

# MERSIN Waste water treatment plant Marine outfall EIA simulations

## Background

Mersin is situated at the southern coast of Turkey. The EIB is supporting the construction of the Wastewater Treatment Plant (WWTP) in Mersin and a sea outfall in order to reduce the impact of the discharge of wastewater into the Bay of Mersin. The study is a follow up of the earlier study [Alkyon, 2006] into various optional routes for the discharge pipeline.

## Objective

The objective of this study is to evaluate the final design and lay out of the outfall, with respect to:

- Mid and Far- field simulations of the discharge and the surface distribution of the plume under various conditions
- The risk of bacterial pollution

**Type of project**            Brine dispersion and refreshment

**Location**                    Mersin, Turkey

**Client**                        Sistem Yapi

**Period**                        August – October 2007



## Study approach

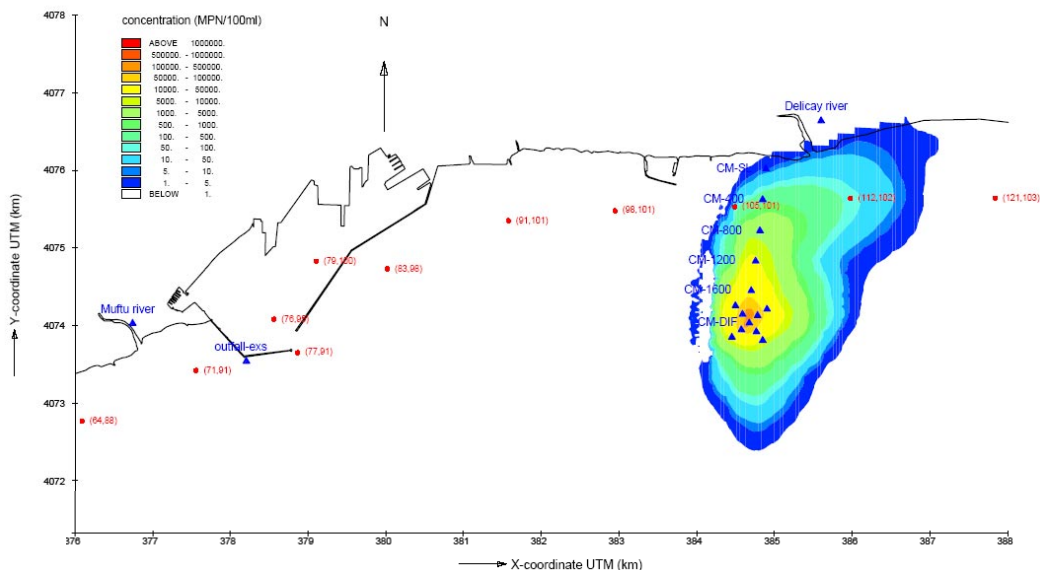
Since the local flow conditions are typically 3-dimensional, 2D flow computations are not considered to be sufficient. Therefore, 3D flow simulations were made of the area that is to be part of the spreading of wastewater. In order to give reliable boundary conditions for the dedicated 3D-flow model, the originally developed overall model, covering a large area, is used. This overall flow model runs in 2D mode, which is adequate for the generation of a consistent set of boundary conditions for the 3D flow model (model nesting).

A previous study indicated that the bacterial pollution (TC and FC) were the most critical parameters. It turns out that the natural mortality rate of these bacteria is high, caused by a combination of the clear water, the bright sunlight, the high temperature and the high salinity of the Mediterranean water near Mersin. In this study simulations are made for various representative environmental conditions. The focus was always on the worst case conditions (2030, maximum discharge, unfavourable environmental conditions).

The most important conclusions of the study are:

- The plume is strongly buoyant (fresh water) and even if there is some minor stratification in summer, caused by the sun's radiation, the mortality rate of the coliforms will increase in comparison with a well-mixed flow.
- The present simulations with the design route of the pipeline show that taking into account a reasonable safety for the spread of Coliform bacteria an outfall at a depth of 9 meter CD is compliant with the Turkish law.

It is recommended to create a non – swimming area around the outfall keeping at least a 1600 m circular distance from the Sea outfall.



## Applied tools

The near field initial dilution and the diffuser design were studied separately using the Cormix model [Blenerger, 2007]. The mid and far field spreading were studied using 2 and 3 dimensional DELFT3D-FLOW and water quality models (DELWAQ). The models were calibrated using measurements.

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