Midleton Flood Relief Scheme

Midleton, Co. Cork, Ireland

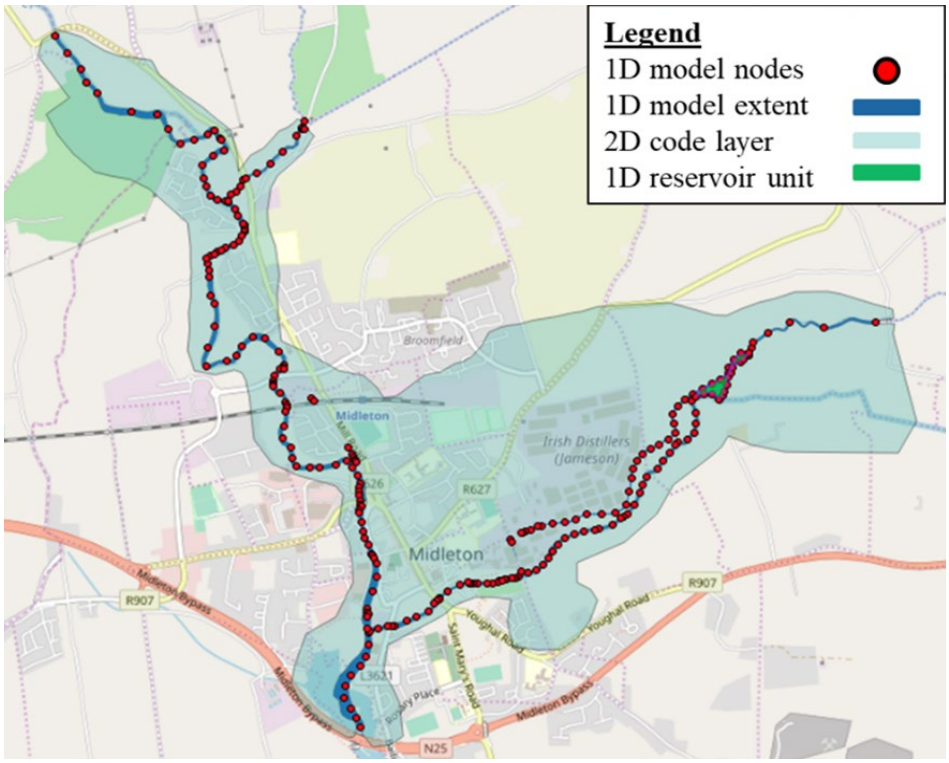
Case study

Key facts

- Flood relief scheme to defend against fluvial, tidal, pluvial and groundwater flooding.
- Fully coupled 1D/2D Flood Modeller/TUFLOW model.
- Modelling showed that large areas of the town are at risk from both fluvial and tidal flooding.
- A number of viable options were developed and subject to a detailed appraisal.

Arup was commissioned by Cork County Council to develop a flood relief scheme for Midleton, Co. Cork, to address the long history of flooding in the town. The scheme will provide flood alleviation measures that defend against fluvial, tidal, pluvial and groundwater flooding up to the target standard of protection (1% AEP Fluvial/0.5AEP Tidal).

As part of the work, Arup developed a fully coupled 1D/2D Flood Modeller/TUFLOW model of the primary watercourses in the town. The Flood Modeller model was circa. 25km in length and included over 50 structures and two complex Mill Races which run parallel to the main watercourses. The TUFLOW model covers an area of circa 7km^2 and has a 2m fixed grid resolution.

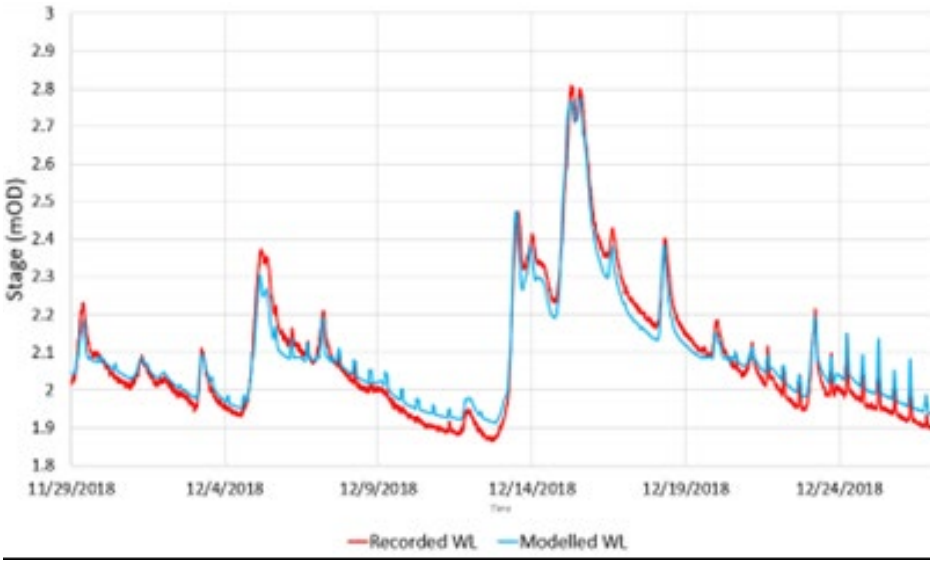


Schematic of the Midleton flood relief scheme Flood Modeller/TUFLOW model of the primary watercourses in the town.

Source: Arup

Flood Modeller by Jacobs

The coupled model was calibrated and validated against three separate high flow events of varying magnitude: two in-bank high flow events which occurred in 2018 and were measured by temporary gauges deployed in the town, and a significant out-of-bank flood event which occurred in December 2015 and affected large areas of the town. Overall, a very good match was achieved between the model and the measured and anecdotal data. This demonstrated the robustness and accuracy of the model and its ability to replicate the complex mechanisms of flooding across Midleton.



Water level calibration plot – April 2018 in-bank high flow event.
Source: Arup

Having confirmed the accuracy of the model, it was then used to define the areas at risk of flooding across the town by simulating a range of Annual Exceedance Probability (AEP) events for various climate epochs. The key conclusion from this work was that large areas of the town are at risk from both fluvial and tidal flooding. Circa 463 residential and 188 commercial properties are at risk in the combined 1% fluvial AEP / 0.5% tidal AEP event. Flood extent maps for fluvially and tidally dominated scenarios were produced to highlight all the areas at risk. Maps of the groundwater and pluvial risk were also produced.

A wide range of possible flood alleviation options were considered as part of the study. The technically viable options were modelled by reconfiguring the existing scenario model to represent each of the options which comprised of different combinations of various engineering measures, including direct defences, upstream storage, groundwater cut-offs, over pumping, conveyance improvements and flood diversion culvert.

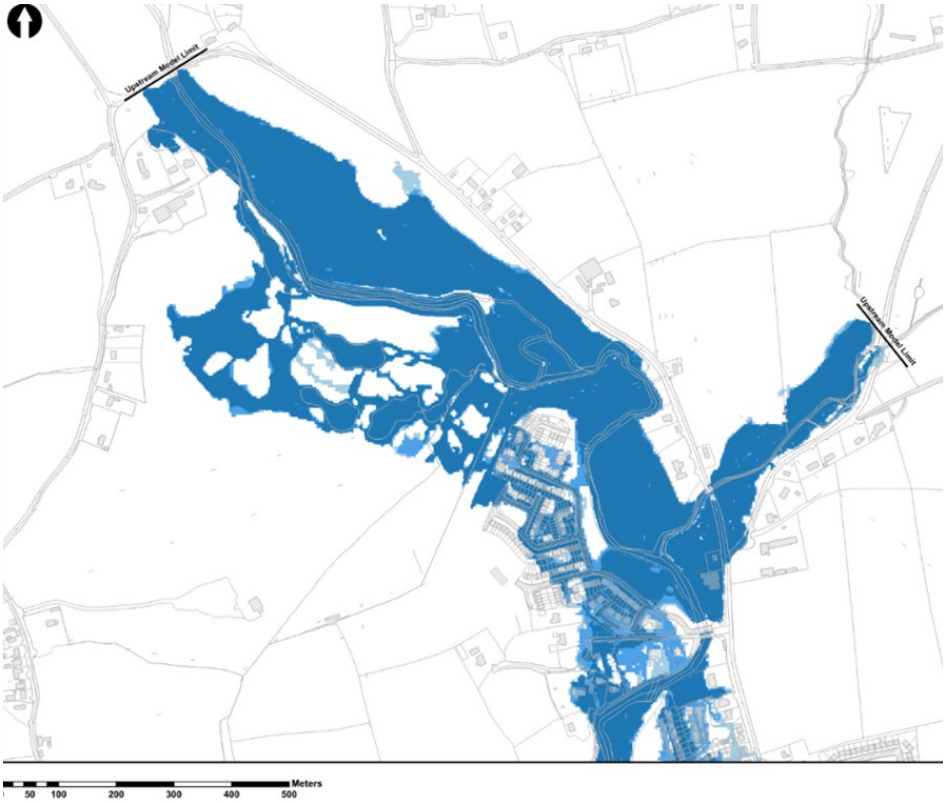
What our client say

"The mechanisms of flooding in Midleton are both varied and complex. The use of Flood Modeller and TUFLOW proved invaluable to the project and allowed flood risk to be assessed with a high degree of confidence. It also allowed the technical viability of various options to be evaluated in detail as part of the overall optioneering process by reconfiguring the existing scenario model."

Kevin Barry
Senior Engineer
Arup

ARUP

A number of viable options were developed which were subject to a detailed appraisal including (1) a multi-criteria analysis to evaluate the performance of each option in terms of predefined technical, environmental, social and economic objectives, (2) cost-benefit analysis to assess the overall monetary value of each option over the lifetime of the scheme, (3) detailed consultation with the public and landowners, (4) climate change adaptation, (5) consideration of wider client objectives and other infrastructure projects currently being developed in the area. An emerging preferred option for the scheme was selected. The preferred scheme was presented to the public at the project's third public participation day in July 2022.



Fluvial flood extent map of the northern area of the town.
Source: Arup

Contact us

sales@floodmodeller.com
www.floodmodeller.com

Flood Modeller
by Jacobs