planning a voyage. Other factors include crew comfort in the prevailing weather and sea conditions, the possible necessity to avoid other marine traffic, and the accuracy to which navigation plans may be followed.

2. The laws of physics mean that sailing yachts cannot sail directly into the wind, and the closest to the wind direction they can get is 45 degrees. As a result yachts can never sail through more than 270 degrees of a 360 degree circle and many vessels, due to design or crew comfort, cannot sail through more than 260 degrees. If the wind is strong, a wind blowing from directly behind the boat can be very uncomfortable and sometimes dangerous, so therefore leads to avoidance of courses where the wind is closer than 15 degrees either side of the stern. As a result many sailing yachts are limited by a further 30 degrees, leaving only 230 degrees out of 360 degrees possible to them for safe and easy navigation.

3. To deal with this limitation when in a narrow channel a sailing yacht will 'tack'/'zig zag' up a channel i.e. will sail first with the wind to one side of the bow, usually until it reaches the edge of the channel, and then it will turn the bow through the wind until the wind is on the other side of the bow and sail until it reaches the far side of the channel. Progress to windward therefore requires the full width of available channel, which will be limited varyingly by the height of tide at the time. Only with the wind from the side or from behind can a yacht proceed along a reasonably straight line.

4. It should be noted that a sailing yacht rarely proceeds in exactly the direction in which it is pointing with a difference (called leeway) between the two of up to 10 degrees. This is due to the physics of sail power which produces a sideways as well as forwards driving force.

5. It should also be noted that the speed of the tide is often a significant proportion of the speed of the vessel. Thus a yacht sailing at 4 knots will make only 2 knots over the ground if against a 2 knot tide but will make 6 knots over the ground if the same tide is with it. Speed through the water can differ considerably to speed over the ground.

6. A power cruiser is normally able to proceed directly to windward but this is often very uncomfortable in rough seas and heavy winds due to butting into waves. This results in power vessels choosing to 'tack' and not follow a direct route up the channel and could well require most of a channel width.

7. The strength of wind and its direction felt at sea level by a recreational craft is considerably affected by the nearby presence of land particularly if this is of any height. In general, a recreational craft will seek a distance offshore, which best meets its requirements.

- An offshore wind will produce less waves close in shore and lead to choice of routing accordingly.
- In conditions of a sea-breeze against an offshore wind a craft may similarly prefer a route in the quieter conditions often then found some miles offshore.
- In conditions of on-shore winds most craft will choose to remain offshore for safety reasons and avoid routes close inshore.
- In strong conditions recreational craft will balance between the choice of quieter routes along channels protected by shallows each side and more offshore routes away from shallow water.

8. The presence of waves or swell is an important element in determining choice of route or continuation of passage. The major factor is the direction and speed of the tidal stream relative to the strength and direction of the wind. Wind-against-tide conditions are avoided where possible because the wave pattern and shape then produced are particularly problematic for small craft.

9. The wind strength and direction felt by a small recreational craft at sea level will rarely be quite the same as at wind-turbine heights and will suffer greater short-term variation. This is due to the frictional effect of the sea and waves (which may be felt up to about 40 ft (13m). A veer of 15 degrees and reduction of 1 Beaufort force would not be exceptional. Experience of vessels sailing close to wind-turbines and similar structures elsewhere in Europe indicates little effect from turning-blade wind shadows but some effect downwind from turbine towers.

## Annex F: Definitions

### Definition of Cruising Routes

#### Traditional Routes

Routes indicated on the charts as 'traditional routes' are so indicated because over the course of a long maritime history they have been shown to be safe for use in most weather by sailing vessels without the benefit of modern hull design, modern navigational equipment or of aids to navigation such as lights and buoyage.

The fitting of reliable motors and electronic equipment (GPS positioning, echo-sounding, radar, etc) to many recreational craft has led to a general preference for new, shorter, recreational routes not otherwise practicable. The traditional routes are still used however and need to be retained additionally as alternatives available to others in case of need.

#### Heavy, Medium and Light Use Recreational Routes

Recreational boating, both under sail and power is highly seasonal and highly diurnal. The division of recreational craft routes into Heavy, Medium and Light Use is somewhat arbitrary although there is widespread agreement on the assignments to these classes indicated on the charts.

- **Heavy Recreational Routes:** - Very popular routes on which a minimum of 6 or more recreational vessels will probably be seen at all times during summer daylight hours. These also include the entrances to harbours, anchorages and places of refuge.
- **Medium Recreational Routes:** - Popular routes on which some recreational craft will be seen at most times during summer daylight hours.
- **Light Recreational Routes:** - Routes known to be in common use but which do not qualify for medium or heavy classification.

### Definition of Sailing Areas

**General Sailing Areas:** - Areas in extensive use for general day-sailing by all types of recreational craft but particularly smaller craft such as small cruisers, day-boats, dinghies, sailboards and personal watercraft. Such craft will not normally be undertaking point-to-point passages but will be on out and return activities and may appear to be sailing in random directions as they take advantage of wind and tide to make progress.

**Racing Areas:** - Areas in frequent use, particularly at week-ends and holiday periods, by large numbers of racing craft normally under sail but also power. Such areas are generally under the control of nearby Sailing Clubs and may contain temporary or permanent race course marking buoys. Detailed routes will normally only be determined on the day of the race although certain longer-distance races may have routes published in advance. In addition some racing may take place outside the areas indicated. Racing craft will obey the specialised racing rules between themselves but will follow the conventional Collision Regulations when other vessels are in conflict.

### Definition of Sailing Facilities

**Training Centres:** - Teaching institutions providing practical and theoretical training in sailing and power boating to recognised Royal Yachting Association standards. Those located on the coast will normally have marina-type boat berths attached which are in use throughout the year.

**Sailing Clubs:** - Membership organisations affiliated to the Royal Yachting Association. Each tends to specialise in certain types of activity – for example dinghy racing, sail cruising, power-boating, but all are normally open to passing visitors. The facilities provided usually include both alongside berths and swinging moorings but shore facilities are not normally to expected commercial standards. The majority of persons sailing in the areas charted are expected to be members of local sailing clubs but some may be visitors from other areas. The areas charted therefore have recreational boaters from local, national and international areas, particularly the *Thames Estuary SEA* area where yachts from the Netherlands, Belgium and France are commonly present but there are also noticeable numbers from Germany and Scandinavia.

**Marinas:** - All charted are commercial marinas. Most berth-holders will be permanently based at that marina but most also have a high proportion of visitor berths available for passing craft. Most have a full range of yachting facilities such as chandlers and repair shops and should be regarded as primary ports of origin and destination for all recreational crafts routes.

## Annex G - Contact details

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