

Mangrove Park Development

Background

A new development has been planned along the northern shore of the South Peripheral Channel in Abu Dhabi, United Arab Emirates. The development consists of a new circular shaped island with an enclosed bay, several small islands and a new lagoon running north of the mangrove nature park.

Objective

The objective of the work is to study various aspects of the Mangrove Park Development:

1. The water refreshment rates around and inside the coral lagoon and through the new lagoon;
2. The design of stable beach profiles of the inner island shores;
3. The spread of fine sediments spilled during the dredging and filling process

Type of project refreshment, beach profiles and sediment plume dispersion

Location Abu Dhabi

Client Hydronamic B.V.

Period 2005-2006



Project description

Study approach

In this study, the development has been tested on the refreshment rates. The layout of the development was optimized, to find an acceptable refreshment rate for all the relevant areas. A high resolution flow model was constructed to simulate the tide within the South Peripheral Channel. The model was calibrated using a small set of available current measurements. Four different lay-outs were tested with this model.

A study was carried out into the sediment plume dispersion during dredging and filling. The processes involved were modelled using a three dimensional convection diffusion model, based on a 2 dimensional flow field and a logarithmic profile assumption for the velocity.

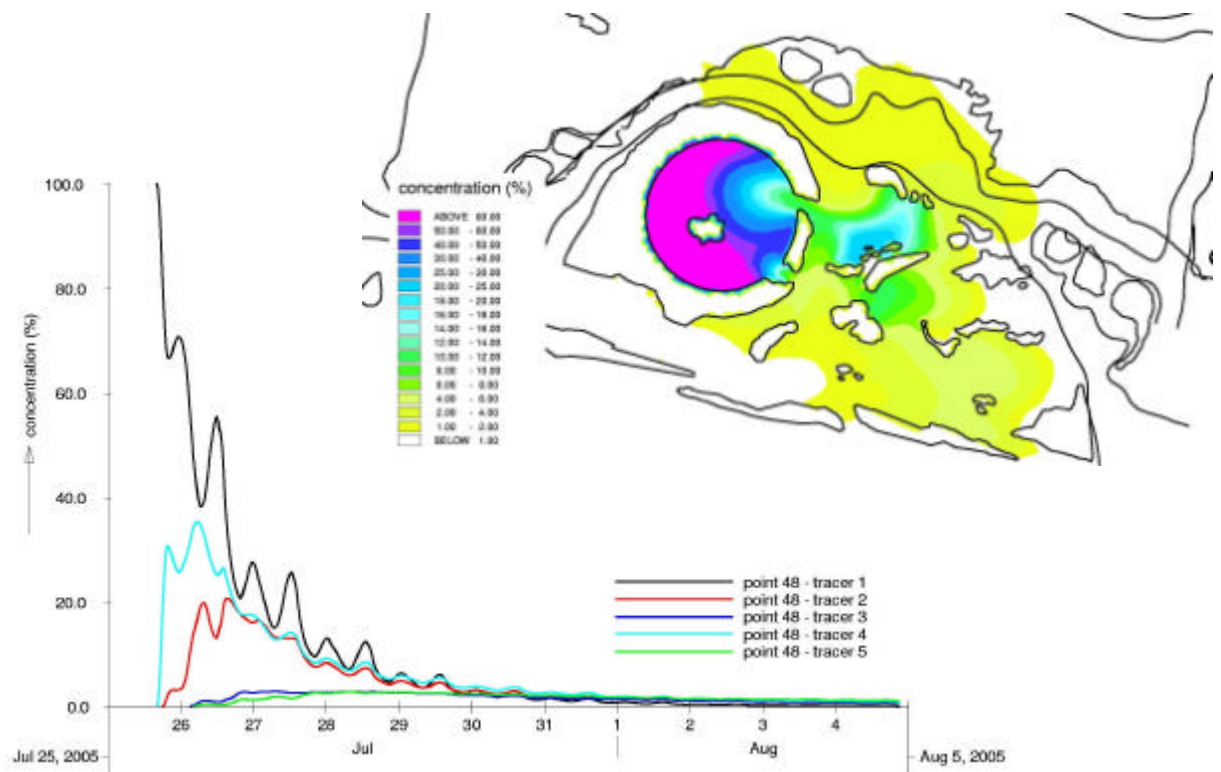
Results

It turned out that some modifications had to be made to the central circular shaped lagoon (additional entrances at the western side) to enhance the refreshment in the central lagoon. Also the northern "New Lagoon" was modified (wider entrances and smoother layout), to enhance the circulation.

The lower-right figure shows the concentration of a tracer after two tidal cycles. The lower left figure shows the concentration decay in time at a specific location.

Applied tools

DELFT3D-FLOW	flow model
DELFT3D-WAQ	water refreshment model
DELSED	sediment plume spreading model



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