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Simulation of Flow Velocities for Manoeuvring Tests in a Shipping Simulator for Offshore Terminal Cuxhaven Berths 8/9

Client: NiedersachsenPorts GmbH & Co. KG

Location: Cuxhaven, Elbe Estuary

Construction: Offshore Basis Cuxhaven, Berth 8 und 9

Scope of Work: Simulation of Hydrodynamics and Conversion of Results for a Ship Simulator

Method: 2D Hydrodynamic Model

INTRODUCTION

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

While planning this, Safety and easiness of shipping traffic in front of berths 8 and 9 had to be accounted for (Fig. 1).

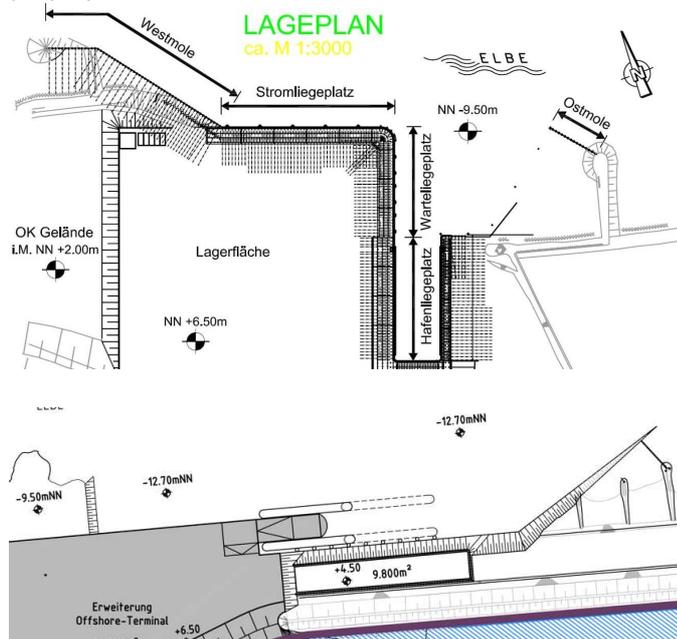


Figure 1: Berth 8 (above) and Berth 9 (below) at Offshore Terminal Cuxhaven

METHODOLOGY

Therefore, a 2D hydrodynamic 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).

The bathymetry of the Elbe Access Channel to Hamburg was provided by the Bundesanstalt für Wasserbau (branch office Hamburg Rissen).

Flow velocities for different construction variants were compared at 75 reference points at the areas „MZU

Steubenhöft“, „LP 8“, „LP 9“, „Altenbrucher Hafen“, „Altenbrucher Bogen“ and „Glameyer Stack“ (Fig. 2).

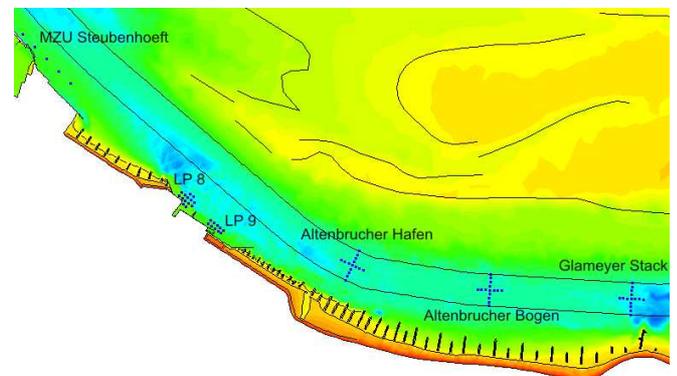


Figure 2: Reference points for comparison of flow velocities and directions

With a special interface flow velocities at different tidal phases were converted¹ as input for shipping simulation. This data was used for the execution of shipping approaches in a simulator.

Docking and cast of maneuvers as well as passages to the North Sea using a new class of maintenance vessel (catamaran for wind mills up to 10.000 to) were simulated during these maneuvering test.

The passage of bulk carriers was also simulated to evaluate the necessary speed to cross „Altenbrucher Bogen“.

CONCLUSIONS

Manoeuvring tests have shown that the difficult passage of „Altenbrucher Bogen“ is also possible after construction of berth 8 and 9.

¹ Interface for Ship Simulators of Rheinmetall Defence Electronics GmbH, Bremen