

Current Velocities in the River Elbe after Extension of Europakai (Berth 4) and Building of Berth 8 und 9

Client: Niedersachsen Ports GmbH & Co. KG, Niederlassung Cuxhaven

Location: Cuxhaven, Elbe Estuary, Liegeplatz 4

Scope of Work: Determination of flow velocities and flow directions

Method: Hydrodynamic 2D model

INTRODUCTION

The impact of Europakai extension (Berth 4) on current velocities and directions in the Elbe Estuary between Brunsbüttel and Großer Vogelsand (Figure 1) was evaluated.

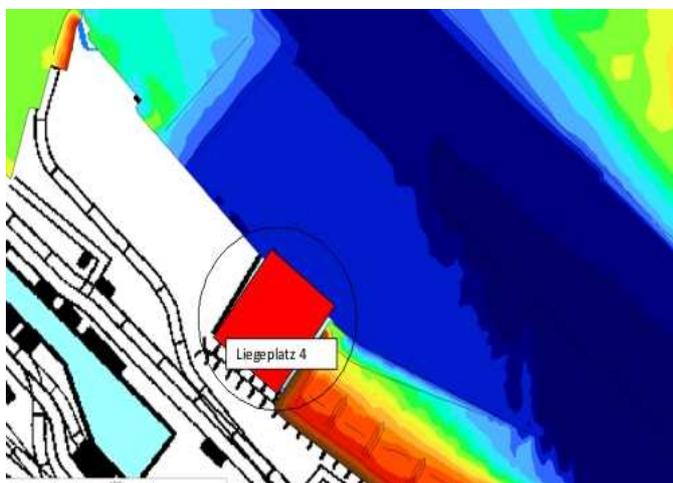


Figure 1: Berth 4 in Line with Europakai

The impact on morphodynamics was supposed to be a function of changes in currents. Furthermore the safety and ease of ship traffic was examined.

METHODOLOGY

A hydronumerical 2D model was setup (Figure 2). Boundary conditions near Brunsbüttel and Scharhörn were exported from an estuary model between Scharhörn and the weir at Geesthacht.

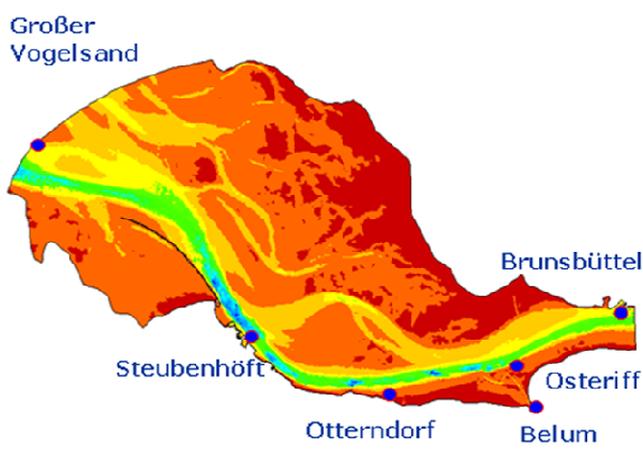


Figure 2: Location of the detail model between Scharhörn and Brunsbüttel

The Elbe model was calibrated by current measurements, official tidal water levels (WSV) and with tidal water levels at five temporary locations.

The differences between measured and calculated water levels are less than 5 cm. A comparison with ADCP measurements (depth averaged) shows differences of maximum 12 cm/s.

At the upper model boundary of the Elbe model in Geesthacht an average discharge of 541,5 m³/s was used.

RESULTS & CONCLUSIONS

The results at reference points show slight differences between the actual situation and the final port extension. A decrease of flow velocities is restricted to the access channel of the berth and an area directly in front of the berth. There are no changes of the sediment transport regime visible. Even the decreases of flow velocities will not lead to a noticeable influence on the morphological development, since the flow velocities remain at a high level. The changes in flow velocities are so low that they are not perceived by the skippers.