



## Palm Islands, Dubai Wave penetration study

Palm Island 1 is a leisure, residential and tourist development being built in the Arabian Gulf off the coast of Dubai. The island is being built in the shape of a palm tree consisting of 17 fronds and a trunk along with a protective crescent shaped breakwater (see satellite image).

The island will measure approximately 6 km in diameter. The protective crescent breakwater surrounding the island has a length of approximately 11 km and will be 200 m in width. For navigational and water quality reasons the breakwater is given two gaps.

Svašek Hydraulics has determined the wave conditions in those two gaps for the design of this specific part of the crescent breakwater. The wave penetration computations are carried out with the HARES wave model. For the boundary conditions the wave height and direction just outside the breakwater has been used.

The two figures show the result for the left gap for a wave period of 7.6 s and a wave direction of 280 degrees (coming from). The upper figure shows the wave height multiplication factor  $K_D$  on a scale from 0 to 2. This factor is the ratio between the wave height in the model area ( $H$ ) and the wave height at the boundary of the model area ( $H_0$ ), so  $K_D = H/H_0$ . The lower figure shows a momentary image of the wave propagation pattern. Diffraction patterns inside the Palm are clearly visible.

Similar simulations has been executed for the design of Palm Island 2.

**Client**  
Dubai Palm Developers

**Location**  
United Arabic Emirates, Dubai

**Date**  
2002 - 2003

**Services**  
Wave penetration study (HARES)

**Associated Firms**  
Royal Haskoning