

## Jebel Ali Power and Desalination Plant

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### assignment

The Jebel Ali Power and Desalination Plant is located on the south-eastern side of the Arabian Gulf along the Dubai coast between Mina Jebel Ali and Palm Jumeirah. The plant is extending in south-western direction along the Dubai coast with a new Station "L". As part of the marine works related to the plant extension, new intake and outfall structures are envisaged as well as a shore protection in front of the site.

For the marine works related to the plant extension WL | Delft Hydraulics was commissioned by Fisia Italimpianti to assess the hydraulic design conditions and the impact of the works in the local morphology. In addition, the proposed designs of the intake channel and the shore protection were evaluated and optimised in a 3D physical model in terms of breakwater stability and wave penetration.

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### client

Fisia Italimpianti, Italy

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### period

September 2003 – April 2004



3D physical model of the intake channel

keywords:  
hydraulic design conditions  
coastal impact  
breakwater stability  
wave penetration

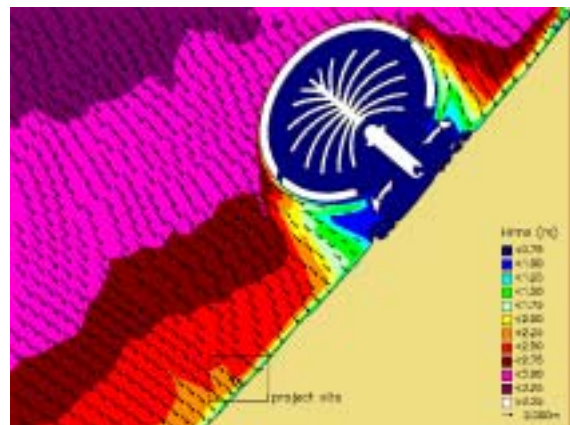


## hydraulic design conditions

Extreme wave and water level conditions were established for various return periods and various locations off the project site.

Extreme wave conditions were determined by transformation of offshore extreme wave conditions to the nearshore area using the numerical wave propagation model SWAN.

Using our numerical flow model Delft3D of the entire Arabian Gulf, several historical storms were simulated to establish the surge levels. The surge levels were combined with the tidal water level components to derive extreme water levels in front of the site for various return periods.



wave height pattern at the site

## shoreline impact and foreshore erosion

The coastal impact of the proposed structures was established with the UNIBEST model taking into account the various existing developments along the Dubai Coast.

The intake and outfall structures were incorporated in our overall coastline model of the Dubai coast and predictions were made for the future shoreline behaviour. In addition, an assessment was made of the expected erosion of the foreshore in front of the shoreline protection. The assessment includes both long term erosion and short term profile fluctuations.



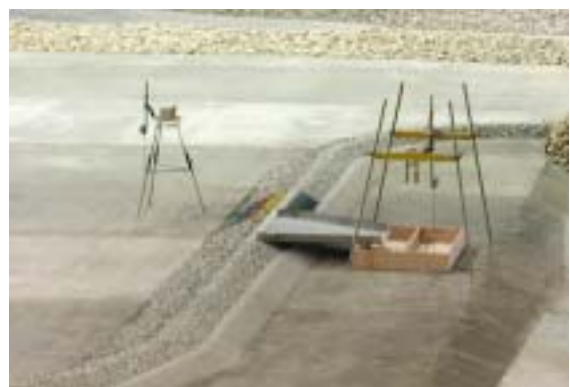
evaluation of breakwater head and trunk stability

## breakwater stability and wave penetration

The intake structure, comprising an intake channel protected by two shore connected breakwaters and offshore breakwater, was constructed on scale in our multi-directional wave basin. The physical model also covered the shore protection adjacent to the intake structure.

The bathymetry in front of the site was represented in the model using a fixed bed foreshore. The foreshore in the model included the predicted long term foreshore erosion assessed in the morphological study.

In the physical model the stability of the armour units and crest elements was evaluated as well as the wave agitation in the intake channel and wave overtopping rates over the shore protection.



evaluation of overtopping rates at shore protection

### WL | Delft Hydraulics

Decisive advice: from multidisciplinary policy studies to design and technical assistance on all water-related issues.

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