

**10<sup>th</sup> CSPWG MEETING**  
**Wellington, New Zealand, 21-24 January, 2014**

**Paper for Consideration by CSPCWG**  
**Wind farms (including under construction)**

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| <b>Submitted by:</b>      | UK   |
| <b>Executive Summary:</b> | UKHO has been reviewing its policy on the charting of offshore wind farms:<br>1. During their construction period, is there a requirement to show more detail than an outline and legend?<br>2. Is it useful to include '(R Lts)' against wind turbines?<br>3. Is the prominence of the turbine symbol adequate? |
| <b>Related Documents:</b> | S-4 B-445.7-9  |
| <b>Related Projects:</b>  | None   |

### **Introduction / Background.**

1. UKHO has been reviewing its policy on the charting of offshore wind farms during their construction period, which can take several years. Some vessels are known to navigate through these areas during the construction period, generating safety concerns. Many planned wind farms cover vast areas (see UK Crown Estate map), including areas transited by existing shipping routes. There are usually no mandatory entry prohibitions in these areas (apart from the safety zones in the immediate vicinity of constructions) and vessels can and do navigate through these areas. This may be during low visibility despite the existence of uncharted structures, including incomplete turbine foundations, during the period of construction. If an accident occurs, rescue vessels (including helicopters) need to know where dangers may be. Simply showing a development area (S-4 B-445.7), possibly for many years, has proven inadequate for some chart users. UK's interim solution is shown at Annex A.
2. Most wind turbines have red air obstruction lights attached at the top. Is it useful to chart these?
3. User comments have been received that the very large London Array Wind Farm is hard to identify – see Annex B. The question has been asked whether the wind turbine symbol (L5.1) can be made bolder/bigger so that it stands out better on the paper chart (as it does on ENC). Wind turbines are very large features, but we can't show each one as conspicuous on paper charts.

### **Analysis / Discussion.**

#### **1. Wind farms under construction**

UK's policy for charting wind farms during the construction phase **has been** to update paper charts and ENCs to show:

- the temporary aids to navigation (these usually simply mark the outer boundaries of the areas);
- a general maritime limit to depict the area, including the proposed cable route (if it is a long cable, the cable may be inserted, with the legend 'Planned' along it);
- the wind farm name in a legend 'xxxxxx Wind Farm Under Construction' (*with dates if known, e.g. 2013 - 2016*) & 'see Note'.

**Now**, on larger scale paper charts/ENCs, UK has started to show the proposed pattern of turbine layout as piles [symbol F22] – see Annex A; in ENC use PILPNT with CONDTN = planned construction.

Should the ‘pile’ symbols be in magenta? The argument for using black is that it represents the ‘worst case’, ie depending on stage of development, some piles will not exist, some will exist as physical obstructions which are difficult to see, some will have clearly visible turbines on top.

A new note will be included on paper charts/ENCs to explain the symbology shown:

#### WIND FARM UNDER CONSTRUCTION

The symbols [F22] within the wind farm construction area show the planned positions of the turbines. A safety zone of 50m becomes operational around each turbine as it is being installed, with a safety zone of 500m around the installation vessel. The symbols [L5.1] show the positions of any turbines that have been installed before the edition date of this chart.

Consult local notices to mariners issued by the wind farm developer for details of installation progress.

In the ENC, the note will be under TXTDSC of the OSPARE:

#### WIND FARM UNDER CONSTRUCTION

The planned positions of the turbines within the wind farm construction area are shown as piles (PILPNTs). A safety zone of 50m becomes operational around each turbine as it is being installed, with a safety zone of 500m around the installation vessel. Wind turbines completed before the last major revision of this chart are included (LNDMRKs). Consult local notices to mariners issued by the wind farm developer for details of installation progress.

Note: the ‘*local notices to mariners issued by the wind farm developer*’ are issued widely (eg local ports, national maritime safety agency, shipping companies), including some activities subject to NAVAREA Warnings, at the recommendation of UK’s MCA safety agency.

#### **While the wind farm is being constructed**

Periodically, the turbines that have been fully installed will be added at New Edition or by NM block update using symbol L5.1. Construction work on large wind farms often progresses area by area.

UKHO is attempting to introduce a standard format for wind farm developers to promulgate information to us – hopefully this will be a monthly/bi-monthly progress report, updating on turbine installation progress. We will assess this information, update the database and decide whether to update the area by NM Block or New Edition. It is expected that periodic NEs will be required during the construction phase of some of the very large wind farms. In such cases, UKHO will use an iterative approach – as one area is completed it will be shown as such, along with the next area under construction. By updating the database at regular intervals, it is possible to create an up-to-date ENC at short notice in the case of an emergency.

**When the wind farm becomes operational** and confirmation is received that the permanent aids to navigation are operating correctly, charts will be updated as at present to include:

- if chart scale permits, all individual turbines (L5.1) on charts/ENCs;
- If scale does not permit showing individual turbines, a wind farm area (L5.2);

- in ENC use LNDMRK with CONVIS = visually conspicuous (& retain PILPNTs);
- final permanent aids to navigation;
- wind farm name;
- cable/s or cable area from wind farm to shore;
- if chart scale permits, show individual cables between the turbines plus a general maritime limit (50m outside outermost turbines);
- if scales does not permit to show individual cables, a cable area limit (50m outside the outermost turbines);
- the temporary navigation buoys to be removed (when confirmation received).

UK would be interested to know whether other members have come across a similar problem in the charting of wind farms under construction and, if so, how they have resolved it.

Note: A precedent for such guidance could be the recently approved B-414.6 on areas being dredged.

## **2. Air obstruction lights on wind turbines**

At present, charts are inconsistent in showing the associated air obstruction lights (INT1 P61.2). In UK, such lights are designed with a horizontal cut-off intended to prevent the lights being visible to shipping. In fact, however, they may be visible to vessels as the turbine towers tend to flex slightly in the wind. In such cases, the red lights could show at varying ranges and in certain quadrants depending on wind speed and direction. Also, they may flash as the blades pass in front (at varying speed) or if the wind speed is not constant. It would be impossible therefore to define the character of such lights except that they are red.

Such red lights, which may be apparently turning off and on erratically, could be confusing to mariners if not charted. Nevertheless, adding '(R Lts)' to every turbine would potentially add a lot of chart clutter. Better options may be to:

- add a note (similar to the oil/gas field note – B-445.2) to state that all (or specified) turbines in the wind farm may exhibit air obstruction lights, or
- add a legend under the wind farm name, eg '(The wind turbines exhibit red air obstruction lights)'.

## **3. Prominence of wind turbine symbol**

UK would be interested to know if members consider the depiction of the wind farm in Annex B is 'hard to identify'. If so, how could it be improved?

### **Conclusions.**

None.

### **Recommendations.**

CSPCWG to consider whether international guidance on charting wind farm developments would be useful and, if so, what it should be.

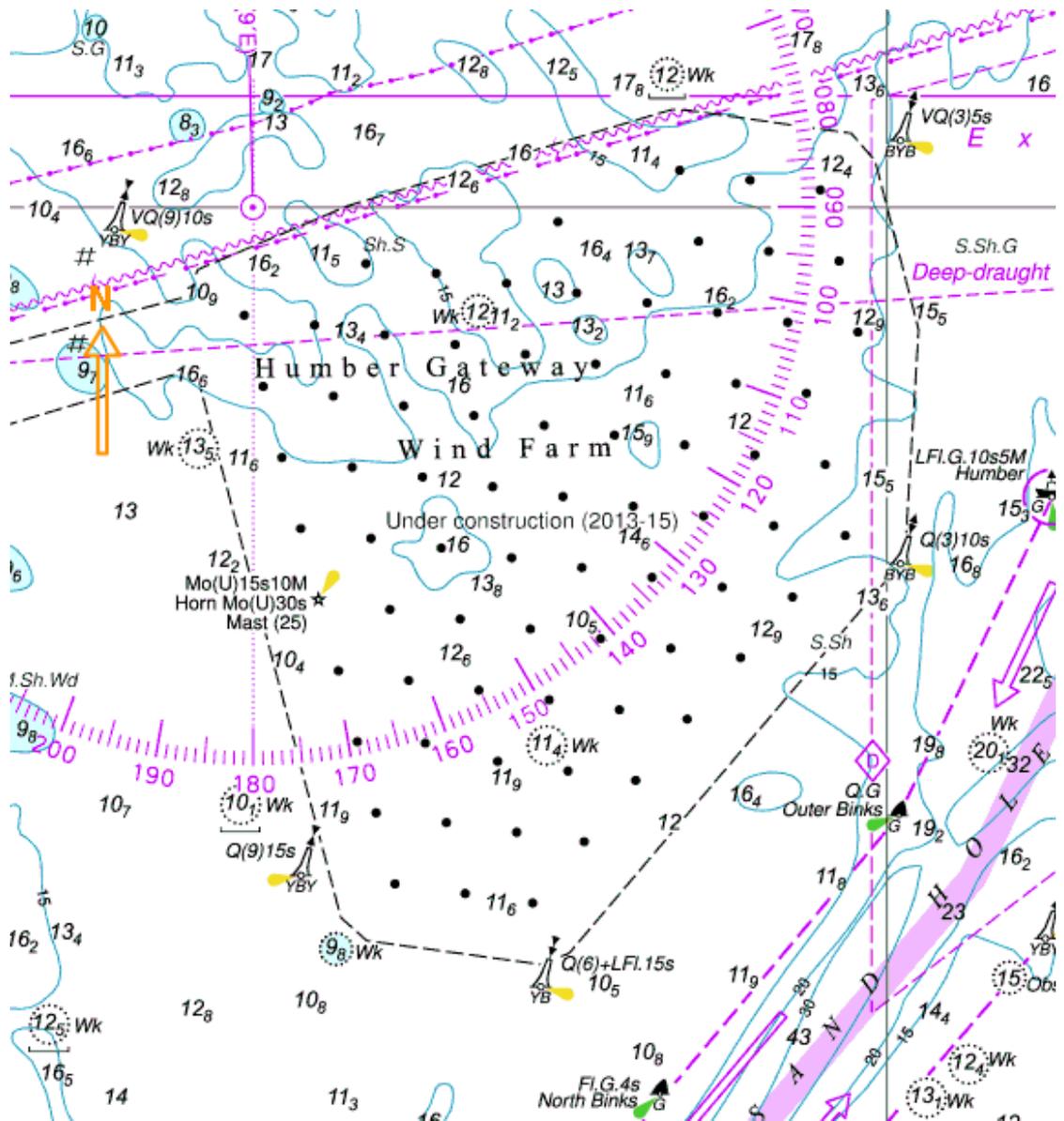
### **Justification and Impacts.**

Apart from very general guidance in Section B-600 about NM criteria and the guidance about 'development areas' at B-445.7, S-4 offers no specific guidance for charting large off-shore construction which may last many years. This has proved inadequate for some very large wind farm constructions in UK waters.

### **Action required of CSPCWG.**

The CSPCWG is invited to decide:

- Whether any international guidance on charting wind farms under construction should be provided. (Note: A precedent for such guidance could be the recently approved B-414.6 on areas being dredged).
- What guidance, if any, should be given on the charting of air obstruction lights on wind turbines?
- Whether any change to the turbine symbol, to make it more prominent, is required. And, if so, how could it be improved?



**WIND FARM UNDER CONSTRUCTION**

The symbols ● within the wind farm construction area show the planned positions of the turbines. A safety zone of 50m becomes operational around each turbine as it is being installed, with a safety zone of 500m around the installation vessel.

The symbols † show the positions of any turbines that have been installed before the edition date of this chart. Consult local notices to mariners issued by the wind farm developers for details of installation progress.

