Term Assignment

Objectives

The objective of the Term Assignment is to build a functional 2D hydrostatic hydrodynamic model (in this case using the Delft3D software suite) to enable your group to provide a preliminary assessment on the impact of proposed changes to the thermal regime in the vicinity of Jurong Island. You will evaluate these effects based on the lessons you have learnt both in the hands-on classes and the lectures.

Information

In addition to this document, the following information has been provided in IVLE:

1. Land boundary file
2. The Google KMZ files for the discharge locations in Figure 2. The actual discharge values are provided in Table 1
3. Grid, enclosure, depth, boundary, time series for boundary (these are to be used as-is)
4. Observation points, thin dam and dry point files (these are preliminary and need to be modified where applicable.

Expected and Necessary Steps

1. First add thin dams or dry points to account for changes to the land boundary in the areas highlighted in Figure 1.
2. Setup a basic 2D model for evaluating the chosen impact during the month of August 2017.
    a. For this step you will not add the discharges given in Table 1.
    b. Use the boundary conditions and time series given to you.
    c. Check that your model is converged and verify it for water level and velocity.
        i. You will be provided with time series of water level and velocity in a location to compare (i.e. you should put observation points near this point if they are not in the provided file).
        ii. You may need to adjust Manning's n within a suitable range (0.02 to 0.04)
    d. Once you are confident that your model is verified proceed to the next step.
3. Extend the model to carry out preliminary assessment of potential impact
    a. Turn on temperature and wind in the model
    b. Add discharges to the correct locations as indicated in the
    c. Choose suitable background values for averaged wind and sea surface temperature as initial conditions, model setup and at the boundaries. You can assume that your wind is constant throughout the month (check NEA website or other public sources e.g. http://www.weatheronline.co.uk/marine).
    d. Check that your model is converged / stable for temperature.

4. Evaluate and discuss your model settings and results, and your conclusions.

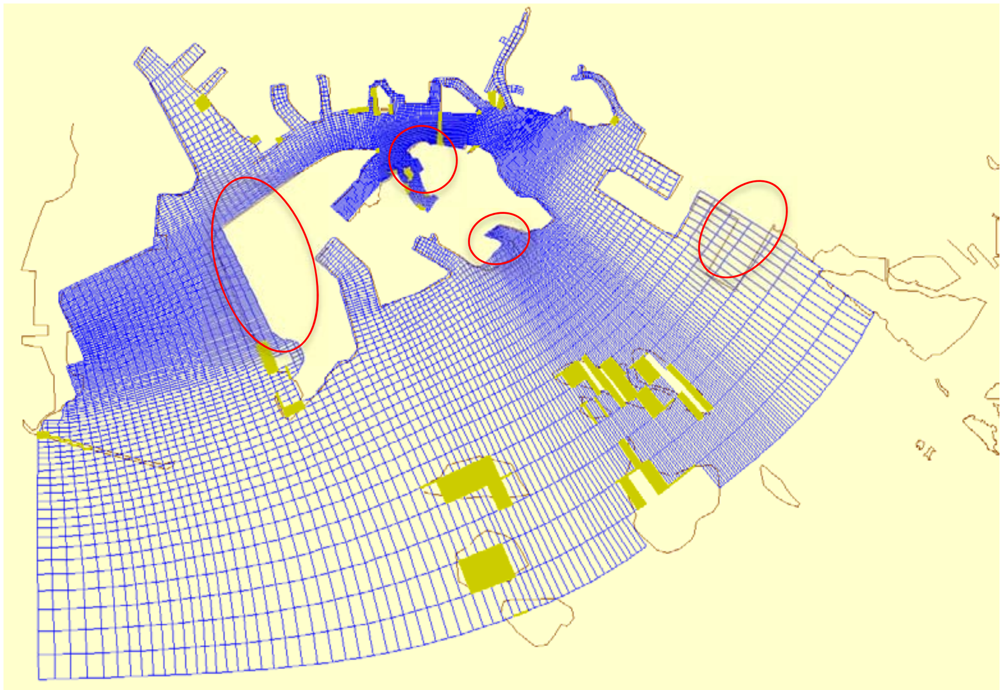

Figure 1: Existing thin dam and dry points in model grid. You are required to add the appropriate thin dams or dry points in the regions circled in red.

Assessments

You will be assessed on your report and a presentation. The assessment will focus on at least the following points:

1. Quality of setup and verification.
2. Quality of results and discussion in the report.
3. Presentation
4. Language (if necessary)

In addition you will be required to grade your team mates relative to yourself with respect to effort and expected grade i.e. if you expect an A, should your team mates get an A or less, and an explanation why. (Mandatory)

Your presentation will be on 17 November with your reports expected the Monday after before 5 pm (20 November). Presentation, report and setup files must be submitted to IVLE on 20th November.

Available Projects

Each group has to choose one project. There are five projects to choose from:

1. A new plant will be discharging water with discharge values equivalent to discharge C and M. You are required to decide which of the 2 locations, 1 or 2 is most advantageous for this purpose. All other discharges in the Table should be included. You must carry out the baseline simulation before adding this new thermal discharge at the locations 1 and 2.

2. Evaluate the impact of removing the causeway to Area A. You must carry out the baseline simulation before removing the causeway as you are evaluating the possible changes to Area A due to relocation. All discharges in the Table should be included.

3. A new plant will be located near location 8. You are required to assess the impact of this new discharge and to assess a possible location for an intake. To do this you will need to carry out a baseline simulation without discharge 8 and then carrying out a simulation with discharge 8. For discharge 8, you can use the temperature values of discharge M and 2.0x the flow rate of discharge M. All other discharges in the Table should be included. Comment on the impact of these discharges with respect to the criteria of a temperature change of 1°C, i.e. how far is this impact.

Evaluate the impact in Area B of adding a new discharge either near discharge 5 or discharge 6. This new discharge point is expected to have discharge values equal to that of discharge K. You are required to decide which of the 2 locations, 5 or 6 is most advantageous for this purpose. All other discharges in the Table should be included. You must carry out the baseline simulation before **separately** adding this new thermal discharge to the locations 5 and 6.

Table 1: Discharge points with quantity and temperature information.

Discharge Point	Quantity (m3/h)	Temperature °C
A	130,000	38.0
B	100,000	38.0
C	54,000	39.0
D	100,000	38.0
E	141,000	36.0
F	15,000	31.5
G	14,100	34.5
H	18,000	37.0
I	4,500	38.0
J	41,000	35.0
K	30,000	38.0
L	12,000	39.0
M	39,000	39.0
N	21,000	36.5
O	21,000	39.0
P	24,000	39.0
Q	9,000	37.0

Figure 2: Location of discharge points (A-Q) and some proposed locations (1,2,5,6,8).