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Long-term Analysis of Morphodynamics at Offshore Terminal Cuxhaven (Berth 8 & Berth 9)

Client: NiedersachsenPorts GmbH & Co. KG
Location: Cuxhaven, Elbe Estuary
Construction: Berth 8 and 9, Offshore Terninal Cuxhaven
Scope of Work: Long-term analysis of morphodynamics in the Elbe Estuary for the next 10 years
Method: Measurements of currents (ADCP) and turbidity, hydrodynamic 2D model, 2D sediment transport model

INTRODUCTION

The German Offshore and Windmill Industry got an Offshore Basis at Cuxhaven to install and maintain Wind Parks in the German Bight.

In this context we were asked to evaluate different design scenarios and their impact on long-term morphodynamics and scour stability near quay walls of Berth 8 (Fig. 1) and it's extension Berth 9 (Fig. 2).

Figure 1: Offshore Terminal Cuxhaven (Berth 8)

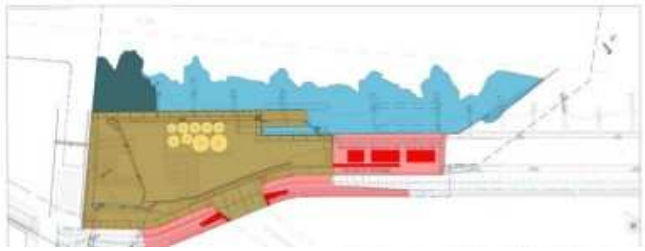

Figure 2: Extension of Offshore Terminal Cuxhaven (Berth 9)[1]

METHODOLOGY

Therefore, a 2D sediment transport model for the mouth of the Elbe Estuary was setup between Brunsbüttel and Scharhörn. The bathymetry is based on multibeam echo soundings (density of original data is 25x25cm).

[1] Source: NiedersachsenPorts GmbH & Co KG

RESULTS

Results (Fig. 3 and Fig. 4) show a slight shifts of scour seawards.

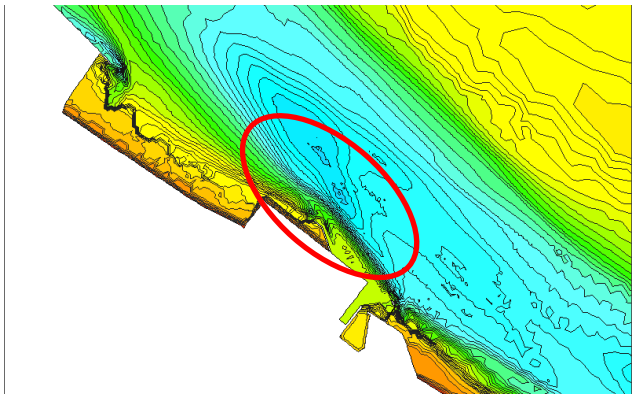

Figure 3: Shift of Scour towards the open Sea at the End of Simulation

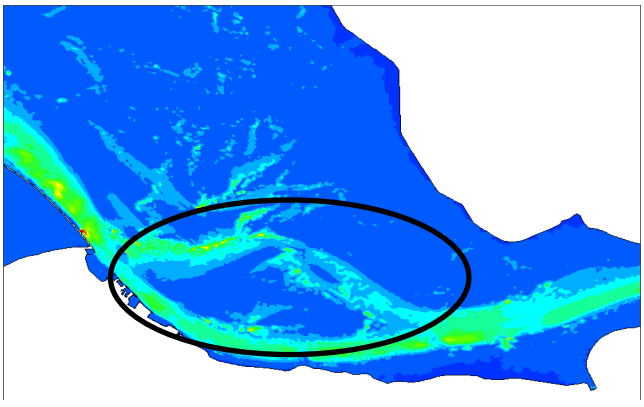

Figure 4: Sediment Concentrations in the Mouth of the Elbe Estuary

CONCLUSIONS

Simulations have shown stability of bed topography in front of quay walls after installation of Berth 8 / 9.