Flood Modeller Pro

Flood mapping for the Grand River watershed, Southern Ontario, Canada

A fluvial flood mapping study for the Grand River watershed, Southern Ontario, Canada was carried out using the Flood Modeller 2D solvers. The primary aim of the study was to produce fluvial flood outlines and flood depths that can provide a better understanding of flood risk and property damages.

A data review was undertaken to assess what elevation and hydrometric data existed within the watershed, from which the hydraulic and hydrologic models could be built. It was found that a comprehensive hydrometric network and historical rainfall and flow datasets existed.

Elevation data available consisted of small areas of high resolution (1m horizontal) LiDAR data, and full coverage of lower resolution (10m horizontal) DTM.

An analysis of this hydrometric data was undertaken to derive design flow estimates. Flow predictions immediately upstream of the study area were based on scaled flows (based on area). Inflows were created for the 1 in 20yr, 50yr, 100yr, 200yr and 500yr storm events.

Two-dimensional flood modelling

The Flood Modeller 2D ADI solver was used to create two-dimensional hydraulic models. The underlying DTM used was a composite of the available elevation datasets. The model grid size was set at 10m by 10m, which was deemed suitable for modelling the river channel and floodplain.

Land use classification data was used to model spatial variance in floodplain roughness. A building polygon layer was used to model the presence of buildings and the preferential flow that occurs around them.

Peak design flow estimates for each sub-watershed immediately upstream of the urban area to be modelled, was input as a constant peak inflow and the model simulated until the inflow and outflows converged.

The outputs of the model provided grids of peak Depth, Water Level (above datum), Velocity and Hazard. From the model outputs, maximum flood extents for each of the modelled storm events were created.

With the predicted increase in surface water flood events, due to intense rainfall events that exceed the drainage capacity, the importance of surface water modelling was identified. This resulted in the surface water modelling of the whole watershed using our rapid 2D FAST solver.

It was also recognised that surface water modelling is only appropriate where high resolution DTM data is available and that the 2D FAST solver should provide a cost effective way of deriving this data.

Modelling outputs from our 2D solver

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With a legacy stretching back 40 years, Flood Modeller allows users to model rivers, floodplains and urban areas, using our powerful 1D and 2D solvers.