

Newton Stewart flood defence scheme, Scotland

Following extensive flooding in November 2012 and 2015, Kaya Consulting Ltd was commissioned by Dumfries and Galloway Council to undertake a detailed flood study for the towns of Newton Stewart and Minnigaff, focusing on flooding risk of urban areas from the River Cree and the lower part of the Penkiln Burn.

Adjacent to the town, the River Cree has a combined catchment of approximately 367 km² with flows monitored by a SEPA's (Scottish Environment Protection Agency) gauging station. As a result, a detailed Flood Modeller 1D-2D linked model was constructed to assess flooding. The model underwent substantial calibration with results confirming that the towns limited flood defences would be overtopped resulting in significant flooding.

Following the study, Dumfries and Galloway Council commissioned SWECO consulting engineers to take the scheme forward, including the design of the scheme and preparation of a flood order (a process required under the Flood Risk Management (Scotland) Act 2009, for local authorities to promote a flood protection scheme in their areas). Dumfries and Galloway Council retained Kaya Consulting Ltd to provide mathematical modelling support to SWECO during the process.

The model was used to consider a range of flood management options, proposed by SWECO. Over 300 model runs were carried out to assess the effectiveness of a range of mitigation options. All model results were provided to assist in the selection of the preferred option.

As part of the sensitivity testing of the proposed scheme, it was also required to assess the effect of future climate change uplifts taking into account the latest climate change predictions. This required design flows to be increased by 28% and 44% as well as increasing the water levels at the downstream



Key facts

- Software run with Flood Cloud: Flood Modeller
- Time to run 300 simulations with normal approach: 750 hours
- Time to run 300 simulations with Flood Cloud: 2.5 hours
- Time saved using Flood Cloud: 31 days of processing time
- High performance computers cost: £0
- Extra licence costs: £0
- Additional labour costs: £0

boundary which is tidally affected. As a requirement of the final economic appraisal, a full suite of model runs was required, ranging from 2 year to 1,000 year return periods.

Flood Cloud played a crucial part in the development of the options for the scheme; the model consisted of approximately +30 cross sections and over 100,000 cells within the 2D domain resulting in approximately +2.5 hours for a single run. The fact that that a high number of runs could be sent to the cloud and run concurrently without the need for an active licence arrangement, meant that the work could be efficiently undertaken without negatively affecting other projects due to loss of resources.

Kaya Consulting Ltd were also able to reduce costs and delivery time for the project which would not have been possible without the use of the Flood Cloud package.