

LOCAL VESSELS ADVISORY COMMITTEE

Offshore Wind Farm in Hong Kong

Purpose

1. The purpose of this paper is to brief members of the Offshore Wind Farm in Hong Kong that is proposed for development in HKSAR waters south west of Lamma Island.

Background

2. HK Electric is proposing to build an offshore Wind Farm in Hong Kong south west of Lamma Island, **Figure 1**. The proposed Wind Farm will be located at a 600-hectare site featuring 28 to 35 wind turbines, each being 2.3-3.6MW output. HK Electric has embarked on the project in support of the Government's policy to develop renewable energy in Hong Kong - fulfilling their commitment to protecting the environment and reducing greenhouse gas emissions.

3. Marine navigation issues were closely integrated into the initial site selection, while the proposed marking and management of the site has been addressed by a Marine Navigation Safety Risk Assessment (MNSRA) 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 activities or reduce marine safety. The MNSRA is nearly completed.

Current Marine Activity at the Site

4. While the proposed Wind Farm is specifically sited in an area of little commercial traffic activities, its size creates the potential for marine navigation issues. An extensive survey study 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 Wind Farm in an area away from key traffic routes - particularly those traversed by larger ocean-going vessels.
- In general the proposed site is set within a triangle of generally low traffic activities with navigation channels set to the west (Adamasta Channel for high speed craft), east (East Lamma Channel for ocean-going vessel activities, separated from the site by Lamma Island) and south (Dan Gan Traffic Separation Scheme, TSS).
- Traffic activity across the proposed Wind Farm is approximately three to four movements per hour (generally small craft).
- The development does not impose significant diversions of the traffic or extensions of transit route.

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 activities that will impact the traffic within the site. It was identified that :

- Traffic growth forecast for the area is anticipated to grow relatively slowly (<1% 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.
- Future port developments are not anticipated to generate additional vessel traffic through the area that will be adversely constrained by the proposed Wind Farm's location.

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:

- Within the Wind Farm boundary – the potential for collision with the new marine structures (with access of small boats to within the Wind Farm area permitted), and a variety of issues associated with maintenance operations within the proposed Wind Farm area. Key issues are also developed with

respect to the presence of the Wind Farm drawing people into the Wind Farm area.

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

7. Given the 22m minimum height of blades above the water, and spacing of the structures (minimum 360m), the potential for collisions with the turbines caused by local vessels is considered low, and operational maintenance activities can be effectively managed.

8. The key risks of vessel-turbine and vessel-vessel collision outside the Wind Farm boundary were assessed using marine traffic simulation for a Future Case up to 2024, **Figure 3**. 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. Radar coverage has been assessed and is anticipated to be largely unaffected by the Wind Farm.

Risk Control – Marking & Management

9. A series of risk control measures have been developed to assist in the safe operation of the proposed Wind Farm, an example of which is shown in **Figure 4**. 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:

- Turbine marking (lights, painting and sound signals) to international standards.
- Monitoring of Wind Farm site.
- The designation of the areas within 50m of turbines as a Advisory Safety Zone to limit fishing activity near the foundations. Waterborne access to turbines would be restricted to minimise the risks posed by hazardous activities within the Wind Farm (i.e. scaling towers for fishing, sightseeing) to within acceptable limits.
- Prohibition of trawling within the Wind Farm – set to be covered by the Government prohibition of trawling within Hong Kong Waters.

Conclusion

10. The proposed location for the Wind Farm is a viable site and has a low impact on adjacent marine traffic. Implementation of relatively simple, common

mitigating measures will be appropriate to manage marine navigation risks within the Wind Farm site. Specific controls will also focus on managing unwarranted intrusion onto the turbines. The resulting societal risks posed by the Wind Farm's operation, expressed as Potential Loss of Life to the adjacent marine population, falls comfortably within the 'Acceptable' range of the Hong Kong societal risk guidelines.

Environmental Impact Assessment

11. The Environmental Impact Assessment report for the Wind Farm was approved on 14 May 2010 with an Environmental Permit granted on 8 June 2010. Consultations have also been held with environmental groups, fisherman's associations and local resident's groups.

For Members' Information

12. The briefing is for members' information.

Presentation

13. The marine specialist BMT Asia Pacific will present the paper together with representatives of Hongkong Electric.

Planning, Development & Port Security Branch
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Figure 1 Proposed Wind Farm Site Area

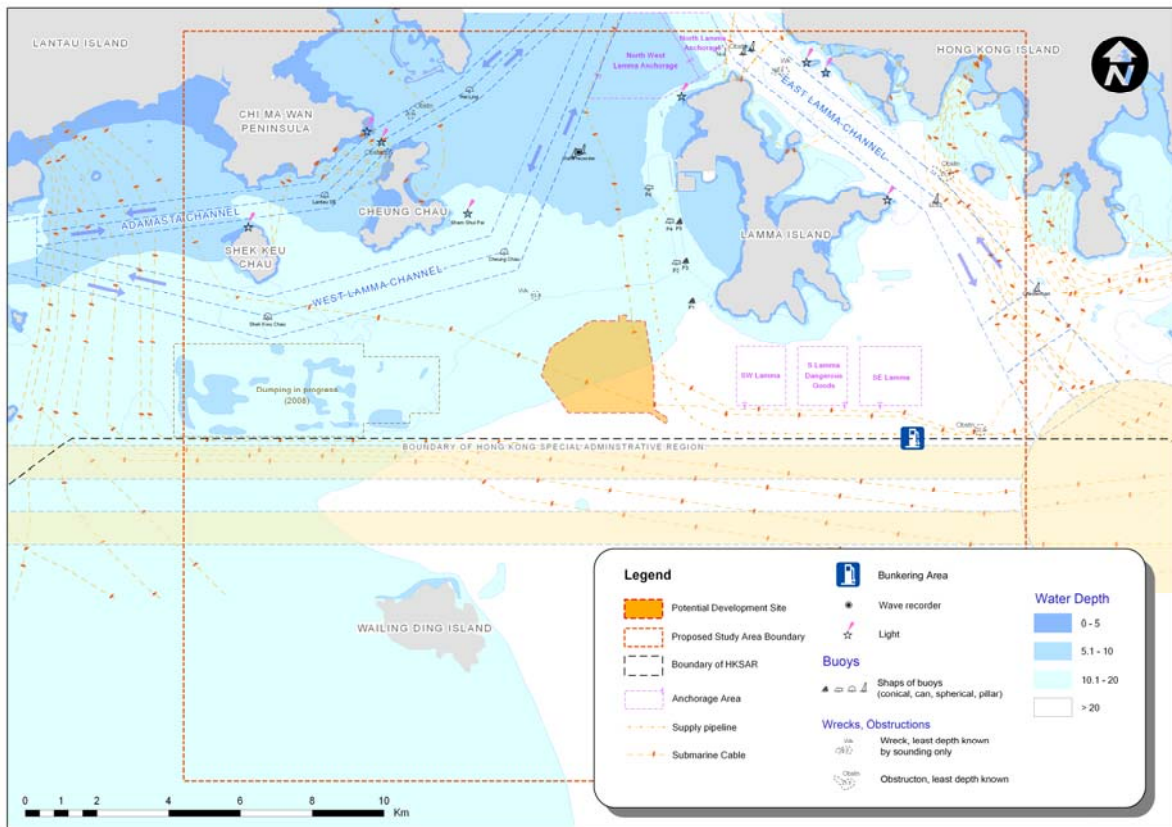


Figure 2 Examples of Installed Offshore Wind Turbine Structures



Figure 3 Marine Traffic Routes and Project Impact

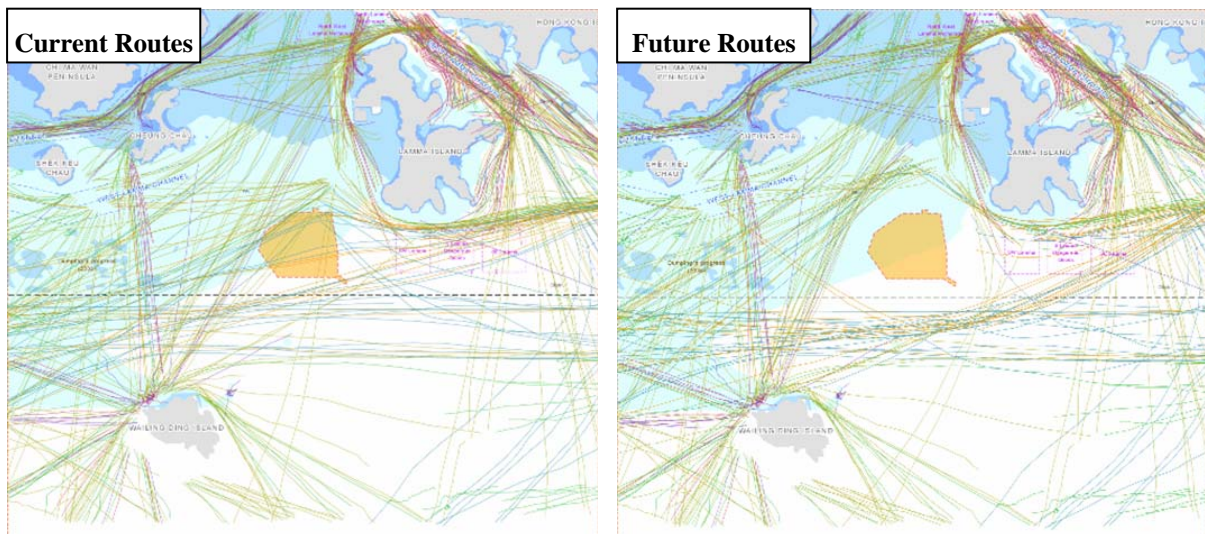


Figure 4 Example of Operational Wind Farm (Horns Rev, Denmark)



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