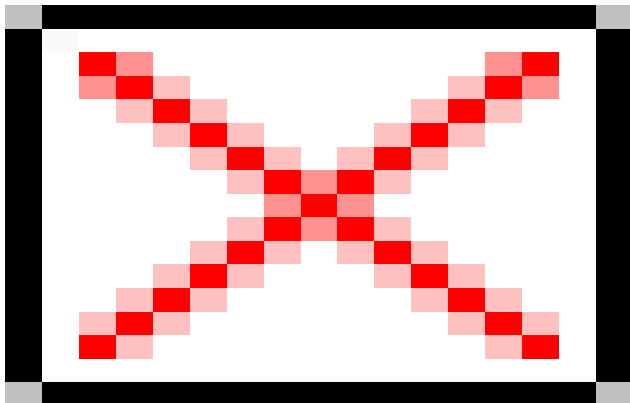


IMDC
Offshore wind parks
Blue energy
Location:
Island of Sylt, Germany
Client:
DEME ? Central Competence Centre



Project Contact Information

For more information about this project, contact:

offshore@imdc.be

SCOUR PROTECTION DESIGN FOR THE OFFSHORE WIND FARM DAN TYSK

DanTysk Kabel GmbH, Hamburg, intends to build an offshore wind farm in the North Sea. The planned Wind farm covers an area of 600 km² and is will consist of 300 wind turbines with 5 MW output each. In the first construction phase it is planned to build 80 wind turbines in the German Bight area, around 75 km to the west of the Island of Sylt. DEME asked IMDC to perform a preliminary design for the scour protection around the turbine foundations. IMDC analysed the scour phenomena and defines the preliminary scour protection characteristics for the monopile foundations.

Vertical piles placed on the seabed provoke changes in the water-particle flow associated with currents and passing waves, as illustrated below. This local change in the flow will increase the bed shear stress and the sediment transport capacity will increase accordingly. In the case of an erodible seabed, this may result in local scour around the pile.

Such scour is a threat to the stability of the pile and therefore scour protection is applied. Three different static scour protection designs have been proposed:

- A basic design for hydrodynamic conditions with a return period 10 years where a geometrically open filter, with very wide stone grading of both armour and filter layers is suggested. The design allows significant movement (but no failure) of the armour layer at the shallowest locations.
- A first alternative design, applying the same methodology as for the basic design, but for hydrodynamic conditions with a return period of 25 years.
- A second alternative design, which is based on hydrodynamic site conditions with a return period 50 years and the use of a geometrically closed filter.

Due to the varying water depth in the project area the basic design consists of three different basic scour protection systems, with three different armour layers, i.e. 60-300kg, 40-200kg and 10-60kg rock, installed over an area with a minimal diameter of 24.8 m. For the basic scour protection design the influence of the presence of the filter layer on the drivability of the monopiles was evaluated and the filter layer stability under temporary exposure to waves and currents was verified.