

# Test 4 – Speed of flood propagation over an extended floodplain

## 1. Modelling performance tested

The objective of the test is to assess the package's ability to simulate the celerity of propagation of a flood wave and predict transient velocities and depths at the leading edge of the advancing flood front. It is relevant to fluvial and coastal inundation resulting from breached embankments.

## 2. Description

This test is designed to simulate the rate of flood wave propagation over a 1000m x 2000m floodplain following a defence failure, Figure (a). The floodplain surface is horizontal, at elevation 0m. One inflow boundary condition will be used, simulating the failure of an embankment by breaching or overtopping, with a peak flow of 20 m<sup>3</sup>/s and time base of ~ 6 hours. The boundary condition is applied along a 20m line in the middle of the western side of the floodplain.

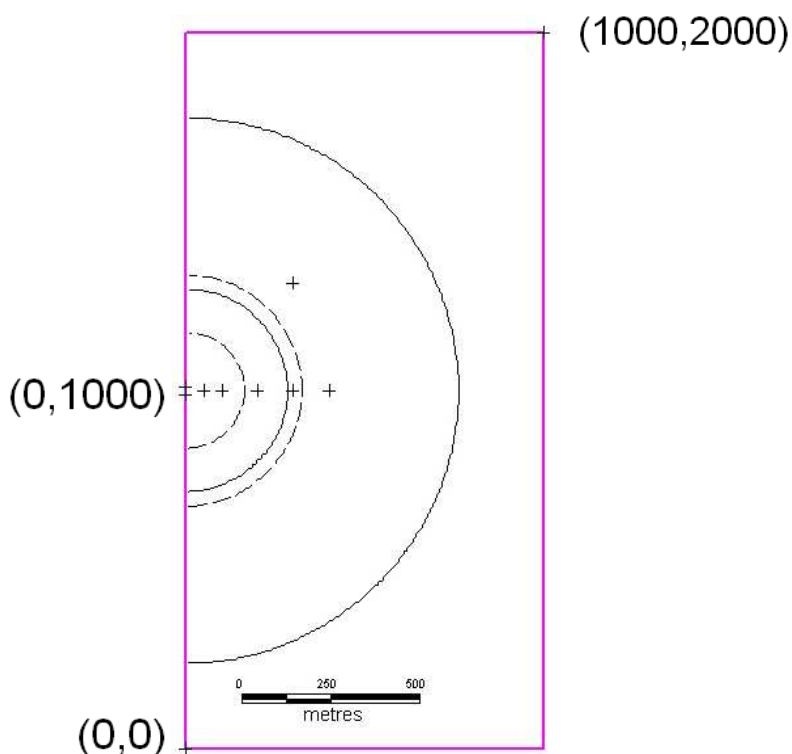


Figure (a): Modelled domain, showing the location of the 20m inflow, 6 output points, and possible 10cm and 20cm contour lines at time 1 hour (dashed) and 3 hours (solid).

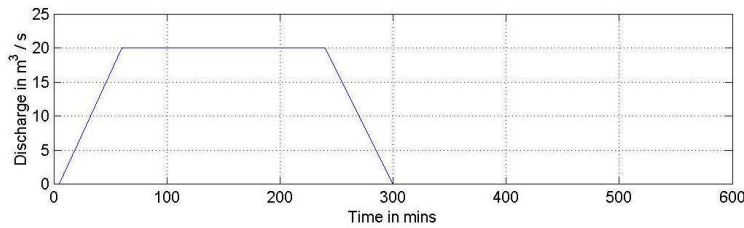


Figure (b): Hydrograph applied as inflow boundary condition

### 3. Boundary and initial conditions

Inflow boundary condition as shown in Figure (b). Table provided as part of dataset.

All other boundaries are closed.

Initial condition: Dry bed.

### 4. Parameter values

Manning's  $n$ : 0.05 (uniform)

Model grid resolution: 5m

(or ~80000 nodes in the area modelled)

Time of end: the model is to be run until time  $t = 5$  hours (if an alternative end time is used run times must be reported for  $t=5$  hours)

### 5. Required output

Software package used: version and numerical scheme.

Specification of hardware used to undertake the simulation: processor type and speed, RAM.

Minimum recommended hardware specification for a simulation of this type.

Time increment used, grid resolution (or number of nodes in area modelled) and total simulation time to specified time of end.

Raster grids (or TIN) at the model resolution consisting of:

**Depths** at times 30mins, 1 hour, 2 hours 3 hours, 4 hours.

**Velocities** (scalar) at times 30mins, 1 hour, 2 hours 3 hours, 4 hours.

Plots of **velocity** and **water elevation** versus time (suggested output frequency 20s) at the six locations represented in Figure (a) and provided as part of dataset.

## 6. Dataset content

Description	File Name
Upstream boundary condition table (inflow vs. time)	Test4BC.csv
Location of output points	Test4Output.csv

The model geometry is as specified in Section 2. No DEM is provided as the ground elevation is uniformly 0.

## 7. Additional comments

**Linear** interpolation should be used to interpolate inflow values.

Participants are asked to provide model results **at least** for the grid resolution specified above.

Model results for 1 alternative resolution or mesh may also be provided.

Participants are asked to justify their reasons for not carrying out the test, or for carrying out the test using an alternative resolution.