

# DEL004 - JIP Coastal Design Support Tools Pilot (CoDeS Pilot)

## Towards shared tools for the design of coastal infrastructure

Coastal Design Support (CoDeS) tools are relatively simple software tools aimed to support engineers in the design of coastal engineering solutions and the communication towards clients and stakeholders. The tools provide quick insights in orders of magnitude of environmental conditions and impacts of human interventions. This way they help to arrive at promising solution directions during an early stage of a project. Bringing CoDeS tools together in one software environment enables engineers to use and improve the same knowledge base in order to increase the efficiency of projects and promote the integration between different disciplines. Moreover, an easy to use General User Interface (GUI) makes them accessible for a wide range of users (e.g. project engineers, managers, reviewers).

With these starting points Royal HaskoningDHV, Witteveen+Bos and Deltares initiated the Joint Industry Project (JIP) CoDeS, starting with the development of a CoDeS pilot application.

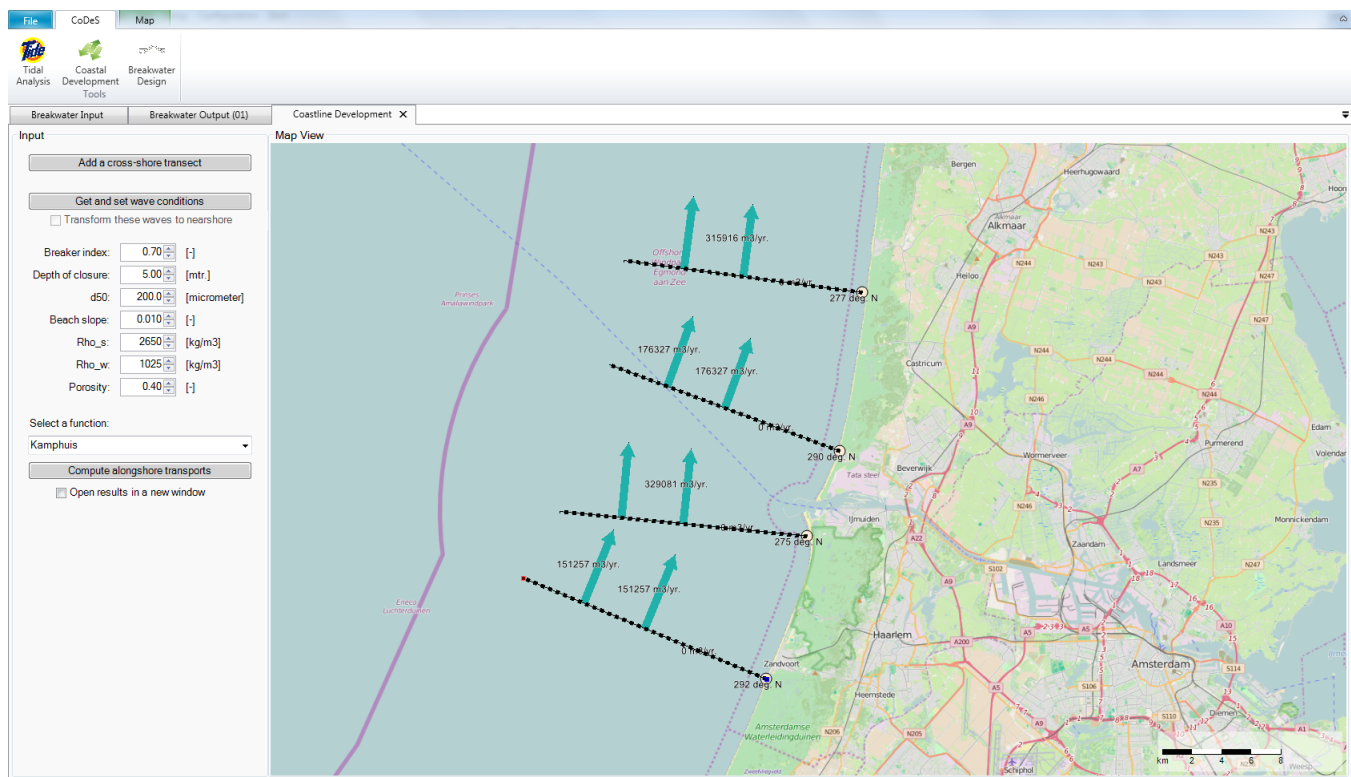


Figure 1: CoDeS tool to quickly assess alongshore sediment transport rates at the coast.

## Objectives

The objectives of JIP CoDeS are:

1. to develop a number of CoDeS tools in the Delta Shell framework (more information: [www.deltares.nl/en/delta-shell-framework/](http://www.deltares.nl/en/delta-shell-framework/)), jointly creating an easy accessible platform for the exchange and dissemination of CoDeS tools
2. to build an active community of developers (and users) amongst the partners

## Methodology

A team of coastal engineers, programmers and managers (product owners) from the three partners worked together on tool development in sprint sessions following a SCRUM alike methodology (more information: <http://scrummethodology.com/>). Each sprint session had a clear scope and clear roles and responsibilities for the team. During the sprint sessions engineers and programmers used scripting to program CoDeS tools and link them to the Delta Shell user interface to make them easily accessible to the user community.

## Results

## Product

The product is a uniform GUI containing tools for:

- bathymetry data import
- wave data import and classification
- wave transformation based on linear wave theory
- tidal data import and calculation of tidal characteristics
- alongshore sediment transport rate calculations
- breakwater design

Within the GUI users can load data in simple ASCII formats or from global data sources - if no site-specific data is available. Based on the data the users can perform simple analyses and apply empirical engineering formulae. The results are shown on a map, in a graph or in a table, which the user can export as images for reporting purposes. The product forms a strong basis and a wide range of opportunities for future tool developments.

The embargo on the product was lifted in April 2016. The python code of the tools can be freely downloaded from the [OpenEarth repository](#). You can sign up for OpenEarth on the [Deltares open source website](#). To use the tools in conjunction with the GUI, you need to acquire Delta Shell. To this end, you can either [purchase a service package](#) of the Delft3D Flexible Mesh suite or [apply for a free version of Delta Shell](#) without support. To link the tools to the Delta Shell GUI please read the [readme](#) document.

## Process

Working together in sprints using a SCRUM methodology was found to be a very constructive and pleasant working method. The team members got hands-on training in scripting (Python) and Delta Shell in a good interaction with each other. Both the development and the use of the tools were received with great enthusiasm. The next step is to test the enthusiasm outside of the development team.

## Way forward

All partners are enthusiastic about the pilot and wish to continue the cooperation. This led to the initiation of a follow-up project: JIP CoDeS 1.0. This project is focusing on extending the number of tools and improving the integration and interactivity of the tools. Examples of future work are tools to assess coastal impacts, navigability, port & channel sedimentation, ecological impacts and costs & benefits. Parties that are interested to use the tools or participate in the cooperation can contact Mr. Wiebe de Boer ([wiebe.deboer@deltares.nl](mailto:wiebe.deboer@deltares.nl)).

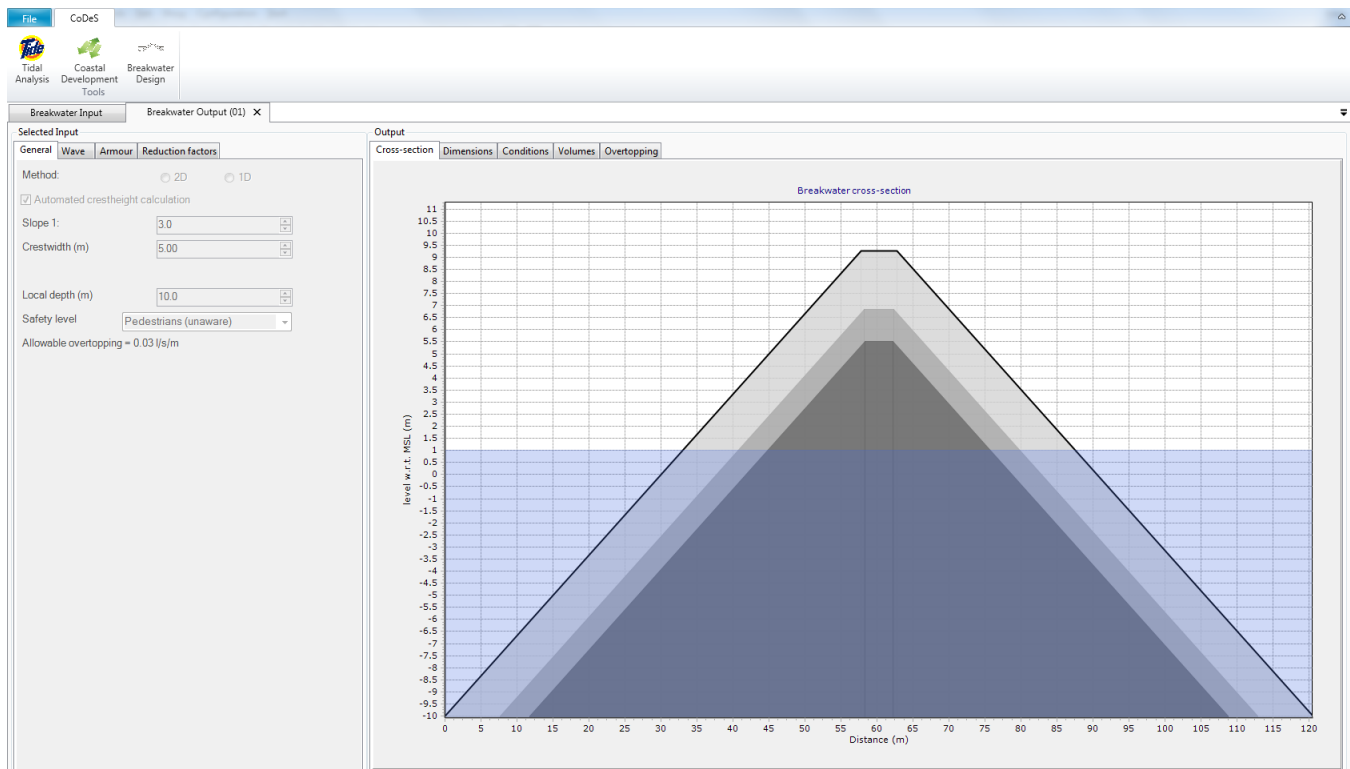


Figure 2: CoDeS tool to assist in the design of breakwaters.

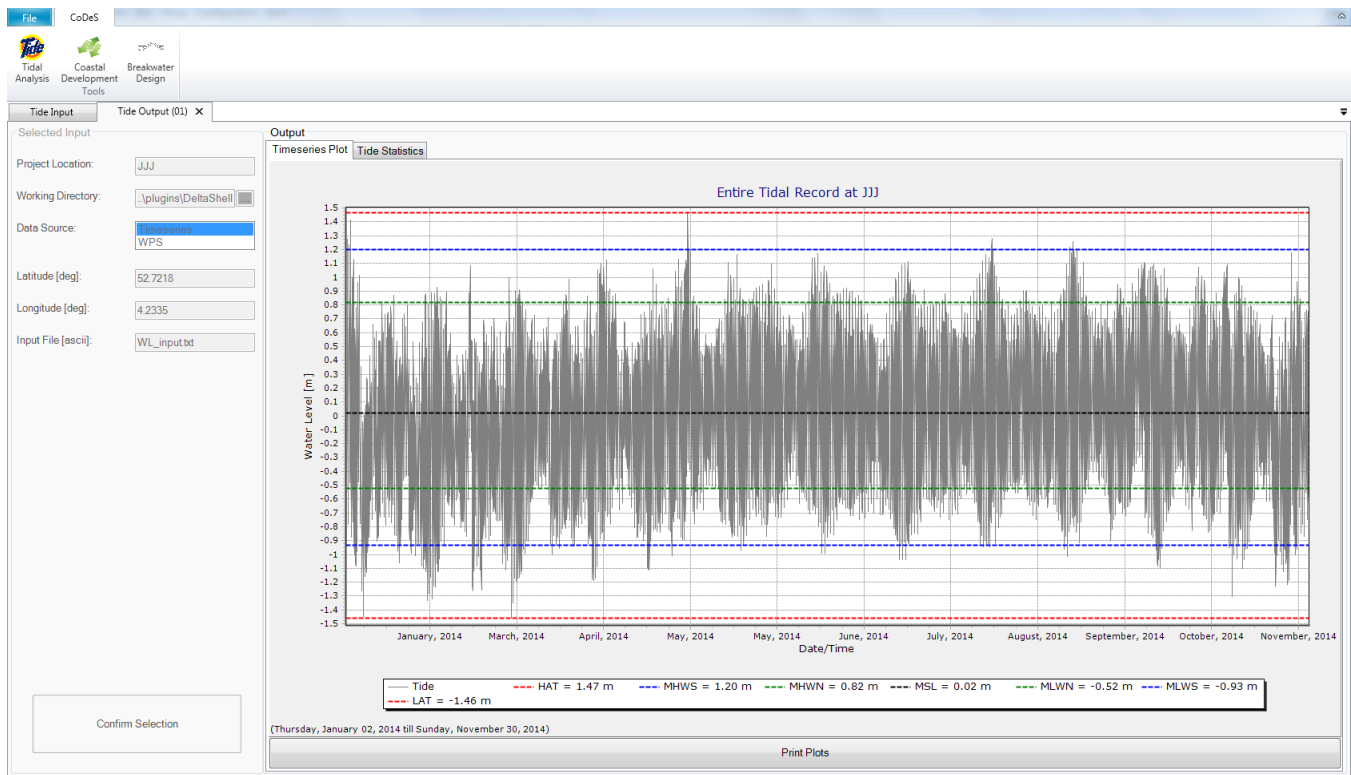


Figure 3: CoDeS tool calculating the tidal statistics at the project location.