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Sediment Transport Modelling on the River Bandon - Abstract

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Sediment Transport Modelling on the River Bandon

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Abstract:

The River Bandon is located west of Cork City in the South Western River Basin District with a catchment area of 608km². The town of Bandon, the largest urban settlement within the river catchment, has a history of flooding with significant river improvement works planned for the summers of 2015 and 2016.

A one dimensional hydrological software modelling package, HEC-RAS, has been applied to the river system as part of the overall river improvement project. The model simulates hydraulic and sediment transport conditions on the river and covers a 10.5km stretch of the river with 239 cross -sections from upstream of the town of Bandon to approximately 6.5km downstream. The model includes the river’s main tributaries (Bridewell, Millstream and Brinny) and various river structures. Calibration of the hydraulics of the model was undertaken for both in-bank and out of bank flow at the two hydrometric stations located within the model boundary. Satisfactory water level calibration was achieved by adjusting the Manning roughness coefficient to produce the lowest root mean square error for flows ranging from 148m³/sec to 330m³/sec (return periods of 2 to 100 years respectively using the L-moments approach) yielding RMSE= 0.085, E=0.993 and BE=-0.024. The hydraulic model was successfully validated using river flows for the calendar year of 2010 (with flows ranging from 2.97m³/sec to 172.6m³/sec yielding RMSE=0.066, E=0.95 and BE=-0.63). Calibration of sediment conditions in the model has involved the analysis of the field suspended sediment concentration data at a measurement sensor on the river.

Appendix A

The HEC-RAS model is being used to assess sediment transport rates and potential bed level change in the river. The model will also be applied to simulate the potential sediment transport impacts of the river improvement works on the river system.

Keywords: River Bandon, HEC-RAS, sediment transport