

Investigation of the spreading and dilution of domestic waste water inputs into the Jade bay using the finite-volume model FVCOM

K. Lettmann (1), J.-O. Wolff (2), G. Liebezeit (3), G. Meier (4)

(1) ICBM, University of Oldenburg, Germany (lettmann@icbm.de)

(2) ICBM, University of Oldenburg, Germany (wolff@icbm.de)

(3) ICBM/Terramare, University of Oldenburg, Germany (gerd.liebezeit@uni-oldenburg.de)

(4) ICBM, University of Oldenburg, Germany

Keywords: domestic waste-water discharge, tidal bay, finite-volume technique, residence time

The 'Jade Bay' is a tidal bay located in the western part of the German Wadden Sea, southern North-Sea coast.

During particularly heavy rain falls, rain water mixed with domestic waste water is discharged into the bay due to the limited capacities of the waste water treatment plant of the city of

Wilhelmshaven. As the discharge point is located only a few hundred meters from a public bathing beach it is important to know spreading and dilution of the waste waters by tidal and wind-driven mixing.

To model the behaviour of the waste water plumes, the finite-volume model FVCOM (Chen and al., 2003) is used, which allows to cover the large area of the Jade and the nearby North Sea with a relatively high resolution near the point of discharge and a coarser resolution at the outer edges of the study side. We adapted the included sediment module of FVCOM to handle the sedimentation, decay and evolution in the bottom sediments of the discharged waste water particles, especially with respect to bacteria.

Sensitivity runs were performed to rule out the effects of tidal range, wind direction and phase between discharge time and the tidal cycle. Furthermore alternative discharge points located in the interior of the bay were tested, which might be more suited for a faster dilution and a smaller residence time of the waste water particles in the tidal bay.