Test 5 – Valley flooding

1. Modelling performance tested

This tests a package's capability to simulate major flood inundation and predict flood hazard arising from dam failure (peak levels, velocities, and travel times).

2. Description

This test is designed to simulate flood wave propagation down a river valley following the failure of a dam. The valley DEM is ~0.8km by ~17km and the valley slopes downstream on a slope of ~0.01 in its upper region, easing to ~0.001 in its lower region. The inflow hydrograph applied as a boundary condition along a ~260m long line at the upstream end is designed to account for a typical failure of a small embankment dam and to ensure that both super-critical and sub-critical flows will occur in different parts of the flow field, see Figure (b). The model is run until time T = 30 hours to allow the flood to settle in the lower parts of the valley.

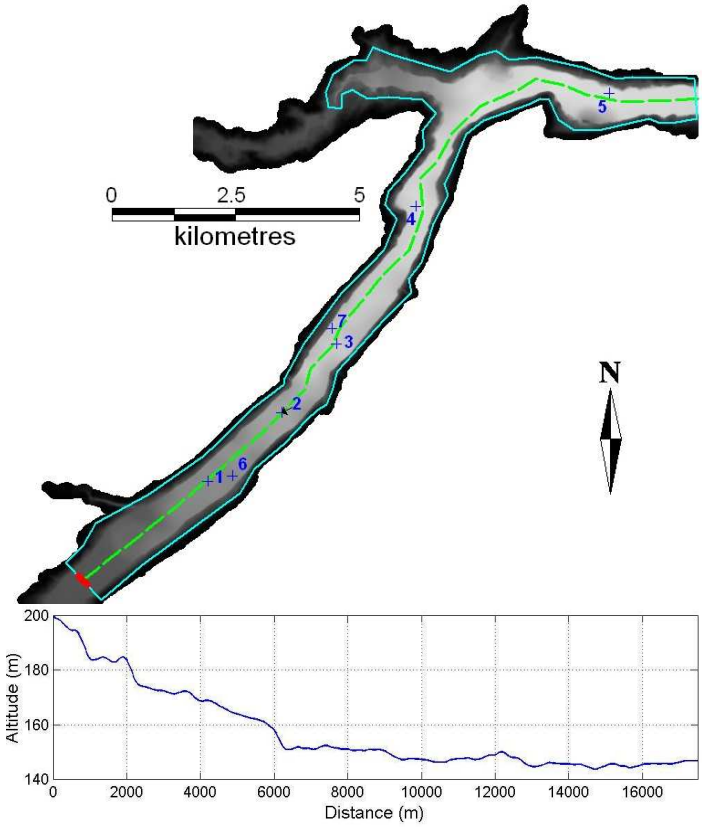

Figure (a): DEM used, with cross-section along the centre line, and location of the output points. The red line indicates the location of the boundary condition and the blue polygon is the modelled area.

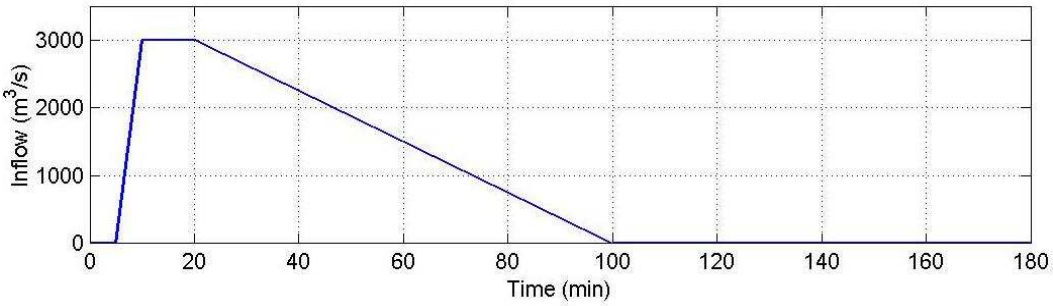

Figure (b): Inflow hydrograph applied in Test 5.

3. Boundary and initial conditions

Inflow boundary condition along the dashed red line in Figure (a). Table provided as part of dataset.

All other boundaries are closed.

Initial condition: Dry bed.

4. Parameter values

Manning's n: 0.04 (uniform)

Model grid resolution: 50m

(or ~7600 nodes in the 19.02 km^2 area modelled)

Time of end: the model is to be run until time t = 30 hours (if an alternative end time is used run times must be reported for t=30 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:

a. Peak **water level elevations** reached during the simulation
b. Peak water **depths** reached during the simulation
c. Peak **velocities** (scalar) reached during the simulation

Water level versus time (suggested output frequency 60s), at seven locations as shown in Figure (a) and provided as part of the dataset.

Velocity versus time (suggested output frequency 60s), at seven locations as shown in Figure (a) and provided as part of the dataset.

6. Dataset content

Description	File Name
Georeferenced Raster ASCII DEM at resolution 10m	Test5DEM.asc
Upstream boundary condition table (inflow vs. time)	Test5BC.csv
Outline of modelled area (shapefiles)	Test5ActiveArea_region
Location of upstream boundary condition (shapefile)	Test5BC_polyline
Location of upstream boundary condition (backup text file)	Test5BC_backup.txt
Location of output points	Test5Output.csv

7. Additional comments

The test can be set-up without access to the 2 shapefiles provided in case participants are unable to use these.

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 one 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.