THE PROXIMITY OF OFFSHORE RENEWABLE ENERGY (WIND) INSTALLATIONS & SUBMARINE CABLE INFRASTRUCTURE IN UK WATERS

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Abstract: The on-going development of offshore wind farms has resulted in the need for cross industry endorsed guidelines [1] on the proximity of submarine cables and wind farms. A cross sector technical working group consisting of Subsea Cables UK, Renewable UK, Renewable Energy Association and The Crown Estate have produced guidance on the considerations that should be given by all Stakeholders in the development of projects requiring proximity agreements between offshore wind farm projects and subsea cable projects in UK Waters. The guidance address installation and maintenance constraints related to wind farm structures, associated cables and other submarine cables where such structures and submarine cables will occupy proximate areas of seabed.

1 INTRODUCTION

The regulatory framework surrounding the guidance is based upon current UK practices. The technical working group have determined that no proximity agreement is required where the minimum approach of planned development and planned/existing infrastructure exceeds one nautical mile (1NM) (1.852 km). At a separation of approximately 1NM, it is considered good practice that high-level consultation is undertaken thereby ensuring that all Stakeholders are aware of each other's activities and requirements.

For a planned development that is within 1NM of existing infrastructure, dialogue needs to be established between the Stakeholders and the consideration of the Guidelines should apply to establish mutually acceptable proximity limits.

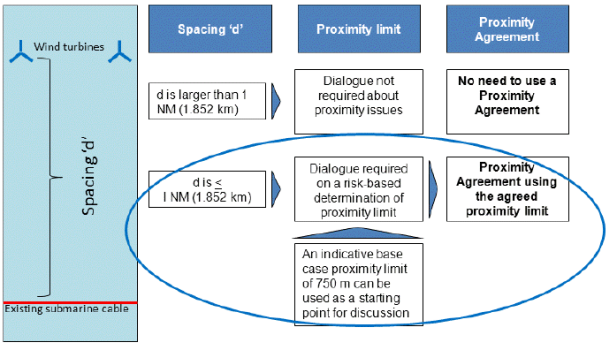

Figure 1: Proximity distances considered in the Guidelines

2 KEY FACTORS DETERMINING PROXIMITY LIMITS

From the outset of their 160+ year history submarine cables have suffered damage. The need to restore a system quickly has always been paramount. Stakeholders in a discussion on proximity limits between submarine cables and offshore wind farm structures are advised to develop and agree safe and appropriate solutions on a case by case basis.

The experience acquired in repairing submarine cables has evolved into a recognised set of maintenance and repair processes and procedures.

■ Fault location;

■ Cable recovery;

■ Cable repair; and

■ Re-deployment.

3 INDICATIVE SEPARATION DISTANCES

Two fundamental concepts must be considered when deriving a generic proximity distance:

■ **Working Zone**, applied either side of the subsea cable; and

■ **Hazard Area,** applied around the cable repair vessel.

Working Zone - A Working Zone is required either side of an in-service submarine cable to enable access for cable maintenance and repair operations by a suitable vessel. The parameters of the Working Zone are a function of many variables, several being site-specific. Nevertheless, the Working Zone is most pertinently the space required by a vessel to conduct all operations which a cable repair potentially comprises..

The Working Zone for typical repair scenarios is likely to be in the order of **500m either side of the existing subsea cable**. This is based on the expected area required to undertake cable fault location using trailed electrodes, grapnel and final bight deployment operations in 50m depth of water. Greater detail can be found in The Crown Estates Evidentiary Study. [2]

Consideration should also be given, but not limited to, the following:

■ Proximity of other adjacent developments (i.e. oil and gas);

■ Proximity of hazards, density of traffic and navigation schemes;

■ Type, size and manoeuvrability of vessels;

■ Support vessels;

■ Cable type and existing burial status/protection;

■ Alternative repair options, such as a lay-through repair, or adjusted final bight location;

■ Predicted prevailing metocean conditions (wind, wave, current, tides) etc.; and

■ Seabed type.

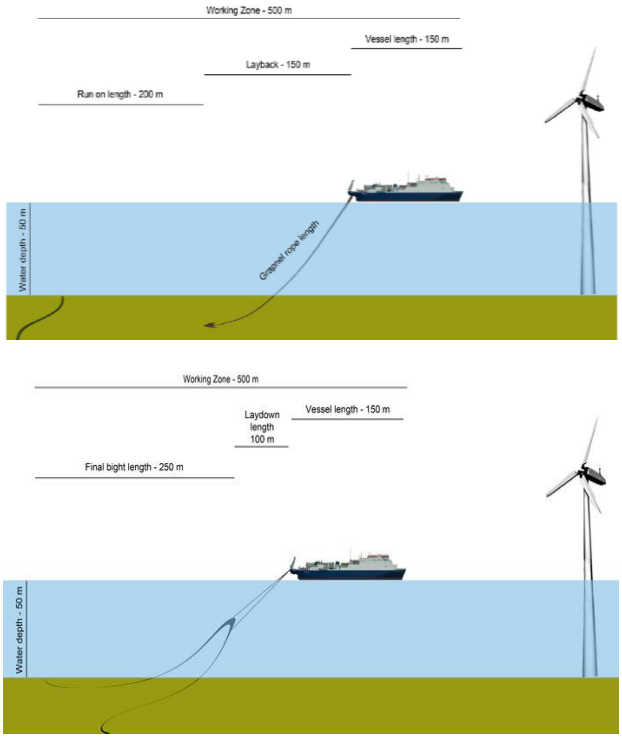

Figure 2: Calculation of typical working zone.

Hazard Area - Independent of, and in addition to, the Working Zone. A Hazard Area should be considered as a trigger

radius around the vessel. If there is potential for a Wind Turbine Generator to come within this Hazard Area as a result of vessel movement, then additional risk assessment needs to be carried out and determination made on the need for application of any appropriate pre-planned risk mitigations. Where this situation occurs, additional consideration needs to be given to supplementary control protocols, weather considerations, etc.

The radius of the Hazard Area needs to be determined by discussion between the key stakeholders (e.g. wind farm developer, the existing subsea infrastructure owner and any affected maintenance provider). The Hazard Area should provide sea room to ameliorate risks of work in close proximity to a WTG. If there is no other direction for opening that discussion, then it is recommended that **consideration begins at a minimum of 250 metres**.

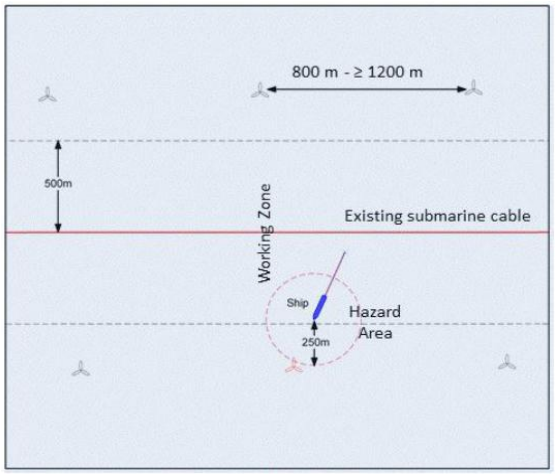

Figure 3: illustrates how the Hazard Area would be applied to a submarine cable repair vessel when operating at the extent of the Working Zone

4 DETERMINING SITE SPECIFIC PROXIMITY LIMITS

A generic set of limiting distances cannot be derived for all cable / wind farm proximity scenarios without recourse to a large number of caveats and exceptions. The recommended approach is to use the principles of a holistic risk based process for determining site specific proximity limits. This allows consideration of a range of external influences, both those beyond the control of the parties and those internal influences that can be affected by the parties.

Once the parties have agreed site-specific proximity limits, the final step in the process is the drafting of a proximity agreement with accompanying method statements.

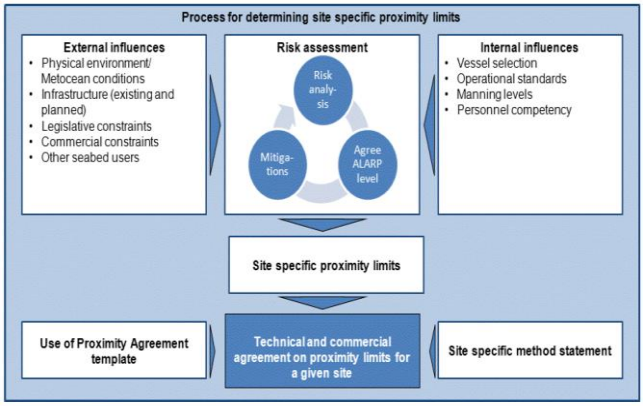

Figure 4: Process to Determining Site Specific Proximity Limits.

4.1 Potential Mitigation Measures to Support Reaching Agreement.

Before decisions are made regarding proximity other solutions should be considered to potentially mitigate or reduce the impact. Such mitigation measures may influence a proximity agreement. Examples of potential mitigation measures include:

■ Diverting the existing cable around a wind farm rather than through it;

■ Provision of additional spare cable for stock and other wet plant in case of repair;

■ Change the cable repair vessel within the maintenance agreement and the necessary financial considerations;

■ Joint use of cable repair vessels in a specific / generic maintenance agreement;

■ Construction of a wind farm in a different area or reconfiguring the WTG layout;

■ If multiple crossings are unavoidable, discussions of the required number, location and spacing should take place and be agreed;

■ Undertake appropriate surveys to identify exact location of "in service" and "out of service" cables as required;

■ Agreement on site-specific methodologies for repair; and

■ Methods of arresting any loss of vessel position, e.g., emergency anchoring procedures, support vessels, etc..

This list is not exhaustive and, depending upon circumstances, additional mitigations could also be developed by the parties through mutually acceptable operational (and other) procedures involving wind farm developer / operator / owner and the existing cable owner / marine repair contractor etc.

5 PROXIMITY AGREEMENT

When site-specific proximity limits have been agreed, a bilateral proximity agreement with accompanying method statement can then be drafted based on a standard template. Such a proximity agreement should be based on the format and spirit of existing cable crossing and proximity agreements in common use throughout both industries, where appropriate.

It is recommended that where possible, finalisation of wind farm layout planning should not be undertaken until such time as Proximity Agreements and the requirements therein have been properly reviewed, discussed and agreed at least in principle, with the wind farm developer, the cable owner and any affected maintenance providers.

6 CONCLUSION

There are common interests between offshore wind farm developers/owners and cable owners regarding safety, access and maintenance and there is a necessity for the parties to spatially interact in terms of access to the seabed.

It is very important to appreciate that the Guidance referenced in this paper does not provide a prescriptive solution on proximity. The distances contained within this document are intended to provide a starting point for Stakeholder discussions

The optimised proximity distance will only be achieved by dialogue and agreement between the parties based upon a risk assessment process where appropriate.

It is in the interest of all Stakeholders that to achieve a mutually acceptable and optimal proximity agreement, very skilled and experienced resources should be utilised during these discussions. It is of the utmost importance that all Stakeholders understand and appreciate each other's requirements and safety issues. All parties should therefore commence proximity discussions as early as possible, proactively and with open minds.

7 REFERENCES

[1] Subsea Cables UK Guideline No 6 The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters.

RSG, Subsea Cables UK, 2013

[2] Subsea Cables and Offshore Renewable Energy Installations.

Red Penguin, Rev 5, 2012

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