

LOCAL VESSELS ADVISORY COMMITTEE

Hong Kong Offshore Wind Farm

Purpose

1. The purpose of this paper is to advise members of the Hong Kong Offshore Wind Farm (HKOWF) that is proposed for development in HKSAR south-eastern waters.

Background

2. The HKSAR Government has implemented a renewable energy target for Hong Kong of 1-2% by 2012. Offshore wind power is the only way to approach this target, and a site in south-eastern waters, some 9km east of Clearwater Bay, has been identified as the best location, **Figure 1**.

3. Marine navigation issues were closely integrated into the initial site selection, while the proposed marking and management of the site has been informed by a marine navigation safety risk assessment conducted with respect to international guidelines (DTI, UK (2005) "*Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms*"), and in accordance with a methodology agreed by Marine Department. The objective of the assessment was to show that sufficient actions have been taken to ensure the risks are acceptable, with appropriate mitigation, and that the development will not adversely constrain marine activity or reduce marine safety.

Current Marine Activity at the Site

4. While the proposed Windfarm is specifically sited in an area of little traffic activity, its size creates the potential for marine navigation issues. An extensive survey campaign was undertaken to develop a comprehensive understanding of traffic patterns. This was achieved by collation of short-term and long-term records including timetabled data, Marine Department arrival/departure records, visual boat-based surveys and capture of digital radar records. The survey identified that:

- The initial site selection has successfully located the Windfarm in an area away from key traffic routes - particularly those traversed by larger ocean-going vessels.
- Traffic activity across the proposed Windfarm is approximately 20 movements per day.
- While the site is large the development does not impose significant diversions of the traffic or extensions of transit route
- The proposed Windfarm site area itself is not a specific focus of fishing, with the greatest activity concentrated closer inshore, particularly near the Ninepins island group.
- The development is sited in an exposed deep water area of Hong Kong waters. Recreational power boating and sailing activity is focussed further inshore to the north-west of the site, within and around the waters of Sai Kung Country Park.

Future Marine Activity at the Site

5. Forecasts of future marine traffic were performed to examine the growth in commercial cargo, passenger, recreational and fishing activity that will impact the traffic within the Study Area. It was identified that

- Traffic growth forecast for the area is anticipated to grow relatively slowly (1.5% per year)
- Construction, operation and decommissioning activities of the Project are not widespread and are focussed within the site boundaries, in particular at the turbine locations
- While increased development of Yantian port (north of the site) is expected, and coastal routes will increase traffic south of the site, no developments are planned that will directly inject new traffic into the Windfarm Site

Formal Safety Assessment

6. The key safety issues were addressed through a Formal Safety Assessment process that includes Hazard Identification, Risk Assessment and Risk Control development. The key hazards posed by the proposed Wind turbine array, examples of which are illustrated in **Figure 2**, can be broadly described as follows:

- Internal – the potential for collision with the new marine structures (if unrestricted access was permitted), and a variety of issues associated with maintenance operations and the conduct of Search & Rescue operations within the proposed Windfarm area. Key issues are also developed with

respect to the presence of the Windfarm drawing people into an exposed offshore area.

- External - what will happen to traffic that transit past or divert around the proposed Windfarm and how will the vessel collision potential be changed? A key issue is also the impact of the Windfarm on Marine Department and local vessel radar.

7. Given the 30-35m minimum height of blades above the water, **Figure 3**, and spacing of the structures (450m+) the potential for internal collisions with the turbines is considered low, and operational maintenance activities and Search & Rescue can be effectively managed. However, safety-security aspects of unrestricted public access to the Wind farm area were identified as a key concern.

8. The key risks of vessel-turbine and vessel-vessel collision external to the proposed Windfarm were assessed using marine traffic simulation for a Future Case up to 2021, **Figure 4**. It was identified that the impact of the proposed Wind Farm on marine users is minor, and acceptable given the design features and management measures proposed to accompany the development.

Risk Control – Marking & Management

9. A series of risk control measures have been developed to assist in the safe operation of the proposed Windfarm, an example of which is shown in **Figure 5**. Experience to date of operational offshore wind farms in European waters identifies that these structures can be readily identified and avoided. Other hazards can be addressed by operational management initiatives, including:

- The provision of additional radars and CCTV
- Turbine marking (lights, painting and sound signals) to international standards.
- Regular deployment of offshore support vessel(s) to assist maintenance support and emergency response.
- Search & Rescue trials to be undertaken to co-ordinate operational measures

Review of the key risks have identified a variety of hazards (such as scaling turbines platforms for fishing, unseaworthy vessels sight-seeing far offshore, and fishing vessels trawling close to the turbine field) that must be managed, and it is proposed that the Windfarm area is designated as a controlled waterspace through the development of byelaws or similar legal instruments.

The following vessel restrictions are proposed:

- Marine vessel management with a designated Marine Restricted Area;
- Trawling activity would be prohibited
- Permitted marine vessels would include all Government vessels, wind farm maintenance vessels and authorized vessels only, and
- Permitted marine vessels are anticipated to be required to carry Automated Identification System (AIS) transmitters to monitor and safeguard their operations.

Conclusion

10. It is identified that the impact of the proposed Windfarm on marine users is minor, and acceptable, given the design features and management measures proposed to accompany the development. These include the provision of navigation aids, CCTV, additional radars, regular deployment of a support/patrol vessel and the designation of the Windfarm area as a restricted waterspace, with managed access.

Advice Sought

11. Members are invited to express their views on the project and related control requirements.

Presentation

12. The Project Proponent Wind Prospect, partner CLP Power, together with marine specialist BMT Asia Pacific will present the paper.

Planning, Development & Port Security Branch
Planning & Services Division
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Figure 1 Proposed Windfarm Site Area

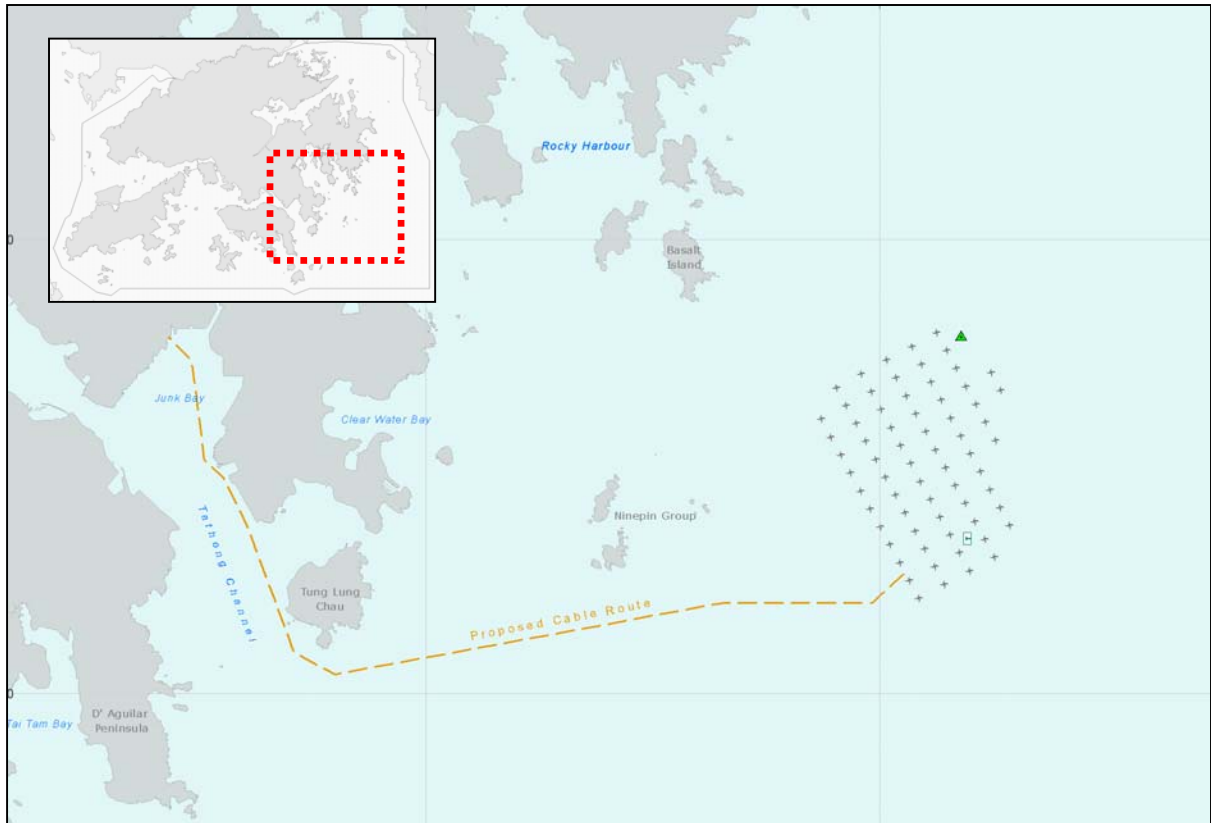


Figure 2 Examples of Installed Offshore Wind Turbine Structures



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Npower Renewables © Anthony Upton 2003

Figure 3 Base Configuration of Offshore Wind Turbine on 4 legged jacket foundation for 3MW & 5MW variant.

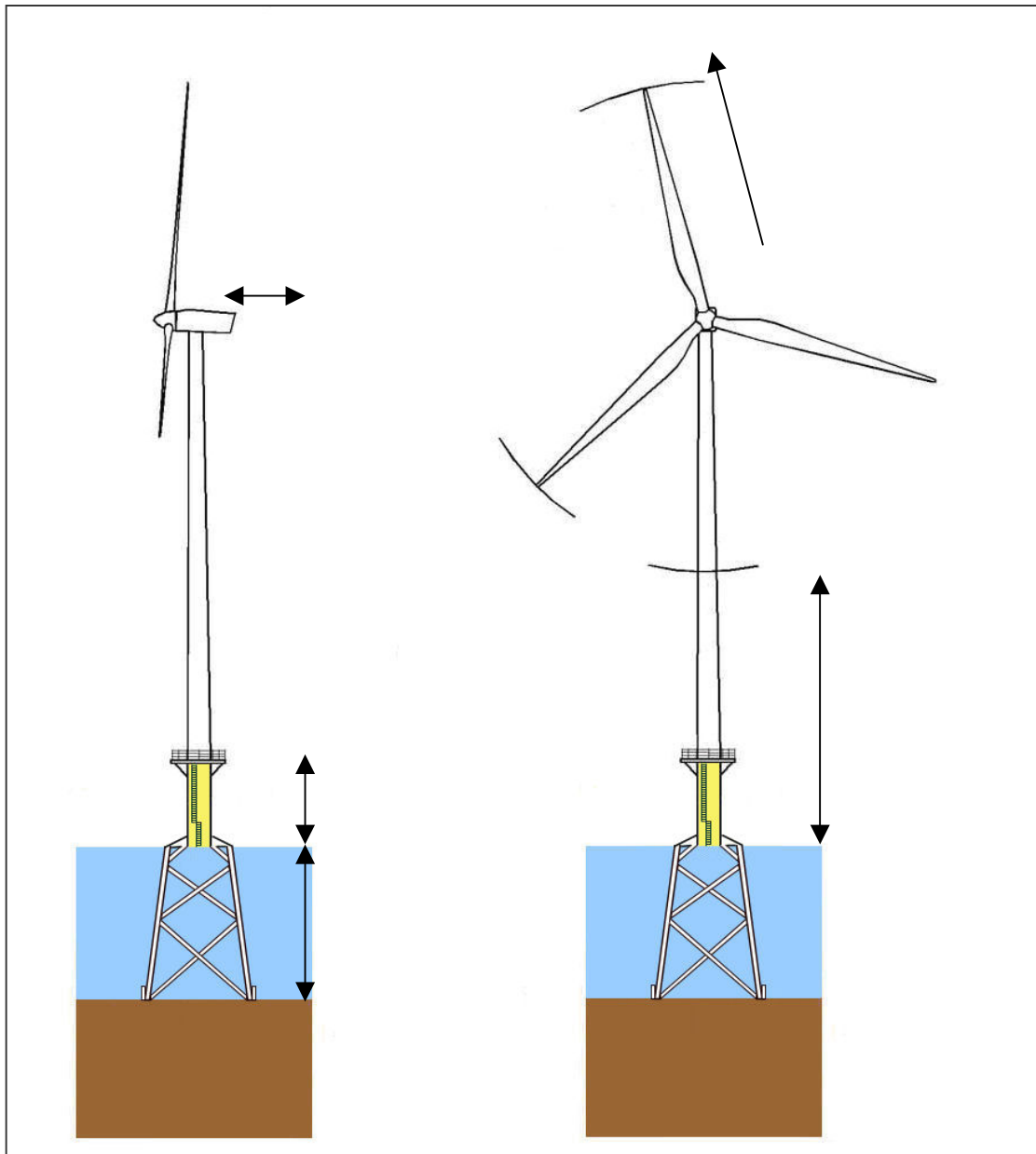


Figure 4 Marine Traffic Routes and Project Impact

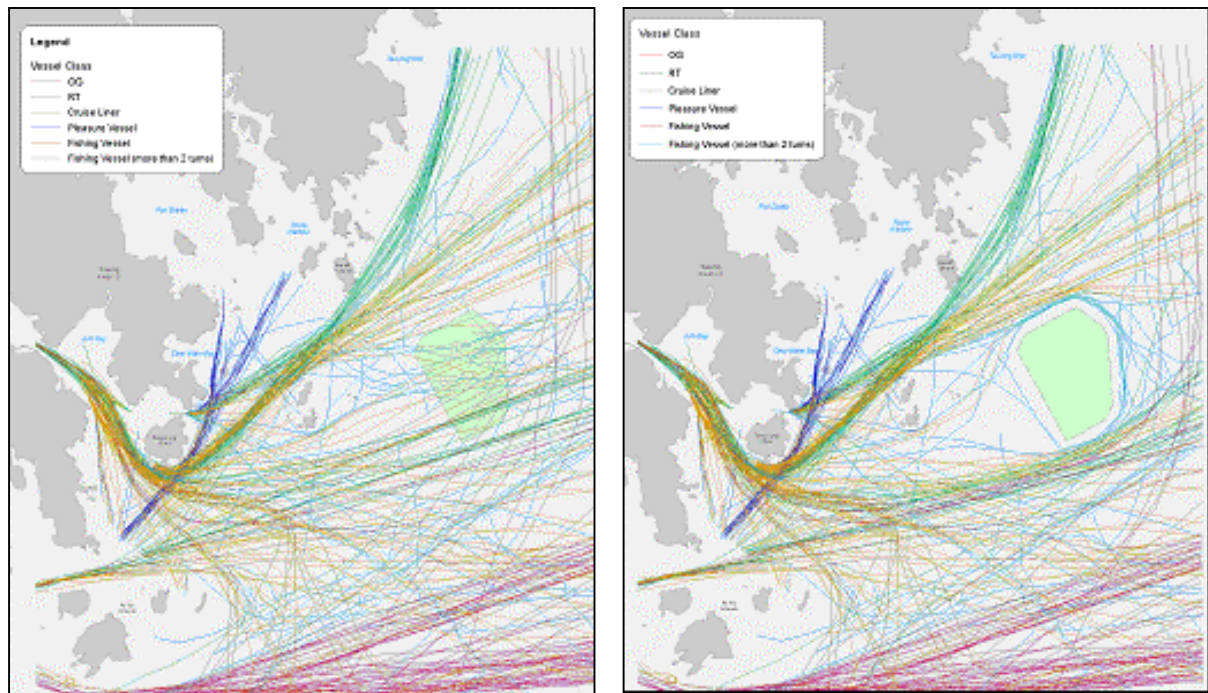


Figure 5 Example of Operational Windfarm (Horns Rev, Denmark)

