

Case Study: Pre-Construction Engineering

1.0 Facts

Services

Pre-Construction Engineering: Preparation for Cable Installation

Related Services

Installation Engineering, Project & QHSE Management, Tendering, Procurement & Financial Support, Offshore Construction Support, Client Representation, Operations & Maintenance and Innovation Development.

Summary Scopes Completed

Pre-Construction Engineering: Baltic 2, HelWin2, IFA2 Interconnector, BritNed Interconnector, Amrumbank OWF.

2.0 Introduction

Primo Marine provides Engineering solutions, incorporating experience of all lessons learned during the pre-construction (installation preparation) phase, from its extensive track record, amongst others NorNed, BritNed, NordBalt, IFA2 and NordLink. The solutions have been designed to focus firmly on providing a more realistic CAPEX/OPEX balance for projects, in terms of ensuring successful route engineering and burial compared to the costs of dealing with obstacles and obstructions during the installation phase, as well as the potential cost of damage, failure and maintenance over the lifetime of the cable.

3.0 Peer Reviews & Subject Matter Expertise

Primo Marine offers a comprehensive capability in regard to the provision of subject matter expertise, covering pro-active problem solving of events, challenges and issues (including the arranging and management of third parties). In summary:

- The conducting of complete peer reviews, including establishing and management of project risk registers. Reviews designed to incorporate all practical lessons learned from an extensive track record, as well as offshore cable industry.
- The management of multiple subsea activities including provision sum operations.
- The provision of subject matter expertise including pro-active problem solving of event, challenges and issues (including the arranging and management of third parties).
- The interfacing with all significant parties to provide technical solutions.
- The advising with project documents and the management of.
- The providing of licence management and supporting of licences, agreements and approvals.
- The translation of technical issues into contractual and permit requirements.

4.0 Engineering Pre-Construction (installation preparation)

Primo Marine provides the following preparation expertise required for the installation and protection of cables.

5.0 UneXploded Ordnance: UXO's

Providing solutions to cover risks related to UXO's, so as not to compromise the whole project:

5.1 Desktop Studies

Conducting of studies to assess risks on UXO's along cable routes, to result in:

- Identification and Classification.
- Identification of areas of special interest.
- Statement of size of magnetic anomalies.
- Safe distances for cable burial operations.
- Recommendation for geotechnical soil surveys.
- Recommendation for UXO survey routing.

5.2 UXO Surveys

Conducting of UXO surveys for routes, including the performing of micro re-routing.

6.0 Route Survey

Designed to reduce risk during tendering and installation phases (related to cable installation and burial). The management of survey campaigns covering:

- Side Scan Sonar (detecting obstacles).
- Multi Beam (bathymetry of routes).
- Sub Bottom Profiling (geophysical, identifying changing seabed soils).
- Cone Penetration Tests (CPT's) and Vibrocores (VC's) (strength of soils).

7.0 Burial Assessment Studies

Assessment of soil and seabed related cable installation options, reduction in risk by focusing on cable protection by burial. Also assessment and selection of suitable cable trenchers.

8.0 Seabed Mobility Assessments

Assessment of estimated depth of burial maintenance required over the lifetime of cables relative to initial burial depths. The establishing of burial depths to reduce maintenance costs.

8.1 Assessment of survey results

8.2 Advanced morphodynamic seabed modelling

9.0 Risk Based Burial Depth

Designed to provide results related to (1) profiles to quantify risks posed to cables by external threats relative to an acceptable probability on failure due to external causes (2) division of cable routes based on external threats and soil types (3) recommendation to minimum burial depth to safeguard cables for each section based on external threats.

10.0 Route Engineering, Design and Preparation

Providing expertise related to the optimising of routes in the provided corridors, including:

- Route Engineering, Design and Preparation.
- Risk assessments including Third Party Damage.
- Installation and Protection in mobile seabeds.
- HDD Feasibility Studies.
- Crossing Designs.

11.0 Comprehensive Offering

This comprehensive offering of analysis, optimisation and protection is designed to focus completely on reducing (1) **installation risk** (2) **installation cost** (3) **cost of seabed preparation** (4) **claims (by differing parties/stakeholders)**.