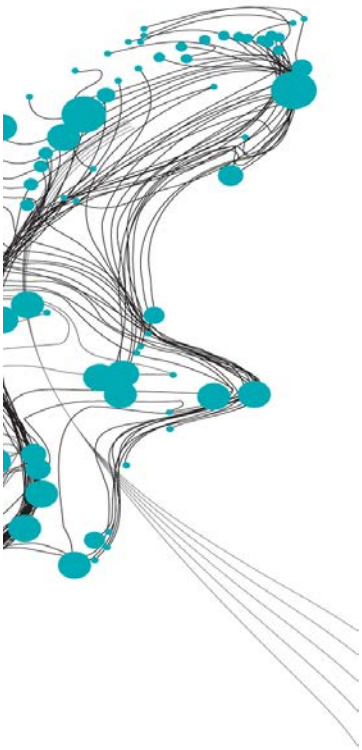

LONG-TERM MORPHODYNAMIC BEHAVIOUR OF THE MAASVLAKTE 2 SAND EXTRACTION PITS AND THE INFLUENCE ON THE SURROUDING SAND WAVE FIELDS.

The Rotterdam harbour is one of the largest harbours in the world and still expanding. The most recent expansion is called Maasvlakte 2 (MV2), which added 2000 hectares to the west of the existing port into the sea. MV2 was realised between 2009 and 2013 using sand dredged some kilometres offshore in the North Sea. A total of 200 Mm^3 sand was extracted from two sandpits which are located near the navigation channel to the Rotterdam harbour. These sandpits are surrounded by sand wave fields, which can hinder navigation so it is important to know how the sand wave fields behave. Therefore the purpose of this study is to determine the long-term morphodynamic effects of the sandpits of Maasvlakte 2 on the surrounding sand wave fields.

This study is done by data analysis of bathymetric data and secondly a model study for the long-term behaviour of sandpit and the sand wave fields. The bathymetric data is gathered from a sand wave field 6 km away of the sandpits. These bathymetric data is analysed by a Fourier analysis (van Dijk et al. 2006) to calculate the specific sand wave characteristics. With a linear regression method the migration rate is determined for the sand waves. Because the calculation of these migration rates is very dependable on the place and angle, there cannot be made a conclusion based on these results.

Modelling the long-term behaviour is done in two steps: (i) by modelling the sandpit in an idealised morphodynamic model (Roos et al. 2008) and, (ii) to use these results as input for a smaller-scale idealised sand wave model (Besio et al. 2006). The sandpit model is forced by tidal flow conditions as they apply near the sandpits, and the sandpit geometry is taken from recent surveys.

The model shows the following long-term behaviour of the sandpits: The edges will flatten out, the little pit will move to the larger sandpit and the pits will move in the dominant flow direction (see figure 1). This eventually results in one large pit. The sand wave fields will not change significantly over time and the crests still have a north-east orientation. At the centre of the large pit, sand waves will appear as well which also have crests with a north-east orientation, but this fluctuates with a small range throughout the years.

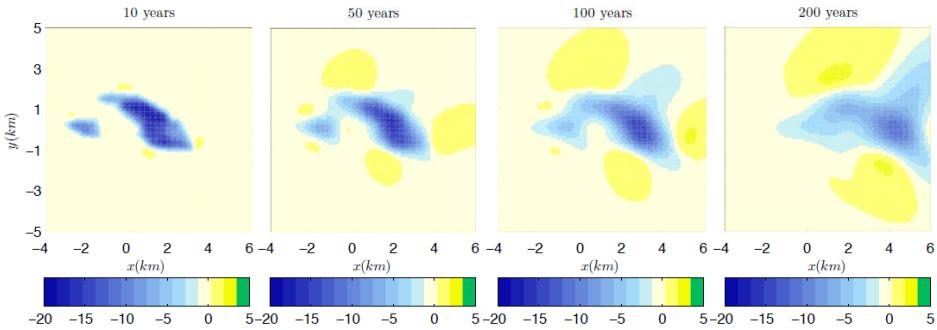

Figure 1 The morphodynamic behaviour of the pits in 200 years.

It can be concluded that the sandpits do not have a large impact on the surrounding sand wave fields. This is positive for the navigation maintenance, because no large changes will be expected over time.

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