Netherlands Enterprise Agency

Webinar Morphodynamical Assessment
24 January 2017

Questions: from the audience
Answers: Tom Roetert (Deltares), Tim Raaijmakers (Deltares), Thaiënne van Dijk (Deltares), Andrea Forzoni (Deltares), Ben de Sonneville (BLIX), Frank van Erp (Netherlands Enterprise Agency).

Question: Have you searched for availability of additional historical set of data acquired for the existing infrastructures that are in proximity of the area? I was referring to the windfarm Eneco Luchterduinen operating in the northern part of HK area and to the existing pipelines running to the south of the area.
Answer: Although Deltares performed the morphodynamics study for Luchterduinen in the past, the data and results of this study are confidential and could therefore not be shared through this study. We did, however, compare the results of the present study to the Luchterduinen results. The sand wave characteristics (height, length and migration rate) at Luchterduinen Windfarm are in line with the results for the northern part of HKZ, where the largest migration rates have been found.
Data of existing pipelines such as the ones in the south of the area or existing export cables were not used in this study mainly for the reason that the surveys that are performed to monitor the cables are usually too narrow (max. 50-100m wide) to be used in a morphodynamic analysis. This width is small compared to the length of a sand wave and also quite small to check the accuracy of the vertical dimensions.

Question: Have the results of the morphodynamic study been confirmed by the Luchterduinen Windfarm or the southern pipeline owners, in terms of scouring effects on these infrastructures?
Answer:
The morphodynamics in Luchterduinen Windfarm were also studied by Deltares, but the data of this study is confidential. The results of the present study, however, were compared to the Luchterduinen results and the sand wave characteristics (height, length and migration rate) at Luchterduinen Windfarm are in line for the northern part of HKZ, where the largest migration rates have been found.
Data on scouring effects around pipelines have limited use for a morphodynamics study. The fact that scour occurs around a pipeline does indeed tell that the seabed sediments can be eroded and that the hydraulic loads are strong enough, but scour observations are not going to tell much more than that. Scour can occur in either flat, stable seabeds, in morphodynamic seabeds, as well as in much deeper waters and even in silty seabeds; so scour alone is not an indicator for morphodynamic activity. We also refer to the response to the first question: typically the surveys that are being performed to monitor the seabed along a cable or pipeline trajectory are too narrow (50-100 m wide) to use in a morphodynamic analysis.

Question: We are also interested in the scouring direction and "shadow" compared to the sand wave direction.
Answer: Observed within this study is that the sand waves migrate in the tidal flood direction, with variations of up to 30 degrees around this direction. Scour in this area will also be mainly driven by the tidal current, but you should expect scour holes extending all around the foundations. The deepest location will most likely occur on the SSW-side of the monopile (upstream side with regard to flood direction), but differences along the pile face will be small. However, if you apply a scour protection then you will see differences in edge scour depth (scour depth just outside the scour protection). Edge scour depth is very much dependent on the layout of the scour protection, but is expected to be most severe downstream with regard the flood direction, so NNE of the monopile. The depth can be calculated with reasonable accuracy, but we would need to know the layout of the scour protection and the location inside the windfarm.

Question: Could you assess the scour risk if a foundation is located in a better avoided area? can we mitigate this risk by placing it in the leeward side of the sand wave?
Answer: The better avoided area is the area where vertical seabed dynamics exceed the criteria set in this study. In the sand wave troughs the flow velocities will slightly reduce, but this will not be sufficient to fully prevent scour at these locations. The scour hole may become slightly less deep and the scour process may occur slower. In the leeward side of sand waves, the seabed is expected to rise, which could in the long-term partially mitigate the scour that will still occur. Please note however that the timescale of scour at these locations will be in the order of weeks to months and will reach (dynamic) equilibrium in somewhat over a year, while the morphodynamic seabed changes will typically have timespans of years. This would mean that the piles still have to deal with lowered seabeds around the foundations (due to scour) for some years. So the idea is certainly interesting, but should be handled with care, and asks for detailed evaluations for each wind turbine site. Note that within the FLOW-SCOUR project detailed measurements and model validations were performed for two unprotected monopiles in Luchterduinen to be able to better predict scour development around monopiles. Because of the close proximity, these results are very valuable for HKZ as well.

Question: Is it possible to ask additional questions after the webinar?
Answer: Yes. Please send your questions to woz@rvo.nl. RVO.nl will answer all questions publicly on offshorewind.rvo.nl.